Flood Risk Report

Tug Fork Watershed, HUC 05070201

Kentucky, Virginia, & West Virginia

**** This report identifies flood risk within Region IV and portions within Region III.***

Report Number ***01***

08/13/2014

FEMA

RiskMAP
Increasing Resilience Together

Project Area Community List

Community Name
Buchanan County - Unincorporated, Virginia*
City of Gary, West Virginia*
City of Inez, Kentucky
City of Welch, West Virginia*
City of Williamstown, West Virginia*
City of War, West Virginia*
Lawrence County - Unincorporated, Kentucky
Martin County - Unincorporated, Kentucky
McDowell County - Unincorporated, West Virginia*
Mercer County - Unincorporated, West Virginia*
Mingo County - Unincorporated, West Virginia*
Pike County - Unincorporated, Kentucky
Tazewell County - Unincorporated, Virginia*

Community Name
Wayne County - Unincorporated, West Virginia*
Town of Anawalt, West Virginia*
Town of Bradshaw, West Virginia*
Town of Davy, West Virginia*
Town of Delbarton, West Virginia*
Town of Fort Gay, West Virginia*
Town of Iaeger, West Virginia*
Town of Kermit, West Virginia*
Town of Keystone, West Virginia*
Town of Kimball, West Virginia*
Town of Matewan, West Virginia*
Town of Northfork, West Virginia*
Town of Warfield, Kentucky

* FEMA Region III communities

I. Preface

The Department of Homeland Security (DHS), Federal Emergency Management Agency's (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) program provides states, tribes, and local communities with flood risk information and tools that they can use to increase their resilience to flooding and better protect their citizens. By pairing accurate floodplain maps with risk assessment tools and planning and outreach support, Risk MAP has transformed traditional flood mapping efforts into an integrated process of identifying, assessing, communicating, planning for, and mitigating flood-related risks.

This Flood Risk Report (FRR) provides non-regulatory information to help local or tribal officials, floodplain managers, planners, emergency managers, and others better understand their flood risk, take steps to mitigate those risks, and communicate those risks to their citizens and local businesses.

Because flood risk often extends beyond community limits, the FRR provides flood risk data for the entire Flood Risk Project as well as for each individual community. This also emphasizes that flood risk reduction activities may impact areas beyond jurisdictional boundaries.

Flood risk is always changing, and there may be other studies, reports, or sources of information available that provide more comprehensive information. The FRR is not intended to be regulatory or the final authoritative source of all flood risk data in the project area. Rather, it should be used in conjunction with other data sources to provide a comprehensive picture of flood risk within the project area.

Flooding becomes a significant hazard, however, when it intersects with the built environment.

FLOOD RISK REPORT

I. Introduction

A. About Flood Risk

Floods are naturally occurring phenomena that can and do happen almost anywhere. In its most basic form, a flood is an accumulation of water over normally dry areas. Floods become hazardous to people and property when they inundate an area where development has occurred, causing losses. Mild flood losses may have little impact on people or property, such as damage to landscaping or the generation of unwanted debris. Severe flooding can destroy buildings, ruin crops, and cause critical injuries or death.

Calculating Flood Risk

It is not enough to simply identify where flooding may occur. Just because one knows where a flood occurs does not mean they know the **risk** of flooding. The most common method for determining flood risk, also referred to as vulnerability, is to identify the probability of flooding and the consequences of flooding. In other words:

> **Flood Risk** (or flood vulnerability) **= Probability x Consequences**; where
> **Probability** = the likelihood of occurrence
> **Consequences** = the estimated impacts associated with the occurrence

The probability of a flood is the likelihood that a flood will occur. Data provided herein is for 10, 4, 2, 1, and 0.2 percent annual chance events. The probability of flooding can change based on physical, environmental, and/or engineering factors. Factors affecting the probability that a flood will impact an area range from changing weather patterns to the existence of mitigation projects. The ability to assess the probability of a flood and the level of accuracy for that assessment are also influenced by modeling methodology advancements, better knowledge, and longer periods of record for the water body in question.

The consequences of a flood are the estimated impacts associated with the flood occurrence. Consequences relate to humans activities within an area and how a flood impacts the natural and built environments.

Which picture below shows more flood risk?

Even if you assume that the flood in both pictures was the same probability—let's say a 10-percent-annual-chance flood—the consequences in terms of property damage and potential injury as a result of the flood in the bottom picture are much more severe. Therefore, the flood risk in the area shown in the bottom picture is higher.

Risk Map Flood Risk Products

Through Risk MAP, FEMA provides communities with updated Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies (FISs) that focus on the probability of floods and that show where flooding may occur as well as the calculated 1% annual chance flood elevation. FEMA understands that flood risk is dynamic—that flooding does not stop at a line on a map—and as such, provides the following flood risk products:

- Flood Risk Report (FRR): The FRR presents key risk analysis data for the Flood Risk Project.

- Flood Risk Map (FRM): Like the example found in Section III. A of this document, the FRM shows a variety of flood risk information in the project area. More information about the data shown on the FRM may be found in Section II of this report.

- Flood Risk Database (FRD): The FRD houses the flood risk data developed during the course of the flood risk analysis that can be used and updated by the community. After the Flood Risk Project is complete, this data can be used in many ways to visualize and communicate flood risk within the Flood Risk Project.

Whether or not an area might flood is one consideration. The extent to which it might flood adds a necessary dimension to that understanding.

These Flood Risk Products provide flood risk information at both the Flood Risk Project level and community level (for those portions of each community within the Flood Risk Project). They demonstrate how decisions made within a Flood Risk Project can impact properties downstream, upstream, or both. Community-level information is particularly useful for mitigation planning and emergency management activities, which often occur at a jurisdictional level.

B. Uses of this Report

The goal of this report is to help inform and enable communities and tribes to take action to reduce flood risk. Possible users of this report include:

- Local elected officials
- Floodplain managers
- Community planners
- Emergency managers
- Public works officials
- Other special interests (e.g., watershed conservation groups, environmental awareness organizations, etc.)

Vulnerability of infrastructure is another important consideration.

State, local, and tribal officials can use the summary information provided in this report, in conjunction with the data in the FRD, to:

- **Update local hazard mitigation plans.** As required by the 2000 Federal Stafford Act, local hazard mitigation plans must be updated at least every five (5) years. Summary information presented in Section III of this report and the FRM can be used to identify areas that may need additional focus when updating the risk assessment section of a local hazard mitigation plan. Information found in Section IV pertains to the different mitigation

techniques and programs and can be used to inform decisions related to the mitigation strategy of local plans.

- **Update community comprehensive plans.** Planners can use flood risk information in the development and/or update of comprehensive plans, future land use maps, and zoning regulations. For example, zoning codes may be changed to better provide for appropriate land uses in high-hazard areas.
- **Update emergency operations and response plans.** Emergency managers can identify low-risk areas for potential evacuation and sheltering and can help first responders avoid areas of high-depth flood water. Risk assessment results may reveal vulnerable areas, facilities, and infrastructure for which planning for continuity of operations plans (COOP), continuity of government (COG) plans, and emergency operations plans (EOP) would be essential.
- **Develop hazard mitigation projects.** Local officials (e.g., planners and public works officials) can use flood risk information to re-evaluate and prioritize mitigation actions in local hazard mitigation plans.
- **Communicate flood risk.** Local officials can use the information in this report to communicate with property owners, business owners, and other citizens about flood risks, changes since the last FIRM, and areas of mitigation interest. The report layout allows community information to be extracted in a fact sheet format.
- **Inform the modification of development standards.** Floodplain managers, planners, and public works officials can use information in this report to support the adjustment of development standards for certain locations. For example, heavily developed areas tend to increase floodwater runoff because paved surfaces cannot absorb water, indicating a need to adopt or revise standards that provide for appropriate stormwater retention.

Flooding along the Wabash River in Clark County, Illinois, contributed to a federal disaster declaration on June 24, 2008.

The flood risk products provided under Risk MAP are “non-regulatory” products. “Non-regulatory” products are available and intended for community use, but are neither mandatory nor tied to the regulatory development and insurance requirements of the National Flood Insurance Program (NFIP). They may be used as regulatory products by communities if authorized by state and local enabling authorities.

1. Sources of Risk Assessment Data Used

To assess potential community losses, or the consequences portion of the “risk” equation, the following data has been collected for analysis and inclusion in the Tug Fork Flood Risk Project:

- Information about local assets or resources at risk of flooding
- Information about the physical features and human activities that contribute to that risk

- Information about where the risk is most severe

For the Tug Fork Flood Risk Project, FEMA used the following sources of flood risk information to develop this report:

- Hazus-estimated flood loss information
- New engineering analyses (e.g., hydrology and hydraulics modeling) to develop new flood boundaries
- Locally supplied data (see Section VII for a description)
- Sources identified during the Discovery process

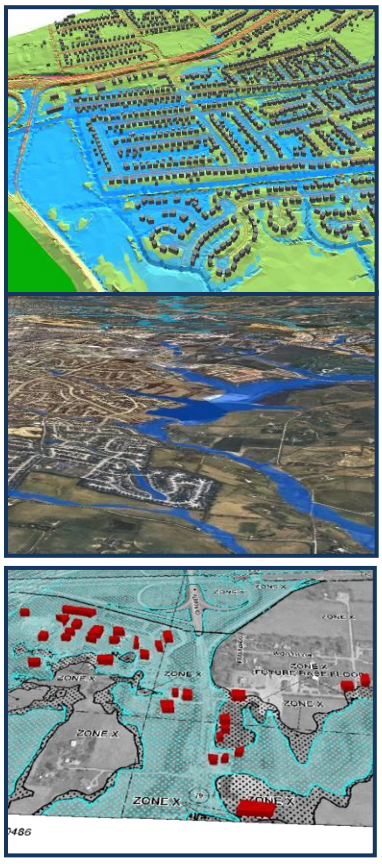
2. Related Resources

For a more comprehensive picture of flood risk, FEMA recommends that state and local officials use the information provided in this report in conjunction with other sources of flood risk data, such as those listed below.

- **FIRMs and FISs.** This information indicates areas with specific flood hazards by identifying the limit and extent of the 1-percent-annual-chance floodplain and the 0.2-percent-annual-chance floodplain. FIRMs and FIS Reports do not identify all floodplains in a Flood Risk Project. The FIS Report includes summary information regarding other frequencies of flooding, as well as flood profiles for riverine sources of flooding. In rural areas and areas for which flood hazard data are not available, the 1-percent-annual-chance floodplain may not be identified. In addition, the 1-percent-annual-chance floodplain may not be identified for flooding sources with very small drainage areas (less than 1 square mile).

- **Flood or multi-hazard mitigation plans.** Local hazard mitigation plans include risk assessments that contain flood risk information and mitigation strategies that identify community priorities and actions to reduce flood risk. This report was informed by any existing mitigation plans in the Flood Risk Project.

- **Hazus Flood Risk Assessment Reports.** Hazus is a nationally applicable standardized methodology that contains models for estimating potential losses from floods. Hazus was used to generate reports on potential flood damage that can occur based on new/proposed mitigation projects or future development patterns and practices. Hazus can also run specialized risk assessments, such as what happens when a dam or levee fails. Flood risk assessment tools are available through other agencies as well, including the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Army Corps of Engineers (USACE). Other existing watershed reports may have a different focus, such as water quality, but may also contain flood risk and risk assessment information. Available at: www.fema.gov/hazus

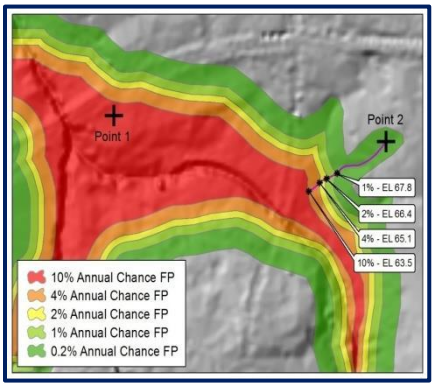


FEMA data can be leveraged to identify and measure vulnerability by including local building information (i.e. building type). The examples above show various ways to display flooding intersecting with buildings.

- **Map Service Center.** The FEMA Flood Map Service Center (MSC) is the official public source for flood hazard information produced in support of the National Flood Insurance Program (NFIP). Use the MSC to find official flood maps, access a range of other flood hazard products, and take advantage of tools for better understanding of your community's flood risk. https://msc.fema.gov/portal

Flooding impacts non-populated areas too, such as agricultural lands and wildlife habitats.

State and Local Hazard Mitigation Plans are required to have a comprehensive all-hazard risk assessment. The flood risk analyses in the FRR, FRM, and FRD can inform the flood hazard portion of a community's or state's risk assessment. Further, data in the FRD can be used to develop information that meets the requirements for risk assessments as it relates to the hazard of flood in hazard mitigation plans.



II. Risk Analysis

A. Overview

Flood hazard identification develops FIRMs and FIS Reports to identify where flooding can occur along with probability and depth of that flooding. Flood risk assessment is the systematic approach to identifying how flooding impacts the environment. In hazard mitigation planning, flood risk assessments serve as the basis for mitigation strategies and actions by defining the hazard and enabling informed decision making. Fully assessing flood risk requires the following:

- Identifying the flooding source and determining the flood hazard occurrence probability
- Developing a complete profile of the flood hazard including historical occurrence and previous impacts
- Inventorying assets located in the identified flood hazard area
- Estimating potential future flood losses caused by exposure to the flood hazard area

Flood risk analyses are different methods used in flood risk assessment to help quantify and communicate flood risk. Flood risk analysis can be performed on a large scale (state, community) level and on a very small scale (parcel, census block). Advantages of large-scale flood risk analysis, especially at the watershed level, include identifying how actions and development in one community can affect areas up- and downstream. On the parcel or census block level, flood risk analysis can provide actionable data to individual property owners so they can take appropriate mitigation steps.

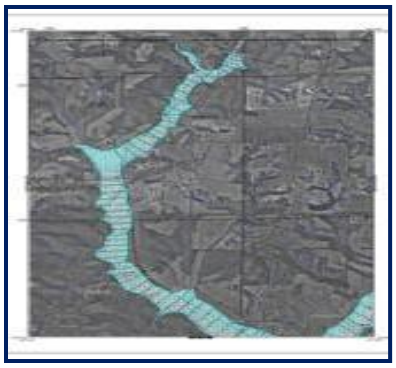
B. Analysis of Risk

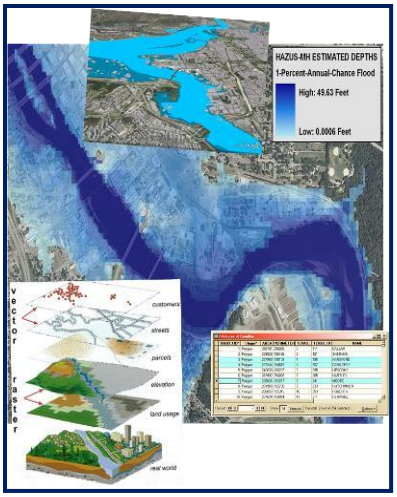
The FRR, FRM, and FRD contain a variety of flood risk analysis information to help describe and visualize flood risk within the project area. This study includes the following analysis elements:

- Changes Since Last FIRM
- Water Surface, Flood Depth, and Analysis Grids
- Flood Risk Assessment Information
- Areas of Mitigation Interest

1. Changes Since Last FIRM

The Changes Since Last FIRM (CSLF) dataset, stored in the FRD and shown in Section III of this report, illustrates where changes to flood risk may have occurred since the last FIRM was published for the subject area. Communities





CSLF data can be used to communicate changes in the physical flood hazard area (size, location) as part of the release of new FIRMS. It can also be used in the development or update of hazard mitigation plans to describe changes in hazard as part of the hazard profile.

CSLF data is shown in the FRR, and underlying data is stored in the FRD.

Grid data can make flood mapping more informative. The top image is a flood depth grid showing relative depths of water in a scenario flood event. The bottom image is a percent annual chance of flooding grid, which shows inundation areas of various frequency floods.

can use this information to update their mitigation plans, specifically quantifying "what is at risk" and identifying possible mitigation activities.
The CSLF dataset identifies changes in the Special Flood Hazard Area (SFHA) and floodway boundary changes since the previous FIRM was developed. These datasets quantify land area increases and decreases to the SFHA and floodway, as well as areas where the flood zone designation has changed (e.g., Zone A to AE, AE to VE, shaded Zone X protected by levee to AE for de-accredited levees).

The CSLF dataset is created in areas that were previously mapped using digital FIRMs. The CSLF dataset for this project area includes:

- Floodplain and/or Floodway Boundary Changes: Any changes to the existing floodplain or floodway boundaries are depicted in this dataset
- Floodplain Designation Changes: This includes changed floodplain designations (e.g., Zone A to Zone AE).

  It should be noted that CSLF Change information (also known as Contributing Engineering Factors) will only be identified in cases where the factor reflects a change since the last FIRM was published. Within the scope of a typical Flood Risk Project, there will always be limitations on identifying factors contributing to the floodplain change. As such, the intent of this dataset is to provide a general sense of why the floodplain has changed, rather than to explain the reason for each and every change.

2. Flood Depth and Analysis Grids

Grids are FEMA datasets provided in the FRD to better describe the risk of the flood hazard. While the FIRM and FIS Report describe "what" is at risk by identifying the hazard areas, water surface, flood depth, and analysis grids can help define "how bad" the risk is within those identified areas. These grids are intended to be used by communities for additional analysis, enhanced visualization, and communication of flood risks for hazard mitigation planning and emergency management. Grids provided in the FRD for this project area include the following:

- **Flood Depth Grids:** Flood Depth Grids were created for five flood frequencies (10-, 4-, 2-, 1-, and 0.2-percent-annual-chance) for all new studies calculated during the course of a Flood Risk Project. Depth Grids were not created for studies incorporated from the existing regulatory studies that were determined to be valid through FEMA's Coordinated Needs Management Strategy (CNMS). These grids communicate flood depth as a function of the difference between the calculated water surface elevation and the ground.

  Depth grids form the basis for refined Hazus loss estimates (as presented in a table in Section III of this report) and are used to calculate potential flood losses for display on the FRM and for tabular presentation in this report.

Grid data can be used to communicate the variability of floodplains, such as where floodplains are particularly deep or hazardous, where residual risks lie behind levees, and where losses may be great after a flood event. For mitigation planning, grid data can inform the hazard profile and vulnerability analysis (what is at risk for different frequencies) and can be used for preliminary benefit-cost analysis screening. For floodplain management, higher regulatory standards can be developed in higher hazard flood prone areas (i.e., 10-percent-chance floodplains or deep floodplains).

Grid data is stored in the FRD, and a list of available grid data is provided in the FRR. Visualizations of grids (maps) are not provided.

Depth grids may also be used for a variety of ad-hoc risk visualization and mitigation initiatives.

- **Percent Annual Chance of Flooding Grid:** This is a grid dataset that represents the percent annual chance of flooding for locations along a flooding source. This grid uses the five standard flood frequencies and shows the probabilities across those grids to highlight highest risk areas.
- **Percent Chance of Flooding in a 30-Year Period Grid:** This is a grid dataset that represents the estimated likelihood of flooding at least once within a 30-year period, which is the average lifespan for a home mortgage, for all locations studied within the extent of the 1-percent-annual-chance and 0.2-percent-annual-chance floodplain.

3. Flood Risk Assessment Information

Flood loss estimates provided in the FRR were developed using a FEMA flood risk assessment tool, Hazus. Originally developed for earthquake risk assessment, Hazus has evolved into a multi-hazard tool developed and distributed by FEMA that can provide risk assessment information for floods, earthquakes, and hurricane winds. Hazus is a nationally accepted, consistent flood risk assessment tool to assist individuals and communities to create a more accurate picture of flood risk. Some benefits of using Hazus include the following:

- Outputs that can enhance state and local mitigation plans and help screen for cost-effectiveness in FEMA mitigation grant programs
- Analysis refinement through updating inventory data and integrating data produced using other flood models
- Widely available support documents and networks (Hazus Users Groups)

Hazus is a loss estimation methodology developed by FEMA for flood, wind, and earthquake hazards. The methodology and data established by Hazus can also be used to study other

Files from the FRD can be imported into Hazus to develop other risk assessment information including:

- Debris generated after a flood event
- Dollar exposure of the agricultural products in a study region
- Utility system exposure in the region
- Vehicle exposure in the study region
- Damages and functionality of lifelines such as highway and rail bridges, potable water, and wastewater facilities

Scenario-Based Flood Loss Estimates:

Flood losses are normally calculated using Hazus for the 10-, 4-, 2-, 1-, and 0.2-percent-annual-chance flood events using the updated depth grids developed in this study. In this report, losses associated with these frequency flood events (or alternate frequencies if warranted) are expressed in dollar amounts and are provided for the Flood Risk Project area only, even though results are shown for the entire watershed and at the local jurisdiction level. Loss data was not

available for all areas within the watershed study. In this case, watershed-wide loss data was produced as an average represented on the Flood Risk Map. Loss Estimate information is provided in the flood risk database, when available.

Loss estimates are based on best available data, and the methodologies applied result in an approximation of risk. These estimates should be used to understand relative risk from flood and potential losses. Uncertainties are inherent in any loss estimation methodology, arising in part from approximations and simplifications that are necessary for a comprehensive analysis (e.g., incomplete inventories, demographics, or economic parameters). Flood loss estimates are being provided at the project and community levels for multiple flood frequencies including:

Hazus-estimated loss data can be used in many ways to support local decision making and explanation of flood risk. For mitigation planning purposes, loss data can be used to help meet requirements to develop loss information for the hazard of flood. Also, the FRM can show where flood risk varies by geographic location. For emergency management, Hazus data can help forecast losses based on predicted events, and resources can be assigned accordingly. Loss information can support floodplain management efforts, including those to adopt higher regulatory standards. *Also, awareness of exposed essential facilities and infrastructure encourages mitigation actions to protect citizens from service disruption should flooding occur.*

Hazus estimated loss data is summarized in the FRR and on the FRM and stored in the FRD.

- **Residential Asset Loss**: These include direct building losses (estimated costs to repair or replace the damage caused to the building) for all classes of residential structures including single family, multi-family, manufactured housing, group housing, and nursing homes. This value also includes content losses.
- **Commercial Asset Loss**: These include direct building losses for all classes of commercial buildings including retail, wholesale, repair, professional services, banks, hospitals, entertainment, and parking facilities. This value also includes content and inventory losses.
- **Other Asset Loss**: This includes losses for facilities categorized as industrial, agricultural, religious, government, and educational. This value also includes content and inventory losses.
- **Essential Facility Losses:** Essential facilities are defined in Hazus as facilities which provide services to the community and should be functional after a flood, including schools, police stations, fire stations, medical facilities, and emergency operation centers. These facilities would otherwise be considered critical facilities for mitigation planning purposes. Estimated damages (in terms of loss of function) for essential facilities are determined on a site-specific basis according to latitude and longitude. For this report, Hazus calculates the types and numbers of essential facilities impacted.
- **Infrastructure:** For analysis of infrastructure, Hazus supports the analysis of transportation systems and lifeline utility systems. Transportation systems include highways, railways, light railways, busses, ports and harbors, ferries, and airport systems. Utility systems include potable water systems, wastewater, oil, natural gas, electric power, and communication systems. For this report, Hazus calculates the types of infrastructure impacted.
- **Business Disruption**: This includes the losses associated with the inability to operate a business due to the damage sustained during the flood. Losses include inventory, income, rental income, wage, and direct output losses, as well as relocation costs.
- **Annualized Losses**: Annualized losses are calculated using Hazus by taking losses from multiple events over different frequencies and expressing the

long-term average by year. This analysis factors in historic patterns of frequent smaller floods with infrequent but larger events to provide a balanced presentation of flood damage.

- **Loss Ratio:** The loss ratio expresses the scenario losses divided by the total building value for a local jurisdiction and can be a gage to determine overall community resilience as a result of a scenario event. For example, a loss ratio of 5 percent for a given scenario would indicate that a local jurisdiction would be more resilient and recover more easily from a given event, versus a loss ratio of 75 percent which would indicate widespread losses. An annualized loss ratio uses the annualized loss data as a basis for computing the ratio. Loss ratios are not computed for business disruption. These data are presented in the FRR.
- **Hazus Flood Risk Value:** On the FRM, flood risk is expressed in the following five categories: very low, low, medium, high, and very high for census blocks that have flood risk. It is based on the 1-percent-annual-chance total asset loss by census block.

4. Areas of Mitigation Interest

Many factors contribute to flooding and flood losses. Some are natural, and some are caused by human activity. In response to these risks, there has been a focus by the federal government, state agencies, and local jurisdictions to mitigate properties against the impacts of flood hazards so that future losses and impacts can be reduced, thereby reducing the associated flood risk. Identification of Areas of Mitigation Interest (AoMIs) by local stakeholders is an important element for a community to lower its flood risk. AoMIs are beneficial in raising awareness of potential flood risk mitigation opportunities (including specific flood risk mitigation projects), encouraging local collaboration, and communicating how various mitigation activities can successfully reduce flood risk.

Dams vary in size and shape, the amount of water they impound, and their assigned hazard classification.

For some Flood Risk Projects, a formal AoMI dataset has been created in direct collaboration with local stakeholders as well as by leveraging revised hydrologic and hydraulic and/or coastal analyses; previous flood studies; community mitigation plans; floodplain management plans; local surveys; and existing federal government databases (e.g., flood claims, disaster grants, and data from other agencies). When this occurs, this report, the Flood Risk Map, and the Flood Risk Database will include information focusing on the areas and issues that may be contributing (positively or negatively) to flood risks in the subject watershed or project area. Regardless of whether or not an AoMI dataset is included as a part of this Flood Risk Project, local stakeholders are encouraged to collaborate, using the same methods outlined above, to identify areas that have flood risk mitigation potential. Below is a list of the types of Areas of Mitigation Interest that may be determined, and that will be included in later sections of this Flood Risk Report, shown on the Flood Risk Map, and stored in the Flood Risk Database:

- **Dams**

  A dam is a barrier built across a waterway for impounding water. Dams vary from impoundments that are hundreds of feet tall and contain thousands of acre-feet of water (e.g., Hoover Dam) to small dams that are a few feet high and contain only a few acre-feet of water (e.g., small residential pond). “Dry dams,” which are designed to contain water only during floods and do not impound water except for the purposes of flood control, include otherwise dry land behind the dam.

  While most modern, large dams are highly engineered structures with components such as impervious cores and emergency spillways, most smaller and older dams are not. State dam safety programs emerged in the 1960s, and the first Federal Guidelines for Dam Safety were not prepared until 1979. By this time, the vast majority of dams in the United States had already been constructed.

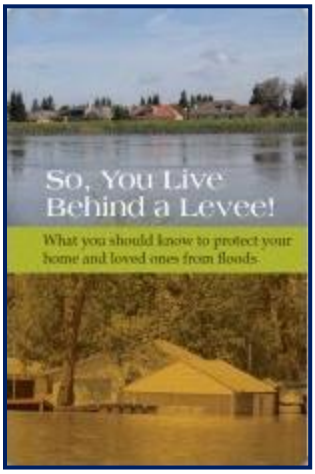
  - **Reasons why dams may be considered AoMIs:**

    - Many older dams were not built to any particular standard and thus may not withstand extreme rainfall events. Older dams in some parts of the country are made out of an assortment of materials. These structures may not have any capacity to release water and could be overtopped, which could result in catastrophic failure.
    - Even dams that follow current dam safety programs may not be regulated, as downstream risk may have changed since the dam was constructed. Years after a dam is built, a house, subdivision, or other development may be constructed in the area downstream of the dam. Thus, a subsequent dam failure could result in damage. Since these dams are not regulated, it is impossible to predict how safe they are.
    - A significant dam failure risk is structural deficiencies associated with older dams that are not being adequately addressed today through needed inspection/maintenance practices.
    - For larger dams a flood easement may have been obtained on a property. However, there may have been buildings constructed in violation of the flood easement.
    - When a new dam is constructed, the placement of such a large volume of material in a floodplain area (if that is the dam location) will displace flood waters and can alter how the watercourse flows. This can result in flooding upstream, downstream, or both.

This dam failure caused flooding that damaged several homes and vehicles.

- For many dams, the dam failure inundation zone is not known. Not having knowledge of these risk areas could lead to unprotected development in these zones.

- **Levees and Major Embankments**



For more information about the risks associated with living behind levees, consult the publication "So, You Live Behind a Levee!" published by the American Society of Civil Engineers at http://content.asce.org/ASCELeveeGuide.html.

FEMA defines a levee as "a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding." Levees are sometimes referred to as dikes. Soil used to construct a levee is compacted to make the levee as strong and stable as possible. To protect against erosion and scouring, levees can be covered with everything from grass and gravel to harder surfaces like stone (riprap), asphalt, or concrete.

Similar to dams, levees have not been regulated in terms of safety and design standards until relatively recently. Many older levees were constructed in a variety of ways, from a farmer piling dirt along a stream to prevent nuisance flooding to levees made out of old mining spoil material. As engineered structures, levees are designed to a certain height and can fail if a flood event is greater than anticipated.

A floodwall is a vertical wall that is built to provide protection from a flood in a similar manner as a levee. Typically made of concrete or steel, floodwalls often are erected in urban locations where there is not enough room for a levee. Floodwalls are sometimes constructed on a levee crown to increase the levee's height.

Most new dams and levees are engineered to a certain design standard. If that design is exceeded, they could be overtopped and fail catastrophically, causing more damage than if the levee was not there in the first place. Few levees anywhere in the nation are built to more than a 1-percent-annual-chance flood protection rating, and the areas behind them are still at some risk for flooding. This threat is called residual risk. In some states, residual risk areas can extend up to 15 miles from a riverbank. Although the probability of flooding may be lower because a levee exists, risk is nonetheless still present. The American Society of Civil Engineers' publication "So, You Live Behind a Levee!" provides an in-depth explanation of levee and residual risk.

Major embankments, on the other hand, are rarely designed with any flood protection level in mind. Railroads, road abutments, and canals—especially in the Western United States—are not considered levees or dams and have issues such as unknown construction materials/methods. These embankments are not regulated from a flood risk standpoint.

Canal levee breaches as a result of Hurricane Katrina in New Orleans in 2005. Note damages can be more extensive due to high velocity flood flows than if the levee was not there.

- **Reasons why levees and major embankments may be considered AoMIs:**
  - Like dams, many levees in the United States were constructed using unknown techniques and materials. These levees have a higher failure rate than those that have been designed to today's standards.
  - A levee might not provide the flood risk reduction it once did as a result of flood risk changes over time. Flood risk can change due to a number of factors, including increased flood levels due to climate change or better estimates of flooding, development in the watershed increasing flood levels and settlement of the levee or floodwall, and sedimentation in the levee channel. Increased flood levels mean decreased flood protection. The lack of adequate maintenance over time will also reduce the capability of a levee to contain the flood levels for which it was originally designed.
  - Given enough time, any levee will eventually be overtopped or damaged by a flood that exceeds the levee's capacity. Still, a widespread public perception of levees is that they will always provide protection. This perception may lead to not taking mitigation actions such as purchasing flood insurance.
  - A levee is a system that can fail due to its weakest point, and therefore maintenance is critical. Many levees in the United States are poorly maintained or not maintained at all. Maintenance also includes maintaining the drainage systems behind the levees so they can keep the protected area dry.

- **Stream Flow Constrictions**

  A stream flow constriction occurs when a human-made structure, such as a culvert or bridge, constricts the flow of a river or stream. The results of this constriction can be increased damage potential to the structure, an increase in velocity of flow through the structure, and the creation of significant ponding or backwater upstream of the structure. Regulatory standards regarding the proper opening size for a structure spanning a river or stream are not consistent and may be non-existent. Some local regulations require structures to pass a volume of water that corresponds to a certain size rain event; however, under sizing, these openings can result in flood damage to the structure itself. After a large flood event, it is not uncommon to have numerous bridges and culverts "washed out."

  - **Reasons why stream flow constrictions are considered AoMIs:**
    - Stream flow constrictions can back water up on property upstream of the structure if not designed properly.

- These structures can accelerate the flow through the structure causing downstream erosion if not properly mitigated. This erosion can affect the structure itself, causing undermining and failure.
- If the constriction is a bridge or culvert, it can get washed out causing an area to become isolated and potentially more difficult to evacuate.
- Washed-out culverts and associated debris can wash downstream and cause additional constrictions.

Clusters of past flood insurance claims can show where there is a repetitive flood problem.

- **At-risk Essential Facilities**

  Essential facilities, sometimes called "critical facilities," are those whose impairment during a flood could cause significant problems to individuals or communities. For example, when a community's wastewater treatment is flooded and shut down, not only do contaminants escape and flow into the floodwaters, but backflows of sewage can contaminate basements or other areas of the community. Similarly, when a facility such as a hospital is flooded, it can result in a significant hardship on the community not only during the event but long afterwards as well.

  - **Reasons why at-risk essential facilities may be considered AoMIs:**
    - Costly and specialized equipment may be damaged and need to be replaced.
    - Impairments to facilities such as fire stations may result in lengthy delays in responding and a focus on evacuating the facility itself.
    - Critical records and information stored at these facilities may be lost.

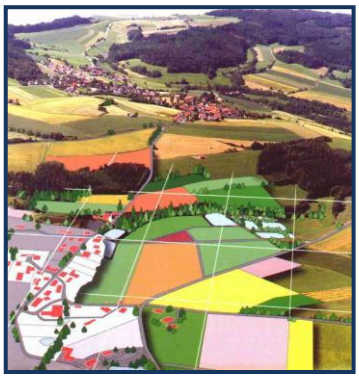
- **Past Flood Insurance Claims and Individual Assistance/Public Assistance Hotspots**

  Assistance provided after flood events (flood insurance in any event and Individual Assistance [IA] or Public Assistance [PA] after declared disasters) occurs in flood affected areas. Understanding geographically where this assistance is being provided may indicate unique flood problems. This type of data is privacy-protected and for local use only and is not to be disseminated to general public or media.

  Flood insurance claims are not always equally distributed in a community. Although estimates indicate that 20 to 50 percent of structures in identified flood hazard areas have flood insurance, clusters of past claims may indicate where there is a flood problem. However, clusters of past claims and/or areas where there are high payments

under FEMA's IA or PA Programs may indicate areas of significant flood hazard.

- **Reasons why past claim hotspots may be considered AoMIs:**
  - A past claim hotspot may reflect an area of recent construction (large numbers of flood insurance policies as a result of a large number of mortgages) and an area where the as-built construction is not in accordance with local floodplain management regulations.
  - Sometimes clusters of past claims occur in subdivisions that were constructed before flood protection standards were in place, places with inadequate stormwater management systems, or in areas that may not have been identified as SFHAs.
  - Clusters of IA or PA claims may indicate areas where high flood insurance coverage or other mitigation actions are needed.



- **Areas of Significant Land Use Change**

Development, whether it is a 100-lot subdivision or a single lot big box commercial outlet, can result in large amounts of fill and other material being deposited in flood storage areas, thereby increasing flood hazards downstream.

Additionally, when development occurs, hard surfaces such as parking lots, buildings and driveways do not allow water to absorb into the ground, and more of the rainwater becomes runoff flowing directly into streams. As a result, the "peak flow" in a stream after a storm event will be higher and will occur faster. Without careful planning, major land use changes can affect the impervious area of a site and result in a significant increase in flood risk caused by streams that cannot handle the extra storm water runoff.

Rooftops, pavements, patios, and driveways contribute to the impervious area in a watershed. This occurs in both urban areas and rural areas being developed.

Sometimes a major land use change may be for planning purposes only. For example, a land use change that rezones land from a classification such as floodplain that restricts development to a zone such as industrial or high density residential could result in significant new infrastructure and structures in high flood risk areas.

- **Reasons why Areas of Significant Land Use Change may be considered AoMIs:**
  - Development in areas mapped SFHA reduces flood storage areas, which can make flooding worse at the development site and downstream of it.

- Impervious surfaces speed up the water flowing in the streams, which can increase erosion and the danger that fast-flowing floodwaters pose to people and buildings.
- Rezoning flood-prone areas to high densities and/or higher intensity uses can result in more people and property at risk of flooding and flood damage.

- **Key Emergency Routes Overtopped During Frequent Flooding Events**

  Roads are not always elevated above estimated flood levels, and present a significant flood risk to motorists during flooding events. When alternate routes are available, risks may be reduced, including risks to life and economic loss.

  - **Reasons why overtopped roads may be considered AoMIs:**
    - Such areas, when identified, can be accounted for and incorporated into Emergency Action Plans.
    - Roads may be elevated or reinforced to reduce the risk of overtopping during flood events.

- **Drainage or Stormwater-Based Flood Hazard Areas, or Areas Not Identified as Floodprone on the FIRM But Known to Be Inundated**

  Although FEMA identifies and maps most flood hazard areas, there are many that remain unidentified and/or unmapped. Many of these areas may be located in communities with existing, older, and often inadequate stormwater management systems or in very rural areas. Other similar areas could be a result of complex or unique drainage characteristics. Even though they are not mapped, awareness of these areas is important so adequate planning and mitigation actions can be performed.

  - **Reasons why drainage or stormwater-based flood hazard areas or unidentified floodprone locations may be considered AoMIs:**
    - So further investigation of such areas can occur and, based on scientific data, appropriate mitigation actions can result (i.e., land use and building standards).
    - To create viable mitigation project applications in order to reduce flood losses.

- **Areas of Mitigation Success**

  Flood mitigation projects are powerful tools to communicate the concepts of mitigation and result in more resilient communities. Multiple agencies have undertaken flood hazard mitigation actions for decades. Both structural measures—those that result in flood control structures—and non-structural measures have been implemented in

When large highways close due to flooding, traffic is detoured causing inconvenience and economic loss.

thousands of communities. An extensive list of mitigation actions can be found in Section IV.

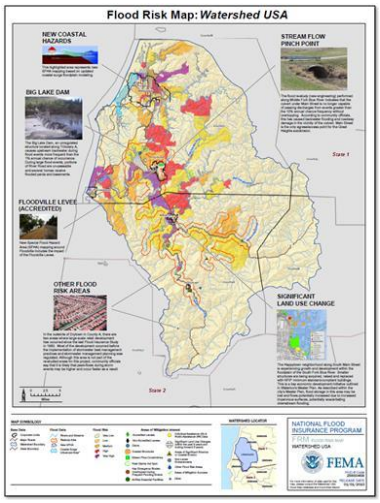
- **Reasons why areas of mitigation success may be considered AoMIs:**
  - Mitigation successes identify those areas within the community that have experienced a reduction or elimination of flood risk.
  - Such areas are essential in demonstrating successful loss reduction measures and in educating citizens and officials on available flood hazard mitigation techniques.
  - Avoided losses can be calculated and shown.

- **Areas of Significant Riverine Erosion**

  Stream channels are constantly subject to the forces of erosion. Areas of erosion (stream or coastal) threaten infrastructure, general building stock, and businesses, and also pose a threat to human life.

  - **Reasons why areas of significant riverine erosion are considered AoMIs:**
    - A community may wish to avoid development in areas identified as subject to erosion hazards.
    - Erosion is not recognized as a significant hazard in Federal floodplain management regulations.
    - Riverine erosion can undercut structures and roads, causing instability and possible collapse.

III. Flood Risk Analysis Results



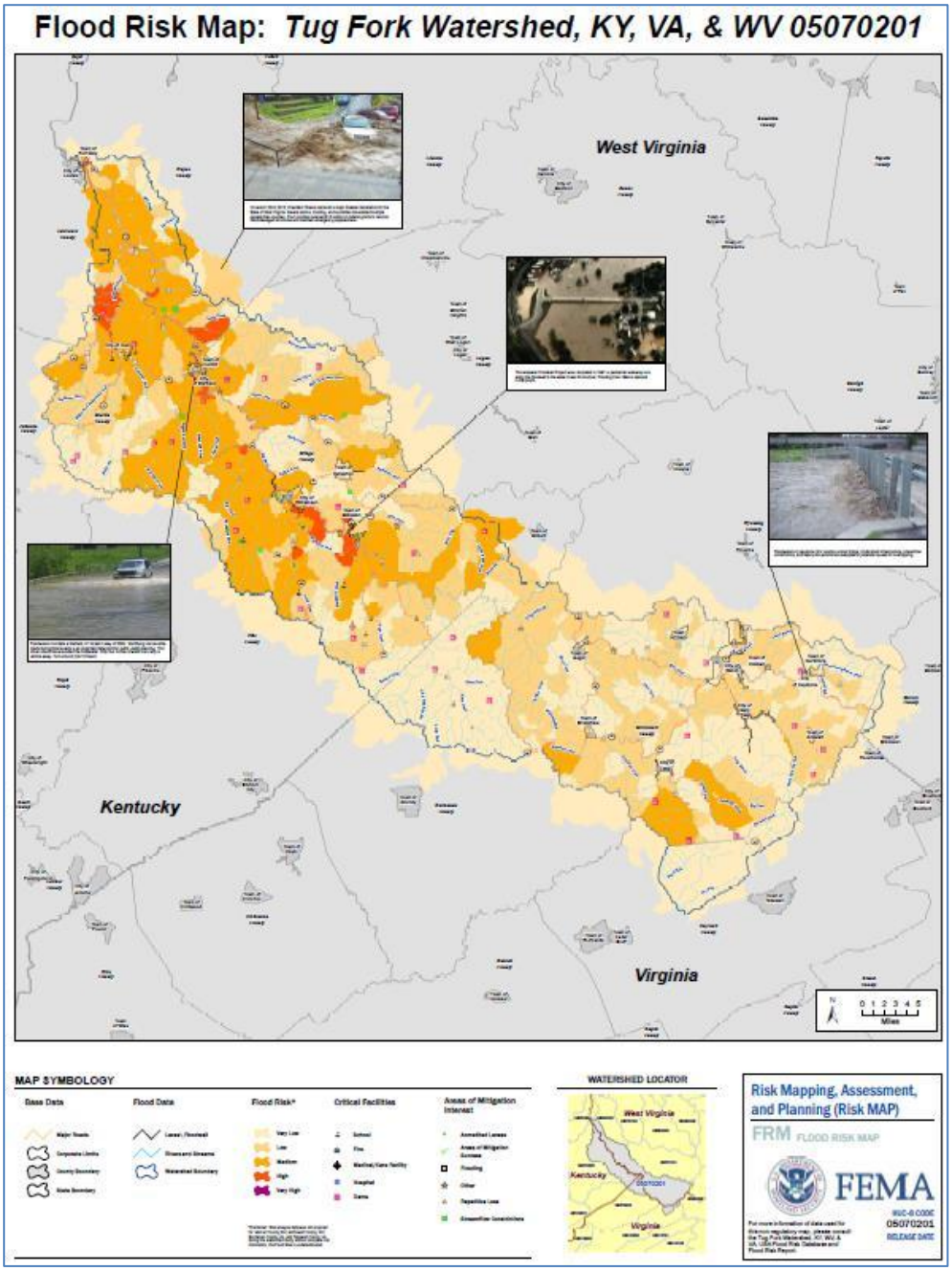
The FRM provides a graphical overview of the Flood Risk Project which highlights areas of risk that should be noted, based on potential losses, exposed facilities, etc., based on data found in the FRD. Refer to the data in the FRD to conduct additional analyses.

The following pages provide summary flood risk results for the Flood Risk Project as follows:

- **Flood Risk Map (FRM).** Within the Flood Risk Project the FRM displays base data reflecting community boundaries, major roads, and stream lines; potential losses that include both the 2010 Flood AAL study supplemented with new Hazus runs for areas with new or updated flood modeling; new Flood Risk Project areas; a bar chart summarizing community per capita loss; and graphics and text that promote access and usage of additional data available through the FRD, FIRM, and National Flood Hazard Layer and viewers (desktop or FEMA website, etc.). This information can be used to assist in Flood Risk Project-level planning as well as for developing mitigation actions within each jurisdiction located within the Flood Risk Project.
- **Flood Risk Project Summary.** Within the Flood Risk Project area, summary data for some or all of the following datasets are provided for the entire project area and also on a jurisdiction by jurisdiction basis:
  - **Changes Since Last FIRM (CSLF).** This is a summary of where the floodplain and flood zones have increased or decreased (only analyzed for areas that were previously mapped using digital FIRMs).
  - **Flood Depth and Analysis Grids.** A general discussion of the data provided in the FRD.
  - **Flood Risk Assessment Information.** A loss estimation of potential flood damages using different flood scenarios.
  - **Areas of Mitigation Interest.** A description of areas that may require mitigation or additional risk analysis.

A. Flood Risk Map

The Flood Risk Map for this Flood Risk Project is shown below. Flood Risk, Areas of Mitigation Interest, and community floodplains are shown for the Tug Fork Watershed. Due to the rural nature of the watershed, areas of dense population are concentrated. At the scale shown, information based on census tract is difficult to read. In addition to this reduced version of the map, a full size version is available within the FRD.



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B. Tug Fork Watershed Flood Risk Project Area Summary

Historically, the Tug Fork Watershed (HUC 05070201) is one of the most disaster-prone areas in the tri-state area of Kentucky, West Virginia, and Virginia. Flooding is consistently identified as a high risk in mitigation plans for communities within the watershed. The watershed has endured repetitive losses of housing, infrastructure and business interruptions. To further complicate matters, in some areas of the watershed, losses are not completely documented. The Tug Fork Watershed was prioritized for Risk Mapping, Assessment, and Planning (MAP) activities in the Federal Fiscal Year 2011 (FY 11) due to the significant need for information which will inspire actions to reduce the high flood risk throughout the watershed and the need for increased education and outreach efforts.

In Kentucky, the only county that is fully within the watershed is Martin County. Pike and Lawrence Counties are located in both the Tug Fork and the Lower Levisa Watersheds. The Kentucky counties (Pike, Lawrence, and Martin) will receive updated Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies in addition to non-regulatory Risk MAP products and datasets. Upon completion of this project, it is estimated that approximately 111 FIRM panels and their associated Flood Insurance Studies (FIS) will be updated in the Kentucky portion of the Tug Fork Watershed.

As part of the FY 2011 Risk MAP initiatives, the Kentucky Division of Water (KDOW), in cooperation with FEMA, initiated Discovery in the Tug Fork Watershed in January 2012. The watershed encompasses a portion of eastern Kentucky, northeastern Virginia and West Virginia, involving 28 communities (9 counties and 18 cities). A tributary of the Big Sandy River, the Tug Fork is approximately 159 miles long. The watershed originates in the Appalachian Mountains and the Tug Fork winds in a northwestern direction through southwestern Virginia and eastern Kentucky, forming a portion of the boundary between West Virginia and Kentucky. The Tug Fork joins the Levisa Fork at Louisa, Kentucky forming the Big Sandy River.

The climate for the watershed generally consists of cold winters and hot, humid summers with an average annual temperature near 55 degrees Fahrenheit. The average precipitation for the area is approximately 50 inches annually. Monthly averages range from about 2.8 inches in October to about 5.2 inches in March.

The topography for this area is hilly to mountainous with slopes as high as 50 percent. Residential and commercial development has occurred in the bottomlands, uplands terraces, hollows, hillsides, and any available land which can be leveled to support such development. Coal mining is one of the major enterprises in the watershed; significant areas have been strip mined and undergone mountain top removal in order to mine the coal seams. Some of these areas have been reclaimed and utilized for development purposes. There are many water sources throughout the watershed including numerous creeks, and thousands of smaller tributaries throughout the watershed constitute a recharge system for the larger waterways. The tributary streams are generally short and steep and can have significant and destructive flash flooding from fast moving and large volumes of rainfall. Flash floods generally occur in the late spring or early summer. Winter flooding usually occurs from less intense rainfall and runoff is accelerated by frozen ground and accumulated snow. Ground water supplements surface water and may be more readily available in areas where mining is minimal.

Prior to Discovery, Light Detection and Ranging (LIDAR) topographic information for the Kentucky portion of the watershed was collected in order to support flood hazard-related analyses and assist in the creation of Risk MAP products and datasets. LIDAR data for most of the watershed in West Virginia was collected by the West Virginia Department of Environmental Protection (WVDEP) and obtained from Dewberry due to their collaborative efforts with the state. The Discovery phase of this Risk MAP project involved data collection, community interviews, in-person meetings with stakeholders in the watershed, and the development of recommendations based on an analysis of data and information gathered throughout the Discovery process. Discovery in this watershed concluded with a follow up meeting and conference call on December 19, 2012 in Pikeville, Kentucky to discuss findings and next steps.

The Tug Fork Watershed Study FRR provides non-regulatory information for communities scoped for floodplain analysis. However, the level of analysis for each region is detailed in the Tug Fork Watershed Discovery Report. All communities within the Tug Fork Watershed will be introduced in section II C. Overview. However, communities receiving non-regulatory products will be discussed in detail.

1. Overview

Tug Fork Watershed, located in Kentucky, Virginia, and West Virginia includes the following communities:

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Buchanan County, VA**	510024	24,098	19.7	504	19.7	Y	10	Y
City of Gary, WV*	540117	968	100	0.87	100	Y	10	Y
City of Inez, KY	210362	717	100	0.7	100	Y	10	Y
City of Welch, WV*	540123	2406	100	1.29	100	Y	10	Y
City of Williamstown, WV*	540138	3,191	100	3.26	100	Y	10	Y
Lawrence County, KY	210258	15,860	7.0	420.12	7.0	Y	10	Y
Martin County, KY	210166	12,929	100	230.81	100	Y	10	Y
McDowell County, WV*	540114	22,113	100	535	100	Y	10	Y
Mercer County, WV*	540124	62,523	0.7	421	0.068	Y	10	Y
Mingo County, WV*	540133	26,839	72.3	424	72.3	Y	10	Y
Pike County, KY	210298	65,024	27.5	788.84	27.5	Y	9	Y
Tazewell County, VA**	510160	45,078	9.4	48.9	100	Y	10	Y

Town of Anawalt, WV*	540115	226	100	0.57	100	Y	10	Y
Town of Bradshaw, WV*	540291	337	100	0.8	100	Y	10	Y
Town of Davy, WV*	540116	420	100	1.29	100	Y	10	Y
Town of Delbarton, WV*	540134	579	100	2.01	100	Y	10	Y
Town of Fort Gay, WV*	540202	705	100	0.89	100	Y	10	Y
Town of Iager, WV*	540118	302	100	0.83	100	Y	10	Y
Town of Kermit, WV*	540136	406	100	0.39	100	Y	10	Y
Town of Keystone, WV*	540119	282	100	0.32	100	Y	10	Y
Town of Kimball, WV*	540120	188	100	0.25	100	Y	10	Y
Town of Matewan, WV*	545538	499	100	0.56	100	Y	10	Y
Town of Northfork, WV*	540121	429	100	0.96	100	Y	10	Y
Town of War, WV*	540122	818	100	0.92	100	Y	10	Y
Town of Warfield, KY	210364	284	100	0.9	100	Y	10	Y
Wayne County, WV*	540200	41,649	0.15	512	15.7	Y	10	Y

*Limited Non-regulatory products were created as part of this watershed stud within the state of West Virginia. 100-year Depth-Grids were acquired from FEMA Region III's mapping partner.
** Non-regulatory products were not created as part of this watershed study within the state of Virginia.

Community-specific results are provided on subsequent pages. Data provided below and on subsequent pages only includes areas located within the Tug Fork Watershed Flood Risk Project and do not necessarily represent community-wide totals.

Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used toward the generation of results of this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Flood Risk Datasets

As a part of this Flood Risk Project, flood risk datasets were created for inclusion in the Flood Risk Database. Those datasets are summarized for this Flood Risk Project below:

- **Changes Since Last FIRM**

  Special Flood Hazard Area (SFHA) boundaries within Tug Fork Watershed were updated due to new engineering analysis performed within the Flood Risk Project. The updated modeling produced new flood zone areas and new base flood elevations in some areas and leveraged recently developed LiDAR-based topographic data for the Flood Risk Project. The table below summarizes the increases, decreases, and net change of SFHAs for the watershed.

Area of Interest	Total Area (mi^2)	Increase (mi^2)	Decrease (mi^2)	Net Change (mi^2)
Area within SFHA	***14.09***	***2.48***	***-4.36***	***-1.88***
Area within Floodway	***9.68***	***1.14***	***-1.84***	***-0.71***

Section II of this report provides more information regarding the source and methodology used to develop this table.

- Evidence of actual flood losses can be one of the most compelling factors for increasing a community's flood risk awareness. During this Risk MAP project, FEMA confirmed several areas within this watershed as having mitigation potential from reviewing local hazard mitigation plans and through ongoing communication with community officials. Communities within the watershed are encouraged to continue working with the State Hazard Mitigation Officer to further identify and mitigate these high-risk areas and structures. Specific areas within each jurisdiction are detailed within the individual community summaries.

- **Flood Depth and Analysis Grids**
  - The FRD contains datasets in the form of depth grids for the entire Flood Risk Project that can be used for additional analysis, enhanced visualization, and communication of flood risks for hazard mitigation planning and emergency management. The data provided within the FRD should be used to further isolate areas where flood mitigation potential is high and may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of water should seriously consider mitigation options for implementation. Section II of the FRR provides general information regarding the development of and potential uses for this data.

- **Flood Risk Assessment Results**
  - Tug Fork Watershed flood risk analysis incorporates results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were estimated as well as potential loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

Table 1 provides an overview of potential flood losses within the area represented by this Flood Risk Project.

Table 1- Summary of Potential Flood Losses

			Estimated Potential Losses for Flood Event Scenarios (Tug Fork Watershed)									
	Total Inventory		10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized ($/yr)	
	Estimated Value	% of Total	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]
Residential Building/Contents	5848714000	74.6	78983000	1.3	117672000	2	175695000	3	236669000	4	10169000	0.2
Commercial Building/Contents	1021476000	13	42043000	4.1	81964000	8	110475000	10.8	176454000	17.3	6687000	0.6
Other Building/Contents	974229000	12.5	21079000	2.1	34733000	3.5	53964000	5.5	92519000	9.5	3135000	0.3
Total Building/Contents[2]	7844419000	*N/A*	142105000	1.8	234369000	2.9	340134000	4.3	505642000	6.4	19991000	0.2
Business Disruption[3]	*N/A*	*N/A*	1744000	*N/A*	4645000	*N/A*	6508000	*N/A*	8920000	*N/A*	269000	*N/A*
TOTAL[4]	7844419000	*N/A*	143849000	1.8	239014000	3	346642000	4.4	514562000	6.5	20260000	0.2

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

C. Community Summary

The Tug Fork Watershed is comprised of small communities in a rural landscape. The largest community in the watershed is Williamstown, West Virginia with a population of 6,837. The watershed's population is estimated to be 85,243. The average age of the population in the watershed is 41 years. Approximately 71 % of the population holds a high school diploma and 9% of the population have a college degree. The average income for individuals in the watershed is approximately $36,000. See Appendix J for the Communication Assessment Tool, which provides socio-economic information by community.

The watershed is approximately 1,600 square miles of hilly to mountainous landscape. The major industries in the watershed are mining, manufacturing, retail, and tourism. Commercial developments in the watershed are generally located in downtown areas and along major thoroughfares. There are a number of tourist locations in and near the watershed including the Appalachian Mountains, the Hatfield and McCoy Museum & Trails, whitewater rafting, and recreation on the waterways.

Only five Kentucky communities within the Tug Fork Watershed are located within FEMA Region IV. RiskMAP product information for the City of Inez, Town of Warfield, and Lawrence, Martin, and Pike County is detailed in the following section.

D. City of Inez, Kentucky Summary (CID 210362)

The City of Inez, Kentucky is located in Martin County, Kentucky. Situated within the coalfields of eastern Kentucky, the rugged terrain has limited residential development to areas within the floodplain. Almost 2 miles of Special Flood Hazard Areas (SFHAs) have been identified within the city boundary. 20% of the city is currently located within the SFHA.

1. Overview

The City of Inez is the largest city within Martin County. The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
City of Inez, KY	210362	717	100	0.7	100	Y	10	Y

- Participating in Big Sandy Area Development District's Hazard Mitigation Plan which expires *in 2016*
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = 17 policies totaling approximately $3,977,400
- NFIP-recognized repetitive loss properties = *15 (13 residential and 2 nonresidential)*
- NFIP-recognized severe repetitive loss properties = *0*

Data provided below only includes areas within the City of Inez, located within the Tug Fork Watershed Flood Risk Project. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used toward the generation of results of this project are described in Section IV of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Changes Since Last FIRM**

  Special Flood Hazard Area (SFHA) boundaries within the City of Inez, Kentucky were updated based on a combination of new engineering analysis and redelineation using newly acquired LiDAR-based topographic data. The updated modeling produced newly identified flood zone areas and new base flood elevations. Rockcastle Creek experienced areas of floodplain decrease both east and west of

the confluence of Rockcastle Creek and Middle Fork Rockcastle Creek. The table below summarizes the increases, decreases, and net change of SFHAs for the community. Special Flood Hazard Area (SFHA) within the boundary of Inez saw a slight net increase of .018 mi^2. The Floodway area as well saw an increase of .003 mi^2.

Areas of Change	Total Area (mi2)	Increase (mi2)	Decrease (mi2)	Net Change (mi2)	Net Population	Increase in Population	Increase in Buildings	Decrease in Population	Decrease in Buildings
Area within SFHA	.145	.030	-.012	.018	null	null	null	null	null
Area within Floodway	.031	.003	-.00	.003	null	null	null	null	null

Previous FIRM effective date: 02/19/1986
Current FIRM effective date: 08/05/2010

- **Flood Depth and Analysis Grids**
  - See the FRD for the following depth and analysis grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grids (10-, 4-, 2-, 1-, and 0.2-percent-annual-chance flood events)
    - Percent annual chance of flooding grids
    - Percent chance of flooding over a 30-year period grids
  - Additional information and data layers provided within the FRD should be used to further isolate these and other areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of water should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - The City of Inez's flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

	Estimated Potential Losses for Flood Event Scenarios				
Total Inventory	10% (10-yr)	2% (50-yr)	1% (100-yr)	0.2% (500-yr)	Annualized ($/yr)

	Estimated Value	% of Total	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]
Residential Building/Contents	39835000	42.8	725000	1.8	1221000	3.1	2787000	7	4683000	11.8	120000	0.3
Commercial Building/Contents	37720000	40.5	2559000	6.7	3853000	10.2	8646000	22.9	11731000	31.1	409000	1.1
Other Building/Contents	15554000	16.7	123000	0.7	154000	1	2696000	17.3	4483000	28.8	68000	0.4
Total Building/Contents[2]	93109000	*N/A*	3407000	3.6	5228000	5.6	14129000	15.2	20897000	22.4	597000	0.6
Business Disruption[3]	*N/A*	*N/A*	54000	*N/A*	98000	*N/A*	442000	*N/A*	602000	*N/A*	9000	*N/A*
TOTAL[4]	93109000	*N/A*	3461000	3.7	5326000	5.7	14571000	15.6	21499000	23.1	606000	0.6

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- ***Areas of Mitigation Interest***
  - Section III. B. 4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	***0***	***Kentucky Division of Water/National Inventory of Dams***
Levee	***0***	***USACE National Levee Database***
Stream Flow Pinch Point/Constrictions	***0***	***Local public works, engineering models***
Significant Land Use Changes	***0***	***Local planning divisions***
Past Claims Hot Spot	***0***	***State NFIP***
At Risk Essential Facilities	***2***	***HAZUS Report***
Other Flood Risk Areas	***1***	***Big Sandy Area Development District***
Area of Mitigation Success	***0***	***State Hazard Mitigation Officer***
Other	***1***	***USACE (Section 202 Flood Control Measres)***

  - 4 areas of mitigation interest were identified for the City of Inez.
  - Two AOMIS classified as 'At Risk Essential Facilities' are located along Coldwater Fork near the eastern city limit.
  - The City of Inez's Flood Damage Prevention Ordinance has a freeboard requirement of one foot above the base flood elevation.

E. Lawrence County, Kentucky Summary (CID 210258)

Lawrence County contains approximately 367 miles of streams with identified Special Flood Hazard Areas. Approximately 6% of the county is located within SHFA. A hazard mitigation plan is in place for Lawrence County; the FIVCO Area Development District authored the plan that identifies actions communities can take to reduce the risks from natural hazards, including flooding.

Overview

The portion of Lawrence County represents the smallest county area of Kentucky within the Tug Fork Watershed. The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Lawrence County, KY	210258	15,860	8.8	420.12	7.0	Y	10	Y

- Participating in the FIVCO Area Development District's Hazard Mitigation Plan which expires in 2016
- Past Federal Disaster Declarations for flooding = 20 within Lawrence County
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = *67 policies totaling approximately $6,072,100*
- NFIP-recognized repetitive loss properties = *0 properties within the watershed study area*
- NFIP-recognized severe repetitive loss properties = *0 properties within the watershed study area*

Data provided below only includes the area of Lawrence County, which intersects the Tug Fork Watershed Flood Risk Project, and do not represent community-wide totals. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used toward the generation of results of this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Changes Since Last FIRM**

Special Flood Hazard Area (SFHA) boundaries within Lawrence County, Kentucky were updated based on a combination of new engineering analysis and redelineation using newly acquired LiDAR-based topographic data. The updated modeling produced newly identified flood zone areas and new base flood elevations. Many SFHA changes occurred along Tug Fork. Lawrence County experienced a net decrease of the Special Flood Hazard Area of 0.290mi², as well as a net decrease for the floodway of .065mi². The table below summarizes the increases, decreases, and net change of SFHAs for the community.

Areas of Change	Total Area (mi2)	Increase (mi2)	Decrease (mi2)	Net Change (mi2)	Net Population	Increase in Population	Increase in Buildings	Decrease in Population	Decrease in Buildings
Area within SFHA	1.167	.169	-.459	-.290	null	null	null	null	null
Area within Floodway	.357	.036	-.101	-.065	null	null	null	null	null

Previous FIRM effective date: June 18, 1990
Current FIRM effective date: June 16, 2011

- **Flood Depth and Analysis Grids**
  - See the FRD for the following depth and analysis grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grids (10-, 4-, 2-, 1-, and 0.2-percent-annual-chance flood events)
    - Percent annual chance of flooding grids
    - Percent chance of flooding over a 30-year period grids
  - Additional information and data layers provided within the FRD should be used to further isolate these and other areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of water should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - Lawrence County, Kentucky's flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized ($/yr)	
	Estimated Value	% of Total	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]
Residential Building/Contents	58131000	79.7	2910000	5	4209000	7.2	4468000	7.7	8107000	13.9	372000	0.6
Commercial Building/Contents	7059000	9.7	2625000	37.1	2872000	40.7	2970000	42.1	3940000	55.8	271000	3.8

Other Building/Contents	7793000	10.7	3279000	42	2862000	36.7	2896000	37.2	4407000	56.6	333000	4.3
Total Building/Contents[2]	72983000	N/A	8814000	12	9943000	13.6	10334000	14.2	16454000	22.5	976000	1.3
Business Disruption[3]	N/A	N/A	100000	N/A	111000	N/A	117000	N/A	156000	N/A	8000	N/A
TOTAL[4]	72983000	N/A	8914000	12.2	10054000	13.8	10451000	14.3	16610000	22.8	984000	1.4

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- Areas of Mitigation Interest
  - Section III. B. 4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	***0***	***Kentucky Division of Water/National Inventory of Dams***
Levee	***0***	***USACE National Levee Database***
Stream Flow Pinch Point/Constrictions	***0***	***Local public works, engineering models***
Significant Land Use Changes	***0***	***Local planning divisions***
Past Claims Hot Spot	***0***	***State NFIP***
At Risk Essential Facilities	***0***	***HAZUS Report***
Other Flood Risk Areas	***0***	***Big Sandy Area Development District***
Area of Mitigation Success	***0***	***State Hazard Mitigation Officer***
Other	***7***	***USACE (Section 202 Flood Control Measres)***

  - Several areas of mitigation interest were identified for Lawrence County, Kentucky. There are 7 AOMIS currently within the portion of Lawrence County which intersects the Tug Fork Watershed Study Area. All 7 sights are ' Other Flood Risk Areas' provided by FIVCO ADD staff during the Discovery Phase of the Watershed Study. Those sites consist of 4 Major Problem areas and 3 Reported Flooding sites.

  - The FIVCO Area Development Mitigation Plan summarizes flooding risk as identified in the following paragraph:

    Flooding of areas alongside rivers and streams is natural and inevitable, however this is often misunderstood. Development of areas within mapped floodplains continues to occur. As such, as development occurs it increases the loss potential and the danger to people who live and work in these areas. Increased attention has been given to improve floodplain management practices in local jurisdictions throughout the region as a result of Discovery. Within the FIVCO region there are many homes and structures located within mapped flood prone areas. There

are also many locations with repetitive flooding problems that are not located within a mapped floodplain.

- The future growth in Lawrence County will likely occur along U.S. 23 in the eastern side of the county and in the Yatesville Lake area. The expansion of water service throughout these areas will likely dictate the direction of such development.

F. Martin County, Kentucky Summary (CID 210166)

Martin County, Kentucky is one of the easternmost counties of the state. Located within the Appalachian Mountains, Martin County's landscape is blanketed with steep terrain. Riverine flooding occurs frequently as many of Martin County's cities have developed in its limited area of flat land. The county has approximately 140 miles of streams with identified Special Flood Hazard Areas.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Martin County, Kentucky	210166	12,929	100	230.81	100	Y	10	Y

- Participating in Big Sandy Area Development District's Hazard Mitigation Plan which expires in 2016
- Past Federal Disaster Declarations for flooding = 14 within Martin County
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = *289 policies totaling approximately $45,037,900*
- NFIP-recognized repetitive loss properties *= 34 (31 residential, 3 non-residential)*
- NFIP-recognized severe repetitive loss properties = 0

Data provided below only includes areas within the Martin County, Kentucky, located within the Tug Fork Watershed Flood Risk Project. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used toward the generation of results of this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Changes Since Last FIRM**

Special Flood Hazard Area (SFHA) boundaries within Martin County, Kentucky were updated based on a combination of new engineering analysis and redelineation using newly acquired LiDAR-based topographic data. The updated modeling produced newly identified flood zone areas and new base flood elevations. Significant changes occurred along Tug Fork resulting in a decrease in the SFHA of 1.586 mi2 and a 0.267 mi2 decrease of area within the floodway. The table below summarizes the increases, decreases, and net change of SFHAs for Martin County.

Areas of Change	Total Area (mi2)	Increase (mi2)	Decrease (mi2)	Net Change (mi2)	Net Population	Increase in Population	Increase in Buildings	Decrease in Population	Decrease in Buildings
Area within SFHA	5.191	1.263	-2.848	-1.586	null	null	null	null	null
Area within Floodway	3.427	.133	.399	-.267	null	null	null	null	null

Previous FIRM effective date: February 19, 1986
Current FIRM effective date: August 5, 2010

- **Flood Depth and Analysis Grids**
  - See the FRD for the following depth and analysis grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grids (10-, 4-, 2-, 1-, and 0.2-percent-annual-chance flood events)
    - Percent annual chance of flooding grids
    - Percent chance of flooding over a 30-year period grids
  - Additional information and data layers provided within the FRD should be used to further isolate areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of water should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - Martin County's flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized ($/yr)	
	Estimated Value	% of Total	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]
Residential Building/Contents	538879000	73.6	22758000	4.2	30542000	5.7	42300000	7.8	52335000	9.7	2813000	0.5
Commercial Building/Contents	98581000	13.5	2979000	3	3837000	3.9	5893000	6	7093000	7.2	367000	0.4
Other Building/Contents	94773000	12.9	2933000	3	2735000	2.9	7875000	8.3	11087000	11.7	410000	0.4

Total Building/Contents[2]	732233000	N/A	28670000	3.9	37114000	5.1	56068000	7.7	70515000	9.6	3590000	0.5
Business Disruption[3]	N/A	N/A	160000	N/A	184000	N/A	727000	N/A	832000	N/A	18000	N/A
TOTAL[4]	**732233000**	N/A	**28830000**	**3.9**	**37298000**	**5.1**	**56795000**	**7.8**	**71347000**	**9.7**	**3608000**	**0.5**

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- Areas of Mitigation Interest
  - Section III. B. 4. of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	***16***	***Kentucky Division of Water/National Inventory of Dams***
Levee	***0***	***USACE National Levee Database***
Stream Flow Pinch Point/Constrictions	***1***	***Local public works, engineering models***
Significant Land Use Changes	***0***	***Local planning divisions***
Past Claims Hot Spot	***0***	***State NFIP***
At Risk Essential Facilities	***5***	***HAZUS Report***
Other Flood Risk Areas	***15***	***Big Sandy Area Development District***
Area of Mitigation Success	***0***	***State Hazard Mitigation Officer***
Other	***2***	***USACE (Section 202 Flood Control Measres)***

  - 39 Area of Mitigation Points were identified within Martin County. One pinch point was identified on Pigeonroost Fork near the confluence of Wolf Creek. Fifteen sites of 'Other Flood Risk Areas' and 16 Dams of various hazard levels were identified.

G. Pike County, Kentucky Summary (CID 210298)

Pike County is one of the most significantly impacted counties in regards to flooding occurrences and related costs, receiving the highest overall rankings for each in the Tug Fork watershed. For example, Pike County has a chance of flooding occurrence of one per 7.41 months with an average cost $1,496,178.52 per occurrence. With the assistance of federal, state, and local partners, Pike County continues to mitigate risk through robust physical flood protection measures. Measures include: large multi-purpose reservoirs, three levees, and the rerouting of the Levisa Fork around the City of Pikeville. Fishtrap Lake and J.W. Flanagan Lake have greatly reduced flood stages along Russell Fork and the Levisa Fork. Certified in 2011, three levee systems within the county protect against the 1-percent-annual-chance flood. The levees are operated by the City of Pikeville Flood Control Works, the South Williamson Business District Flood Control Works, and the Appalachian Regional Hospital Flood Control Works. In 1981, the Pikeville "Model City" Project relocated a portion of the Levisa Fork through Peach Orchard Mountain, west of the city.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Pike county, Kentucky	210298	65,024	31.3	788.84	27.5	Y	9	Y

- Participating in Big Sandy Area Development District's Hazard Mitigation Plan which expires in 2016
- Past Federal Disaster Declarations for flooding = 23 within Pike County
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = *1,255 policies totaling approximately $199,207,700*
- NFIP-recognized repetitive loss properties = *64 within the watershed study area (41 residential, 23 non-residential)*
- NFIP-recognized severe repetitive loss properties = *5 residential properties within the watershed study area*

Data provided below only includes areas within Pike County, Kentucky, which intersects with the Tug Fork Watershed Flood Risk Project, and does not represent community-wide totals. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used toward the generation of results of this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Changes Since Last FIRM**

Special Flood Hazard Area (SFHA) boundaries within Pike County, Kentucky were updated based on acombination of new engineering analysis and redelineation using newly acquired LiDAR-based topographic data. The updated modeling produced newly identified flood zone areas and new base flood elevations. Pike County saw a net SFHA increase of .296mi². The floodway decreased .533mi². The CSLF table below summarizes the increases, decreases, and net change of SFHAs for the portion of Pike County located with the watershed study area.

Areas of Change	Total Area (mi2)	Increase (mi2)	Decrease (mi2)	Net Change (mi2)	Net Population	Increase in Population	Increase in Buildings	Decrease in Population	Decrease in Buildings
Area within SFHA	1.072	.684	-.388	.296	null	null	null	null	null
Area within Floodway	.691	.079	-.612	-.533	null	null	null	null	null

Previous FIRM effective date: September 21, 1998
Current FIRM effective date: May 2, 2008

- **Flood Depth and Analysis Grids**
  - See the FRD for the following depth and analysis grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grids (10-, 4-, 2-, 1-, and 0.2-percent-annual-chance flood events)
    - Percent annual chance of flooding grids
    - Percent chance of flooding over a 30-year period grids
  - Additional information and data layers provided within the FRD should be used to further isolate areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of water should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - Pike County, Kentucky's flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios.. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

	Estimated Potential Losses for Flood Event Scenarios											
	Total Inventory		10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized ($/yr)	
	Estimated Value	% of Total	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]
Residential Building/Contents	990491000	68.6	19095000	1.9	29596000	3	36274000	3.7	52766000	5.3	2272000	0.2
Commercial Building/Contents	265291000	18.4	26768000	10	40522000	15.3	48114000	18.1	71116000	26.8	3516000	1.3
Other Building/Contents	189034000	13.1	5408000	2.8	6981000	3.7	8892000	4.7	12520000	6.6	547000	0.3
Total Building/Contents[2]	1444816000	N/A	51271000	3.5	77099000	5.3	93280000	6.5	136402000	9.4	6335000	0.4
Business Disruption[3]	N/A	N/A	853000	N/A	1429000	N/A	1682000	N/A	2235000	N/A	92000	N/A
TOTAL[4]	1444816000	N/A	52124000	3.6	78528000	5.4	94962000	6.6	138637000	9.6	6427000	0.4

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- Areas of Mitigation Interest
  - Section III. B. 4. of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	*12*	*Kentucky Division of Water/National Inventory of Dams*
Levee	*3*	*USACE National Levee Database*
Stream Flow Pinch Point/Constrictions	*2*	*Local public works, engineering models*
Significant Land Use Changes	*0*	*Local planning divisions*
Past Claims Hot Spot	*3*	*State NFIP*
At Risk Essential Facilities	*17*	*HAZUS Report*
Other Flood Risk Areas	*5*	*Big Sandy Area Development District*
Area of Mitigation Success	*0*	*State Hazard Mitigation Officer*
Other	*1*	*USACE (Section 202 Flood Control Measres)*

  - 43 areas of mitigation interest were identified for Pike County, Kentucky. Pike County has more sites of past claims hotspots than any other county in the Tug Fork Watershed Study Area.
  - 2 pinch points were identified along Road Fork and Pigeonroost Branch.
  - 12 dams and 3 levees have been identified within Pike County.

H. Town of Warfield, Kentucky Summary (CID 210364)

The Town of Warfield resides along the Tug Fork River the boundary between Kentucky and West Virginia. Warfield is in Martin County, within the heart of the Appalachian Mountains. Primary resources of the area include coal, natural gas, and timber. Similar to other communities in the Tug Fork Watershed, Warfield's steep terrain has propagated historical development in flat lands within the floodplain.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Town of Warfield, Kentucky	210364	284	100	0.9	100	Y	10	Y

- Participating in the Big Sandy Area Development District Hazard Mitigation Plan which expires 2016
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = *11 policies totaling approximately $1,313,300*
- NFIP-recognized repetitive loss properties = *2 (residential properties)*
- NFIP-recognized severe repetitive loss properties = *0*

Data provided below only includes areas within Warfield, Kentucky located within the Tug Fork Watershed Flood Risk Project. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used toward the generation of results of this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Changes Since Last FIRM**

Special Flood Hazard Area (SFHA) boundaries within the City of Warfield, Kentucky were updated based on a combination of new engineering analysis and redelineation using newly acquired LiDAR-based topographic data. The updated modeling produced newly identified flood zone areas and new base flood elevations. Significant floodway and floodplain decreases were found along Tug Fork. Warfield saw a net SFHA decrease of .008 mi^2. Warfield experienced a net floodway decrease of .019mi^2. The table below summarizes the increases, decreases, and net change of SFHAs for the City of Warfield.

Areas of Change	Total Area (mi2)	Increase (mi2)	Decrease (mi2)	Net Change (mi2)	Net Population	Increase in Population	Increase in Buildings	Decrease in Population	Decrease in Buildings

Area within SFHA	**.030**	**.011**	**-.019**	**-.008**	**null**	**null**	**null**	**null**	**null**
Area within Floodway	**.025**	**.003**	**-.022**	**-.019**	**null**	**null**	**null**	**null**	**null**

Previous FIRM effective date: February 19, 1986
Current FIRM effective date: April 16, 2013

- **Flood Depth and Analysis Grids**
  - See the FRD for the following depth and analysis grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grids (10-, 4-, 2-, 1-, and 0.2-percent-annual-chance flood events)
    - Percent annual chance of flooding grids
    - Percent chance of flooding over a 30-year period grids
  - Additional information and data layers provided within the FRD should be used to further isolate these and other areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of water should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - The City of Warfield's flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		**10% (10-yr)**		**2% (50-yr)**		**1% (100-yr)**		**0.2% (500-yr)**		**Annualized ($/yr)**	
	Estimated Value	**% of Total**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**
Residential Building/Contents	**15739000**	**75.3**	**1157000**	**7.3**	**2200000**	**14**	**2659000**	**16.9**	**3571000**	**22.7**	**190000**	**1.2**
Commercial Building/Contents	**1918000**	**9.2**	**456000**	**13.7**	**571000**	**29.8**	**628000**	**32.7**	**690000**	**36**	**54000**	**2.8**
Other Building/Contents	**3256000**	**15.6**	**1421000**	**43.6**	**1043000**	**32**	**1152000**	**35.4**	**2088000**	**64.1**	**166000**	**5.1**
Total Building/Contents[2]	**20913000**	*N/A*	**3034000**	**14.5**	**3814000**	**18.2**	**4439000**	**21.2**	**6349000**	**30.4**	**410000**	**2**
Business Disruption[3]	*N/A*	*N/A*	**64000**	*N/A*	**82000**	*N/A*	**88000**	*N/A*	**97000**	*N/A*	**5000**	*N/A*

TOTAL[4]	20913000	N/A	3098000	14.8	3896000	18.6	4527000	21.6	6446000	30.8	415000	2

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- Areas of Mitigation Interest
  - Section III. B. 4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

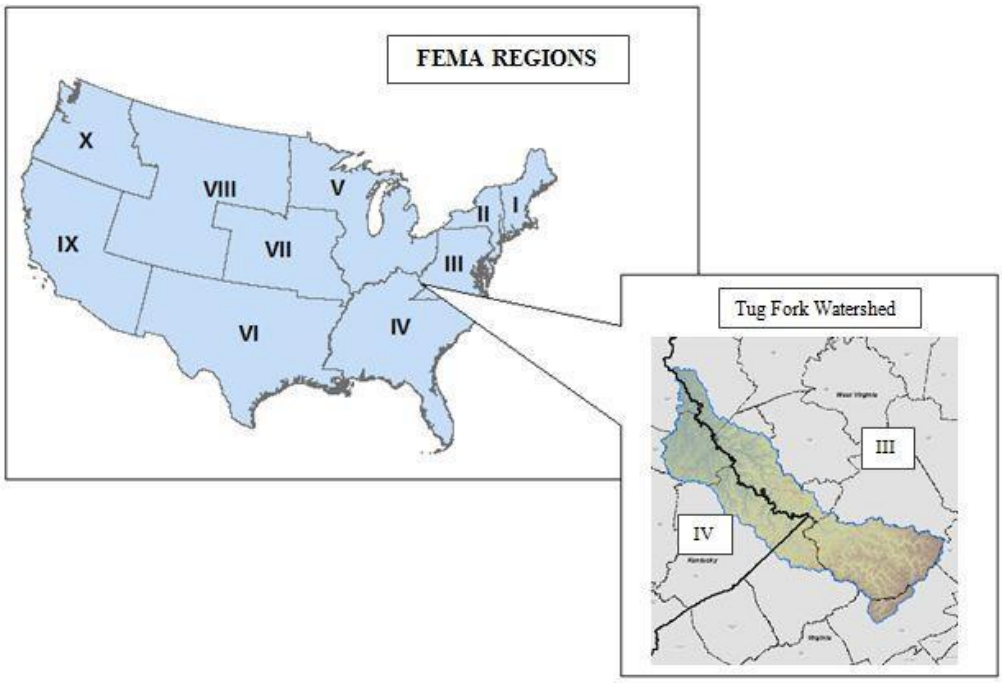
Type of Mitigation Interest	Number of Areas	Data Source
Dam	***0***	***Kentucky Division of Water/National Inventory of Dams***
Levee	***0***	***USACE National Levee Database***
Stream Flow Pinch Point/Constrictions	***0***	***Local public works, engineering models***
Significant Land Use Changes	***0***	***Local planning divisions***
Past Claims Hot Spot	***0***	***State NFIP***
At Risk Essential Facilities	***1***	***HAZUS Report***
Other Flood Risk Areas	***4***	***Big Sandy Area Development District***
Area of Mitigation Success	***0***	***State Hazard Mitigation Officer***
Other	***0***	***USACE (Section 202 Flood Control Measres)***

  - 4 sites of 'Other Flood Risk Areas' are located within Warfield. 3 are located along Buck Creek; 1 located on Collins Creek.

  - Warfield Fire and Rescue was the only critical facility identified within Warfield.

I. FEMA Region III Communities

FEMA Region III has partnered with KDOW and FEMA Region IV to produce risk map data for counties within West Virginia and Virginia. Those counties include Buchanan and Tazewell Counties in Virginia and McDowell, Mercer, Mingo, and Wayne Counties in West Virginia. Digital flood hazard deliverables and non-regulatory products will be created for the areas affected by the Tug Fork in these communities.



J. Region III - Virginia

The Tug Fork Watershed consists of Kentucky, West Virginia, and Virginia; the smallest area of the watershed lies within Virginia. While the watershed area itself touches three states, no streams within Virginia were scoped to be studied as part of this Risk MAP project. Data provided within this Flood Risk Report was gathered to provide community statistics, report important local events and facts, and to provide Areas of Mitigation Interest. The sections below summarize two communities within the boundary of the study area.

K. Buchanan County, VA (CID 510024)

Buchanan County is one of two Virginia counties partially located within the Tug Fork Watershed. Situated in southwest Virginia, Buchanan's terrain is mountainous and prone to flash flooding. The US Army Corps of Engineers and Virginia Department of Transportation have collaborated to develop flood protection measures in the Town of Grundy, outside of the Tug Fork Watershed. Only a small portion of Buchanan County is located within the study boundary of the Tug Fork Watershed.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Buchanan County, VA	510024	24,098	27.3	504	19.7	Y	10	Y

- Participating in the Cumberland Plateau Planning District Commission's Plan which expires in 2018
- Past Federal Disaster Declarations for flooding = 11 in Buchanan County
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = *255 policies totaling approximately $38,340,300.00*
- NFIP-recognized repetitive loss properties = *unknown*
- NFIP-recognized severe repetitive loss properties = *unknown*

Data provided below only includes the areas within Buchanan County, intersecting the Tug Fork Watershed Flood Risk Project, and does not represent county-wide totals. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used to generate results for this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

- **Hazus Estimated Loss Information**
    - Buchanan County, Virginia's flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for

multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized ($/yr)	
	Estimated Value	% of Total	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]
Residential Building/Contents	275402000	87	N/A	N/A	N/A	N/A	12000	0	N/A	N/A	N/A	N/A
Commercial Building/Contents	28393000	9	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Other Building/Contents	12397000	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Building/Contents[2]	316192000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Business Disruption[3]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL[4]	316192000	N/A	N/A	N/A	N/A	N/A	12000	0	N/A	N/A	N/A	N/A

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

2. Community Analyses and Results

Non-regulatory products were not created for Buchanan County, as part of this Risk MAP project. Community analysis was limited to AOMI data collection and review of the Cumberland Plateau Planning District Commission's Multi-Jurisdiction Hazard Mitigation Plan applicable to Buchanan County's study area.

- Additional information and data layers provided within the FRD should be used to further isolate areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of flooding should seriously consider mitigation options for implementation.

- ***Areas of Mitigation Interest***
  - Section III. B. 4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	*3*	*Kentucky Division of Water/National Inventory of*

		Dams
Levee	***0***	***USACE National Levee Database***
Stream Flow Pinch Point/Constrictions	***0***	***Local public works, engineering models***
Significant Land Use Changes	***0***	***Local planning divisions***
Past Claims Hot Spot	***0***	***State NFIP***
At Risk Essential Facilities	***4***	***HAZUS Report***
Other Flood Risk Areas	***0***	***Big Sandy Area Development District***
Area of Mitigation Success	***1***	***State Hazard Mitigation Officer***
Other	***0***	***USACE (Section 202 Flood Control Measres)***

- According to the National Inventory of Dams (2010), 3 dams are located within the study area. Two Dams are classified as a significant hazard and one is a high hazard classification.

- Four At-Risk Essential Facilities were identified using FEMA's HAZUS tool. Facilities are: Council High School, Hurley High School, Hurley Middle School, and the Knox Creek Volunteer Fire Department.

- Pinched flow points or restricted stream flow locations were not identified upon review of Buchanan County's effective Special Flood Hazard Area shapefile.

- According to the Cumberland Plateau Planning District Commission's Plan's last update, flooding was identified as a high risk. Buchanan County adopted a floodplain ordinance and designated a local floodplain administrator, but does not have higher local regulatory ordinance requirements.

- Other areas of mitigation success include removing or flood proofing approximately 100 homes which were damaged in 2002 in Hurley, VA. Buchanan County received emergency funding from the VA Department of Housing for $2,275,000.00.

L. Tazewell County, VA (CID 510610)

Tazewell County is partially located within the Appalachian Mountains of southwest Virginia. Similar to other counties within the Tug Fork Watershed, Tazewell's terrain is mountainous with primarily rural development including infrastructure built along flat areas surrounding floodplains. Flash flooding continues to be a reoccurring threat to homes, infrastructure, and public safety.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Tazewell County, VA	510160	45,078	9.6	520	9.4	Y	10	Y

- Participating in the Cumberland Plateau Planning District Commission's Plan which expires in 2018
- Past Federal Disaster Declarations for flooding = 9 within Tazewell County
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = *161 policies totaling approximately $25,096,600.00*
- NFIP-recognized repetitive loss properties = *unknown*
- NFIP-recognized severe repetitive loss properties = *unknown*

Data provided below only includes the areas within Tazewell County, which intersects the Tug Fork Watershed Flood Risk Project, and does not represent county-wide totals. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used to generate results for this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Non-regulatory products were not created for Tazewell County, VA as part of the Tug Fork watershed Risk MAP project. Community analysis was limited to AOMI data collection and review of the Cumberland Plateau Planning District Commission's Multi-Jurisdiction Hazard Mitigation Plan applicable to Tazewell County's study area.

Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- Additional information and data layers provided within the FRD should be used to further isolate areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of flooding should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - Tazewell County, Virginia's flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized ($/yr)	
	Estimated Value	% of Total	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]
Residential Building/Contents	221428000	95	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Commercial Building/Contents	4614000	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Other Building/Contents	6949000	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Building/Contents[2]	232991000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Business Disruption[3]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL[4]	232991000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- ***Areas of Mitigation Interest***
  - Section III. B..4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	***0***	***Kentucky Division of Water/National Inventory of Dams***
Levee	***0***	***USACE National Levee Database***
Stream Flow Pinch Point/Constrictions	***0***	***Local public works, engineering models***
Significant Land Use Changes	***0***	***Local planning divisions***
Past Claims Hot Spot	***0***	***State NFIP***
At Risk Essential Facilities	***0***	***HAZUS Report***
Other Flood Risk Areas	***0***	***Big Sandy Area Development District***
Area of Mitigation Success	***0***	***State Hazard Mitigation Officer***

Other	***0***	***USACE (Section 202 Flood Control Measres)***

- No AOMI data points were identified for Tazewell County.

- According to the Cumberland Plateau Planning District Commission's Plan's last update, flooding was identified as a high risk. Tazewell County adopted a floodplain ordinance and designated a local floodplain administrator. This plan is intended to fulfill the CRS planning requirement should the City decide to enter the CRS.

- Tazewell County developed and adopted a Comprehensive Plan in 2008. The plan provides the future vision for the community regarding growth and development. Hazard mitigation planning is not specifically addressed in the plan.

M. Region III - West Virginia Communities

Tug Fork Watershed communities within West Virginia include: City of Gary, City of Welch, City of Williamstown, McDowell County, Mercer County, Mingo County, Town of Anawalt, Town of Bradshaw, Town of Davy, Town of Delbarton, Town of Fort Gay, Town of Iaeger, Town of Kermit, Town of Keystone, Town of Kimball, Town of Matewan, Town of McDowell, Town of Northfork, Town of War, and Wayne County.

N. City of Gary, WV (CID 540117)

The City of Gary is located alone the Tug Fork in McDowell County, WV. The corporate limits of Gary are intersected by the Tug River and many tributaries. State Route 103 is the main thoroughfare which spans the width of the corporate area.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
City of Gary, WV	540117	761	*100*	*0.87*	100	Y	10	Y

- Participating in the Region 1 Planning and Development Council Multi-Jurisdictional Hazard Mitigation Plan which expires 2017
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = 21 policies totaling approximately $2,864,400
- NFIP-recognized repetitive loss properties = *0*
- NFIP-recognized severe repetitive loss properties = *0*

Data provided below only includes areas within the City of Gary, located within the Tug Fork Watershed Flood Risk Project. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used to generate results for this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Changes since Last FIRM values were not produced for this area of the watershed study. Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Flood Depths**

- See the FRD for the following depth grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):

  - Multi-frequency flood depth grid (1-percent-annual-chance flood event) provided by FEMA Region III's Mapping Partner.

- Additional information and data layers provided within the FRD should be used to further isolate areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of flooding should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**

  - The City of Gary's flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized ($/yr)	
	Estimated Value	% of Total	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]
Residential Building/Contents	78661000	73.8	*N/A*	*N/A*	*N/A*	*N/A*	413000	0.5	*N/A*	*N/A*	*N/A*	*N/A*
Commercial Building/Contents	9992000	9.4	*N/A*	*N/A*	*N/A*	*N/A*	12000	0.1	*N/A*	*N/A*	*N/A*	*N/A*
Other Building/Contents	17863000	16.8	*N/A*	*N/A*	*N/A*	*N/A*	1000	0	*N/A*	*N/A*	*N/A*	*N/A*
Total Building/Contents[2]	106516000	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	426000	0.4	*N/A*	*N/A*	*N/A*	*N/A*
Business Disruption[3]	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	1000	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
TOTAL[4]	106516000	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	427000	0.4	*N/A*	*N/A*	*N/A*	*N/A*

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- ***Areas of Mitigation Interest***

  - Section III.B.4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	*0*	*Kentucky Division of Water/National Inventory of Dams*
Levee	*0*	*USACE National Levee Database*
Stream Flow Pinch Point/Constrictions	*0*	*Local public works, engineering models*
Significant Land Use Changes	*0*	*Local planning divisions*
Past Claims Hot Spot	*0*	*State NFIP*
At Risk Essential Facilities	*0*	*HAZUS Report*
Other Flood Risk Areas	*0*	*Big Sandy Area Development District*
Area of Mitigation Success	*0*	*State Hazard Mitigation Officer*
Other	*0*	*USACE (Section 202 Flood Control Measres)*

- Zero Areas of Mitigation Interest were identified for the City of Gary, West Virginia during this study.

O. City of War, WV (CID 540122)

The City of War is the southernmost city in the state of West Virginia. Small in both square area and population, War was previously known as Miner's City. Its name is derived from War Creek, whose confluence with Dry Fork is located within the city.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
City of War, WV	540122	793	100	0.92	100	Y	N/A	Y

- Participating in the Region 1 Planning and Development Council Multi-Jurisdictional Hazard Mitigation Plan which expires 2017
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = 13 policies totaling approximately $2,098,700.00
- NFIP-recognized repetitive loss properties = *0*
- NFIP-recognized severe repetitive loss properties = *0*

Data provided below only includes areas within the City of War, located within the Tug Fork Watershed Flood Risk Project. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used to generate results for this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Changes since Last FIRM values were not produced for this area of the watershed study. Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Flood Depths**
  - See the FRD for the following depth grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grid (1-percent-annual-chance flood event) provided by FEMA Region III's Mapping Partner.
  - Additional information and data layers provided within the FRD should be used to further isolate areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to

experience some depth of flooding should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - The Town of War's risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized ($/yr)	
	Estimated Value	% of Total	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]
Residential Building/Contents	50966000	96.1	N/A	N/A	N/A	N/A	16000	0	N/A	N/A	N/A	N/A
Commercial Building/Contents	1372000	2.6	N/A	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A
Other Building/Contents	678000	1.3	N/A	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A
Total Building/Contents[2]	53016000	N/A	N/A	N/A	N/A	N/A	16000	0	N/A	N/A	N/A	N/A
Business Disruption[3]	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A
TOTAL[4]	53016000	N/A	N/A	N/A	N/A	N/A	16000	0	N/A	N/A	N/A	N/A

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- ***Areas of Mitigation Interest***
  - Section III. B 4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	*0*	*Kentucky Division of Water/National Inventory of Dams*
Levee	*0*	*USACE National Levee Database*
Stream Flow Pinch Point/Constrictions	*0*	*Local public works, engineering models*
Significant Land Use Changes	*0*	*Local planning divisions*
Past Claims Hot Spot	*0*	*State NFIP*
At Risk Essential Facilities	*1*	*HAZUS Report*
Other Flood Risk Areas	*0*	*Big Sandy Area Development District*

Area of Mitigation Success	***0***	***State Hazard Mitigation Officer***
Other	***0***	***USACE (Section 202 Flood Control Measres)***

- Provided by FEMA's HAZUS Report, a Volunteer Fire Department is located within the city's limits.

P. City of Welch, WV (CID 540123)

The City of Welch is located within McDowell County, West Virginia at the confluence of the Tug and Elkhorn rivers. Welch has a history of repeat flooding. Record flooding in 2001 and 2002 nearly destroyed the city.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
City of Welch, WV	540123	2,720	100	6.04	100	Y	10	Y

- Participating in the Region 1 Planning and Development Council Multi-Jurisdictional Hazard Mitigation Plan which expires 2017
- *National Flood Insurance Program (NFIP) policy coverage (policies/value) = 133 policies totaling approximately $17,553,800*
- NFIP-recognized repetitive loss properties = *30*
- NFIP-recognized severe repetitive loss properties = *0*

Data provided below only includes areas within the City of Welch, located within the Tug Fork Watershed Flood Risk Project. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used to generate results for this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Changes since Last FIRM values were not produced for this area of the watershed study. Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Flood Depths**
  - See the FRD for the following depth grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grid (1-percent-annual-chance flood event) provided by FEMA Region III's Mapping Partner.
  - Additional information and data layers provided within the FRD should be used to further isolate areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to

experience some depth of flooding should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - The *City of Welch's* flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized ($/yr)	
	Estimated Value	% of Total	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]
Residential Building/Contents	203789000	55.2	N/A	N/A	N/A	N/A	379000	0.2	N/A	N/A	N/A	N/A
Commercial Building/Contents	104447000	28.3	N/A	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A
Other Building/Contents	60947000	16.5	N/A	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A
Total Building/Contents[2]	369183000	N/A	N/A	N/A	N/A	N/A	379000	0.1	N/A	N/A	N/A	N/A
Business Disruption[3]	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A
TOTAL[4]	369183000	N/A	N/A	N/A	N/A	N/A	379000	0.1	N/A	N/A	N/A	N/A

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- ***Areas of Mitigation Interest***
  - Section III. B. .4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	***0***	***Kentucky Division of Water/National Inventory of Dams***
Levee	***0***	***USACE National Levee Database***
Stream Flow Pinch Point/Constrictions	***0***	***Local public works, engineering models***
Significant Land Use Changes	***0***	***Local planning divisions***

Past Claims Hot Spot	***0***	***State NFIP***
At Risk Essential Facilities	***2***	***HAZUS Report***
Other Flood Risk Areas	***1***	***Big Sandy Area Development District***
Area of Mitigation Success	***0***	***State Hazard Mitigation Officer***
Other	***0***	***USACE (Section 202 Flood Control Measres)***

- Provided by FEMA's HAZUS Report, the Welch Volunteer Fire Department and Welch Emergency Hospital are listed as At Risk Essential Facilities.
- One site of 'Other Flood Risk Areas' was identified by Region 1 Planning and Development Council. Severe Flooding was documented in 2012. The current effective FIRM indicated no flood hazard at this location.

Q. City of Williamson, WV (CID 540138)

The City of Williamson is the county seat of Mingo County housing the county's largest population. Located close to the Kentucky-West Virginia state border, the city lies along the Tug River, protected by a floodwall. Built in 1977 by the U.S. Army Corps of Engineers, the floodwall separates the city from South Williamson located on the Kentucky side of Tug Fork.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
City of Williamson, WV	540138	3,414	*100*	3.26	100	Y	10	Y

- Participating in the Mingo County Multi-Jurisdictional Hazard Mitigation Plan last updated in 2009
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = 48 policies totaling approximately $9,683,500
- NFIP-recognized repetitive loss properties = *13 residential*
- NFIP-recognized severe repetitive loss properties = *0*

Data provided below only includes areas within the City of Williamson, located within the Tug Fork Watershed Flood Risk Project. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used to generate results for this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Changes Since Last FIRM**

Special Flood Hazard Area (SFHA) boundaries within Williamson, WV were updated based on a combination of new engineering analysis and redelineation using newly acquired LiDAR-based topographic data. The updated modeling produced newly identified flood zone areas and new base flood elevations. The table below summarizes the increases, decreases, and net change of SFHAs for the City of Williamson.

Areas of Change	Total Area (mi2)	Increase (mi2)	Decrease (mi2)	Net Change (mi2)	Net Population	Increase in Population	Increase in Buildings	Decrease in Population	Decrease in Buildings

Area within SFHA	**.210**	**.011**	**-.054**	**-.043**	**Null**	**Null**	**Null**	**Null**	**Null**
Area within Floodway	**.266**	**.046**	**-.096**	**-.050**	**Null**	**Null**	**Null**	**Null**	**Null**

Previous FIRM effective date:
Current FIRM effective date:

- **Flood Depths**
  - See the FRD for the following depth grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grid (1-percent-annual-chance flood event) provided by FEMA Region III's Mapping Partner.
  - Additional information and data layers provided within the FRD should be used to further isolate areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of flooding should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - The City of Williamson*'s* flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		**10% (10-yr)**		**2% (50-yr)**		**1% (100-yr)**		**0.2% (500-yr)**		**Annualized ($/yr)**	
	Estimated Value	**% of Total**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**
Residential Building/Contents	**322255000**	**54.6**	**2835000**	**0.8**	**9221000**	**2.9**	**13829000**	**4.3**	**43714000**	**13.6**	**742000**	**0.2**
Commercial Building/Contents	**174920000**	**29.6**	**3372000**	**1.9**	**24995000**	**14.3**	**36241000**	**20.7**	**71523000**	**40.9**	**1613000**	**0.9**
Other Building/Contents	**93019000**	**15.8**	**1578000**	**1.6**	**14858000**	**16**	**21432000**	**23**	**43260000**	**46.5**	**879000**	**0.9**
Total Building/Contents[2]	**590194000**	*N/A*	**7785000**	**1.3**	**49074000**	**8.3**	**71502000**	**12.1**	**158497000**	**26.9**	**3234000**	**0.5**
Business Disruption[3]	*N/A*	*N/A*	**156000**	*N/A*	**2223000**	*N/A*	**2653000**	*N/A*	**4155000**	*N/A*	**103000**	*N/A*
TOTAL[4]	**590194000**	*N/A*	**7941000**	**1.3**	**51297000**	**8.7**	**74155000**	**12.6**	**162652000**	**27.6**	**3337000**	**0.6**

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- ***Areas of Mitigation Interest***
  - Section III. B. 4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	*0*	*Kentucky Division of Water/National Inventory of Dams*
Levee	*1*	*USACE National Levee Database*
Stream Flow Pinch Point/Constrictions	*0*	*Local public works, engineering models*
Significant Land Use Changes	*0*	*Local planning divisions*
Past Claims Hot Spot	*0*	*State NFIP*
At Risk Essential Facilities	*3*	*HAZUS Report*
Other Flood Risk Areas	*1*	*Big Sandy Area Development District*
Area of Mitigation Success	*0*	*State Hazard Mitigation Officer*
Other	*0*	*USACE (Section 202 Flood Control Measres)*

  - Provided by FEMA's HAZUS Report, 3 Essential Facility sites were identified: the Williamson Volunteer Fire Department, the Chattaroy Volunteer Fire Department, and Williamson Memorial Hospital are located within the city's limits.
  - The City of Williamson is protected by 2 floodwalls. The USACE shapefile spatially represents the protection efforts with 4 separate attributes. The floodwalls are captured in this study's AOMI shapefile as such.
  - 1 Other Flood Risk Area was identified by the USACE. This site is the location of voluntary floodplain acquisition and flood proofing of eligible structures.

R. McDowell County, WV (CID 540114)

McDowell County is the southernmost county in West Virginia. Nationally known for its historic role in the coal mining industry, McDowell's population once reached 100,000 people. Today's population is significantly smaller after the development of mechanized coal harvesting methods. In 2001 and 2002, flash flooding devastated many communities within McDowell, calling attention to the need for flood protection in the Tug Fork Watershed.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
McDowell County, WV	540114	22,178	*100*	*535.21*	100	Y	10	Y

- Participating in the Region 1 Planning and Development Council Multi-Jurisdictional Hazard Mitigation Plan which expires 2017
- Past Federal Disaster Declarations for flooding = 15 within McDowell County.
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = *202 policies totaling approximately $17,657,900*
- NFIP-recognized repetitive loss properties = *39*
- NFIP-recognized severe repetitive loss properties = *0*

Data provided below only includes areas within McDowell County, which intersects the Tug Fork Watershed Flood Risk Project, and does not represent community-wide totals. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used to generate results for this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Changes since Last FIRM values were not produced for this area of the watershed study. Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Flood Depths**
  - See the FRD for the following depth grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grid (1-percent-annual-chance flood event) provided by FEMA Region III's Mapping Partner.

- Additional information and data layers provided within the FRD should be used to further isolate areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of flooding should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - McDowell County*'s* flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized ($/yr)	
	Estimated Value	% of Total	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]
Residential Building/Contents	1289356000	87.8	N/A	N/A	N/A	N/A	19777000	1.5	N/A	N/A	N/A	N/A
Commercial Building/Contents	80124000	5.5	N/A	N/A	N/A	N/A	1118000	1.4	N/A	N/A	N/A	N/A
Other Building/Contents	98803000	6.7	N/A	N/A	N/A	N/A	1453000	1.5	N/A	N/A	N/A	N/A
Total Building/Contents[2]	1468283000	N/A	N/A	N/A	N/A	N/A	22348000	1.5	N/A	N/A	N/A	N/A
Business Disruption[3]	N/A	N/A	N/A	N/A	N/A	N/A	155000	N/A	N/A	N/A	N/A	N/A
TOTAL[4]	1468283000	N/A	N/A	N/A	N/A	N/A	22503000	1.5	N/A	N/A	N/A	N/A

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- ***Areas of Mitigation Interest***
  - Section III.B. 4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	***13***	***Kentucky Division of Water/National Inventory of Dams***
Levee	***0***	***USACE National Levee Database***

Stream Flow Pinch Point/Constrictions	***0***	***Local public works, engineering models***
Significant Land Use Changes	***0***	***Local planning divisions***
Past Claims Hot Spot	***0***	***State NFIP***
At Risk Essential Facilities	***8***	***HAZUS Report***
Other Flood Risk Areas	***0***	***Big Sandy Area Development District***
Area of Mitigation Success	***0***	***State Hazard Mitigation Officer***
Other	***2***	***USACE (Section 202 Flood Control Measres)***

- 23 Areas of Mitigation Interest were identified for McDowell County during this study. Provided by FEMA's HAZUS Report, 8 Essential Facility sites were identified: Davy, Iaeger, Coalwood, Caretta, Roderfield, Northfork, Berwing, Raysal, and McDowell County Volunteer Fire Departments.
- 2 Other Flood Risk Areas were identified by the USACE. This site is the location of voluntary floodplain acquisition and flood proofing of eligible structures.
- Provided by the 2010 Nation Inventory of Dams, 13 dams are located within McDowell County.

S. Mercer County, WV (CID 540124)

Mercer County, West Virginia touches the easternmost portion of the Tug Watershed and is located on the Virginia, West Virginia border.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Mercer County, WV	540124	*62,523*	0.7	2.8	0.68	Y	10	Y

- Participating in the Region 1 Planning and Development Council Multi-Jurisdictional Hazard Mitigation Plan which expires 2017
- Past Federal Disaster Declarations for flooding = 14 within Mercer County
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = *274 policies totaling approximately $33,818,100*
- NFIP-recognized repetitive loss properties = *44*
- NFIP-recognized severe repetitive loss properties = *0*

Data provided below only includes areas within Mercer County, which intersects the Tug Fork Watershed Flood Risk Project, and does not necessarily represent county-wide totals. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used to generate results for this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Changes since Last FIRM values were not produced for this area of the watershed study. Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Flood Depths**
  - See the FRD for the following depth grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grid (1-percent-annual-chance flood event) provided by FEMA Region III's Mapping Partner.
  - Additional information and data layers provided within the FRD should be used to further isolate areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to

experience some depth of flooding should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - Mercer County*'s* flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized ($/yr)	
	Estimated Value	% of Total	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]
Residential Building/Contents	**29178000**	**84.2**	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
Commercial Building/Contents	**1936000**	**5.6**	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
Other Building/Contents	**3538000**	**10.2**	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
Total Building/Contents[2]	**34652000**	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
Business Disruption[3]	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
TOTAL[4]	**34652000**	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- ***Areas of Mitigation Interest***
  - Section III.B. 4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	***0***	***Kentucky Division of Water/National Inventory of Dams***
Levee	***0***	***USACE National Levee Database***
Stream Flow Pinch Point/Constrictions	***0***	***Local public works, engineering models***
Significant Land Use Changes	***0***	***Local planning divisions***
Past Claims Hot Spot	***0***	***State NFIP***

At Risk Essential Facilities	***0***	***HAZUS Report***
Other Flood Risk Areas	***0***	***Big Sandy Area Development District***
Area of Mitigation Success	***0***	***State Hazard Mitigation Officer***
Other	***0***	***USACE (Section 202 Flood Control Measres)***

- Zero Areas of Mitigation Interest were identified for the City of Gary, West Virginia during this study.

T. Mingo County, WV (CID 540133)

Mingo County is located in southern West Virginia, bordering the state of Kentucky along the Tug Fork. Mingo County contains five municipalities: the towns of Delbarton, Gilbert, Kermit, Matewan and also the City of Williamson. Two Kentucky counties, Pike and Martin, share the western border of Mingo County.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Mingo County, WV	540133	26,839	75.5	423.11	**72.3**	**Y**	**10**	**Y**

- Participating in the Mingo County Multi-Jurisdictional Hazard Mitigation Plan last updated in 2009
- Past Federal Disaster Declarations for flooding = 23 within Mingo County
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = *494 policies totaling approximately $64,514,200*
- NFIP-recognized repetitive loss properties = *67*
- NFIP-recognized severe repetitive loss properties = *0*

Data provided below only includes areas within Mingo County, which intersects the Tug Fork Watershed Flood Risk Project, and do not represent county-wide totals. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used to generate results for this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Changes Since Last FIRM**

Special Flood Hazard Area (SFHA) boundaries within Mingo County, West Virginia updated based on a combination of new engineering analysis and redelineation using newly acquired LiDAR-based topographic data. The updated modeling produced newly identified flood zone areas and new base flood elevations. The table below summarizes the increases, decreases, and net change of SFHAs for Mingo County.

Areas of Change	Total Area (mi2)	Increase (mi2)	Decrease (mi2)	Net Change (mi2)	Net Population	Increase in Population	Increase in Buildings	Decrease in Population	Decrease in Buildings

Area within SFHA	**3.752**	**.170**	**-.427**	**-.257**	**Null**	**Null**	**Null**	**Null**	**Null**
Area within Floodway	**3.058**	**.557**	**-.360**	**.197**	**Null**	**Null**	**Null**	**Null**	**Null**

Previous FIRM effective date:
Current FIRM effective date:

- **Flood Depths**
  - See the FRD for the following depth grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grid (1-percent-annual-chance flood event) provided by FEMA Region III's Mapping Partner.
  - Additional information and data layers provided within the FRD should be used to further isolate these and other areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of flooding should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - Mingo County's flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		**10% (10-yr)**		**2% (50-yr)**		**1% (100-yr)**		**0.2% (500-yr)**		**Annualized ($/yr)**	
	Estimated Value	**% of Total**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**
Residential Building/Contents	**1127179000**	**79.4**	**13215000**	**1.1**	**17425000**	**1.5**	**23594000**	**2.1**	**28690000**	**2.5**	**1609000**	**0.1**
Commercial Building/Contents	**155699000**	**11**	**505000**	**0.3**	**727000**	**0.5**	**1245000**	**0.8**	**1142000**	**0.7**	**64000**	**0**
Other Building/Contents	**136933000**	**9.6**	**1567000**	**1.1**	**1293000**	**0.9**	**1671000**	**1.2**	**3159000**	**2.3**	**176000**	**0.1**
Total Building/Contents[2]	**1419811000**	*N/A*	**15287000**	**1**	**19445000**	**1.4**	**26510000**	**1.9**	**32991000**	**2.3**	**1849000**	**0.1**
Business Disruption[3]	*N/A*	*N/A*	**82000**	*N/A*	**117000**	*N/A*	**156000**	*N/A*	**177000**	*N/A*	**8000**	*N/A*
TOTAL[4]	**1419811000**	*N/A*	**15369000**	**1**	**19562000**	**1.4**	**26666000**	**1.9**	**33168000**	**2.3**	**1857000**	**0.1**

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.

[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- ***Areas of Mitigation Interest***
  - Section III.B. 4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	*8*	*Kentucky Division of Water/National Inventory of Dams*
Levee	*0*	*USACE National Levee Database*
Stream Flow Pinch Point/Constrictions	*3*	*Local public works, engineering models*
Significant Land Use Changes	*0*	*Local planning divisions*
Past Claims Hot Spot	*0*	*State NFIP*
At Risk Essential Facilities	*4*	*HAZUS Report*
Other Flood Risk Areas	*0*	*Big Sandy Area Development District*
Area of Mitigation Success	*0*	*State Hazard Mitigation Officer*
Other	*3*	*USACE (Section 202 Flood Control Measres)*

  - 18 Areas of Mitigation Interest were identified for Mingo County during this study. Provided by FEMA's HAZUS Report, 4 Essential Facilities were identified: the Delbarton, Beech Creek, Baisden, and Lenore Volunteer Fire Department are located within the city's limits.
  - 3 Other Flood Risk Area was identified by the USACE: Sites of voluntary floodplain acquisition, design and construction assistance for water related environmental infrastructure and resource protection and development for 17 counties in southern W, and a non-structural project along the Tug River.
  - Provided by the 2010 Nation Inventory of Dams, 8 dams are located within Mingo County.

U. Wayne County, WV (CID 540200)

Wayne County is the westernmost county in West Virginia. Wayne is located on the boarder of Kentucky and West Virginia, separated by the waters of the Tug Fork. The communities of Ceredo, Fort Gay, Kenova, Wayne, and part of Huntington are located with Wayne County.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Wayne County, WV	540200	41,649	13.5	512	15.7	Y	10	Y

- Participating in the Wayne County Multi-Jurisdictional Hazard Mitigation Plan (updated in 2009)
- Past Federal Disaster Declarations for flooding = 17 within Wayne County
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = *297 policies totaling approximately $35,985,000*
- NFIP-recognized repetitive loss properties = *238*
- NFIP-recognized severe repetitive loss properties = *0*

Data provided below only includes areas within Wayne County, which intersects the Tug Fork Watershed Flood Risk Project, and does not represent county-wide totals. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used to generate results for this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Changes Since Last FIRM**

Special Flood Hazard Area (SFHA) boundaries within Wayne County, West Virginia were updated based on a combination of new engineering analysis and redelineation using newly acquired LiDAR-based topographic data. The updated modeling produced newly identified flood zone areas and new base flood elevations. The table below summarizes the increases, decreases, and net change of SFHAs for Wayne County.

Areas of Change	Total Area (mi2)	Increase (mi2)	Decrease (mi2)	Net Change (mi2)	Net Population	Increase in Population	Increase in Buildings	Decrease in Population	Decrease in Buildings
Area within SFHA	**2.126**	**.118**	**-.072**	**.046**	**Null**	**Null**	**Null**	**Null**	**Null**

Area within Floodway	**1.520**	**.226**	**-.206**	**.020**	**Null**	**Null**	**Null**	**Null**	**Null**

Previous FIRM effective date:
Current FIRM effective date:

- **Flood Depths**
  - See the FRD for the following depth grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grid (1-percent-annual-chance flood event) provided by FEMA Region III's Mapping Partner.
  - Additional information and data layers provided within the FRD should be used to further isolate areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of flooding should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - Wayne County's flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		**10% (10-yr)**		**2% (50-yr)**		**1% (100-yr)**		**0.2% (500-yr)**		**Annualized ($/yr)**	
	Estimated Value	**% of Total**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**
Residential Building/Contents	**299642000**	**91.9**	**10117000**	**3.3**	**12903000**	**4.3**	**15080000**	**5**	**19004000**	**6.3**	**1189000**	**0.4**
Commercial Building/Contents	**11900000**	**3.6**	**0**	**0**	**2000**	**0**	**108000**	**0.9**	**10000**	**0.1**	**0**	**0**
Other Building/Contents	**14644000**	**4.5**	**3000**	**0**	**6000**	**0**	**22000**	**0.2**	**24000**	**0.2**	**0**	**0**
Total Building/Contents[2]	**326186000**	*N/A*	**10120000**	**3.1**	**12911000**	**4**	**15210000**	**4.7**	**19038000**	**5.8**	**1189000**	**0.4**
Business Disruption[3]	*N/A*	*N/A*	**1000**	*N/A*	**2000**	*N/A*	**2000**	*N/A*	**5000**	*N/A*	**0**	*N/A*
TOTAL[4]	**326186000**	*N/A*	**10121000**	**3.1**	**12913000**	**4**	**15212000**	**4.7**	**19043000**	**5.8**	**1189000**	**0.4**

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- ***Areas of Mitigation Interest***
  - Section III. B. 4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	***0***	***Kentucky Division of Water/National Inventory of Dams***
Levee	***0***	***USACE National Levee Database***
Stream Flow Pinch Point/Constrictions	***3***	***Local public works, engineering models***
Significant Land Use Changes	***0***	***Local planning divisions***
Past Claims Hot Spot	***0***	***State NFIP***
At Risk Essential Facilities	***1***	***HAZUS Report***
Other Flood Risk Areas	***0***	***Big Sandy Area Development District***
Area of Mitigation Success	***0***	***State Hazard Mitigation Officer***
Other	***0***	***USACE (Section 202 Flood Control Measres)***

  - 4 Areas of Mitigation Interest was identified for the portion of Wayne County analyzed during this study. Provided by FEMA's HAZUS Report, 1 Essential Facility sites were identified: the Kermit Volunteer Fire Department.
  - 3 Streamflow Constrictions were visually identified by the Mapping Partner. They are identifies under the Areas of Mitigation Interest 'Type.'

V. Town of Anawalt, WV (CID 540115)

The Town of Anawalt is located in the easternmost portion of the Tug Fork Watershed near the confluence of Tug Fork and Little Creek.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Town of Anawalt, WV	540115	262	100	0.57	100	Y	10	Y

- Participating in the Region 1 Planning and Development Council Multi-Jurisdictional Hazard Mitigation Plan which expires *2017*
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = *3 policies totaling approximately $225,800*
- NFIP-recognized repetitive loss properties = *2*
- NFIP-recognized severe repetitive loss properties = *0*

Data provided below only includes areas within Town of Anawalt, located within the Tug Fork Watershed Flood Risk Project. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used to generate results for this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Changes since Last FIRM values were not produced for this area of the watershed study. Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Flood Depths**
  - See the FRD for the following depth grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grid (1-percent-annual-chance flood event) provided by FEMA Region III's Mapping Partner.
  - Additional information and data layers provided within the FRD should be used to further isolate areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of flooding should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - The City of Anawalt's flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized ($/yr)	
	Estimated Value	% of Total	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]
Residential Building/Contents	17810000	87.1	N/A	N/A	N/A	N/A	20000	0.1	N/A	N/A	N/A	N/A
Commercial Building/Contents	822000	4	N/A	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A
Other Building/Contents	1812000	8.9	N/A	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A
Total Building/Contents[2]	20444000	N/A	N/A	N/A	N/A	N/A	20000	0.1	N/A	N/A	N/A	N/A
Business Disruption[3]	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A
TOTAL[4]	20444000	N/A	N/A	N/A	N/A	N/A	20000	0.1	N/A	N/A	N/A	N/A

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- ***Areas of Mitigation Interest***
  - Section III. B. 4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	*0*	*Kentucky Division of Water/National Inventory of Dams*
Levee	*0*	*USACE National Levee Database*
Stream Flow Pinch Point/Constrictions	*0*	*Local public works, engineering models*
Significant Land Use Changes	*0*	*Local planning divisions*
Past Claims Hot Spot	*0*	*State NFIP*
At Risk Essential Facilities	*0*	*HAZUS Report*
Other Flood Risk Areas	*0*	*Big Sandy Area Development District*
Area of Mitigation Success	*0*	*State Hazard Mitigation Officer*
Other	*0*	*USACE (Section 202 Flood Control Measres)*

- Zero Areas of Mitigation Interest were identified for the City of Anawalt, West Virginia during this study.

W. Town of Bradshaw, WV (CID 540291)

The Town of Bradshaw is a small community located in southwestern McDowell County at the confluence of Dry Fork River and Bradshaw Creek. The Town of Bradshaw has experienced multiple flooding events.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Town of Bradshaw, WV	540291	289	100	0.8	100	Y	10	Y

- Participating in the Region 1 Planning and Development Council Multi-Jurisdictional Hazard Mitigation Plan which expires *2017*
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = *5 policies totaling approximately $2,630,000*
- NFIP-recognized repetitive loss properties = *0*
- NFIP-recognized severe repetitive loss properties = *0*

Data provided below only includes areas within the Town of Bradshaw, located within the Tug Fork Watershed Flood Risk Project. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used to generate results for this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Changes since Last FIRM values were not produced for this area of the watershed study. Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Flood Depths**
  - See the FRD for the following depth grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grid (1-percent-annual-chance flood event) provided by FEMA Region III's Mapping Partner.
  - Additional information and data layers provided within the FRD should be used to further isolate areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of flooding should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - The *Town of Bradshaw's* flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized ($/yr)	
	Estimated Value	% of Total	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]
Residential Building/Contents	18170000	79	N/A	N/A	N/A	N/A	137000	0.8	N/A	N/A	N/A	N/A
Commercial Building/Contents	130000	0.6	N/A	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A
Other Building/Contents	4686000	20.4	N/A	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A
Total Building/Contents[2]	22986000	N/A	N/A	N/A	N/A	N/A	137000	0.6	N/A	N/A	N/A	N/A
Business Disruption[3]	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A
TOTAL[4]	22986000	N/A	N/A	N/A	N/A	N/A	137000	0.6	N/A	N/A	N/A	N/A

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- ***Areas of Mitigation Interest***
  - Section III. B. 4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	***0***	***Kentucky Division of Water/National Inventory of Dams***
Levee	***0***	***USACE National Levee Database***
Stream Flow Pinch Point/Constrictions	***0***	***Local public works, engineering models***
Significant Land Use Changes	***0***	***Local planning divisions***
Past Claims Hot Spot	***0***	***State NFIP***
At Risk Essential Facilities	***1***	***HAZUS Report***
Other Flood Risk Areas	***0***	***Big Sandy Area Development District***
Area of Mitigation Success	***0***	***State Hazard Mitigation Officer***
Other	***0***	***USACE (Section 202 Flood Control Measres)***

  - The site of the Bradshaw Volunteer Fire Department was the only Essential Facility identified.

X. Town of Davy, WV (CID 540116)

The Town of Davy is located within McDowell County, West Virginia. It is a mostly residential community in a coal mining district along the main line of the Norfolk Southern Railway.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Town of Davy, WV	540116	373	100	1.29	100	Y	10	Y

- Participating in the Region 1 Planning and Development Council Multi-Jurisdictional Hazard Mitigation Plan which expires in 2017
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = *2 policies totaling approximately $104,300*
- NFIP-recognized repetitive loss properties = *1*
- NFIP-recognized severe repetitive loss properties = *0*

Data provided below only includes areas within the Town of Davy, located within the Tug Fork Watershed Flood Risk Project. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used to generate results for this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Changes since Last FIRM values were not produced for this area of the watershed study. Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Flood Depths**
  - See the FRD for the following depth grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grid (1-percent-annual-chance flood event) provided by FEMA Region III's Mapping Partner.
  - Additional information and data layers provided within the FRD should be used to further isolate areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of flooding should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - *Town of Davy's flood* risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized ($/yr)	
	Estimated Value	% of Total	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]
Residential Building/Contents	17777000	90.3	N/A	N/A	N/A	N/A	9000	0.1	N/A	N/A	N/A	N/A
Commercial Building/Contents	350000	1.8	N/A	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A
Other Building/Contents	1552000	7.9	N/A	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A
Total Building/Contents[2]	19679000	N/A	N/A	N/A	N/A	N/A	9000	0	N/A	N/A	N/A	N/A
Business Disruption[3]	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A
TOTAL[4]	19679000	N/A	N/A	N/A	N/A	N/A	9000	0	N/A	N/A	N/A	N/A

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- ***Areas of Mitigation Interest***
  - Section III. B. 4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	***0***	***Kentucky Division of Water/National Inventory of Dams***
Levee	***0***	***USACE National Levee Database***
Stream Flow Pinch Point/Constrictions	***0***	***Local public works, engineering models***
Significant Land Use Changes	***0***	***Local planning divisions***
Past Claims Hot Spot	***0***	***State NFIP***
At Risk Essential Facilities	***0***	***HAZUS Report***
Other Flood Risk Areas	***0***	***Big Sandy Area Development District***
Area of Mitigation Success	***0***	***State Hazard Mitigation Officer***
Other	***0***	***USACE (Section 202 Flood Control Measres)***

- Zero Areas of Mitigation Interest were identified for the Town of Davy, West Virginia during this study.

Y. Town of Delbarton, WV (CID 540134)

The Town of Delbarton is located within Mingo County, WV. Residing just east of the City of Williamson, the town is comprised mostly of residential properties. U.S. Route 52 and State Route 65 are the main thoroughfares of the community.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Town of Delbarton, WV	540134	474	100	2.01	100	Y	10	Y

- Mingo County Multi-Jurisdictional Hazard Mitigation Plan last updated in 2009.
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = *18 policies totaling approximately $2,160,400*
- NFIP-recognized repetitive loss properties = *1*
- NFIP-recognized severe repetitive loss properties = *0*

Data provided below only includes areas within the Town of Delbarton, located within the Tug Fork Watershed Flood Risk Project. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used to generate results for this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Changes Since Last FIRM**

Special Flood Hazard Area (SFHA) boundaries within the Town of Delbarton, West Virginia were updated based on a combination of new engineering analysis and redelineation using newly acquired LiDAR-based topographic data. The updated modeling produced newly identified flood zone areas and new base flood elevations. The table below summarizes the increases, decreases, and net change of SFHAs for Delbarton.

Areas of Change	Total Area (mi2)	Increase (mi2)	Decrease (mi2)	Net Change (mi2)	Net Population	Increase in Population	Increase in Buildings	Decrease in Population	Decrease in Buildings
Area within SFHA	**.049**	**0**	**0**	**0**	**Null**	**Null**	**Null**	**Null**	**Null**

Area within Floodway	**.059**	**0**	**0**	**0**	**Null**	**Null**	**Null**	**Null**	**Null**

Previous FIRM effective date:
Current FIRM effective date:

- **Flood Depths**
  - See the FRD for the following depth grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grid (1-percent-annual-chance flood event) provided by FEMA Region III's Mapping Partner.
  - Additional information and data layers provided within the FRD should be used to further isolate areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of flooding should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - The *Town of Davey's* flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		**10% (10-yr)**		**2% (50-yr)**		**1% (100-yr)**		**0.2% (500-yr)**		**Annualized ($/yr)**	
	Estimated Value	**% of Total**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**
Residential Building/Contents	**32264000**	**66.1**	*N/A*	*N/A*	*N/A*	*N/A*	**4000**	**0**	*N/A*	*N/A*	*N/A*	*N/A*
Commercial Building/Contents	**8008000**	**16.4**	*N/A*	*N/A*	*N/A*	*N/A*	**18000**	**0.2**	*N/A*	*N/A*	*N/A*	*N/A*
Other Building/Contents	**8503000**	**17.4**	*N/A*	*N/A*	*N/A*	*N/A*	**8000**	**0.1**	*N/A*	*N/A*	*N/A*	*N/A*
Total Building/Contents[2]	**48775000**	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	**30000**	**0.1**	*N/A*	*N/A*	*N/A*	*N/A*
Business Disruption[3]	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	**0**	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
TOTAL[4]	**32264000**	**66.1**	*N/A*	*N/A*	*N/A*	*N/A*	**4000**	**0**	*N/A*	*N/A*	*N/A*	*N/A*

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption

[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- ***Areas of Mitigation Interest***
  - Section III. B. 4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	***0***	***Kentucky Division of Water/National Inventory of Dams***
Levee	***0***	***USACE National Levee Database***
Stream Flow Pinch Point/Constrictions	***0***	***Local public works, engineering models***
Significant Land Use Changes	***0***	***Local planning divisions***
Past Claims Hot Spot	***0***	***State NFIP***
At Risk Essential Facilities	***0***	***HAZUS Report***
Other Flood Risk Areas	***0***	***Big Sandy Area Development District***
Area of Mitigation Success	***0***	***State Hazard Mitigation Officer***
Other	***0***	***USACE (Section 202 Flood Control Measres)***

  - Zero Areas of Mitigation Interest were identified for the Town of Delbarton during this study.

Z. Town of Fort Gay, WV (CID 540202)

The Town of Fort Gay is located in Wayne County, West Virginia along the Kentucky- West Virginia border. Fort Gay is adjacent to Louisa, Kentucky near the confluence of Levisa Fork and Tug Fork.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Town of Fort Gay, WV	540202	775	100	0.89	100	Y	10	Y

- Participating in the Wayne County Multi-Jurisdictional Hazard Mitigation Plan (updated in 2009)
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = *10 policies totaling approximately $1,139,100*
- NFIP-recognized repetitive loss properties = *1*
- NFIP-recognized severe repetitive loss properties = *0*

Data provided below only includes areas within the Town of Fort Gay, located within the Tug Fork Watershed Flood Risk Project. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used to generate results for this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Changes Since Last FIRM**

Special Flood Hazard Area (SFHA) boundaries within the town of Fort Gay, West Virginia were updated based on a combination of new engineering analysis and redelineation using newly acquired LiDAR-based topographic data. The updated modeling produced newly identified flood zone areas and new base flood elevations. The table below summarizes the increases, decreases, and net change of SFHAs for Fort Gay.

Areas of Change	Total Area (mi2)	Increase (mi2)	Decrease (mi2)	Net Change (mi2)	Net Population	Increase in Population	Increase in Buildings	Decrease in Population	Decrease in Buildings
Area within SFHA	**.127**	**.004**	**-.052**	**-.048**	**Null**	**Null**	**Null**	**Null**	**Null**

Area within Floodway	**.060**	**.001**	**-.001**	**0**	**Null**	**Null**	**Null**	**Null**	**Null**

Previous FIRM effective date:
Current FIRM effective date:

- **Flood Depths**
  - See the FRD for the following depth grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grid (1-percent-annual-chance flood event) provided by FEMA Region III's Mapping Partner.
  - Additional information and data layers provided within the FRD should be used to further isolate areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of flooding should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - The *Town of Fort Gay's* flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		**10% (10-yr)**		**2% (50-yr)**		**1% (100-yr)**		**0.2% (500-yr)**		**Annualized ($/yr)**	
	Estimated Value	**% of Total**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**
Residential Building/Contents	**49581000**	**62.5**	**3340000**	**6.7**	**5992000**	**12.1**	**6432000**	**13**	**13477000**	**27.2**	**493000**	**1**
Commercial Building/Contents	**13567000**	**17.1**	**2668000**	**19.6**	**4279000**	**31.5**	**4661000**	**34.4**	**7305000**	**53.8**	**363000**	**2.7**
Other Building/Contents	**16193000**	**20.4**	**3093000**	**19.1**	**3283000**	**20.3**	**3553000**	**21.9**	**7314000**	**45.2**	**415000**	**2.6**
Total Building/Contents[2]	**79341000**	*N/A*	**9101000**	**11.4**	**13554000**	**17.1**	**14646000**	**18.5**	**28096000**	**35.4**	**1271000**	**1.6**
Business Disruption[3]	*N/A*	*N/A*	**219000**	*N/A*	**311000**	*N/A*	**335000**	*N/A*	**495000**	*N/A*	**21000**	*N/A*
TOTAL[4]	**79341000**	*N/A*	**9320000**	**11.7**	**13865000**	**17.5**	**14981000**	**18.9**	**28591000**	**36**	**1292000**	**1.6**

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption

[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- ***Areas of Mitigation Interest***
  - Section III. B. 4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	*0*	*Kentucky Division of Water/National Inventory of Dams*
Levee	*0*	*USACE National Levee Database*
Stream Flow Pinch Point/Constrictions	*0*	*Local public works, engineering models*
Significant Land Use Changes	*0*	*Local planning divisions*
Past Claims Hot Spot	*0*	*State NFIP*
At Risk Essential Facilities	*1*	*HAZUS Report*
Other Flood Risk Areas	*0*	*Big Sandy Area Development District*
Area of Mitigation Success	*0*	*State Hazard Mitigation Officer*
Other	*0*	*USACE (Section 202 Flood Control Measres)*

  - The site of the Fort Gay Volunteer Fire Department was the onle Essential Facility identified.

AA. Town of Iaeger, WV (CID 540118)

The Town of Iaeger is located in McDowell County, West Virginia.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Town of Iaeger, WV	540118	358	100	0.83	100	Y	10	Y

- Participating in the Region 1 Planning and Development Council Multi-Jurisdictional Hazard Mitigation Plan which expires *2017*
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = *11 policies totaling approximately $1,932,200*
- NFIP-recognized repetitive loss properties = *2*
- NFIP-recognized severe repetitive loss properties = *0*

Data provided below only includes areas within the Town of Iaeger, located within the Tug Fork Watershed Flood Risk Project. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used to generate results for this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Changes since Last FIRM values were not produced for this area of the watershed study. Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Flood Depths**
  - See the FRD for the following depth grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grid (1-percent-annual-chance flood event) provided by FEMA Region III's Mapping Partner.
  - Additional information and data layers provided within the FRD should be used to further isolate areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of flooding should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - The *Town of Iaeger's* flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized ($/yr)	
	Estimated Value	% of Total	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]
Residential Building/Contents	24775000	90.4	N/A	N/A	N/A	N/A	49000	0.2	N/A	N/A	N/A	N/A
Commercial Building/Contents	1570000	5.7	N/A	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A
Other Building/Contents	1048000	3.8	N/A	N/A	N/A	N/A	1000	0.1	N/A	N/A	N/A	N/A
Total Building/Contents[2]	27393000	N/A	N/A	N/A	N/A	N/A	50000	0.2	N/A	N/A	N/A	N/A
Business Disruption[3]	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A
TOTAL[4]	27393000	N/A	N/A	N/A	N/A	N/A	50000	0.2	N/A	N/A	N/A	N/A

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- ***Areas of Mitigation Interest***
  - Section III. B. 4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	***0***	***Kentucky Division of Water/National Inventory of Dams***
Levee	***0***	***USACE National Levee Database***
Stream Flow Pinch Point/Constrictions	***0***	***Local public works, engineering models***
Significant Land Use Changes	***0***	***Local planning divisions***
Past Claims Hot Spot	***0***	***State NFIP***
At Risk Essential Facilities	***0***	***HAZUS Report***
Other Flood Risk Areas	***0***	***Big Sandy Area Development District***
Area of Mitigation Success	***0***	***State Hazard Mitigation Officer***
Other	***0***	***USACE (Section 202 Flood Control Measres)***

- Zero Areas of Mitigation Interest were identified for the Town of Iaeger, West Virginia during this study.

BB. Town of Kermit, WV (CID 540136)

The Town of Kermit is located in north western corner of Mingo County near the Kentucky-West Virginia state line. Kermit is adjacent to Warfield, Kentucky. The communities of Kermit and Warfield, KY are separated by the Tug Fork. Kermit is accessed by U.S. Route 52, a majority of which runs along the border of the two states.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Town of Kermit, WV*	540136	3,202	0.01	0.27	0.00	Y	N/A	Y

- Mingo County Multi-Jurisdictional Hazard Mitigation Plan last updated in 2009.
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = *24 policies totaling approximately $4,791,900*
- NFIP-recognized repetitive loss properties = *3*
- NFIP-recognized severe repetitive loss properties = *0*

Data provided below only includes areas within the *Town of Kermit*, located within the Tug Fork Watershed Flood Risk Project. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used to generate results for this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Changes Since Last FIRM**

Special Flood Hazard Area (SFHA) boundaries within the Town of Kermit, West Virginia were updated based on a combination of new engineering analysis and redelineation using newly acquired LiDAR-based topographic data. The updated modeling produced newly identified flood zone areas and new base flood elevations. The table below summarizes the increases, decreases, and net change of SFHAs for Kermit.

Areas of Change	Total Area (mi2)	Increase (mi2)	Decrease (mi2)	Net Change (mi2)	Net Population	Increase in Population	Increase in Buildings	Decrease in Population	Decrease in Buildings
Area within SFHA	**.054**	**.009**	**-.001**	**.008**	**Null**	**Null**	**Null**	**Null**	**Null**

Area within Floodway	**.031**	**.019**	**-.002**	**.017**	**Null**	**Null**	**Null**	**Null**	**Null**

Previous FIRM effective date:
Current FIRM effective date:

- **Flood Depths**
  - See the FRD for the following depth grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grid (1-percent-annual-chance flood event) provided by FEMA Region III's Mapping Partner.
  - Additional information and data layers provided within the FRD should be used to further isolate areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of flooding should seriously consider mitigation options for implementation.
- **Hazus Estimated Loss Information**
  - The Town of Kermit's flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		**10% (10-yr)**		**2% (50-yr)**		**1% (100-yr)**		**0.2% (500-yr)**		**Annualized ($/yr)**	
	Estimated Value	**% of Total**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**	**Dollar Losses[5]**	**Loss Ratio[1,6]**
Residential Building/Contents	**14418000**	**74**	**667000**	**4.6**	**1126000**	**7.8**	**2522000**	**17.5**	**4157000**	**28.8**	**103000**	**0.7**
Commercial Building/Contents	**4015000**	**20.6**	**0**	**0**	**0**	**0**	**239000**	**6**	**652000**	**16.2**	**5000**	**0.1**
Other Building/Contents	**1052000**	**5.4**	**57000**	**5.4**	**97000**	**9.2**	**275000**	**26.1**	**545000**	**51.8**	**13000**	**1.2**
Total Building/Contents[2]	**19485000**	*N/A*	**724000**	**3.7**	**1223000**	**6.3**	**3036000**	**15.6**	**5354000**	**27.5**	**121000**	**0.6**
Business Disruption[3]	*N/A*	*N/A*	**1000**	*N/A*	**5000**	*N/A*	**13000**	*N/A*	**29000**	*N/A*	**0**	*N/A*
TOTAL[4]	**19485000**	*N/A*	**725000**	**3.7**	**1228000**	**6.3**	**3049000**	**15.6**	**5383000**	**27.6**	**121000**	**0.6**

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.

[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- ***Areas of Mitigation Interest***
  - Section III. B. 4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	*0*	*Kentucky Division of Water/National Inventory of Dams*
Levee	*0*	*USACE National Levee Database*
Stream Flow Pinch Point/Constrictions	*0*	*Local public works, engineering models*
Significant Land Use Changes	*0*	*Local planning divisions*
Past Claims Hot Spot	*0*	*State NFIP*
At Risk Essential Facilities	*1*	*HAZUS Report*
Other Flood Risk Areas	*0*	*Big Sandy Area Development District*
Area of Mitigation Success	*0*	*State Hazard Mitigation Officer*
Other	*1*	*USACE (Section 202 Flood Control Measres)*

  - Two Areas of Mitigation Interest were identified for the Town of Kermit within this study. Only 1 essential facility was identified, the Kermit Volunteer Fire Department.

  - 1 Other Flood Risk Area was identified by the USACE. Structures within the April 1977 floodplain were identified and the USACE began imlpementing a voluntary nonstructural program of floodprooding and acquisition.

CC. Town of Keystone, WV (CID 540119)

The Town of Keystone is located in McDowell County, West Virginia. The Town of Keystone was founded in 1892 by the Keystone Coal & Coke Company. The community is intersected by Elkhorn Creek.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Town of Keystone, WV	540119	435	100	0.32	100	Y	10	Y

- Participating in the Region 1 Planning and Development Council Multi-Jurisdictional Hazard Mitigation Plan which expires *in 2017*
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = *4 policies totaling approximately $152,300*
- NFIP-recognized repetitive loss properties = *2*
- NFIP-recognized severe repetitive loss properties = *0*

Data provided below only includes areas within the Town of Keystone, located within the Tug Fork Watershed Flood Risk Project. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used to generate results for this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Changes since Last FIRM values were not produced for this area of the watershed study. Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Flood Depths**
  - See the FRD for the following depth grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grid (1-percent-annual-chance flood event) provided by FEMA Region III's Mapping Partner.
  - Additional information and data layers provided within the FRD should be used to further isolate areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to

experience some depth of flooding should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - The Town of Keystone's flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized ($/yr)	
	Estimated Value	% of Total	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]
Residential Building/Contents	27424000	100	N/A	N/A	N/A	N/A	11000	0	N/A	N/A	N/A	N/A
Commercial Building/Contents	0	0	N/A	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A
Other Building/Contents	0	0	N/A	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A
Total Building/Contents[2]	27424000	N/A	N/A	N/A	N/A	N/A	11000	0	N/A	N/A	N/A	N/A
Business Disruption[3]	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A
TOTAL[4]	27424000	N/A	N/A	N/A	N/A	N/A	11000	0	N/A	N/A	N/A	N/A

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- ***Areas of Mitigation Interest***
  - Section III. B. 4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	*0*	*Kentucky Division of Water/National Inventory of Dams*
Levee	*0*	*USACE National Levee Database*
Stream Flow Pinch Point/Constrictions	*0*	*Local public works, engineering models*
Significant Land Use Changes	*0*	*Local planning divisions*
Past Claims Hot Spot	*0*	*State NFIP*
At Risk Essential Facilities	*0*	*HAZUS Report*
Other Flood Risk Areas	*0*	*Big Sandy Area Development District*

Area of Mitigation Success	***0***	***State Hazard Mitigation Officer***
Other	***0***	***USACE (Section 202 Flood Control Measres)***

- Zero Areas of Mitigation Interest were identified for the Town of Davy, West Virginia during this study.

DD. Town of Kimball, WV (CID 540120)

The Town of Kimball is located in McDowell County, West Virginia. Kimball is intersected by Elkhorn Creek and Rockhouse Fork. US 52 is the main thoroughfare allowing access to Northfork, WV and Welch, WV.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Town of Kimball, WV	540120	411	100	0.25	100	Y	10	Y

- Participating in the Region 1 Planning and Development Council Multi-Jurisdictional Hazard Mitigation Plan which expires *in 2017*
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = *11 policies totaling approximately $2,380,600*
- NFIP-recognized repetitive loss properties = *0*
- NFIP-recognized severe repetitive loss properties = *0*

Data provided below only includes areas within the Town of Kimball, located within the Tug Fork Watershed Flood Risk Project. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used to generate results for this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Changes since Last FIRM values were not produced for this area of the watershed study. Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Flood Depths**
  - See the FRD for the following depth grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grid (1-percent-annual-chance flood event) provided by FEMA Region III's Mapping Partner.
  - Additional information and data layers provided within the FRD should be used to further isolate areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to

experience some depth of flooding should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - Kimball's flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized ($/yr)	
	Estimated Value	% of Total	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]
Residential Building/Contents	31796000	15.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Commercial Building/Contents	4418000	2.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Other Building/Contents	174396000	82.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Building/Contents[2]	210610000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Business Disruption[3]	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTAL[4]	210610000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- ***Areas of Mitigation Interest***
  - Section III. B. 4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	*0*	*Kentucky Division of Water/National Inventory of Dams*
Levee	*0*	*USACE National Levee Database*
Stream Flow Pinch Point/Constrictions	*0*	*Local public works, engineering models*
Significant Land Use Changes	*0*	*Local planning divisions*
Past Claims Hot Spot	*0*	*State NFIP*
At Risk Essential Facilities	*0*	*HAZUS Report*

Other Flood Risk Areas	***0***	***Big Sandy Area Development District***
Area of Mitigation Success	***0***	***State Hazard Mitigation Officer***
Other	***0***	***USACE (Section 202 Flood Control Measres)***

- Provided by FEMA's HAZUS Report, 1 Essential Facility site was identified: the Kimball Volunteer Fire Department.

EE. Town of Matewan, WV (CID 545538)

The Town of Matewan is located near the border of Virginia-West Virginia on the central-western border of Mingo County. The Tug River runs along the western edge of the town which is also protected by a floodwall built by the Army Corps of Engineers. Main thoroughfares are State Route 49 and County Route 9, intersecting just south of the town.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Town of Matewan, WV	545538	510	100	0.56	100	Y	N/A	Y

- Mingo County Multi-Jurisdictional Hazard Mitigation Plan last updated in 2009.
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = 30 policies totaling approximately $5,485,000
- NFIP-recognized repetitive loss properties = *10*
- NFIP-recognized severe repetitive loss properties = *0*

Data provided below only includes areas within the City of Matewan, located within the Tug Fork Watershed Flood Risk Project. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used to generate results for this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Changes Since Last FIRM**

Special Flood Hazard Area (SFHA) boundaries within the town of Matewan, West Virginia were updated based on a combination of new engineering analysis and redelineation using newly acquired LiDAR-based topographic data. The updated modeling produced newly identified flood zone areas and new base flood elevations. The table below summarizes the increases, decreases, and net change of SFHAs for Matewan.

Areas of Change	Total Area (mi2)	Increase (mi2)	Decrease (mi2)	Net Change (mi2)	Net Population	Increase in Population	Increase in Buildings	Decrease in Population	Decrease in Buildings
Area within SFHA	**.095**	**.011**	**-.024**	**-.013**	**Null**	**Null**	**Null**	**Null**	**Null**

Area within Floodway	**.156**	**.036**	**-.045**	**-.009**	**Null**	**Null**	**Null**	**Null**	**Null**

Previous FIRM effective date:
Current FIRM effective date:

- **Flood Depths**
  - See the FRD for the following depth grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grid (1-percent-annual-chance flood event) provided by FEMA Region III's Mapping Partner.
  - Additional information and data layers provided within the FRD should be used to further isolate areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas expected to experience some depth of flooding should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - The Town of Matewan's flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized ($/yr)	
	Estimated Value	% of Total	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]
Residential Building/Contents	33963000	75.8	2164000	6.3	3237000	9.5	3855000	11.4	6165000	18.2	266000	0.8
Commercial Building/Contents	4072000	9.1	111000	2.7	306000	7.5	491000	12.1	1252000	30.7	25000	0.6
Other Building/Contents	6744000	15.1	1617000	23.9	1421000	21.1	1697000	25.2	3632000	53.9	128000	1.9
Total Building/Contents[2]	44779000	*N/A*	3892000	8.6	4964000	11.1	6043000	13.5	11049000	24.7	419000	0.9
Business Disruption[3]	*N/A*	*N/A*	54000	*N/A*	83000	*N/A*	97000	*N/A*	137000	*N/A*	5000	*N/A*
TOTAL[4]	44779000	*N/A*	3946000	8.8	5047000	11.3	6140000	13.7	11186000	25	424000	1

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption

[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- ***Areas of Mitigation Interest***
  - Section III. B. 4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	*0*	*Kentucky Division of Water/National Inventory of Dams*
Levee	*1*	*USACE National Levee Database*
Stream Flow Pinch Point/Constrictions	*0*	*Local public works, engineering models*
Significant Land Use Changes	*0*	*Local planning divisions*
Past Claims Hot Spot	*0*	*State NFIP*
At Risk Essential Facilities	*0*	*HAZUS Report*
Other Flood Risk Areas	*0*	*Big Sandy Area Development District*
Area of Mitigation Success	*0*	*State Hazard Mitigation Officer*
Other	*1*	*USACE (Section 202 Flood Control Measres)*

  - Provided by the USACE, 1 Levee was identified. 1 Other Flood Risk Area was identified.

FF. Town of Northfork, WV (CID 540121)

Northfork is a town in McDowell County, West Virginia located on US Route 52 between Welch and Bluefield. The town was named for its location on the north fork of Elkhorn Creek at the confluence with South Fork.

1. Overview

The information below provides an overview of the community as of the date of this publication.

Community Name	CID	Total Community Population	Percent of Population in Watershed	Total Community Land Area (sq mi)	Percent of Land Area in Watershed	NFIP	CRS Rating	Mitigation Plan
Town of Northfork, WV	540121	429	100	0.96	100	Y	10	Y

- Participating in the Region 1 Planning and Development Council Multi-Jurisdictional Hazard Mitigation Plan which expires ***in*** *2017*
- National Flood Insurance Program (NFIP) policy coverage (policies/value) = *14 policies totaling approximately $1,236,500*
- NFIP-recognized repetitive loss properties = *7*
- NFIP-recognized severe repetitive loss properties = *0*

Data provided below only includes areas within the Town of Northfork, located within the Tug Fork Watershed Flood Risk Project. Section II of the Flood Risk Report (FRR) provides more information regarding the source and methodology used to develop the information presented below. Datasets used to generate results for this project are described in Section VII of the FRR and are found in the Flood Risk Database (FRD).

2. Community Analyses and Results

Changes since Last FIRM values were not produced for this area of the watershed study. Results for each of the Flood Risk Datasets developed for this Flood Risk Project are summarized below:

- **Flood Depths**
  - See the FRD for the following depth grid data (Section II of the FRR provides general information regarding the development of and potential uses for this data):
    - Multi-frequency flood depth grid (1-percent-annual-chance flood event) provided by FEMA Region III's Mapping Partner.
  - Additional information and data layers provided within the FRD should be used to further isolate these and other areas where flood mitigation potential is high. The FRD includes data which may be helpful in planning and implementing mitigation strategies. Properties located in areas

expected to experience some depth of flooding should seriously consider mitigation options for implementation.

- **Hazus Estimated Loss Information**
  - The Town of Northfork's flood risk analysis uses results from a FEMA-performed Hazus analysis which accounts for newly modeled areas in the Flood Risk Project and newly modeled depths for certain flood events. Potential losses were compared with tax data to estimate loss ratios for multiple scenarios. Additional information and data layers provided within the FRD should be used to further analyze potential losses and areas where they are likely to occur.

			Estimated Potential Losses for Flood Event Scenarios									
	Total Inventory		10% (10-yr)		2% (50-yr)		1% (100-yr)		0.2% (500-yr)		Annualized ($/yr)	
	Estimated Value	% of Total	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]	Dollar Losses[5]	Loss Ratio[1,6]
Residential Building/Contents	39805000	93.8	N/A	N/A	N/A	N/A	1068000	2.7	N/A	N/A	N/A	N/A
Commercial Building/Contents	558000	1.3	N/A	N/A	N/A	N/A	91000	16.3	N/A	N/A	N/A	N/A
Other Building/Contents	2062000	4.9	N/A	N/A	N/A	N/A	340000	16.5	N/A	N/A	N/A	N/A
Total Building/Contents[2]	42425000	N/A	N/A	N/A	N/A	N/A	1499000	3.5	N/A	N/A	N/A	N/A
Business Disruption[3]	N/A	N/A	N/A	N/A	N/A	N/A	40000	N/A	N/A	N/A	N/A	N/A
TOTAL[4]	42425000	N/A	N/A	N/A	N/A	N/A	1539000	3.6	N/A	N/A	N/A	N/A

Source: Hazus analysis results stored as the Flood Risk Assessment Dataset in the Flood Risk Database.
[1]Loss ratio = Dollar Losses / Estimated Value
[2]Total Building/Contents Loss = Residential Building/Contents Loss + Commercial Building/Contents Loss + Other Building/Contents Loss.
[3]Business Disruption = Inventory Loss + Relocation Cost + Income Loss + Rental Income Loss + Wage Loss + Direct Output Loss.
[4]Total Loss = Total Building/Contents + Business Disruption
[5]Losses shown are rounded to nearest $10,000 for values under $100,000 and to the nearest $100,000 for values over $100,000.
[6]Loss Ratios rounded to nearest integer percent.

- ***Areas of Mitigation Interest***
  - Section III. B. 4 of the FRR provides more information regarding areas of mitigation interest, how they are defined for this analysis, and potential mitigation actions that could be considered for each type. The table below summarizes the number of areas of mitigation interest by type.

Type of Mitigation Interest	Number of Areas	Data Source
Dam	***0***	***Kentucky Division of Water/National Inventory of Dams***
Levee	***0***	***USACE National Levee Database***
Stream Flow Pinch Point/Constrictions	***0***	***Local public works, engineering models***
Significant Land Use Changes	***0***	***Local planning divisions***
Past Claims Hot Spot	***0***	***State NFIP***
At Risk Essential Facilities	***0***	***HAZUS Report***

Other Flood Risk Areas	***0***	***Big Sandy Area Development District***
Area of Mitigation Success	***0***	***State Hazard Mitigation Officer***
Other	***0***	***USACE (Section 202 Flood Control Measres)***

- Zero Areas of Mitigation Interest were identified for the Town of Davy, West Virginia during this study

Before Mitigation and After Mitigation

Communities will need to prioritize projects as part of the planning process. FEMA can then help route federal mitigation dollars to fund these projects.

IV. Actions to Reduce Flood Risk

In order to fully leverage the Flood Risk Datasets and Products created for this Flood Risk Project, local stakeholders should consider many different flood risk mitigation tactics, including, but not limited the items shown in the sub-sections below.

A. Types of Mitigation Actions

Mitigation provides a critical foundation on which to reduce loss of life and property by avoiding or lessening the impact of hazard events. This creates safer communities and facilitates resiliency by enabling communities to return to normal function as quickly as possible after a hazard event. Once a community understands its flood risk, it is in a better position to identify potential mitigation actions that can reduce the risk to its people and property.

The mitigation plan requirements in 44 CFR Part 201 encourage communities to understand their vulnerability to hazards and take actions to minimize vulnerability and promote resilience. Flood mitigation actions generally fall into the following categories:

1. Preventative Measures

Preventative measures are intended to keep flood hazards from getting worse. They can reduce future vulnerability to flooding, especially in areas where development has not yet occurred or where capital improvements have not been substantial. Examples include:

- Comprehensive land use planning.
- Zoning regulations.
- Subdivision regulations.
- Open space preservation.
- Building codes.
- Floodplain development regulations.
- Stormwater management.
- Purchase development rights or conservation easements.
- Participation in the NFIP Community Rating System (CRS).

2. Property Protection Measures

Property protection measures protect existing buildings by modifying the building to withstand floods, or by removing buildings from hazardous locations. Examples include:

- Building relocation.
- Acquisition and clearance.
- Building elevation.

- Barrier installation.
- Building retrofit.

3. Natural Resource Protection Activities

Natural resource protection activities reduce the impact of floods by preserving or restoring natural areas such as floodplains, wetlands, and dunes and their natural functions. Examples include:

- Wetland protection.
- Habitat protection.
- Erosion and sedimentation control.
- Best management practices (BMP).
- Prevention of stream dumping activities (anti-litter campaigns).
- Improved forestry practices such as reforesting or selective timbering (extraction).

NFIP's CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from community actions meeting the three goals of the CRS: to reduce flood losses, to facilitate accurate insurance rating, and to promote the awareness of flood insurance.

For CRS participating communities, flood insurance premium rates are discounted in increments of 5%; i.e., a Class 1 community would receive a 45% premium discount, while a Class 9 community would receive a 5% discount. (A Class 10 is not

4. Structural Mitigation Projects

Structural mitigation projects lessen the impact of floods by modifying the environmental natural progression of the flooding event. Structural protection such as upgrading dams/levees for already existing development and critical facilities may be a realistic alternative. However, citizens should be made aware of their residual risk. Examples include:

- Reservoirs, retention, and detention basins.
- Levees and floodwalls.
- Channel modifications.
- Channel maintenance.

5. Public Education and Awareness Activities

Public education and awareness activities advise residents, business owners, potential property buyers, and visitors about floods, hazardous areas, and mitigation techniques they can use to reduce the flood risk to themselves and their property. Examples include:

- Readily available and readable updated maps.
- Outreach projects.
- Libraries.
- Technical assistance.
- Real estate disclosure.
- Environmental education.
- Risk information via the nightly news.

6. Emergency Service Measures

Although not typically considered a mitigation technique, emergency service measures minimize the impact of flooding on people and property. These are actions commonly taken immediately prior to, during, or in response to a hazard event. Examples include:

- Hazard warning system.
- Emergency response plan.
- COOP and COG planning.
- Critical facilities protection.
- Health and safety maintenance.
- Post flood recovery planning.

For more information regarding hazard mitigation techniques, best practices, and potential grant funding sources, visit www.fema.gov or contact your local floodplain manager, emergency manager, or State Hazard Mitigation Officer.

In Section III, specific Areas of Mitigation Interest were identified. Table 4.1 below identifies possible mitigation actions for each identified area.

Table 4.1 Mitigation Actions for Areas of Mitigation Interest

AoMI	Possible Actions to Reduce Flood Risk
Dams	Engineering assessment Dam upgrades and strengthening Emergency Action Plan Dam removal Easement creation in impoundment and downstream inundation areas
Levees (accredited and non-accredited) and significant levee-like structures	Generally same as dams above Purchase of flood insurance for at-risk structures
Stream Flow Pinch Point Undersized culverts or bridge openings	Engineering analysis Replacement of structure pre- and post-disaster
Past Claims and IA/PA Hot Spots	Acquisition Elevation Relocation Floodproofing
Major Land Use Changes (past 5 years or next 5 years)	Higher regulatory standard Stormwater BMPs Transfer of Development rights Compensatory storage and equal conveyance standards
Key Emergency Routes Overtopped During Frequent Flooding Events	Elevation Creation of alternate routes Design as low water crossing
Areas of Significant Riverine or Coastal Erosion	Relocation of buildings and infrastructure Regulations and planning Natural vegetation Hardening
Other Flood Risk Areas	Identification of all flood hazard areas

B. Identifying Specific Actions for Your Community

As many mitigation actions are possible to lessen the impact of floods, how can a community decide which ones are appropriate to implement? There are many ways to identify specific actions most appropriate for a community. Some factors to consider may include the following:

- **Site characteristics.** Does the site present unique challenges (e.g., significant slopes or erosion potential)?
- **Flood characteristics.** Are the flood waters affecting the site fast or slow moving? Is there debris associated with the flow? How deep is the flooding?
- **Social acceptance.** Will the mitigation action be acceptable to the public? Does it cause social or cultural problems?
- **Technical feasibility.** Is the mitigation action technically feasible (e.g., making a building watertight to a reasonable depth)?
- **Administrative feasibility.** Is there administrative capability to implement the mitigation action?
- **Legal.** Does the mitigation action meet all applicable codes, regulations, and laws? Public officials may have a legal responsibility to act and inform citizens if a known hazard has been identified.
- **Economic.** Is the mitigation action affordable? Is it eligible under grant or other funding programs? Can it be completed within existing budgets?
- **Environmental.** Does the mitigation action cause adverse impacts on the environment or can they be mitigated? Is it the most appropriate action among the possible alternatives?

Refer to FEMA Mitigation Planning How To Guide #3 (FEMA 386-3) "Developing the Mitigation Plan - Identifying Mitigation Actions and Implementation Strategies" for more information on how to identify specific mitigation actions to address hazard risk in your community.

FEMA in collaboration with the American Planning Association has released the publication, "Integrating Hazard Mitigation into Local Planning." This guide explains how hazard mitigation can be incorporated into several different types of local planning programs. For more information go to www.planning.org. or http://www.fema.gov/library.

Your local Hazard Mitigation Plan is a valuable place to identify and prioritize possible mitigation actions. The plan includes a mitigation strategy with mitigation actions that were developed through a public and open process. You can then add to or modify those actions based on what is learned during the course of the Risk MAP project and the information provided within this FRR.

C. Mitigation Programs and Assistance

Not all mitigation activities require funding (e.g., local policy actions such as strengthening a flood damage prevention ordinance), and those that do are not limited to outside funding sources (e.g., inclusion in local capital improvements plan, etc.). For those mitigation actions that require assistance through funding or technical expertise, several state

and federal agencies have flood hazard mitigation grant programs and offer technical assistance. These programs may be funded at different levels over time or may be activated under special circumstances such as after a presidential disaster declaration.

1. FEMA Mitigation Programs and Assistance

FEMA awards many mitigation grants each year to states and communities to undertake mitigation projects to prevent future loss of life and property resulting from hazard impacts, including flooding. The FEMA Hazard Mitigation Assistance (HMA) programs provide grants for mitigation through the programs listed in Table 4.2 below.

Table 4.2 FEMA Hazard Mitigation Assistance Programs

Mitigation Grant Program	Authorization	Purpose
Hazard Mitigation Grant Program (HMGP)	Robert T. Stafford Disaster Relief and Emergency Assistance Act	Activated after a presidential disaster declaration; provides funds on a sliding scale formula based on a percentage of the total federal assistance for a disaster for long-term mitigation measures to reduce vulnerability to natural hazards
Flood Mitigation Assistance (FMA)	National Flood Insurance Reform Act	Reduce or eliminate claims against the NFIP
Pre-Disaster Mitigation (PDM)	Disaster Mitigation Act	National competitive program focused on mitigation project and planning activities that address multiple natural hazards

Communities can link hazard mitigation plans and actions to the right FEMA grant programs to fund flood risk reduction. More information about FEMA HMA programs can be found at http://www.fema.gov/government/grant/hma/index.shtm.

The HMGP and PDM programs offer funding for mitigation planning and project activities that address multiple natural hazard events. The FMA, program focus funding efforts on reducing claims against the NFIP. Funding under the HMA programs is subject to availability of annual appropriations, and HMGP funding is also subject to the amount of FEMA disaster recovery assistance provided under a presidential major disaster declaration.

FEMA's HMA grants are awarded to eligible states, tribes, and territories (applicant) that, in turn, provide subgrants to local governments and communities (subapplicant). The applicant selects and prioritizes subapplications developed and submitted to them by subapplicants and submits them to FEMA for funding consideration. Prospective subapplicants should consult the office designated as their applicant for further information regarding specific program and application requirements. Contact information for the FEMA Regional Offices and State Hazard Mitigation Officers (SHMO) is available on the FEMA website (www.fema.gov).

The Silver Jackets program, active in several states, is a partnership of USACE, FEMA, and state agencies. The Silver Jackets program provides a state-based strategy for an interagency approach to planning and implementing measures for risk reduction.

2. Additional Mitigation Programs and Assistance

Several additional agencies including USACE, Natural Resource Conservation Service (NRCS), U.S. Geological Survey (USGS), and others have specialists on staff and can offer further information on flood hazard mitigation. The State NFIP Coordinator and SHMO are state-level sources of information and assistance, which vary among different states.

V. Acronyms and Definitions

A. Acronyms

A

AAL	Average Annualized Loss
ALR	Annualized Loss Ratio
AoMI	*Areas of Mitigation Interest*

B

BCA	Benefit-Cost Analysis
BFE	Base Flood Elevation
BMP	Best Management Practices
BSADD	Big Sandy Area Development District

C

CFR	Code of Federal Regulations
COG	Continuity of Government Plan
COOP	Continuity of Operations Plan
CNMS	Coordinated Needs Management Strategy
CPPDC	Cumberland Plateau Planning District Commission
CRS	Community Rating System
CSLF	Changes Since Last FIRM

D

DHS	Department of Homeland Security
DMA 2000	Disaster Mitigation Act of 2000

E

EOP	Emergency Operations Plan

F

FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FIVCO	FIVCO Area Development Disrrict
FMA	Flood Mitigation Assistance
FRD	Flood Risk Database
FRM	Flood Risk Map
FRR	Flood Risk Report
FY	Fiscal Year

G

GIS	Geographic Information System

H

HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program

I

IA	Individual Assistance

K

KDOW	Kentucky Division of Water

M

MAS	Mapping Activity Statement

N

NFIA	National Flood Insurance Act
NFIP	National Flood Insurance Program
NRCS	Natural Resource Conservation Service

P

PA	Public Assistance
PDM	Pre-Disaster Mitigation

R

RFC	Repetitive Flood Claims
Risk MAP	Mapping, Assessment, and Planning

S

SFHA	Special Flood Hazard Area
SHMO	State Hazard Mitigation Officer
SRL	Severe Repetitive Loss

U

USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey

W

WV	WV Planning

B. Definitions

0.2-percent-annual-chance flood – The flood elevation that has a 0.2-percent chance of being equaled or exceeded each year. Sometimes referred to as the 500-year flood.

1-percent-annual-chance flood – The flood elevation that has a 1-percent chance of being equaled or exceeded each year. Sometimes referred to as the 100-year flood.

Average Annualized Loss (AAL) – The estimated long-term weighted average value of losses to property in any single year in a specified geographic area.

Annualized Loss Ratio (ALR) – Expresses the annualized loss as a fraction of the value of the local inventory (total value/annualized loss).

Base Flood Elevation (BFE) – Elevation of the 1-percent-annual-chance flood. This elevation is the basis of the insurance and floodplain management requirements of the NFIP.

Berm – A small levee, typically built from earth.

Cfs – Cubic feet per second, the unit by which discharges are measured (a cubic foot of water is about 7.5 gallons).

Consequence (of flood) – The estimated damages associated with a given flood occurrence.

Crest – The peak stage or elevation reached or expected to be reached by the floodwaters of a specific flood at a given location.

Dam – An artificial barrier that has the ability to impound water, wastewater, or any liquid-borne material, for the purpose of storage or control of water.

Design flood event – The greater of the following two flood events: (1) the base flood, affecting those areas identified as SFHAs on a community's FIRM; or (2) the flood corresponding to the area designated as a flood hazard area on a community's flood hazard map or otherwise legally designated.

Erosion – Process by which floodwaters lower the ground surface in an area by removing upper layers of soil.

Essential facilities – Facilities that, if damaged, would present an immediate threat to life, public health, and safety. As categorized in Hazus, essential facilities include hospitals, emergency operations centers, police stations, fire stations, and schools.

Flood – A general and temporary condition of partial or complete inundation of normally dry land areas from (1) the overflow of inland or tidal waters or (2) the unusual and rapid accumulation or runoff of surface waters from any source.

Flood Insurance Rate Map (FIRM) – An official map of a community, on which FEMA has delineated both the SFHAs and the risk premium zones applicable to the community. See also Digital Flood Insurance Rate Map.

Flood Insurance Study (FIS) Report – Contains an examination, evaluation, and determination of the flood hazards of a community, and if appropriate, the corresponding water-surface elevations.

Flood risk – Probability multiplied by consequence; the degree of probability that a loss or injury may occur as a result of flooding. Sometimes referred to as flood vulnerability.

Flood vulnerability – Probability multiplied by consequence; the degree of probability that a loss or injury may occur as a result of flooding. Sometimes referred to as flood risk.

Floodborne debris impact – Floodwater moving at a moderate or high velocity can carry floodborne debris that can impact buildings and damage walls and foundations.

Floodwall – A long, narrow concrete or masonry wall built to protect land from flooding.

Floodway (regulatory) – The channel of a river or other watercourse and that portion of the adjacent floodplain that must remain unobstructed to permit passage of the base flood without cumulatively increasing the water surface elevation more than a designated height (usually 1 foot).

Floodway fringe – The portion of the SFHA that is outside of the floodway.

Freeboard – A factor of safety usually expressed in feet above a flood level for purposes of flood plain management. “Freeboard” tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed (44CFR§59.1).

Hazus – A GIS-based risk assessment methodology and software application created by FEMA and the National Institute of Building Sciences for analyzing potential losses from floods, hurricane winds and surge, and earthquakes.

High velocity flow – Typically comprised of floodwaters moving faster than 5 feet per second.

Loss ratio – Expresses loss as a fraction of the value of the local inventory (total value/loss).

Levee – A human-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding. (44CFR§59.1)

Mudflow – Mudslide (i.e., mudflow) describes a condition where there is a river, flow or inundation of liquid mud down a hillside usually as a result of a dual condition of loss of brush cover, and the subsequent accumulation of water on the ground preceded by a period of unusually heavy or sustained rain. A mudslide (i.e., mudflow) may occur as a distinct phenomenon while a landslide is in progress, and

will be recognized as such by the Administrator only if the mudflow, and not the landslide, is the proximate cause of damage that occurs. (44CFR§59.1)

Probability (of flood) – The likelihood that a flood will occur in a given area.

Risk MAP – Risk Mapping, Assessment, and Planning, a FEMA strategy to work collaboratively with state, local, and tribal entities to deliver quality flood data that increases public awareness and leads to action that reduces risk to life and property.

Riverine – Of or produced by a river. Riverine floodplains have readily identifiable channels.

Special Flood Hazard Area (SFHA) – Portion of the floodplain subject to inundation by the 1-percent-annual or base flood.

Stafford Act – Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-707, signed into law November 23, 1988; amended the Disaster Relief Act of 1974, PL 93-288. This Act constitutes the statutory authority for most federal disaster response activities especially as they pertain to FEMA and FEMA programs.

Stream Flow Constrictions – A point where a human-made structure constricts the flow of a river or stream.

Stillwater –Projected elevation that flood waters would assume, referenced to National Geodetic Vertical Datum of 1929, North American Vertical Datum of 1988, or other datum, in the absence of waves resulting from wind or seismic effects.

VI. Additional Resources

ASCE 7 – National design standard issued by the American Society of Civil Engineers (ASCE), *Minimum Design Loads for Buildings and Other Structures*, which gives current requirements for dead, live, soil, flood, wind, snow, rain, ice, and earthquake loads, and their combinations, suitable for inclusion in building codes and other documents.

ASCE 24-05 – National design standard issued by the ASCE, *Flood Resistant Design and Construction*, which outlines the requirements for flood resistant design and construction of structures in flood hazard areas.

National Flood Insurance Program (NFIP), Federal Emergency Management Agency (FEMA), www.floodsmart.gov

FEMA, www.fema.gov

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FEMA, 2001. *Understanding Your Risks: Identifying Hazards and Estimating Losses*, FEMA 386-2. Washington, DC, August 2001.

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FEMA, 2003a. *Developing the Mitigation Plan: Identifying Mitigation Actions and Implementing Strategies*, FEMA 386-3. Washington, DC, April 2003.

FEMA, 2003b. *Bringing the Plan to Life: Implementing the Hazard Mitigation Plan*, FEMA 386-4. Washington, DC, August 2003.

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FEMA, 2004b. *Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners*, FEMA 64. Washington, DC, April 2004.

FEMA, 2005. *Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning*, FEMA 386-6. Washington, DC, May 2005.

FEMA, 2006a. *Multi-Jurisdictional Mitigation Planning*, FEMA 386-8. Washington, DC, August 2006.

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FEMA, 2006c. "*Designing for Flood Levels Above the BFE," Hurricane Katrina Recovery Advisory 8, Hurricane Katrina in the Gulf Coast: Building Performance Observations, Recommendations, and Technical Guidance*, FEMA 549, Appendix E. Washington, DC, July 2006.

FEMA, 2007a. *Property Acquisition Handbook for Local Communities*, FEMA 317. Washington, DC, September 2007.

FEMA, 2007b. *Public Assistance Guide*, FEMA 322. Washington, DC, June 2007.

FEMA, 2007c. *Using Benefit-Cost Review in Mitigation Planning*, FEMA 386-5. Washington, DC, May 2007.

FEMA, 2007d. *Design Guide for Improving Critical Facility Safety from Flooding and High Winds: Providing Protection to People and Buildings*, FEMA 543. Washington, DC, January 2007.

FEMA, 2007e. *Selecting Appropriate Mitigation Measures for Floodprone Structures*, FEMA 551. Washington, DC, March 2007.

FEMA, 2007f. *Design Guide for Improving Hospital Safety in Earthquakes, Floods, and High Winds: Providing Protection to People and Buildings,* FEMA 577. Washington, DC, June 2007.

FEMA, 2008. *Reducing Flood Losses Through the International Codes: Meeting the Requirements of the National Flood Insurance Program,* FEMA 9-0372, Third Edition. Washington, DC, December 2007.

VII. Data Used to Develop Flood Risk Products

GIS base map information was acquired from the following sources:

- ***Lawrence County, Kentucky's GIS Office***
- ***Big Sandy Area Development District***
- ***FIVCO Area Development District***
- ***Kentucky Transportation Cabinet District 12***
- ***Kentucky Division of Water***
- ***Kentucky Emergency Management***
- ***Mingo County, West Virginia's Floodplain Manager***
- ***State of Kentucky Emergency Management Agency***
- ***United States Army Corps of Engineers***
- ***West Virginia Department of Transportation***
- ***West Virginia Department of Homeland Security***
- ***Virginia Region 1 Planning Council***

Engineering study information was leveraged from the USGS with coordination from the Kentucky Division of Water's Floodplain Management Program. Mitigation Plans and AoMI information were acquired from local community input as well as significant input from the State of Kentucky Emergency Management Agency.