HAZARD MITIGATION PLAN

Fulton County, Pennsylvania

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EXECUTIVE SUMMARY

The 2025 update to the Fulton County Hazard Mitigation Plan (HMP) was prepared in accordance with the Disaster Mitigation Act of 2000 (DMA 2000). DMA 2000 requires states and local governments to prepare HMPs to remain eligible to receive pre-disaster mitigation grant funds and funds made available in the wake of federally declared disasters. Additionally, DMA 2000 effectively improves the disaster planning process by increasing hazard mitigation planning requirements for hazard events. DMA 2000 requires participating municipalities to (1) document their hazard mitigation planning process and (2) identify hazards, potential losses, and mitigation needs, goals, and strategies.

The Fulton County HMP represents the work of citizens, elected and appointed government officials, business leaders, and volunteer and nonprofit groups to protect community assets, preserve the economic viability of the community, and save lives. DMA 2000 regulations require formal updates and adoptions of local plans every 5 years, reassessing risks, and updating local strategies to manage and mitigate those risks. To comply, Fulton County and inclusive jurisdictions actively participated in updating the Fulton County HMP. Extensive outreach efforts by Fulton County's Planning & Mapping Department resulted in participation from 12 of its municipalities. Valley-Hi Borough was the only jurisdiction that did not participate. Upon completion and approval of the HMP, participating jurisdictions will continue to address and implement the findings and recommendations of this plan update. This 2020 version is the third update of the County HMP, with the original HMP developed in 2004.

Table ES-1 identifies municipal governments that actively participated in the HMP update process.

Table ES-1. Participating Jurisdictions in the 2020 Fulton County HMP Update

Jurisdictions				
• Fulton County	• Bethel Township	• Licking Creek Township	• Thompson Township	• Wells Township
• Ayr Township	• Brush Creek Township	• McConnellsburg Borough	• Todd Township	
• Belfast Township	• Dublin Township	• Taylor Township	• Union Township	

During the plan update process, Fulton County and its 12 participating municipalities engaged in the following planning process steps:

1. Identified and prioritized hazards that may affect the county and its municipalities.
2. Assessed the vulnerabilities of the county and each municipality to these hazards.
3. Identified mitigation actions that can reduce those vulnerabilities.
4. Developed a strategy for implementing those actions, including identifying the agency (or agencies) responsible for each implementation.

Throughout the planning process, the general public was offered an opportunity to comment on the existing HMP and provide suggestions for the updated version. The county hosted two Steering Committee meetings that were open to the public, during which residents could provide input on the HMP.

The following hazards were identified by the Steering Committee as presenting the highest risk to the county and its municipalities:

- Flood, Flash Flood, and Ice Jam
- Winter Storm

- Transportation Accidents
- Environmental Hazards- Hazardous Releases
- Environmental Hazards- Gas and Liquid Pipelines
- Drought

This HMP also includes hazard profiles for the following hazards (listed in order of risk factor analysis ranking):

- Dam Failure
- Earthquake
- Tornado, Windstorm
- Subsidence and Sinkholes
- Radon Exposure
- Wildfire
- Hailstorm
- Landslide

To mitigate the effects of the above hazards, the Steering Committee identified the following goals for hazard mitigation over the next 5 years:

1. **Goal 1:** Protect the people, property, and environment in hazard areas.
2. **Goal 2:** Prevent hazards from impacting the community.
3. **Goal 3:** Enhance awareness, understanding, and preparedness among local, county, state, and federal emergency management personnel to protect public health and safety.
4. **Goal 4:** Ensure that stakeholder groups have the necessary information to mitigate against hazard impacts.

Objectives and actions to be implemented are discussed in the Mitigation Action Plan in Section 6.2 of this HMP.

Additionally, Steering Committee members will meet annually to evaluate the status of plan implementation and prepare a summary report of HMP status and any needed updates. The mitigation evaluation will address changes as new hazard events occur, as the area develops, and as more information becomes available pertaining to hazards and their impacts. The evaluation will include an assessment of whether the planning process and actions have been effective, whether development or other issues warrant changes to the HMP or its priorities, if progress toward the communities' goals is satisfactory, and whether changes are warranted. The public is encouraged to give feedback (1) by directly contacting the Fulton County Hazard Mitigation Plan Coordinator, (2) during recurring review meetings, and (3) during the 5-year revision process.

To request information or provide comments regarding this plan, please contact Fulton County Emergency Management Agency (EMA)/911. Contact information is provided below:

Mailing Address:	Hazard Mitigation Plan Steering Committee c/o Fulton County Emergency Management Agency (EMA)/911 219 North 2nd Street, Suite 106 McConnellsburg, PA 17233
Contact Name:	Brian Barton, EMA/911 Director
E-mail Address:	bjbarton@co.fulton.pa.us
Telephone:	(717) 485-3201

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CERTIFICATION OF ANNUAL REVIEW MEETINGS

The Fulton County Hazard Mitigation Steering Committee has reviewed this Hazard Mitigation Plan (HMP). See Section 7 of this document for further details regarding this certification section. The HMP Coordinator hereby certifies the review.

Year	Date of Meeting	Public Outreach Addressed?*	Signature
2015	N/A	N/A	To the best of the knowledge of the Fulton County Steering Committee, no HMP progress reports were submitted from municipalities for 2015
2016	December 5, 2016	N/A	
2017	December 4, 2017	N/A	
2018	December 3, 2018	N/A	
2019	Fulton County engaged in a full update of the HMP during 2019-2020.		
2020			
2021		N/A	
2022		N/A	
2023		N/A	
2024	Fulton County engaged in a full update of the HMP during 2024-2025.		
2025			

** Confirm yes here annually and describe on record of changes page.*

RECORD OF CHANGES

Date	Description of Change Made, Mitigation Action Completed, or Public Outreach Performed	Change Made By (Print Name)	Change Made By (Signature)
2015	To the best of the knowledge of the Fulton County Steering Committee, no HMP progress reports were submitted from municipalities for 2015	N/A	N/A
2016	Updated hazard events. Added a mitigation action. Updated the status of mitigation actions.	N/A	N/A
2017	Updated hazard events. Updated the status of mitigation actions.	N/A	N/A
2018	Updated hazard events. Updated the status and wording of mitigation actions.	N/A	N/A
2019	Fulton County engaged in a full update of the HMP in 2019.	N/A	N/A
2020	Fulton County engaged in a full update of the HMP 2020.	N/A	N/A
2021	To the best of the knowledge of the Fulton County Steering Committee, no HMP progress reports were submitted from municipalities for 2021.	N/A	N/A
2022	To the best of the knowledge of the Fulton County Steering Committee, no HMP progress reports were submitted from municipalities for 2022.	N/A	N/A
2023	To the best of the knowledge of the Fulton County Steering Committee, no HMP progress reports were submitted from municipalities for 2023.	N/A	N/A
2024	Fulton County engaged in a full update of the HMP in 2024.	N/A	N/A
2025	Fulton County engaged in a full update of the HMP .	N/A	N/A

REMINDER: Please *attach all associated meeting agendas, sign-in sheets, handouts, and minutes.*

SECTION 1 INTRODUCTION

This section presents background information, describes the purpose, and defines the scope of the 2025 update of the Fulton County Hazard Mitigation Plan (HMP).

1.1 BACKGROUND

Across the United States, natural and human-caused disasters have led to increasing levels of deaths, injuries, property damage, and interruptions of business and government services. The time, money, and effort spent to recover from these disasters exhaust limited resources, diverting attention from important public programs and private efforts.

Fulton County, Pennsylvania, has experienced a significant number of statewide or county-specific federal disaster declarations since 1955 (FEMA 2020). Planners, citizens, elected officials, and other stakeholders in Fulton County recognize the impact of disasters on their community and have concluded that proactive efforts need to be taken to reduce the impact of natural and human-caused hazards. For that reason, Fulton County is committed to updating, maintaining, and implementing the Fulton County HMP.

"Hazard mitigation" refers to actions taken to prevent, reduce, or eliminate the long-term risks to life and property caused by a disaster (FEMA 2020). Pre-disaster mitigation actions, taken in advance of a hazard event, are critical to breaking the typical disaster cycle. If a community sustains damage from a hazard event and rebuilds the same way, it may experience damage again when another event occurs. Carefully selected mitigation actions are long-term, cost-effective ways to reduce the risk of future loss (PEMA 2018). "Hazard mitigation planning" is the process of identifying disaster risks and developing strategies to reduce or eliminate the loss of life and/or property damage associated with those risks.

This 2025 HMP update serves as a roadmap for Fulton County to proactively reduce risk. It also fulfills federal requirements that HMPs be regularly updated to maintain eligibility for certain types of Federal Emergency Management Agency (FEMA) funding. The update was led by two advisory teams that provided guidance and steered the direction of the plan:

- The Fulton County Hazard Mitigation Core Planning Team was composed of officials from Fulton County, municipal representatives, stakeholder organizations, elected officials, and Commonwealth and federal agencies.
- The Planning Partners included additional Fulton County officials, municipal representatives, emergency first responders, and representatives from the private sector, such as utility companies.

Fulton County contracted Tetra Tech, Inc. to prepare the 2025 HMP update. The HMP update is the result of several months of collaboration between the County's citizens and officials and Tetra Tech's representatives to develop a pre-disaster, multi-hazard mitigation plan that will guide Fulton County toward greater disaster resistance while respecting the character and needs of the community. The planning process focused on increasing opportunities for engagement; gaining meaningful input from municipalities, special districts (municipal utility authorities, school districts, etc.), and stakeholders; and developing an implementable mitigation strategy that could be achieved based on the County's current capabilities.

1.2 SCOPE

The 2025 HMP update aims to advance previous and ongoing mitigation efforts proposed in the 2020 Fulton County HMP by calculating changes in risk and reassessing mitigation strategies and priorities (44 CFR Section 201.6(d)(3)). The 2025 HMP update will be integrated into other community planning initiatives to promote cohesive planning practices recommended by FEMA. FEMA requires local mitigation plans to document the following elements (FEMA 2023c):

- Planning Process—Describes how the plan was developed, who was involved, and what data was used.
- Hazard Identification/Risk Assessment—Identifies the hazards that can affect jurisdictions participating in the mitigation plan, including high-hazard potential dams.
- Mitigation Strategy—Serves as the long-term blueprint for reducing risks from natural and human-caused hazards identified in the risk assessment.
- Plan Maintenance—Documents a process for evaluating implementation of the plan, which allows for efficiency for future updates to the plan.
- Plan Update—Reflects how current conditions have changed since the last plan.
- Plan Adoption—Legitimizes the plan and authorizes responsible agencies to perform their responsibilities.

In addition to the above elements, FEMA's April 2023 Local Planning Policy Guide emphasizes the importance of incorporating climate change impacts and equity considerations into hazard mitigation planning.

1.3 PURPOSE

The purpose of this HMP is to minimize the effects that natural and human-caused hazards have on the people, property, environment, and business operations of Fulton County. This document provides the background information and rationale for mitigation actions that the Core Planning Team, Planning Partners, and municipal representatives have chosen to implement across Fulton County.

The document is governed by the Disaster Mitigation Act of 2000 and its implementing regulations (Title 44 Code of Federal Regulations [CFR] Section 201.6, published February 26, 2002). Local jurisdictions must comply with 44 CFR to remain eligible for funding and technical assistance from state and federal hazard mitigation programs, such as those listed in Table 1-1.

Table 1-1 Non-Emergency Federal Disaster Assistance Programs

Program	Description
Building Resilient Infrastructure and Communities (BRIC)	Pre-disaster funding for proactive mitigation and community resilience projects and plans
Hazard Mitigation Grant Program (HMGP)	Post-disaster funding for mitigation and community resilience projects and plans
HMGP Post-Fire	Assistance to help communities implement hazard mitigation measures after wildfire disasters
Flood Mitigation Assistance (FMA)	Pre-disaster funding for flood hazard mitigation and community resilience activities that benefit properties insured under the National Flood Insurance Program (NFIP)
Rehabilitation of High-Hazard Potential Dams	Technical, planning, design, and construction assistance in the form of grants for the rehabilitation of eligible high-hazard potential dams
Safeguarding Tomorrow Revolving Loan Fund Program	Capitalization grants are passed through to states for states to establish revolving loan funds that provide hazard mitigation assistance for local governments to reduce risk from natural hazards and disasters

1.4 AUTHORITY AND REFERENCE

This HMP was prepared in accordance with the following regulations and guidance:

- Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C., Section 322, as amended

- Title 44 CFR, Part 201, Mitigation Planning
- Disaster Mitigation Act of 2000, as amended
- FEMA Local Mitigation Planning Policy Guide, effective April 2023
- FEMA Local Mitigation Planning Handbook, May 2023
- Pennsylvania Emergency Management Services Code, Title 35, Pa C.S. Section 101
- Pennsylvania Municipalities Planning Code of 1968, Act 247, as reenacted and amended by Act 170 of 1988
- Pennsylvania Hazard Mitigation Planning Standard Operating Guide, 2025
- Commonwealth of Pennsylvania 2023 Hazard Mitigation Plan, approved August 28, 2023

A list of references used to update this HMP is provided at the end of this volume.

1.5 COVERAGE

The mitigation actions outlined in this HMP apply to Fulton County and any municipalities within the County that adopt this plan. Only those municipalities that have participated in the plan update process may adopt this plan and will be eligible for associated state and federal hazard mitigation funding. For this plan, municipal participation was defined as actively engaging in the planning process and providing meaningful feedback to inform the content of the plan. This included participating in meetings, completing and submitting surveys (e.g., Hazard Identification and Risk Evaluation Worksheet, Capability Assessment Survey), updating the status of the 2020 mitigation strategy, and contributing to the development of the 2025 mitigation strategy.

SECTION 2 COUNTY PROFILE

Section 2 of the Fulton County Hazard Mitigation Plan (HMP) discusses the geography and environment, community facts, population and demographics, and land use and development in Fulton County.

2.1 GEOGRAPHY AND ENVIRONMENT

Fulton County is located in the south-central portion of Pennsylvania (Figure 2-1) and encompasses approximately 438 square miles. The county has 13 municipalities and is one of the smallest counties in the Commonwealth of Pennsylvania. The County is bordered to the north by Huntingdon County, to the east by Franklin County, to the south by Allegany and Washington Counties (Maryland), and to the west by Bedford County.

Fulton County has a scenic landscape characterized by numerous high ridges separating narrow valleys. These valleys are fertile and productive enough to support the primarily rural lifestyle of the county's residents. Over 68 percent of the land area is forestland. Several of the large streams within the county flow southward into Maryland and drain into the Potomac River. The streams in the western and northern parts of the county are tributaries of the Juniata River.

2.1.1 Topography and Geology

Fulton County is bordered to the east by Tuscarora Mountain, to the south by Maryland, and to the west by the Rays and Town hills. It consists of a mountainous area in the Appalachian Ridge and Valley physiographic region. The principal waterways are Meadow Grounds Lake and Wooden Bridge, Tonoloway, Little Tonoloway, and Licking creeks. Other features include Sideling Hill, Cowans Gap State Park, and Buchanan State Forest (Britannica n.d.)

2.1.2 Hydrography and Hydrology

The County is located at the headwater of streams that are tributary to the Potomac and Susquehanna River. Water quality in the Susquehanna River Watershed is excellent due to the forested and sparsely populated land uses found within the watershed boundaries.

Nearly three-fourths of the surface in Fulton County flows south into the Potomac River in Maryland. The principal streams of the Potomac River system within Fulton County are the Tonoloway Creek, Little Tonoloway Creek, and Licking Creek. The Potomac River Watershed in Fulton County has poorer surface water quality than the Susquehanna River Watershed. The byproducts of agriculture increase the level of nutrients in the watershed (Fulton County Regional Planning Commission 2008).

Drainage Basins and Watersheds

A watershed is the area of land that drains into a body of water, such as a river, lake, stream, or bay. It is separated from other systems by high points in the area, such as hills or slopes. It includes not only the waterway itself but also the entire land area that drains to it. For example, the watershed of a lake would include not only the streams entering the lake but also the land area that drains into those streams and eventually the lake. Fulton County is located entirely within the Chesapeake Bay Watershed.

Fulton County lies in the headwaters of both the Susquehanna and Potomac River Watersheds. The northern third and western edge of Fulton County drain north to the Juniata River and eventually the Susquehanna River. The main stems of the Susquehanna Watershed (in Fulton County) include Brush Creek, Sideling Hill Creek, Wooden Bridge Creek, and Aughwick Creek. The other twothirds of Fulton County drain largely to Licking Creek, Tonoloway Creek, and Little Tonoloway Creek, which are all tributaries of the Potomac River (Fulton County Regional Planning Commission 2008).

2.1.3 Climate

Fulton County is characterized by a humid, continental climate with warm summers and cold winters. Precipitation is adequate and normally well distributed. Winds prevail from the west and bring most of the major pressure systems that affect the area.

Summers are generally warm with daytime high temperatures averaging in the high 70°s and low 80°s. On average, there are 196 sunny days per year in Fulton County. The July high is around 85°. The annual precipitation is approximately 38-inches with thunderstorms occurring in the summer months.

Winter is characterized by cold temperatures and cloudy skies. Daytime temperatures average in the mid to upper 20°'s. The January high is approximately 19°. Winter precipitation is frequent and sometimes heavy, averaging between 40- and 50-inches of seasonal snowfall. The ground is generally covered with snow for more than half of the winter.

Spring and fall are characterized by rapidly changing weather patterns. Alternate periods of freezing and thawing are common during both seasons (Fulton County Regional Planning Commission 2008).

Figure 2-1. Base Map of Fulton County

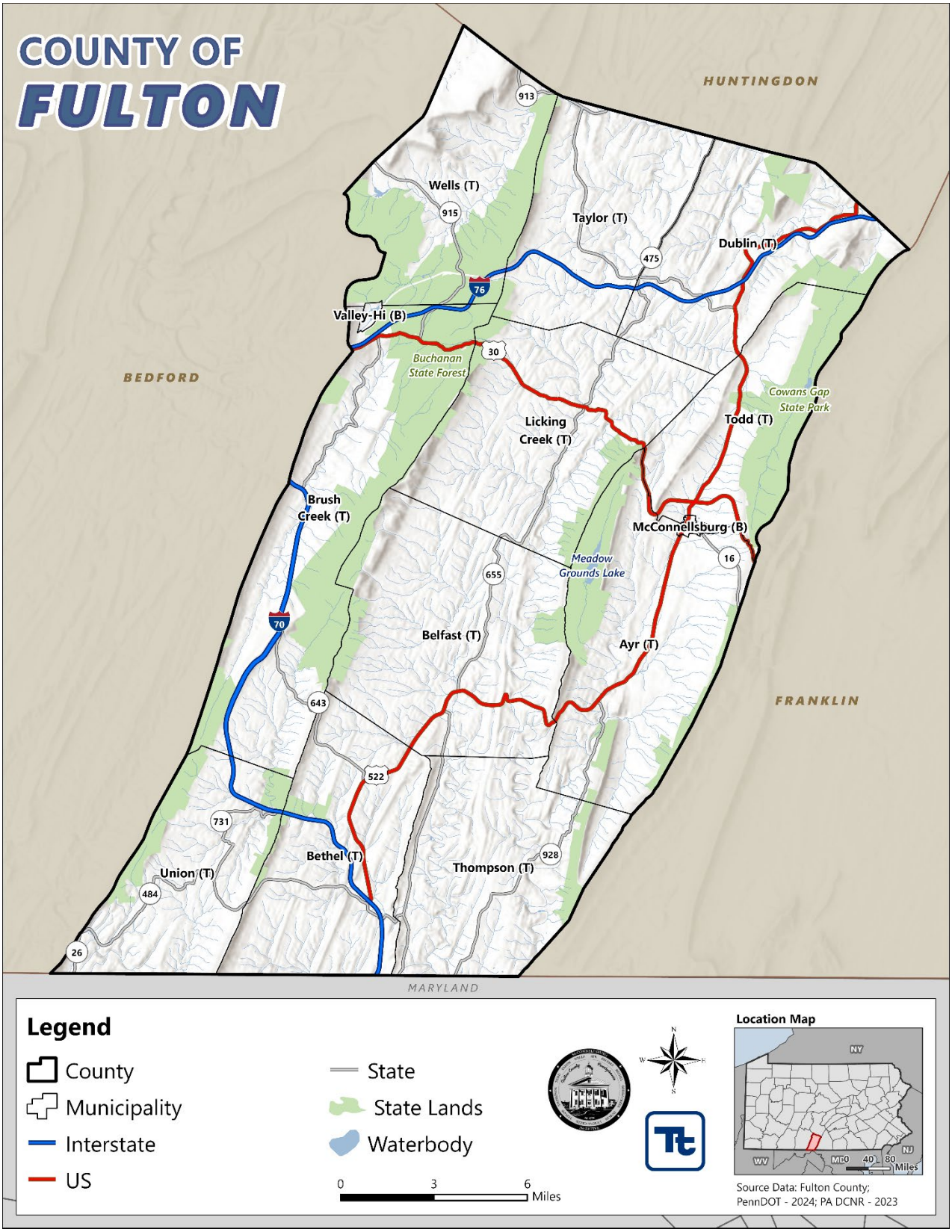
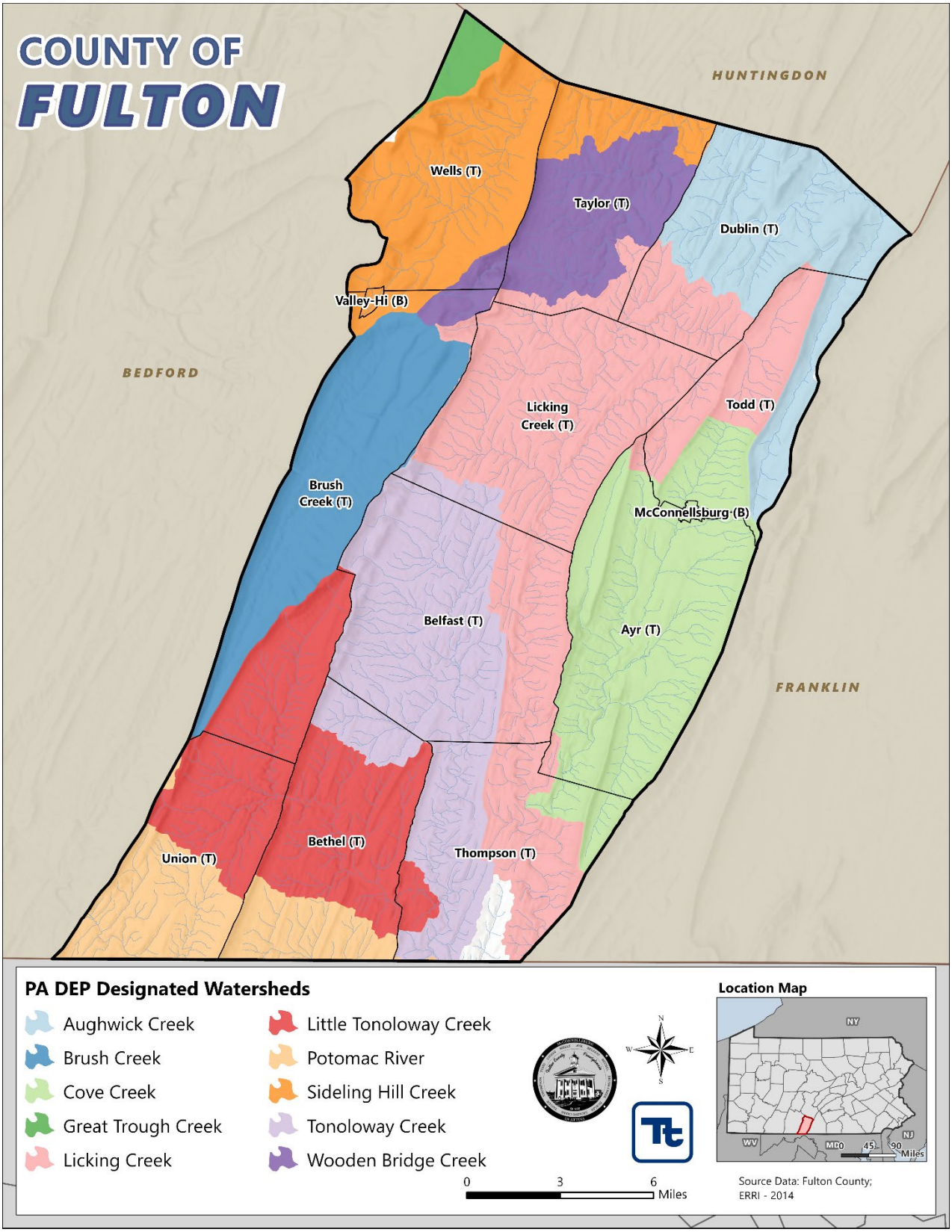


Figure 2-2. Watersheds Located Within Fulton County



2.1.4 Community Facts

Fulton County was created on April 19, 1850, from a portion of Bedford County. It is named after Robert Fulton, the inventor who pioneered the use of the steamboat. It consists of 13 municipalities; specifically, 11 townships and 2 boroughs. The County seat is McConnellsburg. The County has an estimated population of 14,631 (U.S. Census Bureau 2018). These municipalities are listed below.

- Ayr Township
- Belfast Township
- Bethel Township
- Brush Creek Township
- Dublin Township
- Licking Creek Township
- McConnellsburg Borough
- Taylor Township
- Thompson Township
- Todd Township
- Union Township
- Valley-Hi Borough
- Wells Township

Fulton County has an extensive transportation network of roads, with 20 miles each of turnpike and interstate highways, 368.4 miles of State and federal highways, and 231.5 miles of secondary and municipal roads. The major routes are US-522, US-30, PA-16, Interstate (I)-70, and the Pennsylvania Turnpike (I-76).

McConnellsburg Borough has remained the population center and the industrial and commercial nucleus of Fulton County. Several larger population centers are located just outside of Fulton County: the City of Altoona, located approximately 70 miles north; the City of Harrisburg, located approximately 90 miles northeast; the City of Hagerstown (Maryland), located approximately 45 miles southeast; Pittsburgh, located approximately 135 miles to the west; and Johnstown, located approximately 75 miles northwest.

The County has a rich historical background dating back to pre-Revolutionary days. Because of its Mason-Dixon Line location, Fulton County played a significant role during the Civil War. According to the U.S. Census Bureau's 2016 County Business Patterns, key industries in Fulton County include: other services (except public administration), retail trade, construction, health care and social assistance, transportation and warehousing, and accommodation and food services (U.S. Census Bureau 2018). Agriculture is also a main industry within Fulton County.

2.1.5 FEMA Community Lifelines

Supporting the County are hundreds of critical facilities, and all are essential for the health, safety, and economic stability of the community, especially during emergencies. FEMA defines Community Lifelines as essential services that enable the continued functioning of communities during an emergency. They are categorized into eight primary lifelines:

Safety and Security

- **Law Enforcement:** Local police departments, the Fulton County Sheriff's Office, and the State Police Troop G - McConnellsburg in the county.

- **Fire and Emergency Services:** Fire stations throughout the county and volunteer fire companies.

- **Emergency Management:** Fulton County Emergency Management Agency (EMA) oversees coordination and response in conjunction with municipal emergency management capabilities.

Food, Hydration, Shelter

- **Water Supply:** Municipal water authorities ensure potable water.
- **Food Distribution Centers:** Warehouses and distribution hubs for food supplies.
- **Sheltering Locations:** County shelter locations include religious and community centers.

Health and Medical

- **Hospitals and Medical:** Fulton County Medical Center and other local clinics.
- **Emergency Medical Services (EMS):** Fulton County Pennsylvania Fire and EMS Agency.

Energy (Power and Fuel)

- **Electric Grid Infrastructure:** Substations operated by Allegheny Power, Valley Rural Electric and regional power providers.
- **Fuel:** Gasoline and propane distribution centers.

Communications

- **Emergency Communications Systems:** 911 dispatch centers and radio tower infrastructure.
- **Telecommunications Providers:** Verizon, AT&T, and other local ISPs for phone and internet services.

Transportation

- **Roadways and Bridges:** Major routes such as I-70, the Pennsylvania Turnpike – I-76, U.S.-522, and U.S.-30.
- **Public Transit:** CART Senior Transportation.

Hazardous Material (Management)

- **Hazardous Materials:** Transported hazardous materials on roadways.

Water Systems

- **Wastewater Treatment Plants:** Ensuring proper sanitation during emergencies.

Additional Critical Facilities

- **Schools and Daycare Centers:** Essential for community sheltering and continuity of education.
- **Government:** Fulton County Courthouse, administrative buildings, and municipal offices.

This overview highlights the interconnectedness of critical infrastructure, emphasizing the need for coordination among public and private partners to ensure resilience during emergencies.

Figure 2-3 FEMA Safety and Security Lifelines in Fulton County, PA

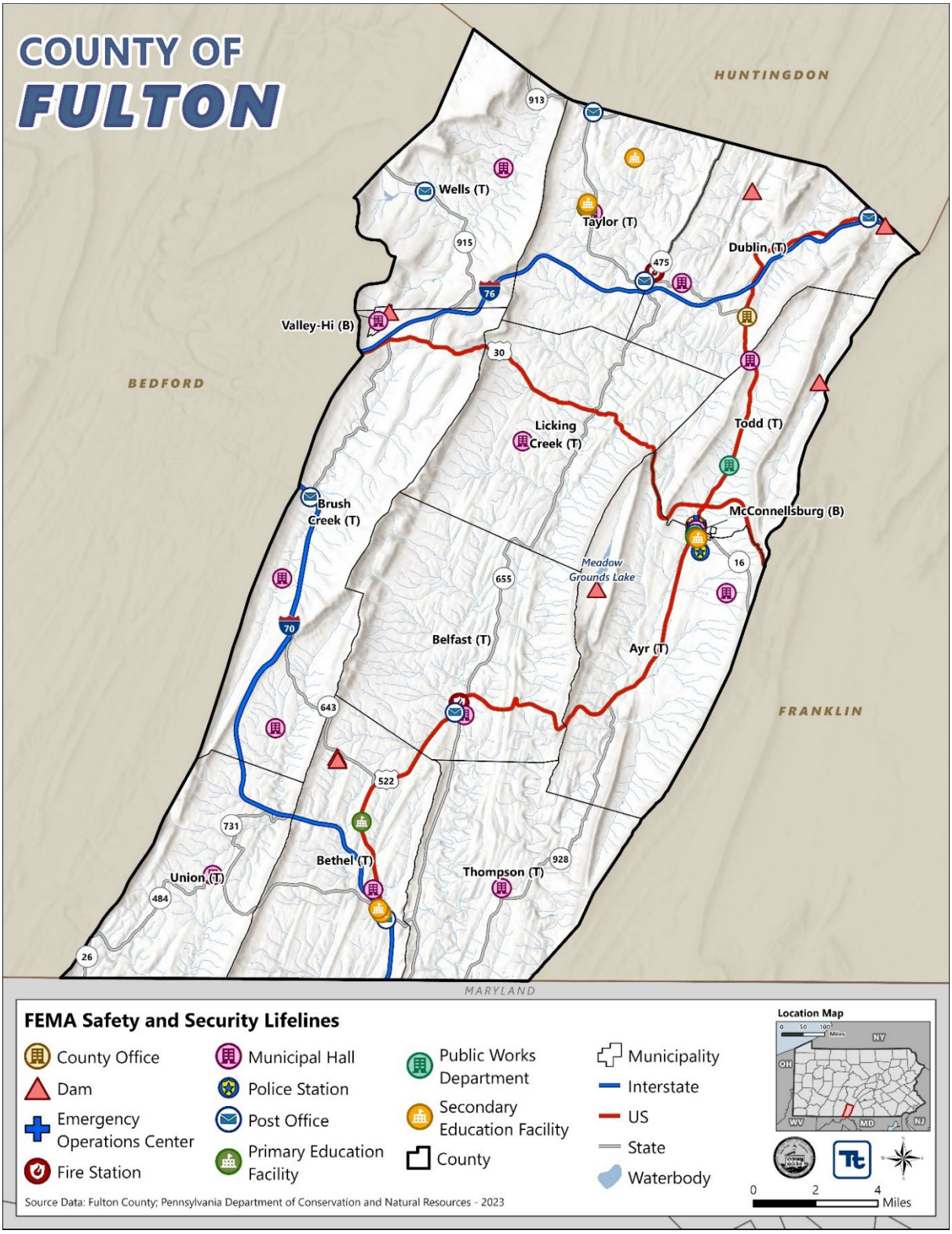


Figure 2-4 FEMA Food, Hydration, Shelter Lifelines in Fulton County, PA

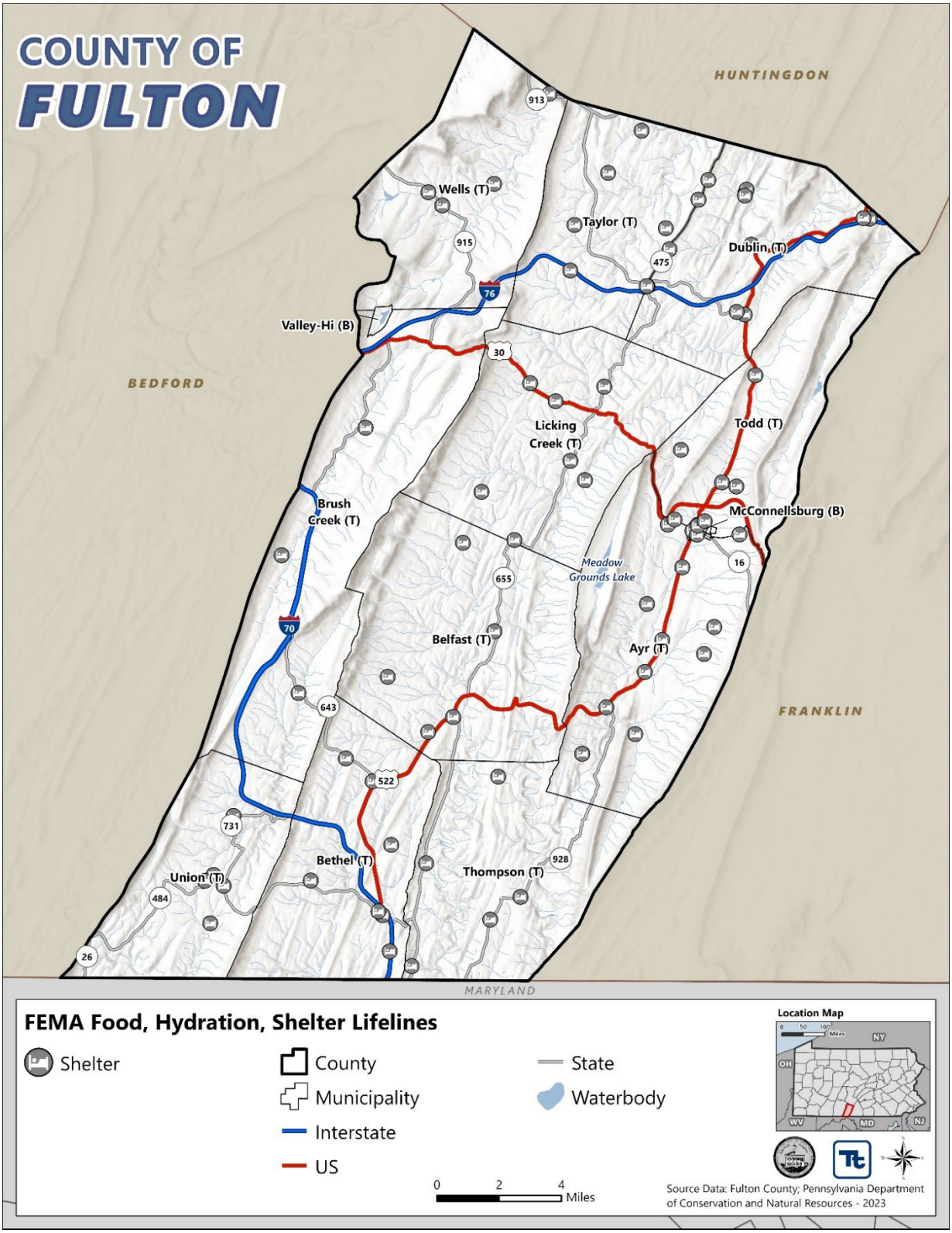


Figure 2-5 FEMA Health and Medical Lifelines in Fulton County, PA

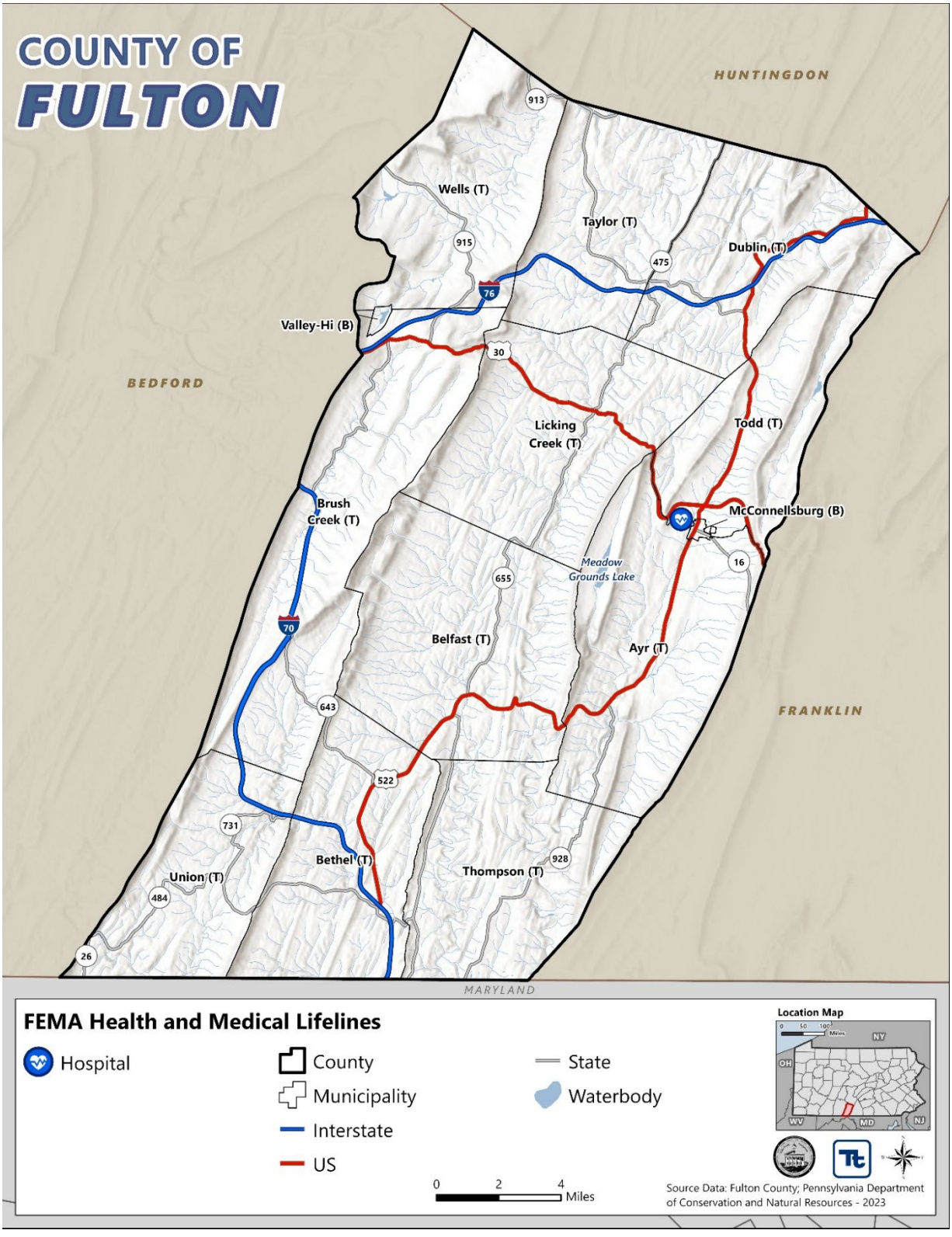


Figure 2-6 FEMA Energy Lifelines in Fulton County, PA

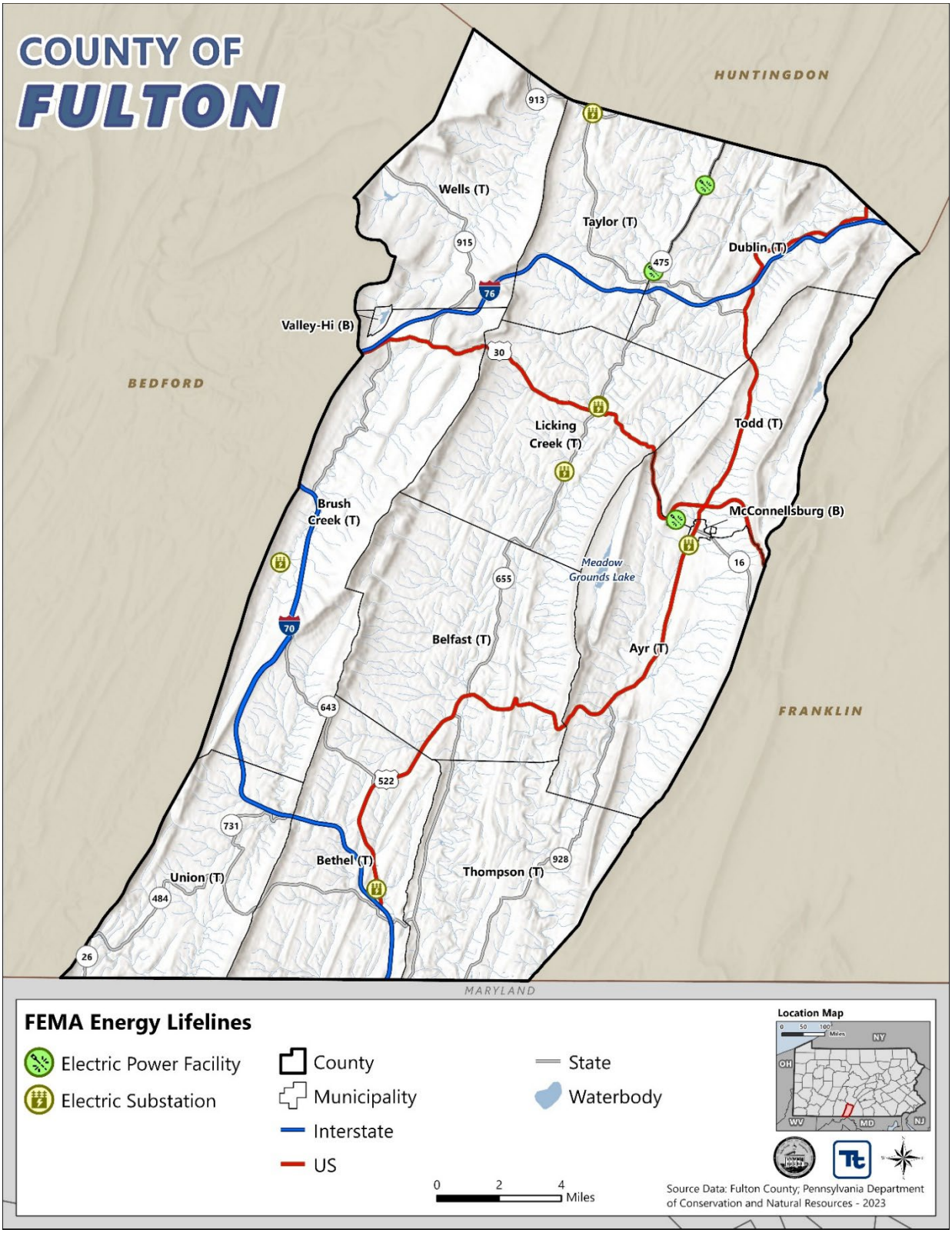


Figure 2-7 FEMA Communications Lifelines in Fulton County, PA

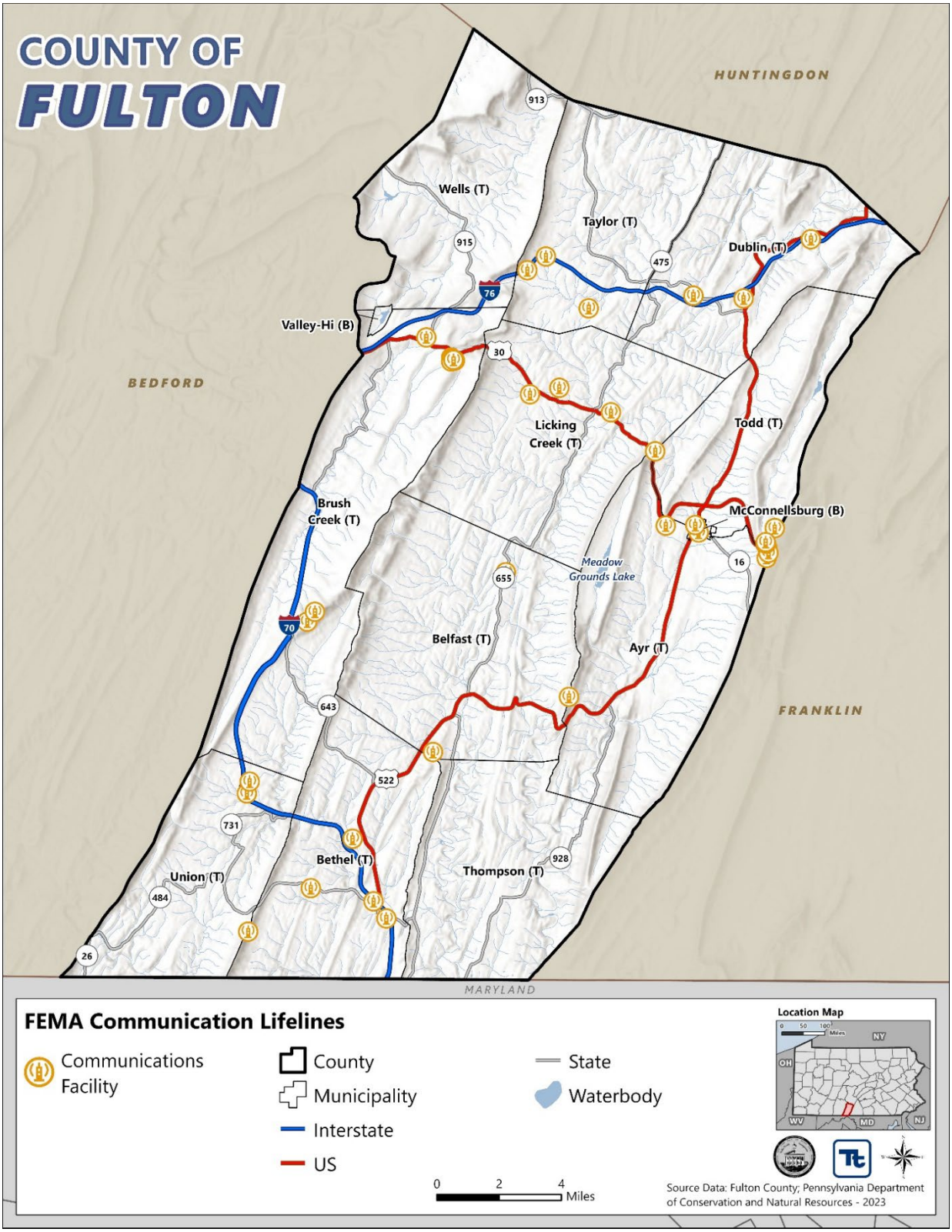


Figure 2-8 FEMA Hazardous Materials (Management) Lifelines in Fulton County, PA

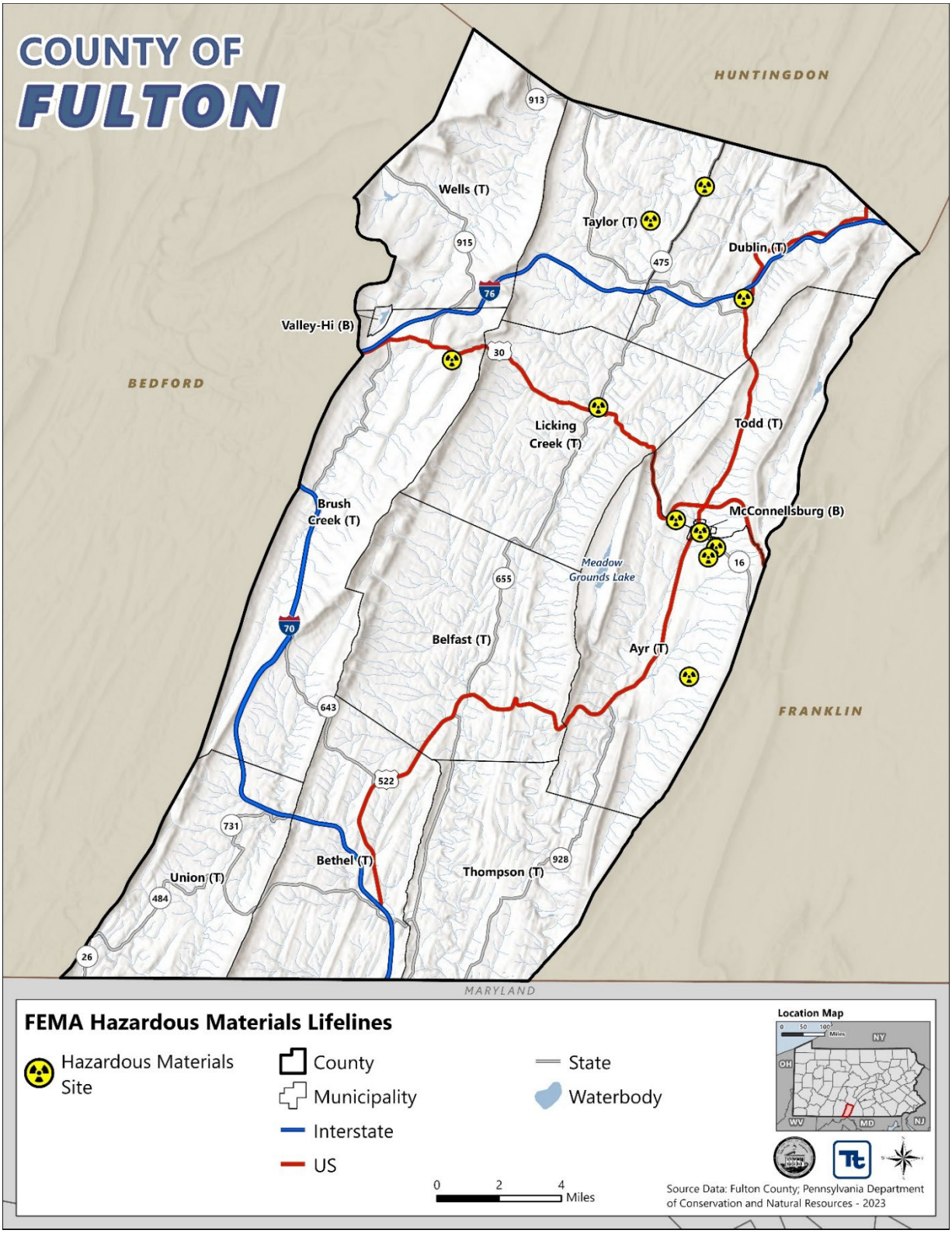
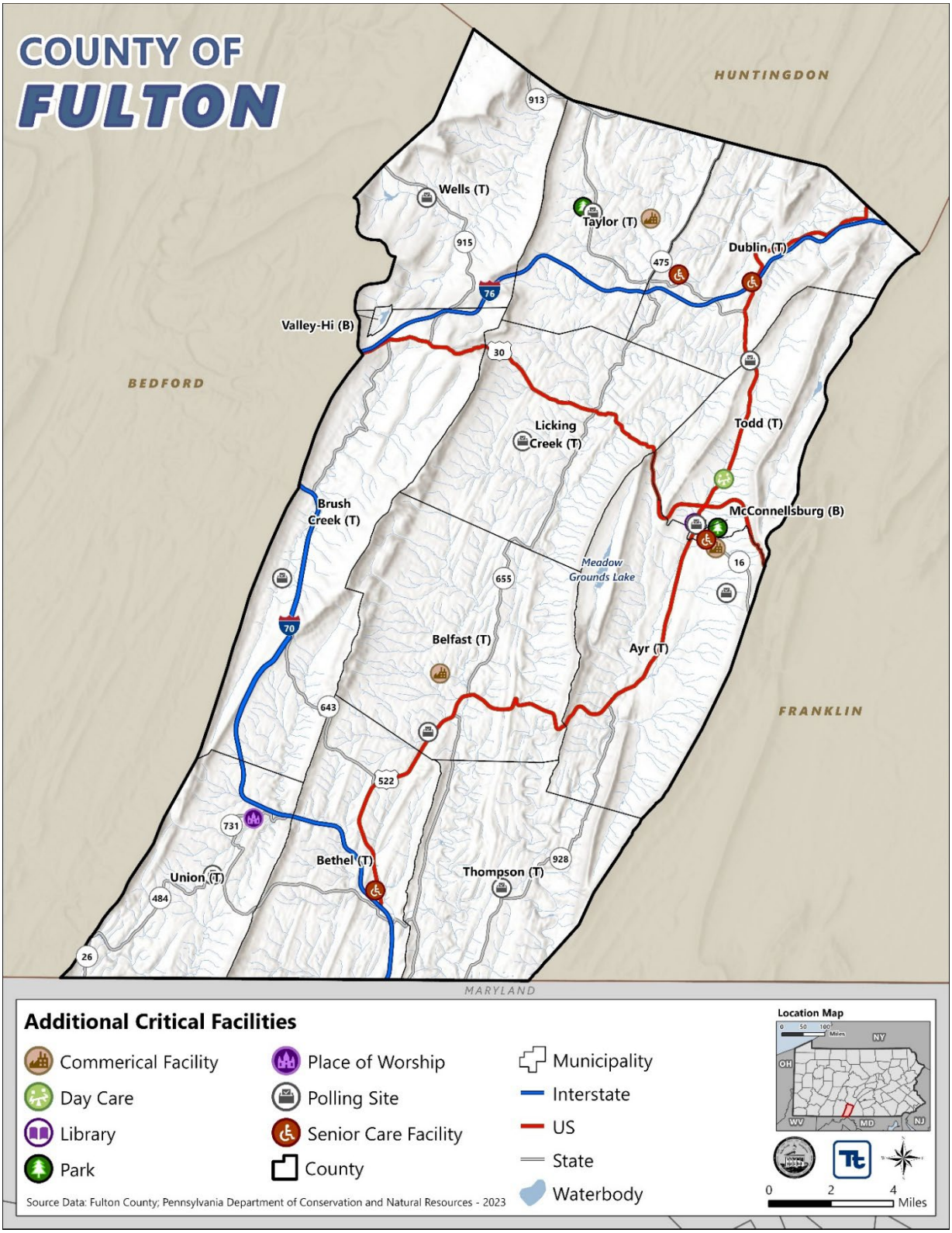


Figure 2-9 Additional Critical Facilities in Fulton County, PA



2.2 POPULATION AND DEMOGRAPHICS

Population and demographic data provide baseline information about residents. Changes in demographics or population may be used to identify higher-risk populations. Maintaining up-to-date data on demographics will allow the county to better assess magnitudes of hazards and develop more specific mitigation plans. According to the 2020 U.S. Census, Fulton County had a population of 14,492, which represents a 4.1 percent increase from the 2010 U.S. Census population of 558,979. Table 2-1 presents the population statistics for Fulton County based on the 2000, 2010, and 2020 U.S. Census. Table 2-2 provides details regarding the demographics for Fulton County.

Table 2-1 Fulton County Population Statistics

Municipality	2000 Census	2010 Census	2020 Census	Population Change 2000-2020	Population Change 2000-2020 (%)	Population Density Per Square Mile
Ayr Township	1,982	1,942	2,097	-40	-2.02%	46
Belfast Township	1,341	1,448	1,299	107	7.98%	26
Bethel Township	1,420	1,508	1,595	88	6.20%	43
Brush Creek Township	730	819	585	89	12.19%	11
Dublin Township	1,277	1,264	1,202	-13	-1.02%	32
Licking Creek Township	1,532	1,703	1,458	171	11.16%	33
McConnellsburg Borough	1,073	1,220	1,030	147	13.70%	2,870
Taylor Township	1,237	1,118	1,126	-119	-9.62%	35
Thompson Township	998	1,098	1,012	100	10.02%	27
Todd Township	1,488	1,527	1,776	39	2.62%	61
Union Township	634	706	868	72	11.36%	29
Valley-Hi Borough*	20	15	2	-5	-25.00%	5
Wells Township	529	477	442	-52	-9.83%	12
Fulton County	**14,261**	**14,845**	**14,492**	**584**	**4.10%**	**33**

Sources: U.S. Census Bureau 2000, 2010, and 2020

As shown in the tables above, Fulton County's 2020 Census population was 14,492. Based on these data, the population density of Fulton County is 33 persons per square mile, which is considerably lower than the Pennsylvania statewide average of 284 persons per square mile. McConnellsburg Borough has the highest population density of all the municipalities in the county (2,870 persons per square mile). McConnellsburg Borough is the only municipality with a population densities above the statewide average. Higher concentrations of people and structures can increase vulnerability to natural hazards. The potential for damage and injury in these urban areas is higher because of the greater concentration of people and property.

While low-density areas provide challenges to disseminating hazard mitigation information, a low population density also means that hazards will not affect as many people. For example, diseases may not spread as quickly because citizens are in contact with less people. Similarly, fires are less likely to spread to other structures because of the large distances between them. The magnitude of an event is typically smaller in a less-populated area because each event affects fewer people and properties.

Figure 2-10 Total Population by Census Tract in Fulton County, PA

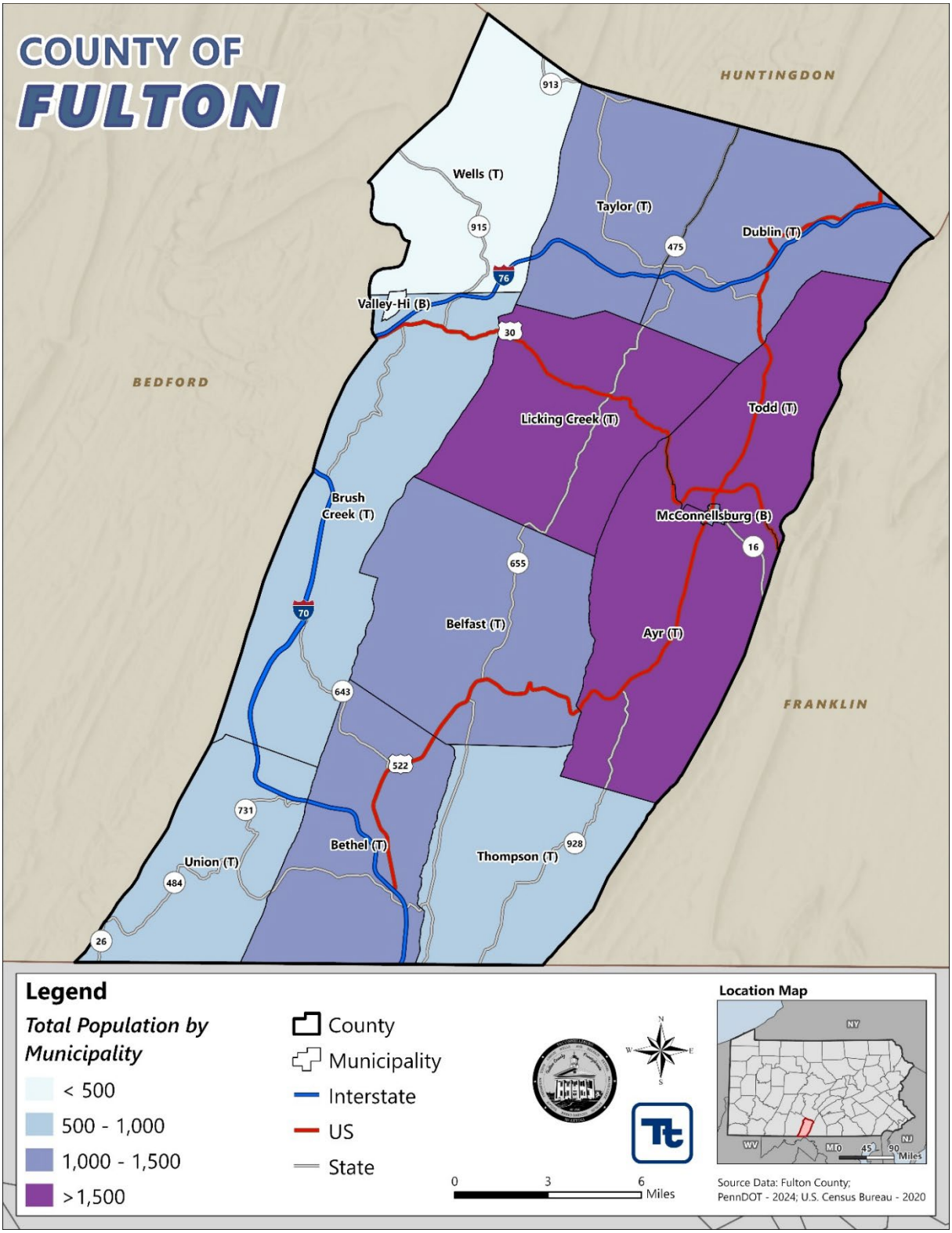


Table 2-2 Demographics for Fulton County

Demographics	2010	2020	2022 ACS 5-Year Estimate
Total population	14,845	14,492	14,545
Male	7,471	7,320	7,485
Female	7,374	7,172	7,060
Median age (years)	41.8	45.7	45.7
Under 5 years	916	710	691
18 years and over	11,414	11,610	11,677
65 years and over	2,544	3,086	3,177
Total households	6,014	6,040	6,126
Group quarters population	122	26	41

Source: U.S. Census Bureau 2010, U.S Census Bureau 2020, U.S Census Bureau 2022 American Community Survey 5-Year Estimates

Based upon Table 2-2, it is estimated that less than one percent of Fulton County's population lives in group quarters. The term "group quarters" refers to people living in communal settings, which can include inmates in a prison, students in a dorm, or elderly or mentally disabled individuals living in group care homes. Residents living in group quarters are often special needs populations. It is important to ensure that each group quarter facility has its own emergency plan to account for the unique needs of its residents during a hazard event.

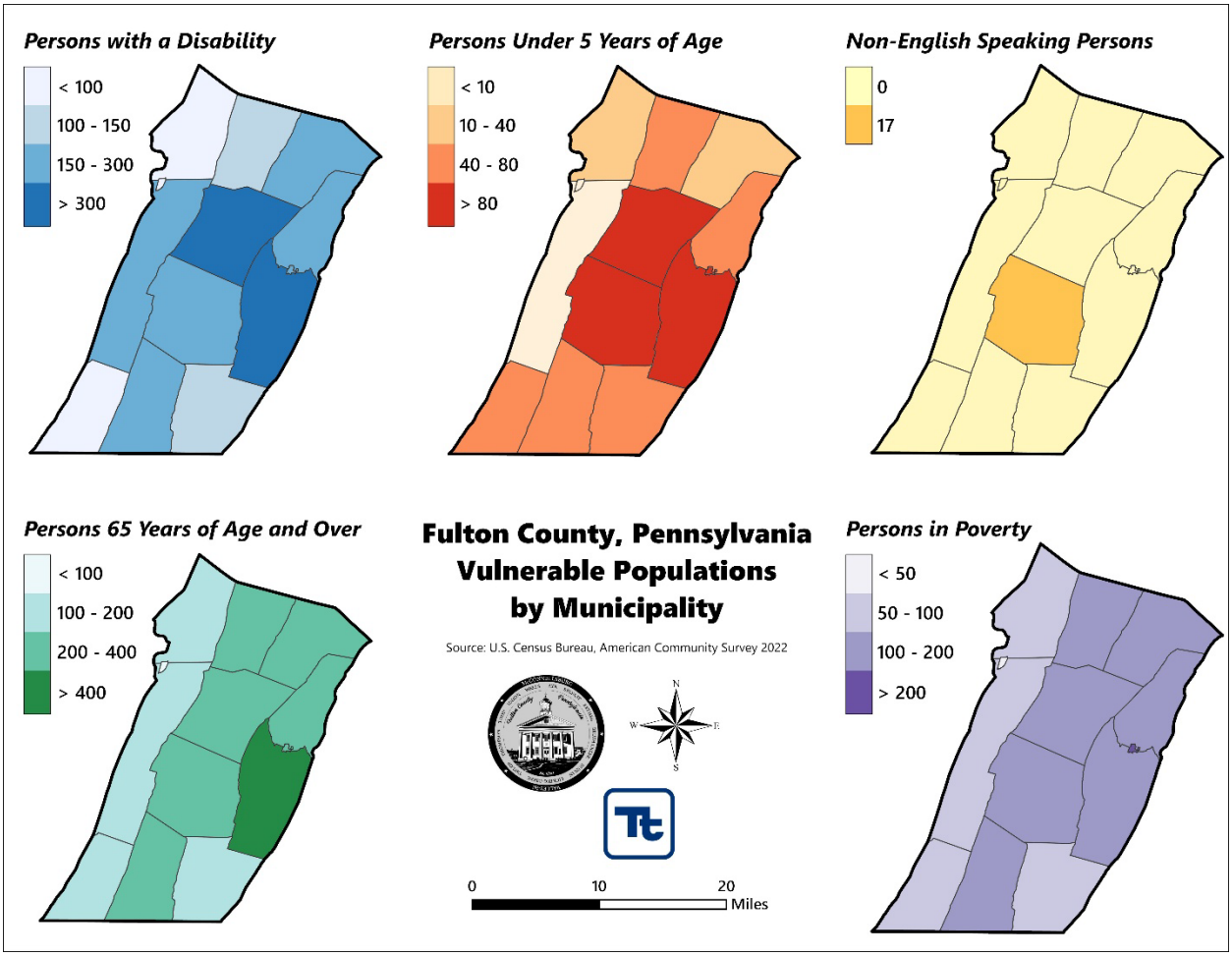
2.2.1 Vulnerable Populations

The DMA 2000 requires that HMPs consider socially vulnerable populations. These populations can be more susceptible to hazard events based on a number of factors, including their physical and financial ability to react or respond to a hazard and the location and construction quality of their housing.

Identifying concentrations of vulnerable populations can assist communities in targeting preparedness, response, and mitigation actions. Populations with a higher level of vulnerability may be more seriously affected during the course of an emergency or disaster.

For this plan, information collected through the National Risk Index (NRI), Centers for Disease Control and Prevention (CDC)/Agency for Toxic Substances and Disease Registry (ATSDR) Social Vulnerability Index (SVI), U.S. Census Bureau Decennial Census and American Community Survey (ACS), and other sources characterizes Fulton Country's vulnerable populations and barriers contributing to social vulnerability. It is important to note there are multiple resources available to assess social vulnerability and more specific barriers and challenges.

Figure 2-11 Vulnerable Populations in Fulton County, PA

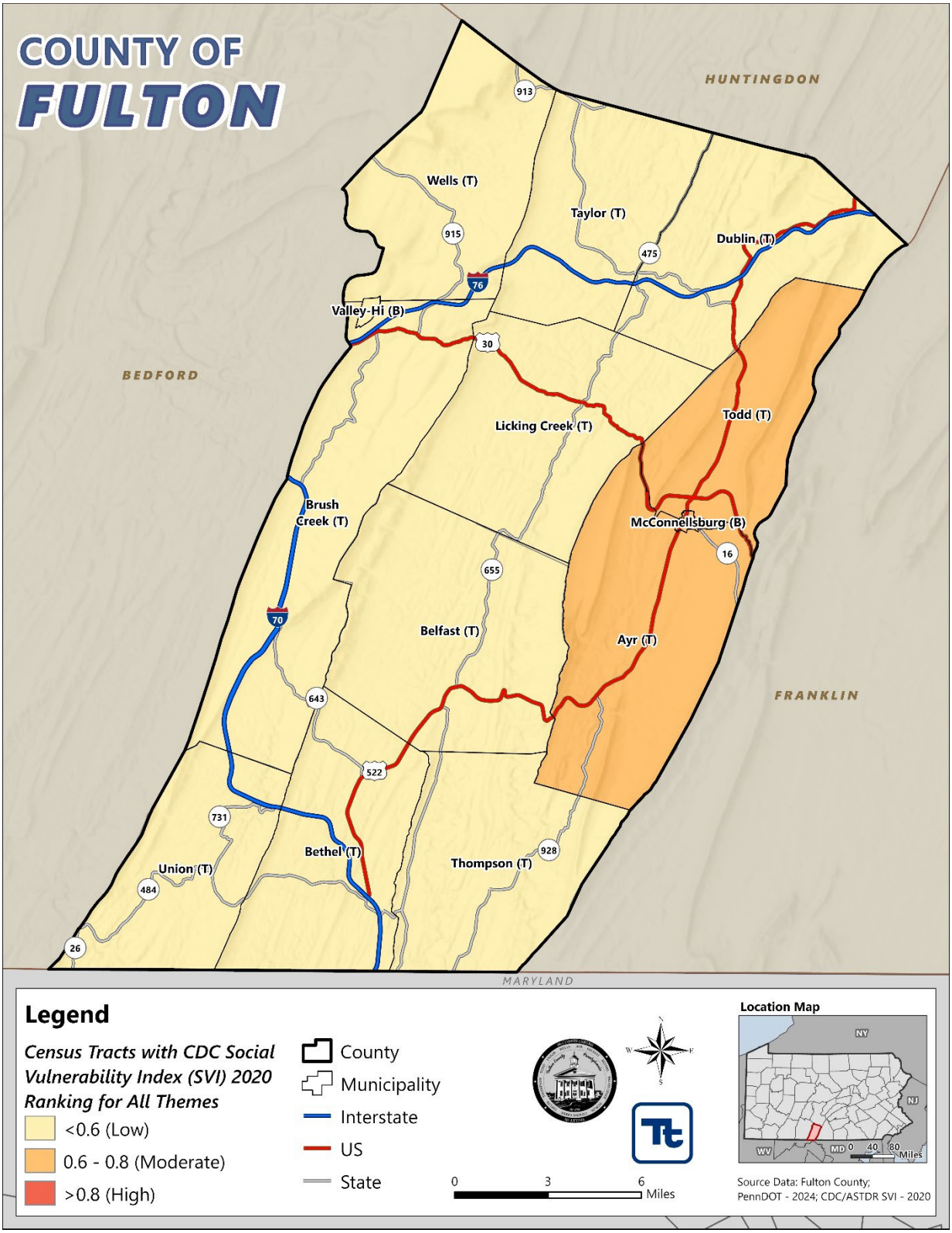


National Risk Index (NRI)

The NRI is a resource made available by FEMA to provide data to communities for 18 natural hazards. This index defines risk as the potential for negative impacts as a result of a natural hazard. The tool incorporates expected annual loss from natural hazards, social vulnerability, and community resilience. Within the NRI tool, a social vulnerability score and rating represents the relative level of a community's social vulnerability compared to all other communities at the same level; the score is measured on a national percentile starting at zero and increasing to 100, with 100 being the highest (FEMA 2021). Fulton County's overall NRI social vulnerability is 8.3, meaning social vulnerability in the County is greater than 8.3 percent of all U.S. communities. A score is also calculated for each census tract.

Figure 2-12 depicts the social vulnerability score for census tracts in Fulton County. A majority of the County is within the low vulnerability category, whereas areas surrounding McConnellsburg Borough display a moderate social vulnerability.

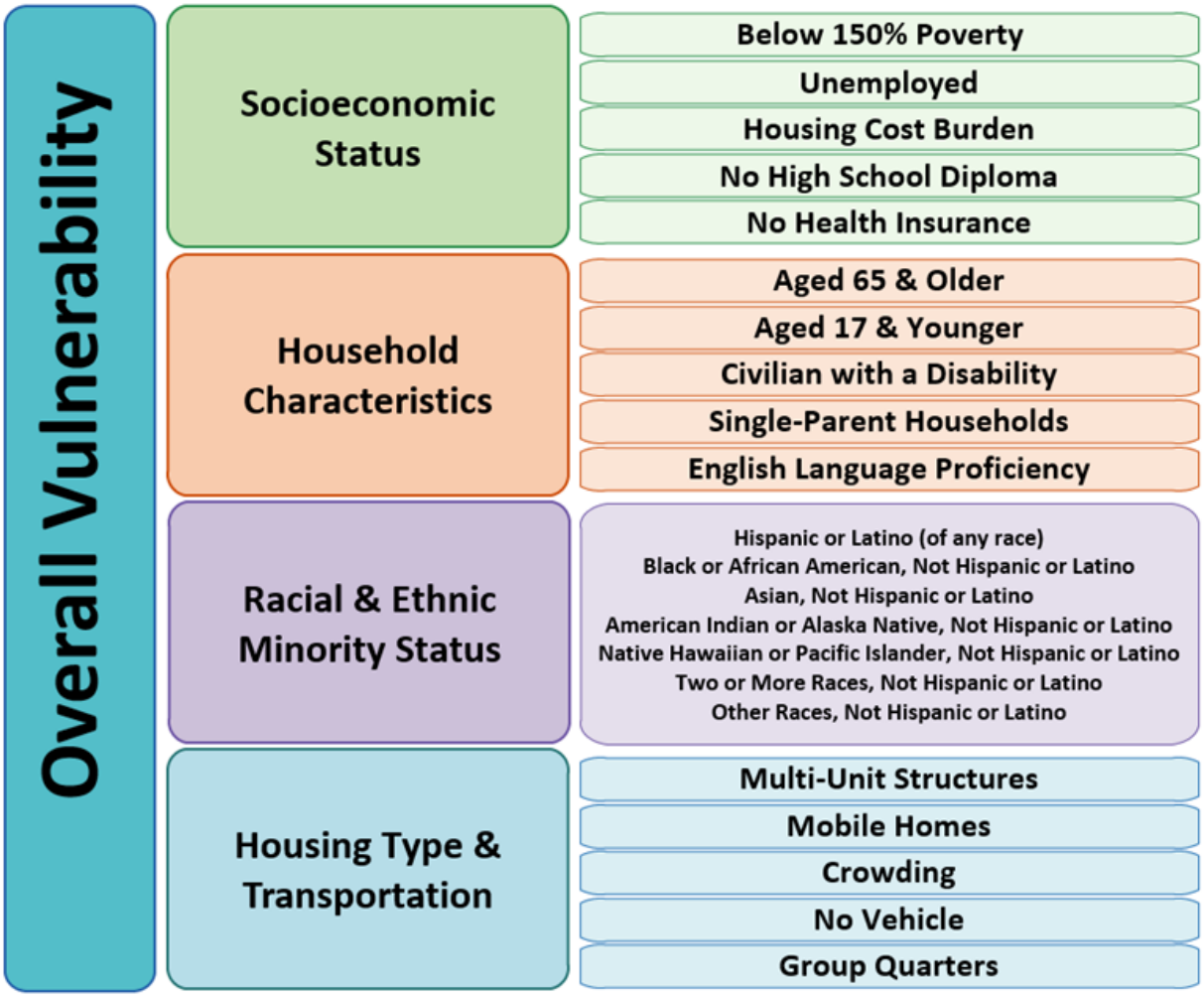
Figure 2-12 CDC Social Vulnerability Index (SVI) in Fulton County, PA



Social Vulnerability Index

The CDC/ATSDR SVI is a combination of 16 different social factors that contribute to social vulnerability as shown in Figure 2-13. These social factors are grouped into four themes to indicate social vulnerability concerning socioeconomic status, household characteristics, racial and ethnic minority status, and housing type and transportation. The vulnerability index is established by combining all the factors. The SVI data provides a visualization of geographic areas with higher social vulnerability.

Figure 2-13 CDC/ATSDR SVI Social Factors



Source: CDC/ATSDR 2020

U.S. Decennial Census and American Community Survey

When assessing social vulnerability, an individual may be categorized into one or more populations that experience a disproportionately higher vulnerability to emergencies and disasters. Quantitative data indicates what proportion of the community they represent, but applying a qualitative lens of intersectionality illuminates how and why these individuals may be impacted disproportionately by disasters. It is important to recognize that this data only accounts for those individuals who participated and responded to the 2020 U.S. Decennial Census and 2017-2022 ACS. Census data may be incomplete and not provide a full depiction of the County's population due to multiple factors, including distrust of government officials or programs, immigration status, or other factors.

Within Fulton County, there are many individuals and groups who may experience one or more factors that contribute to heightened vulnerability. Approximately 21.8 percent of the county's population is over the age of 65, accounting for 3,177 individuals. The second highest percentage of individuals experiencing heightened social vulnerability are those individuals with a disability, representing 18 percent of the County's total population. Table 2-3 provides a breakdown of vulnerable populations, as identified in the U.S. Census, for Fulton County. The following sections provide a brief overview of how different factors of social vulnerability contribute to a heightened risk of hazards.

Table 2-3 Social Vulnerability in Fulton County, PA

Jurisdiction	American Community Survey 5-Year Population Estimates (2022)									
	Population Over 65		Population Under 5		Non-English Speaking Population		Population with Disability		Population Below Poverty Level	
	Number	% of Jurisdiction Total	Number	% of Jurisdiction Total	Number	% of Jurisdiction Total	Number	% of Jurisdiction Total	Number	% of Jurisdiction Total
Ayr (T)	524	26.6%	85	4.3%	0	0.0%	399	20.3%	143	7.3%
Belfast (T)	351	25.1%	85	6.1%	17	1.2%	276	19.7%	130	9.3%
Bethel (T)	299	20.7%	48	3.3%	0	0.0%	238	16.5%	117	8.1%
Brush Creek (T)	169	28.8%	10	1.7%	0	0.0%	161	27.4%	69	11.8%
Dublin (T)	257	21.9%	31	2.6%	0	0.0%	201	17.1%	154	13.1%
Licking Creek (T)	317	20.1%	82	5.2%	0	0.0%	304	19.3%	159	10.1%
McConnellsburg (B)	266	25.2%	83	7.9%	0	0.0%	279	26.4%	281	26.6%
Taylor (T)	229	19.7%	53	4.6%	0	0.0%	147	12.6%	107	9.2%
Thompson (T)	158	16.6%	52	5.5%	0	0.0%	147	15.5%	90	9.5%
Todd (T)	345	19.2%	78	4.3%	0	0.0%	282	15.7%	151	8.4%
Union (T)	142	14.3%	54	5.4%	0	0.0%	96	9.7%	84	8.5%
Valley-Hi (B)	3	100.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Wells (T)	117	26.9%	30	6.9%	0	0.0%	81	18.6%	65	14.9%
Fulton County (Total)	**3,177**	**21.8%**	**691**	**4.8%**	**17**	**0.1%**	**2,611**	**18.0%**	**1,550**	**10.7%**

Source: *U.S. Census Bureau; American Community Survey (ACS) 2022*
Note: *Valley-High (B) has a low low population and therefore American Community Survey (ACS) data may be skewed because of the sampling techniques used for ACS data collection.*
Note: *2.37 persons per household. This number was used to calcualte the Non-English speaking population. U.S. Census Bureau 2018-2022*
Note: *% = Percent*

Age

Children are considered vulnerable to hazard events because they are dependent on others to safely access resources during emergencies and may experience increased health risks from hazard exposure. Older adults are more apt to lack the physical and economic resources necessary to respond to hazard events and are more likely to suffer health-related consequences. Those older adults living on their own may have more difficulty evacuating their homes. Older adults are also more likely to live in senior care and living facilities where emergency preparedness occurs at the discretion of facility operators.

According to the 2022 American Community Survey 5-Year Estimate, the median age in Fulton County was 45.7 years. Approximately 21.8 percent of the County's total population is aged 65 and older. Older residents may have access and functional needs that require particular mitigation actions to address. For example, many

older residents may be unable to drive, and special evacuation plans may be necessary for this population. They may also have hearing or vision impairments that could make receiving emergency instructions difficult.

Additionally, 4.8 percent of the County's total population is under the age of five. Both older and younger populations have higher risks of contracting certain diseases. The County's combined population under five years of age and over 65 years of age represents approximately 26.6 percent of its total population.

Income

The 2022 American Community Survey 5-Year Estimates indicate that the median household income in Fulton County was $63,153 and the poverty rate was 10.7 percent (U.S. Census 2022). The U.S. Census Bureau identifies households with two adults and two children with an annual household income below $30,900 per year as living in poverty (U.S. Census 2024).

Household income has many implications for disaster preparedness and post-disaster recovery. Households and individuals that are low-income may struggle to afford disaster preparedness measures, such as purchasing flood insurance for their homes (SAMHSA 2017). Low-income households may have a more difficult time evacuating during hazard events due to financial and employment barriers. Additionally, low-income and impoverished individuals and households often live in lower-quality housing that is in more hazard-prone areas than their higher-income peers (SAMHSA 2017).

Race and Ethnicity

Black, Indigenous, and People of Color (BIPOC) often experience more profound short- and long-term impacts from disasters than their white peers. A meta-analysis of recent research found that "multiple studies of heat, extreme cold, hurricanes, flooding, and wildfires find evidence that people of color, including Black, Latinx, Native American, Pacific Islander, and Asian communities are at higher risk of climate-related health impacts than Whites… Studies of adults have found evidence of racial disparities related to climatic changes with respect to mortality, respiratory and cardiovascular disease, mental health, and heat-related illness… and infants and children of color have experienced adverse perinatal outcomes, occupational heat stress, and increases in emergency department visits associated with extreme weather" (Berberian, Gonzalez and Cushing 2022).

Fulton County has a growing population of BIPOC residents, increasing from 2.3 percent of the total population in 2010 to 3.1 percent of the population in 2022. As the County's demographics continue to shift, future mitigation actions should account for the particular needs of communities of color.

Table 2-4 Race and Ethnicity Population Summary for Fulton County, PA

Race and Ethnicity	2020	% of Population	2022	% of Population
One race	14,691	99%	14,244	97.9%
White	14,450	97.3%	13,782	94.8%
Black or African American	151	1.0%	197	1.4%
American Indian and Alaska Native	28	0.2%	2	0.0%
Asian	19	0.1%	39	0.3%
Native Hawaiian and Other Pacific Islander	1	0.0%	0	0.0%
Some other race	42	0.3%	224	1.5%
Two or more races	154	1.0%	301	2.1%
Foreign born	116	0.7%	113	0.8%
Speak a language other than English	166	1.2%	176	1.3%
Hispanic or Latino	110	0.7%	197	1.4%

Source: U.S. Census Bureau 2010 Decennial; U.S. Census Bureau 2022 ACS Vulnerable Population Totals

Access and Functional Needs

Persons with a disability include those who have physical, sensory, or cognitive impairment that might limit a major life activity (Centers for Disease Control and Prevention 2020). These impairments may increase the level of difficulty that individuals may face during an emergency. Cognitive impairments may reduce an individual's capacity to receive, process, and respond to emergency information or warnings. Individuals with a physical or sensory disability may face issues of mobility, sight, and hearing, or rely on specialized medical equipment or supplies that may become inaccessible during a hazard event. According to the 2022 American Community Survey 5-Year Estimates, 18 percent of residents of Fulton County are living with a disability.

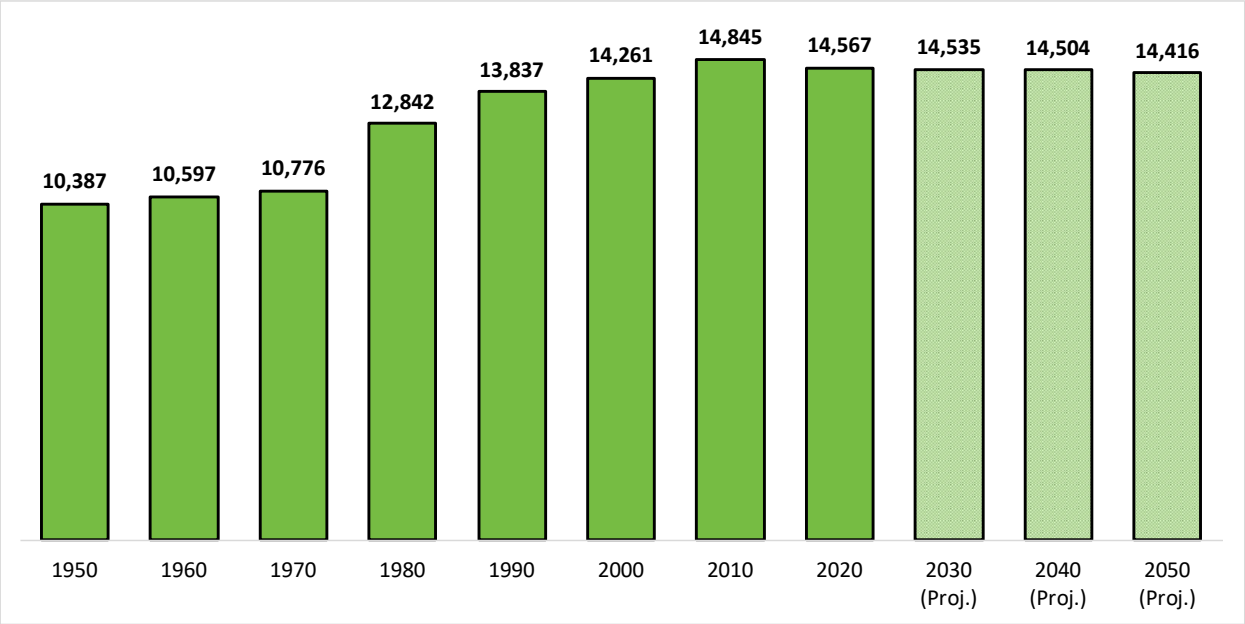
Limited-English Proficiency

Individuals who are not fluent or do not possess a working proficiency in English are vulnerable because they may have difficulty understanding the information being conveyed to them. Cultural differences can also add complexity to how information is being conveyed to populations with limited proficiency in English (Centers for Disease Control and Prevention 2021). According to the 2022 American Community Survey 5-Year Estimates, 1.3 percent of residents over the age of five primarily speak a language other than English at home. Of the 142 individuals who reported speaking English less than "very well," 74.2 percent speak Spanish, 84.2 percent speak other Indo-European languages, 0 percent speak Asian and Pacific Island Languages, and 0 percent speak other languages (U.S. Census 2022). Future hazard mitigation strategies should consider addressing language barriers to ensure that all residents can receive emergency instructions. Table 2-4 summarizes race and ethnicity population information, including English proficiency, for Fulton County.

Population and Demographic Trends

This section discusses population trends to use as a basis for estimating future changes that could result from the seasonal character of the population and significantly change the character of the area. Population trends can provide a basis for making decisions on the type of mitigation approaches to consider and the locations in which these approaches should be applied. This information can also be used to support planning decisions regarding future development in vulnerable areas. Various Census Bureau products were used as sources for the population trends section. The Decennial Census is the official population count taken every 10 years. In addition to the U.S. Census historic counts, the population projections from the Pennsylvania State Data Center and the Pennsylvania Department of Environmental Protection were utilized to provide insight into future population trends. The county's population experienced a gradual increase in the mid to late 20th century and continued to grow steadily through the first three decades of the 21st century. The population is projected to slightly decrease through 2050.

Figure 2-14 Fulton County Population Change, 1950 - 2050



Source: Pennsylvania State Data Center for the Center for Rural Pennsylvania 2013, Pennsylvania Department of Environmental Protection 2012, 2000 U.S. Census Bureau 2000, 2010 U.S. Census Bureau 2010, and 2020 U.S. Census Bureau

Population changes at the municipal level are also important to capture to better understand changing populations within the county and where the concentration of population resides. Table 2-5 provides population change and projections in population for each municipality. The population of the entire County is estimated to be 16,573 by the year 2040, which represents a net population increase of 1,728 people in a 30-year period. As shown in the table below, approximately half of the municipalities in Fulton County are projected to see an increase in population. The table also shows that four municipalities are projected to see a decrease in population. It should be noted that changes in population or demographics may be used to identify higher-risk populations. Maintaining up-to-date data on demographics will allow Fulton County to better assess magnitudes of hazards and develop more specific mitigation plans and strategies.

Table 2-5 Fulton County Population Projections by Municipality

Municipality	2000 Census	2010 Census	Population Change 2000-2010 (%)	2020 Projection	2030 Projection	2040 Projection	Projected Population Change 2010-2040 (%)
Ayr Township	1,982	1,942	-2.02%	1,819	1,744	1,641	-15.50%
Belfast Township	1,341	1,448	7.98%	1,570	1,683	1,801	24.38%
Bethel Township	1,420	1,508	6.20%	1,605	1,696	1,791	18.77%
Brush Creek Township	730	819	12.19%	907	995	1,084	32.36%
Dublin Township	1,277	1,264	-1.02%	1,333	1,356	1,405	11.16%
Licking Creek Township	1,532	1,703	11.16%	1,846	2,005	2,155	26.54%
McConnellsburg Borough	1,073	1,220	13.70%	1,264	1,367	1,436	17.70%
Taylor Township	1,237	1,118	-9.62%	1,104	1,030	991	-11.36%
Thompson Township	998	1,098	10.02%	1,112	1,176	1,211	10.29%

Municipality	2000 Census	2010 Census	Population Change 2000-2010 (%)	2020 Projection	2030 Projection	2040 Projection	Projected Population Change 2010-2040 (%)
Todd Township	1,488	1,527	2.62%	1,575	1,853	1,830	19.84%
Union Township	634	706	11.36%	743	800	846	19.83%
Valley-Hi Borough*	20	15	-25.00%	14	12	11	-26.67%
Wells Township	529	477	-9.83%	446	406	371	-22.22%
Fulton County	**14,261**	**14,845**	**4.10%**	**15,338**	**16,123**	**16,573**	**11.64%**

Sources: U.S. Census Bureau 2000, 2010, and 2020 and PA DEP 2012

Housing

Fulton County has an estimated 7,119 housing units. These properties may be vulnerable to various natural hazards, particularly those located in defined hazard areas. Damage to residential properties is not only costly to repair or rebuild but devastating to the displaced residents.

According to the U.S. Census, approximately 13.9 percent of the county's residential properties are vacant. Vacant buildings are particularly vulnerable to arson and criminal activity. Because vacant properties are not inhabited year-round or may not be adequately maintained, many are structurally deficient and at risk of collapse.

Approximately 23 percent of the county's housing units are renter-occupied. Because renters are more transient than homeowners, communicating with renters may be more difficult than communicating with homeowners. Similarly, communications with tourists would be harder during an emergency event. Communication strategies should be developed to ensure that these populations receive proper notifications. Table 2-6 summarizes the characteristics of the residential properties in Fulton County.

Table 2-6 Housing Characteristics in Fulton County

Housing Characteristics	2010	2022
Total housing units	7,122	7,119
Owner-occupied housing units	4,617	4,720
Renter-occupied housing units	1,397	1,406
Vacant housing units	1,102	993
Median value (dollars)	$157,500	$188,000
Housing units with a mortgage	2,457	2,265
Housing units without a mortgage	2,160	2,455

Source: U.S. Census Bureau 2010, U.S. Census, ACS 5-Year Estimates 2022

In 2022, the median household income in the county was $188,000, which was lower than the Commonwealth of Pennsylvania's estimated median household income of $76,081 (U.S. Census 2022). Approximately 9.2 percent of families' incomes in Fulton County were below the poverty level, and 10.7 percent of its individuals' incomes were below the poverty level. Emergency responders may have difficulty connecting with individuals within this economic bracket for several reasons, including less access to the Internet within these communities. Additionally, some low-income families and individuals may not own vehicles and therefore could be more vulnerable during an evacuation. Table 2-7 summarizes the economic characteristics of Fulton County's population and the population distribution of residents with incomes below the poverty level

Table 2-7 Economic Characteristics in Fulton County

Economic Characteristics	2010	2022

Median household income	$45,240	$63,153
Median family income	$54,946	$77,817
Per capita income	$21,729	$41,804
Families with income below the poverty level	8.8%	8.0%
Individuals with income below the poverty level	13.3%	10.7%

Source: 2010 and 2022 American Community Survey 5-Year Estimates

Figure 2-15 Total Residential Cost Value(RCV) per Census Tract in Fulton, County, PA

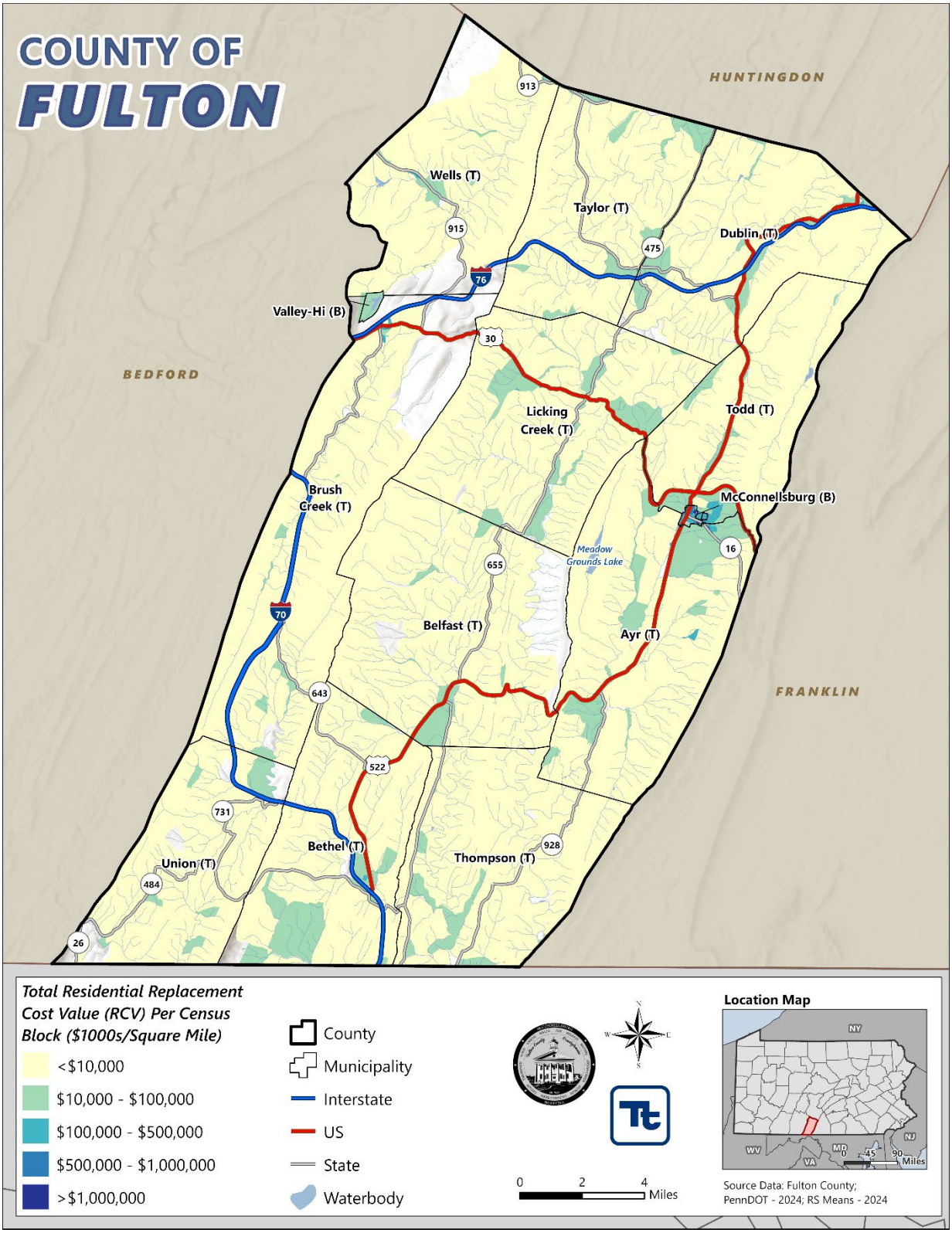


Figure 2-16 Total Commercial Cost Value(RCV) per Census Block in Fulton County, PA

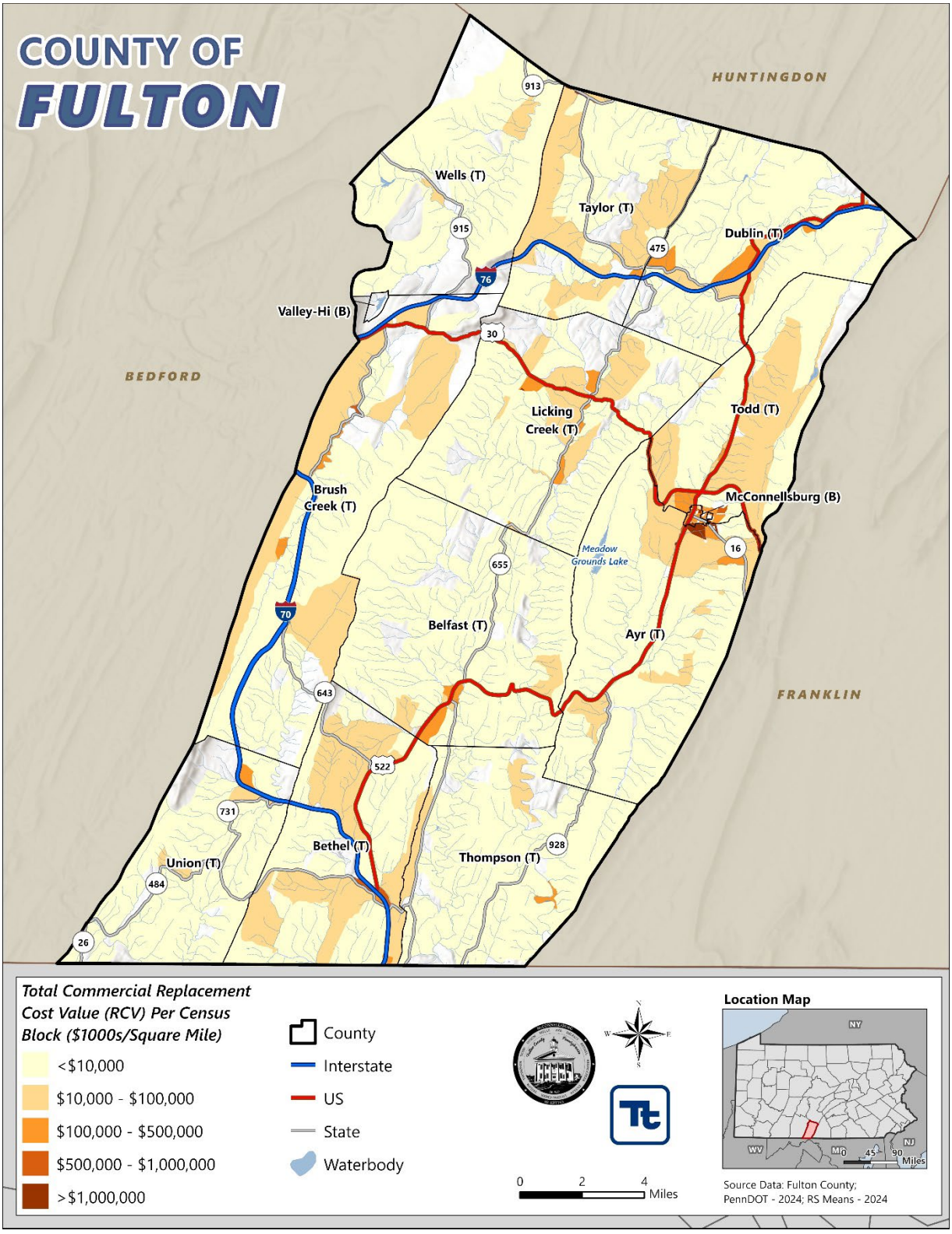
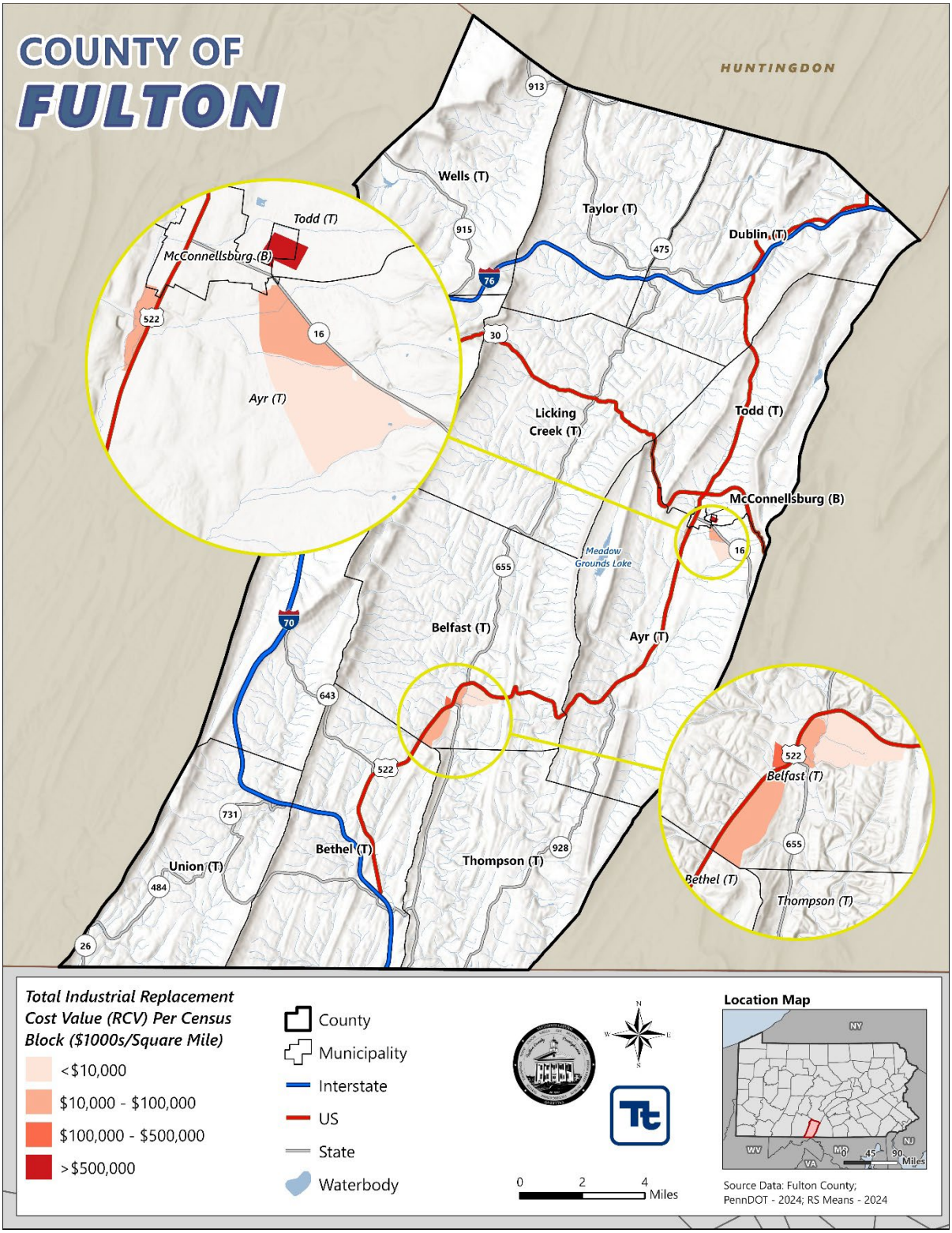


Figure 2-17 Total Industrial Cost Value (RCV) per Census Tract in Fulton County, PA



2.3 LAND USE AND DEVELOPMENT

Fulton County's existing land use patterns are greatly influenced and shaped by surrounding natural features such as mountain ranges, valleys, and waterways. These features have largely determined the location of transportation corridors and development activities, as well as agricultural practices.

A network of high-capacity transportation systems traverses Fulton County. These systems include the Pennsylvania Turnpike, I-70, US Route 30, and US Route 522. In addition, Fulton County is in proximity to the juncture of I-70 and I-68 in Maryland. These transportation systems have greatly contributed to Fulton County's accessibility and land development patterns. Of the county's total land area of 438 square miles, approximately 95 percent is classified as agricultural or forested land and approximately 5 percent is considered developed.

McConnellsburg Borough has remained the population center and the industrial and commercial nucleus of Fulton County. Consequently, a natural pattern of development has occurred as a concentric ring of growth has expanded outward from the Borough into the neighboring rural townships.

Fulton County's commercial and industrial land development patterns are largely influenced by the transportation network and availability of public sewer services. As a result, future growth in the county is expected to occur in five distinct geographic areas: (1) McConnellsburg, (2) Warfordsburg, (3) Hustontown, (4) Fort Littleton, and (5) Crystal Spring.

Fulton County's future population growth and land use development patterns will be largely influenced by in-migration patterns of people from the east and south. Data gathered from the Internal Revenue Service reveal that Fulton County's greatest population inflows originated in Franklin County, Pennsylvania; and Washington County, Maryland.

Fulton County residents have expressed concern that the county's rural character is being jeopardized as its agricultural lands are slowly being converted to areas of low-density, scattered residential development. While still a concern, residential development growth has slowed since this trend has been noted. From 2010 to 2022, U.S. Census records showed an decrease in housing units (0.4 percent) that was outpaced by the county's population growth (4.1 percent). This contrasts from the 2000 to 2010 comparison, which showed a housing unit growth of 4.9 percent, compared to a County population growth of only 4.1 percent.

Land use regulations are not prevalent in Fulton County. For example, Fulton County does not have a County zoning ordinance nor a subdivision and land development ordinance. In addition, of the 13 municipalities, only McConnellsburg Borough has adopted a zoning ordinance. Moreover, municipal subdivision and land development ordinances lack the regulations necessary to support the preservation of the county's existing rural character.

Fulton County identified actions to increase the agriculture industry, including increasing representation of agriculture on the county economic development agency, actively recruiting additional businesses or facilities to the county, increasing public awareness of the role agriculture plays in the county's economy, and collaborating with lenders to offer low-interest loans to farmers (Southern Alleghenies Regional Planning Commission 2018)

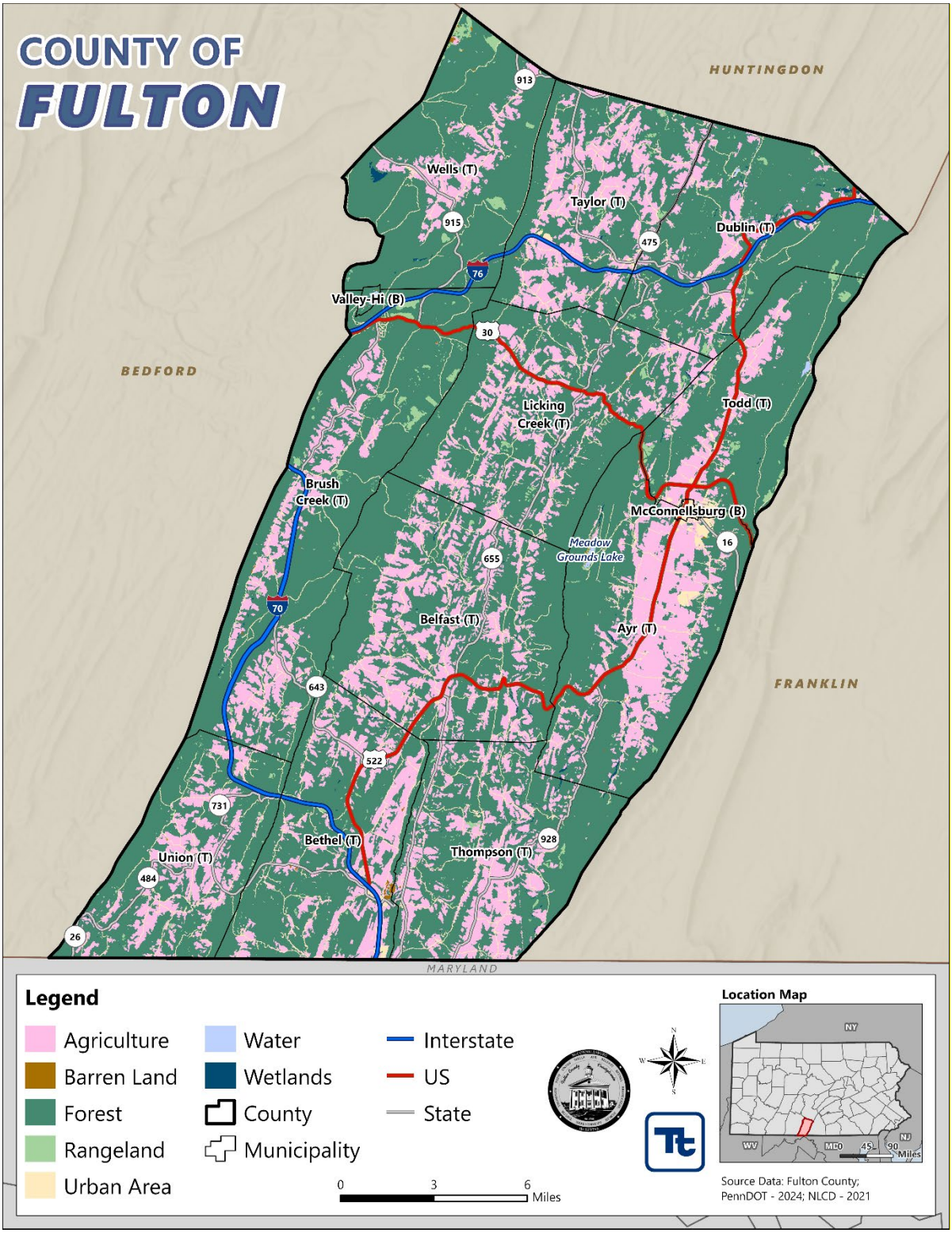
Access management is an increasing concern as residential land development patterns continue to develop in a linear fashion along local roadways (e.g., US-522) and each property obtains an individual highway occupancy permit from the Pennsylvania Department of Transportation (PennDOT). Fulton County has developed a growth management survey to help monitor and guide County growth and development in a way to ensure compliance with overall County land use goals. Land use in Fulton County is listed in Table 2-8 and illustrated in Figure 2-18.

Table 2-8 Land Use Area in Fulton County

Land Use Category	2021 Data

	Acreage	% of County
Agriculture	65,105	23.2%
Barren Land	252	0.1%
Forest	194,433	69.3%
Rangeland	3,304	1.2%
Urban Area	16,498	5.9%
Water	301	0.1%
Wetland	547	0.2%
Fulton County (Total)	**280,440**	**100.0%**

Figure 2-18 Fulton County Land Use and Land Cover



2.4 DATA SOURCES AND LIMITATIONS

The County Profile section of this HMP was developed with information from the following sources:

1. American Community Survey. 2019. *2015 - 2019 American Community Survey 5-Year Estimates.*
2. Berberian, A.G., D.J.X. Gonzalez, and L.J. Cushing. 2022. "Racial Disparities in Climate Change-Related Health Effects in the United States." *Curr Envir Health Rpt* 9: 451–464. https://doi.org/10.1007/s40572-022-00360-w.
3. Britannica. n.d. *Fulton County* . https://www.britannica.com/place/Fulton-county-Pennsylvania.
4. Centers for Disease Control and Prevention . 2021. *Culture and Language.* December 9. https://www.cdc.gov/healthliteracy/culture.html.
5. Centers for Disease Control and Prevention. 2020. *Disability and Health Overview.* September 16. https://www.cdc.gov/ncbddd/disabilityandhealth/disability.html.
6. Delaware County. n.d. "Government Structure." Accessed 2022. https://delcopa.gov/council/structure.html.
7. Delaware County Planning Department. 2013. *Delaware County 2035 Land Use Policy Framework.* https://www.delcopa.gov/planning/pubs/delco2035/LandUseFrameworkPlan.pdf.
8. Delaware County Planning Department. 2013. "Delaware County 2035: Land Use Policy Framework Plan." https://www.delcopa.gov/planning/pdf/LandUseFrameworkPlan.pdf.
9. Delaware County. n.d. "Your County at a Glance: History." Accessed 2022. https://www.delcopa.gov/departments/history.html.
10. FEMA. 2021. *National Risk Index: Social Vulnerability.* https://hazards.fema.gov/nri/social-vulnerability.
11. Fulton County Regional Planning Commission. 2008. *County-Wide Plan.* December. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.co.fulton.pa.us/files/live-folders/planning/Fulton%20County%20Act%20167%20Stormwater%20Plan%20-%20Phase%20I%20Report.pdf.
12. National Oceanic And Atmospheric Administration. n.d. *Data Tools: 1981 - 2010 Normals.* Accessed April 26, 2022. https://www.ncdc.noaa.gov/cdo-web/datatools/normals.
13. Pennsylvania Department of Conservation and Natural Resources. 2008. *County Rock-Type Maps of Pennsylvania.* April. http://elibrary.dcnr.pa.gov/GetDocument?docId=1752638&DocName=RxTypeMap_BedfordCo.pdf.
14. SAMHSA. 2017. *Greater Impact: How Disasters Affect People of Low Socioeconomic Status.* Disaster Technical Assistance Center Supplemental Research Bulletin, Substance Abuse and Mental Health Services Administration (SAMHSA). https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwiTtOjAybeCAxXfFlkFHVqsAewQFnoECBYQAQ&url=https%3A%2F%2Fwww.samhsa.gov%2Fsites%2Fdefault%2Ffiles%2Fdtac%2Fsrb-low-ses_2.pdf&usg=AOvVaw1rvdEv4dJ_oCg-81BMfGKz&opi=899784.
15. U.S. Census Bureau. 2000. *2000 U.S. Census.*

16. —. 2021. "Poverty Thresholds." Accessed 2022. https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html.

17. U.S. Census. 2022. *Financial Characteristics.* https://data.census.gov/table/ACSST5Y2022.S2503?t=Income+(Households,+Families,+Individuals):Income+and+Earnings&g=050XX00US42057.

18. —. 2022. *Language Spoken at Home.* https://data.census.gov/table/ACSST5Y2022.S1601?t=Language+Spoken+at+Home&g=050XX00US42057.

19. —. 2024. *Poverty Thresholds.* September 5. https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html.

20. —. 2022. *Selected Housing Characteristics.* https://data.census.gov/table/ACSDP5Y2022.DP04?t=Financial+Characteristics&g=050XX00US42057.

Data sources used to develop the HMP in general are listed in Appendix A. Data sources used to perform geographic information system (GIS) analysis for the risk assessment are listed in Section 4.4. These sources were key in understanding the current demographic makeup of the community as well as in framing the foundation of the Plan. The sources listed provided the underlying context of the Plan and allowed the Planning Team to understand critical vulnerabilities in the County. Throughout the planning process, the Planning Team continually sought additional data sources to augment the information included in the Plan. The Planning Team made multiple requests for existing jurisdictional documents (e.g., jurisdictional hazard mitigation plans and other relevant information). Despite multiple requests for municipal documents, the response was somewhat limited.

SECTION 3 PLANNING PROCESS

A successful planning process builds partnerships and brings together members representing government agencies, the public, and other stakeholders to reach consensus on ways the community will prepare for and respond to those hazards most likely to occur. Applying a comprehensive and transparent process adds validity to the Hazard Mitigation Plan (HMP). Participants involved in the HMP planning process gained better understanding of problems and issues and helped devise solutions and actions for the community—resulting in a revised set of common community values and widespread support for directing financial, technical, and human resources to agreed-upon actions.

The planning process was an integral part of updating the Fulton County HMP. This section describes the planning process used to update the HMP, with participation from 12 of the County's 13 municipalities and the Forbes Road School District, a special district. This section also describes the hazard mitigation and multi-jurisdictional planning implemented by the Steering Committee and Planning Team in meetings and documentation with public and stakeholder participation during the HMP update process. Additional details about the process of updating each section of this HMP appear at the beginning of each section.

3.1 UPDATE PROCESS AND PARTICIPATION SUMMARY

In accordance with the Disaster Mitigation Act of 2000 (DMA 2000) requirements, this plan documents the following topics:

- Planning process.
- Hazard identification.
- Risk assessment.
- Mitigation strategy: goals, actions, and projects.
- Formal adoption by the participating jurisdictions.
- Pennsylvania Emergency Management Agency (PEMA) and Federal Emergency Management Agency (FEMA) approval.

The PEMA All-Hazard Mitigation Planning Standard Operating Guide lays out the standard planning process in Pennsylvania to create and update HMPs (including this HMP), and is cited in Appendix A, under Authorities and References. Section 4 (Risk Assessment) describes hazard vulnerabilities, and the risk assessment and Section 6 (Mitigation Strategy) describes the mitigation strategy for this HMP.

Public participation and planning meetings served as the main forum for gathering information to update the HMP. The Steering Committee and Planning Team were afforded access to information in relevant and approved plans, policies, and procedures for Fulton County. Opportunities for public participation included public meetings, distribution of information at municipal meetings, and chances to review and comment on the draft HMP update. To develop all sections of the HMP, the Planning Team used meetings, e-mail correspondence, and teleconferences to solicit input from county, municipal, and other stakeholders, including members of the general public. Most information received for this update came from Fulton County, its municipalities, and the Steering Committee. Through this planning process, the county established a comprehensive approach to reduce effects of hazards on the county and its municipalities.

3.2 THE PLANNING TEAM

For the 2025 Fulton County HMP Update, the Planning Team was assembled which included two primary groups of participants – the Steering Committee and the Planning Team. Both groups are described below.

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3.1.1 Steering Committee

Recognizing the need to manage risk within the county, and to meet the requirements of the DMA 2000, Fulton County Emergency Services led the update to the 2019 HMP. Mr. Justin Evans, Planning and Mapping Director, Planning Commission, developed a Steering Committee to provide guidance and direction to the planning effort, and to ensure the resulting document will be embraced both politically and by the constituency within the planning area. They also attended and participated in Steering Committee meetings as well as provided assistance with the development and completion of certain planning elements, including:

- Reviewing and updating the hazards of concern.
- Developing a public and stakeholder outreach program.
- Assuring that the data and information used in the plan update process are the best available.
- Reviewing and updating the hazard mitigation goals.
- Identifying and screening appropriate mitigation strategies and activities.
- Reviewing and commenting on plan documents prior to submission to PEMA and FEMA.

The Steering Committee helped to ensure that the resulting document will be embraced both politically and by the constituency within the planning area. Mr. Evans served as chair of the Steering Committee as well as the lead planner and point of contact throughout the planning process. The Steering Committee is identified in Table 3-1.

Table 3-1. Steering Committee Members for the 2025 Fulton County HMP Update

Name	Title	Jurisdiction/Affiliation
Justin Evans	Planning and Mapping Director	Fulton County Planning Commission
Brian Barton	Director	Fulton County Emergency Management Agency/911
Jim Gress	Supervisor	Todd Township

3.1.2 Planning Team

The Planning Team is a combined group consisting of the Steering Committee and at least one representative from each municipality. Municipal Representatives provide direct input to jurisdictional-specific sections of the plan regarding capabilities, hazard event history, and project development. The jurisdictions in Fulton County have differing levels of capabilities and resources available to apply to the plan update process, and further, have differing exposure and vulnerability to the natural hazard risks being considered in this plan. Fulton County's intent is to encourage participation by all-inclusive jurisdictions and to accommodate their specific needs and limitations while still meeting the intents and purpose of plan update participation. Such accommodations have included the establishment of a Steering Committee, engaging a contract consultant to assume certain elements of the plan update process on behalf of the jurisdictions, and the provision of additional and alternative mechanisms to meet the purposes and intent of mitigation planning.

This group was assembled to represent each of the municipalities participating in the HMP update, and Table 3-2 below identifies the Planning Team which includes 12 municipalities, one health and medical facility, one equipment manufacturer, a school district and other County departments.

Appendices C, D and E include complete lists of individual invitees and participants, attendance at meetings, completion of worksheets, and submittal of comments.

The Planning Team acknowledged that important steps in developing a comprehensive HMP included identifying hazards that specifically affect Fulton County, and assessing their likelihood of occurrence, along with potential damage to the people, property, and environment of the county. The Planning Team chose to focus on an all-hazards approach rather than to narrow the focus to natural disasters only.

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As the contract consultant, Tetra Tech guided the Steering Committee and Planning Team through the HMP update planning process. More specifically, Tetra Tech was tasked with:

- Assisting with the organization of a Steering Committee and Planning Team.
- Assisting with the development and implementation of a public and stakeholder outreach program.
- Collecting data.
- Facilitating and recording attendance at meetings.
- Assisting with the review, update, and ranking of the hazards of concern, and hazard profiling, and risk assessment.
- Assisting with the review and update of mitigation planning goals and objectives.
- Assisting with the review of progress of past mitigation strategies.
- Assisting with the screening of mitigation actions and the identification of appropriate actions.
- Assisting with the prioritization of mitigation actions.
- Authoring of the draft and final HMP documents.

Table 3-2. Planning Team for the 2025 Fulton County HMP Update

Name	Position	Organization	Sector/Community Lifeline
Justin Evans	Planning and Mapping director	Fulton County Planning Commission	Safety and Security
Brian Barton	Director	Fulton County Emergency Management Agency/911	Safety and Security
Eric Reckner	Emergency Management Coordinator	Fulton County Emergency Management Agency	Safety and Security
Marlin Harr	Chairman	Ayr Township	Safety and Security
John Keefer	Supervisor	Belfast Township	Safety and Security
LuAnne Keebaugh	Secretary	Bethel Township and Licking Creek Township	Safety and Security
Jim Gress	Supervisor and Road Master	Todd Township	Safety and Security
Delmas Bard	Supervisor	Brush Creek Township	Safety and Security
Connie Hann	Secretary	Dublin Township	Safety and Security
Richard Buterbaugh	LEMC	McConnellsburg Borough	Safety and Security
Monica Mellot	Secretary/Treasurer	Taylor Township	Safety and Security
Carolyn Wills	Secretary/Treasurer	Union Township	Safety and Security
Connie Barnett	Secretary	Wells Township	Safety and Security
Kriste Shoop	BSN, RN	Fulton County Medical Center	Health and Medical
Jason Sharpe	Principal Environmental Engineer	JLG Industries	Transportation
Tim Cummings	Safety Security Coordinator	Forbes Road School District Police	Safety and Security

3.3 MEETINGS AND DOCUMENTATION

Tetra Tech assisted the county in drafting planning documents, preparing meeting materials, and facilitating meetings. The Steering Committee reviewed documentation, provided validation, and acted as an advocate for the HMP update.

Table 3-1 lists dates and descriptions of meetings held by the Fulton County Steering Committee and Planning Team as part of the process of updating the Fulton County HMP.

Table 3-3. Public and Planning Meetings

Date	Description of Meeting
October 04, 2023	Kickoff meeting with the Steering Committee
December 05, 2025	Kickoff Meeting with Planning Team members, including 5-year plan review and plan update process, evaluation of identified hazards, capability assessment, and mitigation strategy review.
March 11, 2024	Kickoff Meeting #2 with Planning Team members to discuss an update for the risk assessment, capabilities, mitigation strategy, the submittal and adoption process. The schedule was reviewed, and worksheets were introduced. Discussion on stakeholder and public outreach.
May 30, 2024	Risk Assessment and Capability Assessment review meeting.
October 25, 2024	Mitigation Strategy Workshop to review mitigation goals, objectives, actions, and current plan status with the Planning Team.
TBD	Public HMP Draft Review Meeting to receive comments on the draft HMP.
TBD	HMP adoption by County

The Steering Committee followed up each meeting with meeting notes that documented all agenda topics, decisions, and action items identified. The meeting minutes were posted to the project website. Appendix C includes documentation from all meetings.

Fulton County residents were informed of the planning process through various sources, including newspaper-announced public notices and announcements on the Fulton County HMP website (https://www.fultoncountypahmp.com/).

The Risk Assessment Review Meeting and Draft Review Meeting were advertised as public meetings. Press releases were sent to the major media outlets serving Fulton County, and invitations were posted to the county's website and social media network. One member of the general public attended. Any subsequent supporting documentation provided by county residents will be included in Appendix E (Public and Stakeholder Participation).

3.4 PUBLIC AND STAKEHOLDER PARTICIPATION

To maximize effectiveness of the HMP, the Steering Committee fostered continual public and stakeholder engagement. Input was encouraged and collected through a variety of methods. Five worksheets and surveys—the Hazard Identification and Risk Evaluation, Hazard/Risk Identification Survey, Capabilities Assessment Survey, NFIP Survey, and Mitigation Strategy 5-Year Plan Review Worksheet (Mitigation Review Worksheet)—were given to representatives from each municipality in Fulton County. Of the county and the 14 municipalities within Fulton County surveyed, 13 jurisdictions (the county and 12 municipalities) provided information so that their input could be reviewed and incorporated into the updated HMP.

The following entities with vested interest in development of the updated HMP were given the opportunity to participate in the planning process by attending a Steering Committee or public meeting, or by offering comments on the project website:

- local, state, and federal agencies
- neighboring jurisdictions (e.g., Franklin)
- community leaders and educators
- healthcare facilities
- other relevant private and nonprofit groups

Invitations to participate in meetings were sent to the stakeholders listed. Appendix E includes a copy of the Steering Committee meeting invitation list and copies of invitation letters sent. Meeting invitations were also sent to all municipalities, including elected officials and Emergency Management Coordinators. Five of the 13 municipalities in Fulton County had representatives attending at least one meeting. Additionally, direct outreach was conducted with municipalities who were unable to attend other meetings or who had questions about worksheets, participation requirements, the planning process, or mitigation project selection. This additional outreach was conducted by phone or in one-on-one meetings.

In addition, the County EMA collaborated with the Pennsylvania Department of Environmental Protection (PA DEP) to obtain a comprehensive inventory of dams within the County. This inventory included the three High Hazard Potential Dams (HHPDs) as classified by PA DEP.

Fulton County proactively reached out to the owners of these dams to collect data from their Emergency Action Plans (EAPs) and inundation maps. This collected data has been integrated into the referenced maps used in the HMP. The EAPs and associated inundation maps are maintained on file by each dam owner and by Fulton County to safeguard the confidential and sensitive information they contain. Due to the sensitive nature of these documents, they can be requested as needed.

Through public notices published in the local newspapers, the groups listed in Section 3.2 and the general public were invited to visit the project website, review the draft County HMP update, and send comments to Fulton County Planning and Mapping Department. In addition, two general public meetings were held during the planning process, as listed in Table 3-2. Copies of the public notices and other forms of public and stakeholder outreach are presented in Appendix C.

Section 3.5, Multi-jurisdictional Planning, includes Table 3-4, which indicates overall municipal participation in the planning process.

3.5 MULTI-JURISDICTIONAL PLANNING

Fulton County led a multi-jurisdictional effort to prepare and update the HMP, which will apply to the county and all participating municipalities. The county provided resources (e.g., demographic data, geographic information system [GIS] data, etc.) to municipalities to augment locally available information. Fulton County undertook an intensive effort to involve all 13 municipalities in the update process. However, Fulton County depended on municipal buy-in for plan participation, as municipalities in the Commonwealth of Pennsylvania have the legal authority to enforce compliance with land use planning and development directives, and thus determine whether to participate in the planning process.

Each municipality was given the opportunity to join the process. The county invited municipal officials and representatives to attend Steering Committee and public meetings; provided worksheets to update the hazards of concern, capabilities, and mitigation strategy; and tasked municipalities to review and prioritize the mitigation actions. Municipal participation culminated in formal adoption of the HMP; copies of municipal adoption resolutions are provided in Appendix F. Table 3-4 indicates the ways each municipality participated in the planning process. In some cases, a municipality was unable to attend a Planning Team meeting; therefore, an individual follow-up meeting with each municipality was held by Fulton County Steering Committee representatives to cover the meeting material and provide municipal support on the topics presented.

Table 3-4. Participation Matrix

Jurisdiction	Worksheets					Meetings				
	Hazard Identification and Risk Evaluation Worksheet Received	Municipal Risk Factor Analysis Received	Capabilities Assessment Survey Received	Mitigation Review Worksheet Received	NFIP Survey	Steering Committee Kickoff 10/04/23	Planning Team Kickoff Meeting 1 12/05/23	Planning Team Kickoff Meeting 2 03/11/24	RA and CA Review Meeting 05/30/24	Mitigation Strategy Workshop 10/25/24
Fulton County	X		X	X	X	X	X	X	X	X
Ayr Township	X		X	X	X		X	X		
Belfast Township	X		X	X	X		X			
Bethel Township	X		X	X	X		X			X
Brush Creek Township	X	X	X	X	X					
Dublin Township	X	X	X	X	X					X
Licking Creek Township	X		X	X	X		X			X
McConnellsburg Borough	X	X	X	X	X					
Taylor Township	X	X	X	X	X					
Thompson Township	X	X	X	X	X					
Todd Township	X	X	X	X	X	X	X	X		
Union Township	X	X	X	X	X					X
Valley-Hi Borough										
Wells Township	X		X	X	X					

Note: Blank = Not received or attendance from jurisdiction.

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SECTION 4 RISK ASSESSMENT

4.1 UPDATE PROCESS AND PARTICIPATION SUMMARY

In accordance with the Federal Emergency Management Agency (FEMA) Local Mitigation Planning Handbook, risk is defined as the potential for damage, loss, or other impacts created by the interaction of natural hazards with community assets. Fulton County's risk assessment is organized into the following sections:

- Section 4.2 outlines the hazard identification process for both natural and human-caused hazards of concern for further profiling and evaluation.
- Section 4.3 profiles the hazards of concern (location and extent, range of magnitude, past occurrence, and future occurrence) and assesses vulnerability.
- Section 4.4 summarizes the risk assessment methodology, ranking results, potential losses, and future development and vulnerability.

The Steering Committee and Planning Team evaluated the 2020 Fulton County Hazard Mitigation Plan (HMP) hazards of concern by examining the historic events that have taken place in the county since the last plan update and reviewing the Commonwealth's 2023 Hazard Mitigation Plan. In addition, the Steering Committee and Planning Team completed the risk assessment worksheet (Hazard Identification and Risk Evaluation Worksheet). The worksheet listed hazards profiled in the 2020 HMP and requested that participants identify whether the frequency of occurrence, magnitude of impact, and/or geographic extent of each hazard has increased, decreased, or not changed since the 2020 HMP was issued. The worksheet also provided participants with the opportunity to assess hazards not profiled in the 2020 HMP to determine if those hazards should be included as part of the update. The Steering Committee reviewed responses from the worksheets to identify a list of hazards to profile in the 2025 HMP. Appendix D includes copies of the completed worksheets.

4.2 HAZARD IDENTIFICATION

4.2.1 Disaster Declarations

In reviewing and updating Fulton County's hazards of concern, the Core Planning Team and Planning Partners reviewed historical records and other information from a wide range of sources. This section discusses the federal major disaster (DR) and emergency (EM) declarations, Pennsylvania gubernatorial disaster declarations or proclamations, and U.S. Small Business Administration (SBA) disaster declarations that have affected Fulton County.

Federal DR and EM declarations are issued when it has been determined that state and local governments need assistance in responding to a disaster event. Since 1965, declarations have been issued for various hazard events, including hurricanes or tropical storms, severe winter storms, and flooding. Table 4.2-1 lists the declarations that affected Fulton County from 1965 through 2023. Additional declarations can be found on the Federal Emergency Management Agency (FEMA) website at: https://www.fema.gov/disasters.

Between 1965 and 2023, Fulton County was affected by 36 events that warranted Pennsylvania gubernatorial disaster declarations or proclamations, as listed in Table 4.2-2.

SBA disaster declarations qualify communities for access to affordable, timely, and accessible financial assistance. Table 4.2-3 lists SBA disaster declarations issued for Fulton County between 1991 and 2023 (PEMA 2018) (SBA 2023).

Table 4.2-1. Presidential Disaster and Emergency Declarations affecting Fulton County

Declaration Number	Date	Event
DR-4618	September 2021	Remnants of Hurricane Ida
DR-4506	March 2020	Covid-19 Pandemic
EM-3441	March 2020	Covid-19
DR-4267	March 23, 2016	Severe Winter Storm and Snowstorm
DR-4099	January 10, 2013	Hurricane Sandy
EM-3356	October 29, 2012	Hurricane Sandy
EM-3340	September 8, 2011	Remnants of Tropical Storm Lee
DR-1898	April 16, 2010	Severe Winter Storms and Snowstorms
EM-3235	September 10, 2005	Hurricane Katrina Evacuation
DR-1557	September 19, 2004	Tropical Depression Ivan
DR-1555	September 19, 2004	Severe Storms and Flooding associated with Tropical Depression Frances
EM-3180	March 14, 2003	Snowstorm
DR-1093	January 21, 1996	Flooding

Declaration Number	Date	Event
DR-1085	January 13, 1996	Blizzard
EM-3105	March 16, 1993	Severe Snowfall and Winter Storm
DR-485	September 26, 1975	Severe Storms, Heavy Rain, Flooding
DR-340	June 23, 1972	Tropical Storm Agnes

Source: FEMA 2023

Table 4.2-2. Gubernatorial Disaster Declarations or Proclamations affecting Fulton County

Date	Event
August 2024	Proclamation of Disaster Emergency- Tropical Storm Debby
August 2021	Proclamation of Disaster Emergency – Hurricane Ida
April 2021	Amendment to Proclamation of Disaster Emergency – Civil Disturbance
February 2021	Amendment to Proclamation of Disaster Emergency – Coronavirus (COVID-19)
February 2021	Proclamation of Disaster Emergency- Winter Weather
February 2021	Amendment to Proclamation of Disaster Emergency – Opioid Crisis
December 2020	Proclamation of Disaster Emergency – Winter Weather
March 2020	Proclamation of Disaster Emergency – Coronavirus (COVID-19)
February 2020	Amendment to Proclamation of Disaster Emergency – Opioid Crisis
September 2019	Amendment to Opioid Crisis Emergency Proclamation
August 2018	Proclamation of Disaster Emergency – Rapid, Heavy Rainfall Resulting in Flash Floods
January 2018	Proclamation of Disaster Emergency – Opioid Crisis
March 2017	Proclamation of Emergency – Severe Winter Storm
January 2016	Proclamation of Disaster Emergency – Severe Winter Storm
August 2015	Proclamation of Disaster Emergency – Severe Storms
January 2015	Proclamation of Disaster Emergency – Severe Winter Storms
February 2014	Proclamation of Emergency – Severe Winter Storms
January 2014	Proclamation of Disaster Emergency – Extreme Weather, Utility Interruption
June 2013	Proclamation of Emergency – High Winds, Thunderstorms, Heavy Rain, Tornado, Flooding
October 2012	Proclamation of Emergency – Hurricane Sandy
April 2012	Proclamation of Emergency – Spring Winter Storms
August 2011	Proclamation of Emergency - Severe Storms and Flooding (Lee/Irene)
January 2011	Proclamation of Emergency – Severe Winter Storm
February 2010	Proclamation of Emergency – Severe Winter Storm
April 2007	Proclamation of Emergency – Severe Winter Storm
February 2007	Proclamation of Emergency – Severe Winter Storm
February 2007	Proclamation of Emergency – Regulations
September 2006	Proclamation of Emergency – Tropical Depression Ernesto
September 2005	Proclamation of Emergency – Hurricane Katrina

Date	Event
February 2002	Drought and Water Shortage
June 1999	Drought
February 1978	Blizzard
January 1978	Heavy Snow
February 1974	Truckers' Strike
February 1972	Heavy Snow
January 1966	Heavy Snow

Source: PEMA 2018, PEMA 2023

Table 4.2-3. Small Business Administration Disaster Declarations affecting Fulton County

Date	Event
May 2020	Apartment Fire
July 2016	Flash Flooding
January 2007	Fire
July 1991	Drought

Source: PEMA 2023, SBA 2021

4.2.2 Summary of Hazards

As part of the plan update process, the Steering Committee and Planning Team reviewed the hazards of concern detailed in the 2020 version of the HMP, as well as those identified in the State HMP. They also considered the history of hazard events that have occurred in Fulton County, as well as events that occurred after the completion of the 2020 version of the plan. This review of historical events included an evaluation of all emergency and disaster declarations in the Commonwealth, with a focus on those events that warranted federal assistance for Fulton County.

Further, all jurisdictions participating in the plan update process were provided a Hazard Identification/ Evaluation of Risk worksheet to help identify the hazards—natural and non-natural—that each community believed posed significant risk to Fulton County, including hazards that may not have been considered in either the 2020 version of the plan or the State HMP. Completed worksheets submitted by the municipalities are included in Appendix D. Based on the review of the 2020 hazards list and completion of the Hazard Identification/Evaluation of Risk worksheet, additional hazards were considered in need of a risk assessment.

Based on all available information and input from the municipalities, the Steering Committee and Planning Team selected the following natural and non-natural hazards for consideration in this plan:

- Dam Failure
- Drought
- Earthquake
- Environmental Hazards – Gas and Liquid Pipelines
- Environmental Hazards – Hazardous Materials Releases
- Flood, Flash Flood, and Ice Jam
- Pandemic and Infectious Disease
- Radon Exposure
- Subsidence, Sinkholes
- Tornado, Windstorm
- Transportation Accidents
- Utility Interruption
- Wildfire

- Hailstorm
- Landslide
- Winter Storm

Section 4.3 includes individual profiles for these hazards.

4.3 HAZARD PROFILES

The following sections profile and assess vulnerability for each hazard of concern. Profiles include a general hazard description and details on hazard location and extent, range of magnitude, past occurrence, and future occurrence. The vulnerability assessment describes risks to life, health, and safety, general building stock, critical facilities, the economy, and the environment; it also describes how future change could affect vulnerability and how vulnerability has changed since the previous HMP update.

4.3.1 Dam Failure

4.3.1.1 Hazard Description

Dam failure is the uncontrolled release of water (and any associated wastes) from a dam. This hazard often results from a combination of natural and human causes, and can follow other hazards such as hurricanes, earthquakes, and landslides. The consequences of dam failures can include property and environmental damage and loss of life (PEMA 2020).

The area downstream of a dam that would be flooded in the event of the dam's failure is called the inundation area. This area is generally much larger than the normal river or stream floodplain. When a dam experiences a complete structural breach, the failure can release a high-velocity wall of debris-filled water that rushes downstream, damaging whatever lies within the inundation area (ASDSO 2014).

Hundreds of dams have failed in the United States, causing property and environmental damage, injuries, and fatalities. Today, more than a third of the country's dams are 50 or more years old. Approximately 14,000 of those dams pose a significant hazard to life and property if failure occurs. About 2,000 unsafe dams are dispersed throughout the United States in almost every state. Maintenance and enhancement of infrastructure is important to reduce the risk of downstream flooding and impact on structures within the affected communities.

The impact of a dam failure is dependent on the volume of water impounded by the dam and the amount of population or assets located downstream. Catastrophic failures are characterized by the sudden, rapid, and uncontrolled release of impounded water or any other fluid from a dammed water body. Potential for catastrophic flooding caused by dam failures led to enactment of the National Dam Safety Act (Public Law 92-367). The act established the National Dam Safety Program (NDSP), a partnership among states, federal agencies, and other stakeholders that encourages individual and community responsibility for dam safety. Through this program, state assistance funds have allowed all participating states to improve their programs through increased inspections, emergency action planning, and purchases of needed equipment. FEMA has also expanded training programs. Grant assistance from FEMA provides support for improvement of dam safety programs that regulate most dams in the United States (FEMA 2023).

4.3.1.2 Location and Extent

Dams are categorized in several ways (ASDSO n.d.):

- By the functions the dam serves: flood control, human water supply, irrigation, livestock water supply, energy generation, containment of mine tailings, recreation, or pollution control.
- By construction materials or methods; earth, rock, tailings from mining or milling, concrete, masonry, steel, timber, miscellaneous materials (plastic or rubber), and any combination of these materials.
- By the slope or cross-section of the dam.
- By the way, the dam resists water pressure forces behind it.
- By the means of controlling seepage.

For this HMP update, the County Emergency Management Agency engaged with the Pennsylvania Department of Environmental Protection (PA DEP) to acquire a detailed inventory of dams within the County, including the three High Hazard Potential Dams (HHPDs) classified by PA DEP.

Seven (7) dams are present throughout Fulton County, as shown on Figure 4.3.3-1. Most of these dams pose little risk; however, three Hazard Category 1 high-hazard dams require EAPs. Table 4.3.3-1 is a complete list of dams in Fulton County with high-hazard dams listed first.

The EAPs associated with the Fulton County high-hazard dams provide information concerning the estimated number of homes and residents vulnerable to a dam failure. The county considers the Cowan's Gap dam, located in Harrisburg, to be the most significant due to the potential impact of a failure from this dam. The dam is located

across South Branch Little Aughwick Creek, approximately 6 miles northeast of McConnellsburg, Pennsylvania The dam is a 32.3-foot high, 600- foot long earthen embankment recreation dam, maintaining a normal pool of 497 acre-feet of water with a maximum pool capacity of 1,032 acre-feet (DCNR,2020). According to the Cowan's Gap Dam 2020 EAP, the inundation area resulting from a sudden dam failure affects areas along the South Branch Little Aughwick Creek, the North Branch Little Aughwick Creek, Little Aughwick Creek, Sideling Hill Creek, and Aughwick Creek located downstream of the Cowans Gap Dam. Within the inundation area are approximately 60 homes and one church with a total approximate population of 300 people. There are no hospitals, schools, nursing homes, etc. within the estimated dam break flood limits. The Pennsylvania Turnpike (I-76), United States Route 522, and State Route 475 are major roadways that will be inundated by a dam failure.

The Meadow Grounds Dam is another dam that Fulton County considers to be a high hazard. This dam is located across the Roaring Run about 3 ½ miles above its confluence with Big Cove Creek and about 4 ½ south of McConnellsburg on Meadow Grounds Road. This dam is a 39-foot high, 530-foot long earthen embankment recreation dam, maintaining a normal pool of 3,130 acre-feet of water with a maximum pool capacity of 4,670 acre-feet (DCNR 2021). According to the Meadow Grounds Dam 2021 EAP, the inundation area resulting from a sudden dam failure follows the flood plain of Roaring Run, Big Cove Creek, and Licking Creek and includes portions of Ayr Township and Thompson Township, Fulton County, as well as portions of Warren Township, Franklin County. Within the inundation area are approximately 80 residents in 31 homes and one small retail business (up to 20 customers/employees) and in addition, approximately 3 residents in 1 home within the neighboring county of Franklin County.

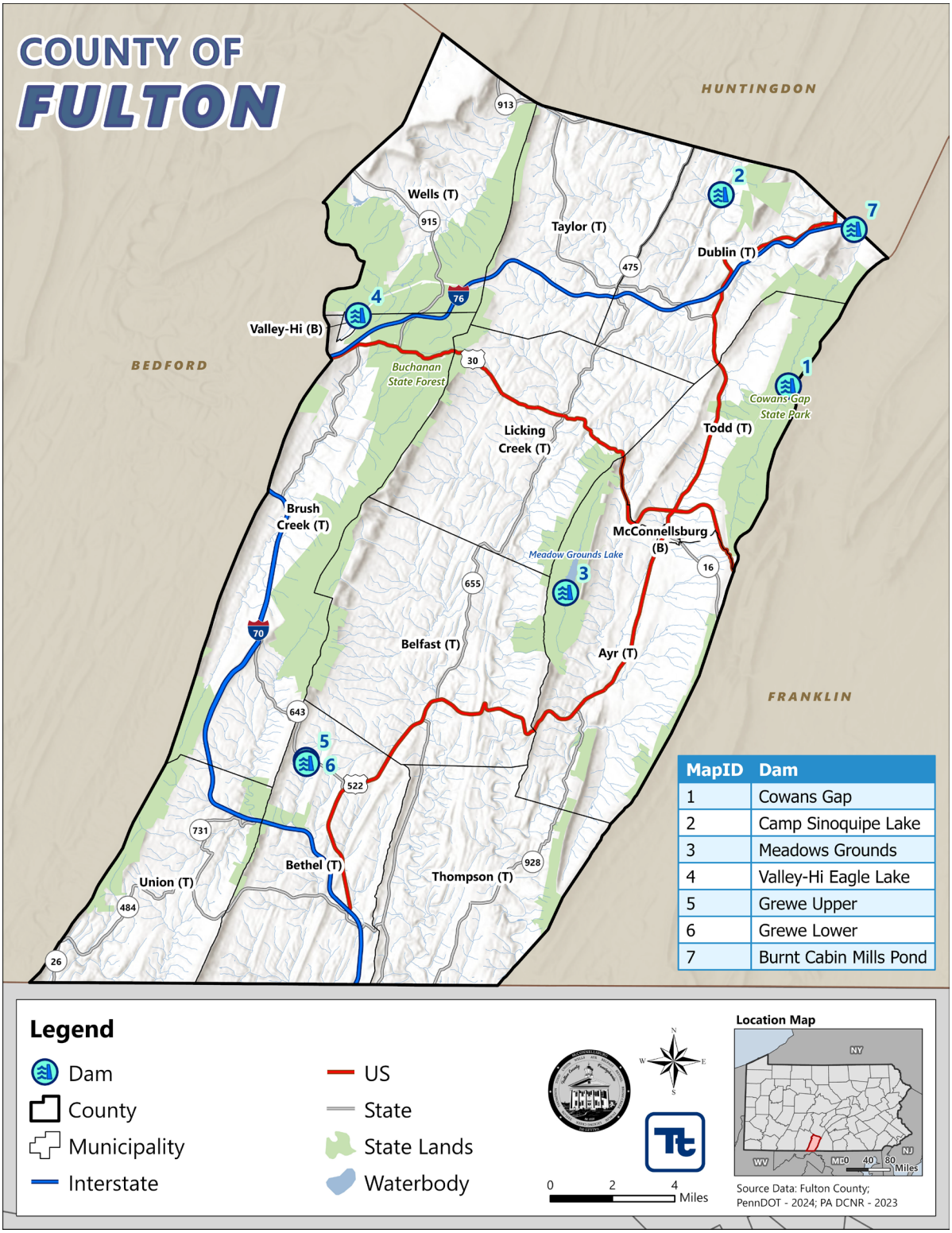
Dam failure events are often associated with other natural hazards such as earthquakes, landslides, or severe weather, which limits their predictability and compounds the hazard. Earthquakes can weaken dam structures, particularly earthen dams, leading to failure. Landslides can directly damage dams or weaken the surrounding ground, increasing the risk of failure. Severe weather can result in large quantities of upstream rain, raising water levels behind the dam and potentially causing overtopping or upstream flooding. Populations without adequate warning are highly vulnerable to these hazards.

Table 4.3.1-1. Dams in Fulton County

Dam Name	Municipality	Stream	Type	Class	Permittee
High-Hazard Dams					
Meadow Grounds	Ayr Township	Roaring Run	Earth	B-1	PA Fish and Boat Commission
Cowan's Gap	Todd Township	Little Aughwick Creek	Earth	B-1	DNCR – Bureau of State Parks
Valley-Hi Eagle Lake	Valley-Hi Borough	Oregon Creek	Earth	C-1	Valley-Hi Development Association, Inc.
Other Dams					
Camp Sinoquipe Lake	Dublin Township	Plum Run	Earth	C-4	Boy Scouts of America
Grewe Upper	Bethel Township	Mellot Run	Earth	C-4	Josef Grewe
Grewe Lower	Bethel Township	Mellot Run	Earth	C-4	Josef Grewe
Burnt Cabins Mill Pond	Dublin Township	S Br Little Aughwick Creek	Earth	C-4	Greg and Dawn Harnish

Source: PADEP 2024

Figure 4.3.3-1. Dams in Fulton County



4.3.1.3 Range of Magnitude

Extent or magnitude of a dam failure event can be measured in terms of classification of the dam. Three dams in Fulton County are classified as Hazard Category 1 under the DEP rating system and high hazard by USACE.

The magnitude of a dam failure event is indicated by the dam's classification. Dams are classified according to the downstream damage that would result if the structure were to fail. Dam hazard rating systems are based on the potential consequences of a dam failure; they do not consider the probability of a failure occurring. Therefore, the classification has no relationship to a dam's condition, structural integrity, operational status, or flood storage capability. FEMA, USACE, and PA DEP have all developed classification systems for the dam failure hazard.

FEMA Dam Classifications

FEMA classifies three levels of dams based on the potential loss of human life or property destruction to downstream areas if that dam should fail (FEMA 2004):

- Low hazard potential dams—Failure or mis-operation would result in no probable loss of human life and low economic or environmental losses. Losses are principally limited to the owner's property.
- Significant hazard potential dams—Failure or mis-operation would result in no probable loss of human life, but can cause economic loss, environmental damage, disruption of lifeline facilities, or other impacts. These dams are often located in predominantly rural or agricultural areas.
- High hazard potential dams—Failure or mis-operation would probably cause loss of human life.

USACE Dam Classifications

USACE developed the classification system shown in Table 4.3.3-2 for the hazard potential of dam failures.

Table 4.3.1-2. USACE Dam Hazard Potential Classification

Hazard Category[a]	Direct Loss of Life[b]	Lifeline Losses[c]	Property Losses[d]	Environmental Losses[e]
Low	None (rural location, no permanent structures for human habitation)	No disruption of services (cosmetic or rapidly repairable damage)	Private agricultural lands, equipment, and isolated buildings	Minimal incremental damage
Significant	Rural locations, only transient or day-use facilities	Disruption of essential facilities and access	Major public and private facilities	Major mitigation required
High	Certain (one or more) extensive residential, commercial, or industrial development	Disruption of essential facilities and access	Extensive public and private facilities	Extensive mitigation cost or impossible to mitigate

Source: (USACE 2013)

a. Categories are assigned to overall projects, not individual structures within a project.
b. Loss-of-life potential is based on inundation mapping of the area downstream of the project. Analysis of loss-of-life potential should consider the population at risk, time of flood wave travel, and warning time.
c. Lifeline losses include indirect threats to life caused by the interruption of lifeline services from project failure or operational disruption; for example, loss of critical medical facilities or access to them.
d. Property losses include damage to project facilities and downstream property and indirect impact from loss of project services, such as impact from loss of a dam and navigation pool, or impact from loss of water or power supply.
e. Environmental impact downstream caused by the incremental flood wave produced by the project failure, beyond what would normally be expected for the magnitude flood event under which the failure occurs.

PA DEP Dam Classifications

Pennsylvania Code classifies dams and reservoirs based on size and hazard potential in the event of a failure. Size categories are determined by either reservoir storage volume or dam structure height, whichever results in the higher category, as indicated in Table 4.3.3-3. Hazard potential categories are determined by either loss of life or economic loss, whichever results in the higher category, as indicated in Table 4.3.1-4.

The State classifies dams on a scale from one (highest hazard) to five (lowest hazard)—hazards in Categories 1 and 2 are rated high hazard. Hazard Potential Category 1 dams are those whose failure could result in significant loss of life, excessive economic losses, and significant public inconvenience. Hazard Potential Category 2 dams are those whose failure could result in the loss of a few lives, appreciable property damage, and short-duration public inconvenience (Commonwealth of Pennsylvania 1980).

Table 4.3.1-3. Commonwealth of Pennsylvania Dam Size Classifications

Category	Impoundment Storage (Acre-feet)	Dam Height (Feet)
A	Equal to or greater than 50,000	Equal to or greater than 100
B	Less than 50,000 but greater than 1,000	Less than 100 but greater than 40
C	Equal to or less than 1,000	Equal to or less than 40

Source: Commonwealth of Pennsylvania, 1980

Table 4.3.1-4. Commonwealth of Pennsylvania Dam Hazard Potential Classifications

Category	Population at Risk	Economic Loss
1	Substantial (Numerous homes or small businesses, a large business, or a school).	Excessive such as extensive residential, commercial, or agricultural damage, or substantial public inconvenience.
2	Few (A small number of homes or small businesses.)	Appreciable, such as limited residential, commercial, or agricultural damage, or moderate public inconvenience.
3	None expected (no permanent structures for human habitation or employment).	Significant damage to private or public property and short-duration public inconvenience, such as damage to storage facilities or loss of critical stream crossings.
4	None expected (no permanent structures for human habitation or employment).	Minimal damage to private or public property and no significant public inconvenience.

Source: Commonwealth of Pennsylvania, 1980

Dam Classifications in Fulton County

PA DEP lists seven dams within Fulton County and categorizes three of those dams as high-hazard dams (Hazard Potential Category 1 or 3). USACE is responsible for safety inspections of some federal and non-federal dams in the United States that meet the size and storage limitations specified in the National Dam Safety Act. USACE has inventoried dams and surveyed each state and federal agency's capabilities, practices, and regulations regarding the dams' design, construction, operation, and maintenance. USACE has also developed guidelines for inspecting and evaluating dam safety (USACE n.d.). The USACE National Inventory of Dams (NID) provides the most recent dates of inspection of the following Fulton County dams:

- Camp Sinoquipe Lake Dam: June 1, 2018
- Cowans Gap Dam: June 24, 2020
- Meadow Grounds Dam: November 03, 2020
- Valley-Hi Eagle Lake Dam: September 28, 2020

Types of Risk

The risk that a dam poses to communities downstream can be split into the following components (FEMA 2022):

- **Non-Breach Risk** – The risk in the reservoir pool area and affected downstream floodplain due to normal operation of the dam (e.g., large spillway flows within the design capacity that exceed channel capacity) or scenarios in which the dam is overtopped but not breached.
- **Incremental Risk** – The risk to the pool area and downstream floodplain occupants should the dam breach (before or after overtopping) or undergo component malfunction or misoperation leading to consequences greater than those that would occur without a dam breach. The consequences typically are due to downstream inundation, but a loss of the pool can result in significant consequences in the pool area upstream of the dam.
- **Residual Risk** – The risk that remains after all decisions related to a specific dam safety issue are made, and prudent actions have been taken to address the risk. It is the remote risk associated with a condition that was judged not to be a credible dam safety issue.

Due to the different classification systems used by PA DEP, FEMA, and USACE, it is necessary to reassess risk and prioritize the dams for comparison. To aid with creating a consistent categorization, PEMA approved the below dam risk prioritization calculation.

Dam Risk Prioritization Calculation

Dam Risk Prioritization Score = Probability x (Impact + Complexity)

The calculation considers the probability of failure based on the condition of the dam; the estimated impact of failure based on the percentage of structures and population to be affected; and the complexity of the required response. The dam prioritization score and classifications for dams with available data are provided in Table 4.3.3-5.

Table 4.3.1-5. Dam Risk Prioritization Calculation Criteria

Category	Degree of Risk		
	Level	Criteria	Value
Probability of Failure Based on Condition Rating	Unlikely for failure	Condition rating of the dam is **Satisfactory**. No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the minimum applicable state or federal regulatory criteria or tolerable risk guidelines.	1
	Possible for failure	Condition rating of the dam is **Fair.** No existing dam safety deficiencies are recognized for normal operating conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action.	2
	Likely for failure	Condition rating of the dam is **Poor**. A dam safety deficiency is recognized for normal operating conditions that may realistically occur. Remedial action is necessary. POOR may also be used when uncertainties exist as to critical analysis parameters that identify a potential dam safety deficiency. Investigations and studies are necessary	3
	Highly likely for failure	Condition rating of the dam is **Unsatisfactory/ N/A.** A dam safety deficiency is recognized that requires immediate or emergency remedial action for	4

Category	Degree of Risk		
	Level	Criteria	Value
		problem resolution. Or the dam has not been inspected, is not under state jurisdiction, or has been inspected but, for whatever reason, has not been rated.	
Impact	Minor	**10% or less** of the population and structures of affected municipalities are within the inundation area. Only **minor property damage** and minimal disruption to quality of life. **Temporary shutdown** of critical facilities.	1
	Limited	**More than 10%** of the population and structures of affected municipalities are within the inundation area. **More than 10%** of properties in affected areas are **damaged or destroyed.** Minor injuries only. Complete shutdown of critical facilities for **more than one day**.	2
	Critical	**More than 25%** of the population and structures of affected municipalities are within the inundation area. **More than 25%** of properties in the affected area are **damaged or destroyed.** Complete shutdown of critical facilities for **more than one week**.	3
	Catastrophic	**50% or higher** of the population and structures of affected municipalities are within the inundation area. High number of **deaths/injuries possible**. **More than 50%** of the property in the affected area is **damaged or destroyed**. Complete shutdown of critical facilities for **30 Days or more**.	4
Complexity	Mild	**Single jurisdiction** affected and uses its **local emergency response agencies.**	1
	Moderate	**Multiple jurisdictions are affected,** and response agencies require **mutual aid support**.	2
	High	**Multiple jurisdictions** that require **County coordination.**	3
	Very High	**Multiple jurisdictions and counties** require **Commonwealth coordination**.	4

Once a dam risk prioritization score is calculated, dams are prioritized based on the criteria in Table 4.3.3-5. Dams with a score of less than 17 are categorized as medium priority, while those with a score of 17 or more are categorized as high priority, as shown in Table 4.3.3-6.

Table 4.3.1-6. Dam Risk Prioritization Calculation Classification

Priority	Population at Risk
Low	The dam is not considered a "high-hazard" dam by PA DEP or a "high-hazard potential" dam by the USACE.
Medium	The dam is considered a "high-hazard" dam by PA DEP but is not considered a "high-hazard potential" dam by the USACE. - OR - The dam is considered a "high-hazard" dam by PA DEP and is considered a "high-hazard potential" dam by the USACE, and receives a Dam Risk Prioritization score of less than 17.
High	The dam is considered a "high-hazard" dam by PA DEP and is considered a "high-hazard potential" dam by the USACE, and receives a Dam Risk Prioritization score of 17 or more.

4.3.1.4 Past Occurrence

There have not been any dam failures in Fulton County's recent history.

4.3.1.5 Future Occurrence

Likelihood of a dam failure in Fulton County is difficult to predict. Dam failure events are infrequent and usually coincide with events that cause them, such as earthquakes, landslides, and excessive rainfall and snowmelt. However, the risk of such an event increases for each dam as the dam's age increases or frequency of maintenance decreases.

"Residual risk" to dams is risk that remains after implementation of safeguards. Residual risk to dams is associated with events beyond those that the facility was designed to withstand. However, probability of any type of dam failure is low in today's dam safety regulatory and oversight environment.

Based on Risk Factor Methodology Probability Criteria (further defined in Section 4.4), and assuming regular maintenance and inspections of the dams in Fulton County, dam failures are considered *unlikely* in the county.

4.3.1.6 Vulnerability Assessment

The dam failure hazard is of significance to Fulton County because three of the county's seven dams are classified as high-hazard by PA DEP. Warning time for dam failure is often limited. These events are frequently associated with other natural hazard events such as earthquakes, landslides, or severe weather, limiting their predictability and compounding the hazard. Populations without adequate warning of the event are highly vulnerable to this hazard. Direct and indirect losses associated with dam failures include injury and loss of life, damage to structures and infrastructure, agricultural losses, utility failure (power outages), and stress on community resources.

Impact on Life, Health, and Safety

The entire population residing within a dam failure inundation zone is considered exposed and vulnerable. Of the population exposed, the economically disadvantaged and the population over the age of 65 are the most vulnerable. Economically disadvantaged populations are more vulnerable because they may be unable to evacuate their homes due to a lack of transportation, lack of a safe place to which to evacuate, or lack of financial resources (e.g., cannot afford temporary lodging). The population over the age of 65 is also highly vulnerable because they are more likely to seek or need medical attention that may not be available because of isolation during a flood event, and they may have more difficulty evacuating.

Other than the population in the dam failure inundation zone, the safety of the first responders on-scene is also at risk. First responders would be responsible for traffic control and responding to transportation accidents. There would be a higher than normal call volume and demand of first responders during a dam failure. Continuity of operations, including continued delivery of services, may be impeded, and additional personnel would potentially be needed due to the lack of fire and police personnel in the county.

People who are economically disadvantaged or over the age of 65 are the most at-risk. Economically disadvantaged populations may be unable to evacuate their homes due to a lack of transportation, lack of a safe place to which to evacuate, or lack of financial resources (e.g., cannot afford temporary lodging). The population over the age of 65 is highly at-risk because they are more likely to need medical attention that may not be available because of isolation during a dam failure event, and they may have more difficulty evacuating.

The EAPs associated with the Fulton County high-hazard dams provide information concerning the estimated number of homes and residents vulnerable to a dam failure, as shown in Table 4.3.3-7.

Table *4.3.1-7*. Fulton County High-Hazard Dam EAP Impacts

Dam Name	Vulnerable Structures/Homes	At-Risk Residents
Meadow Grounds Dam	65 Homes	163 Residents
Cowans Gap Dam	57 Permanent Inhabited Structures	N/A
Valley-Hi Dam	7 Homes	20 Residents

Source: Meadow Grounds EAP 2012, Cowans Gap EAP 2008, Valley-Hi EAP 2010

Note: The Cowans Gap Dam inundation area does not impact any hospitals, schools, or nursing homes. Fort Littleton Bible Church is located in the inundation area for Fort Littleton.
The Valley-Hi Dam inundation area does not impact any businesses, hospitals, nursing homes, or daycares.

Impact on General Building Stock

All buildings and infrastructure located in the dam failure inundation zone are considered exposed and vulnerable. Property located closest to the dam inundation area has the greatest potential to experience the largest, most destructive surge of water. All transportation infrastructure in the dam failure inundation zone is vulnerable to damage and potentially cutting off evacuation routes, limiting emergency access, and creating isolation issues. Utilities such as overhead power lines, cable lines, and phone lines could also be vulnerable. Loss of these utilities could create additional isolation issues for the inundation areas.

Dam failure can cause severe downstream flooding and may transport large volumes of sediment and debris, depending on the magnitude of the event. Widespread damage to buildings and infrastructure affected by an event would result in large costs to repair these locations. In addition to physical damage costs, businesses can be closed while flood waters retreat and utilities are returned to a functioning state.

Community Lifelines and Other Critical Facilities

Dam failures can cut evacuation routes, limit emergency access, and create isolation issues. All transportation infrastructure in the dam failure inundation zone is vulnerable to damage and potentially cutting off evacuation routes, limiting emergency access, and creating isolation issues. Utilities such as overhead power lines, cable lines, and phone lines could also be vulnerable. Loss of these utilities could create additional isolation issues. Drinking water and wastewater treatment facilities can become temporarily out of operation. Floodwaters can back up sanitary sewer systems and inundate wastewater treatment plants, causing raw sewage to contaminate residential and commercial buildings and the flooded waterway.

Dam failure can cause severe downstream flooding and may transport large volumes of sediment and debris, depending on the magnitude of the event. Widespread damage to infrastructure affected by an event would result in large repair costs.

Impact on the Economy

Severe flooding that follows an event like a dam failure can cause extensive structural damage and disruptions to delivery of services. Debris from surrounding buildings can accumulate. The cost to recover from damage will vary depending on the hazard risk of each dam. In addition to physical damage costs, businesses can be closed while floodwaters retreat and utilities are returned to a functioning state.

The flooding following a dam failure can lead to economic stress on agricultural communities and farmers. Impacts may include crop loss, contamination, soil erosion, equipment loss, debris deposition, and the spread of invasive species. It can be anticipated that following a dam failure event that leads to flooding, the cost for supplies to repair and maintain equipment will increase.

Impact on the Environment

The environmental impacts of a dam failure can include significant water-quality and debris-disposal issues or severe erosion that can impact local ecosystems. Flood waters can back up sanitary sewer systems and inundate wastewater treatment plants, causing raw sewage to contaminate residential and commercial buildings and the flooded waterway. The contents of unsecured containers of oil, fertilizers, pesticides, and other chemicals may get added to flood waters. Hazardous materials may be released and distributed widely across the floodplain. Water supply and wastewater treatment facilities could be offline for weeks. After the flood waters subside, contaminated and flood-damaged building materials and contents must be properly disposed of. Contaminated sediment must be removed from buildings, yards, and properties.

Future Changes That May Impact Vulnerability

Understanding future changes that affect vulnerability can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. Several factors are examined in this section to assess hazard vulnerability.

Future Growth and Development

As discussed, and illustrated in Section 4.4 (Hazard Vulnerability Summary), areas targeted for future growth and development have been identified across the county. Any areas of growth could be potentially impacted by a dam or levee failure event if the structures are located within the flood protection area and mitigation measures are not considered. Therefore, it is the intention of the county and all participating municipalities to discourage development in vulnerable areas or to encourage higher regulatory standards at the local level.

Projected Changes in Population

Estimated population projections provided by the Center of Rural Pennsylvania indicates that Fulton's population will decrease into 2040, decreasing total population to approximately 14,504 persons (Center for Rural Pennsylvania 2023). This is approximately a 0.5 percent decrease from the county's 2020 population.

As more persons move out of flood zones, a decreased amount of the population will be vulnerable to dam inundation hazards. Higher density can not only create issues for local residents during evacuation of a dam failure event but can also have an effect on commuters that travel into and out of the county for work. Refer to Section 2 (County Profile) for more information about population trends in the County.

Expected Future Conditions

Increased precipitation will occur in the form of heavy rainfalls, which have the potential to increase the risk to dam failures. Increases in precipitation may stress the dam wall. Existing dams may not be able to retain and manage increases in water flow from more frequent, heavy rainfall events. Heavy rainfalls may result in more frequent overtopping of these dams and flooding of the county's assets in adjacent inundation areas. However, the probable maximum flood used to design each dam may be able to accommodate changes in climate.

Change of Vulnerability Since 2020 Hazard Mitigation Plan (HMP)

Since the 2020 analysis, population statistics have been updated using the 2022 American Community Survey Population Estimates. The general building stock and the critical facilities dataset was provided from the county. Additionally, the EAPs for the Meadow Grounds Dam, Cowans Gap Dam, and Valley-Hi Dam were provided for this analysis.

For future HMP updates, additional dam failure inundation areas can be delineated and used to spatially assess the asset exposure. A customized general building stock list could be generated in the Hazus model to assess future impacts at the structural level versus the census-block level. Depth grids could be generated for the inundation areas and used in Hazus to estimate potential losses similar to those listed in the flood profile (Section 4.3.6).

4.3.2 Drought

4.3.2.1 Hazard Description

This section provides a profile and vulnerability assessment of the drought hazard in Fulton County. Drought is defined as a deficiency of precipitation experienced over an extended period of time, usually a season or more. Droughts increase the risk of other hazards, like wildfires, flash floods, and landslides or debris flows. This hazard is of particular concern in Pennsylvania due to the prevalence of farms and other water-dependent industries, water dependent recreation uses, and residents who depend on wells for drinking water (PEMA 2020).

Drought can be defined or grouped in four ways (NDMC 2023):

Meteorological drought is a measure of the departure of precipitation from normal, defined solely by reference to the relative degree of dryness. Because of climatic differences, dryness considered a drought at one location of the country may not be considered a drought at another location.

Agricultural drought links various characteristics of meteorological (or hydrological) drought to agricultural impacts, focusing on precipitation shortages, differences between actual and potential evapotranspiration, soil water deficits, reduced groundwater or reservoir levels, and other parameters. Agricultural drought occurs when not enough water is available for a particular crop to grow at a particular time. Agricultural drought is defined in terms of soil moisture deficiencies relative to water demands of plant life, primarily crops.

Hydrological drought is associated with below-normal surface or subsurface water supply resulting from periods of precipitation shortfalls (including snowfall). Hydrological drought is related to the effects of precipitation shortfalls on stream flows and water levels in reservoirs, lakes, and groundwater.

Socioeconomic drought is associated with the supply and demand of an economic good, with elements of meteorological, hydrological, and agricultural drought categories. This differs from the aforementioned types of drought because its occurrence depends on supply and demand to identify or classify droughts. Supplies of many economic goods such as water, silage, food grains, fish, and hydroelectric power depend on weather. Socioeconomic drought occurs when demand for an economic good exceeds supply as a result of a weather-related shortfall in water supply.

Ecological drought is characterized by a prolonged and widespread deficit in naturally available water supplies — including changes in natural and managed hydrology — that create multiple stresses across ecosystems (NDMC 2023).

Drought can affect many sectors of an economy and can reach beyond an area undergoing physical drought. Because water is essential for producing goods and providing services, drought can reduce crop yield, increase fire hazard, lower water levels, and damage wildlife and fish habitats. Further consequences include reductions in crop yields, rangeland, and forest productivity that may lower incomes of farmers and agribusinesses; increase in prices of food and timber; increase in unemployment; reduction of tax revenues as expenditures decline; increase in crime, foreclosures, and migration; and depletion of disaster relief funds. The many impacts of drought can be categorized as economic, environmental, or social.

4.3.2.2 Location

Droughts are regional in scope and may affect the entirety of Fulton County rather than only individual municipalities within the county. Droughts may also concurrently affect counties near Fulton County, or even the entire Commonwealth. Generally, areas along waterways will reveal drought conditions later than areas away from waterways.

Climate divisions are regions within a state that are climatically homogenous. The National Oceanic and Atmospheric Administration (NOAA) has divided the United States into 344 climate divisions. NOAA has a map of these climate divisions nationally across the country. It was originally developed for climate division,

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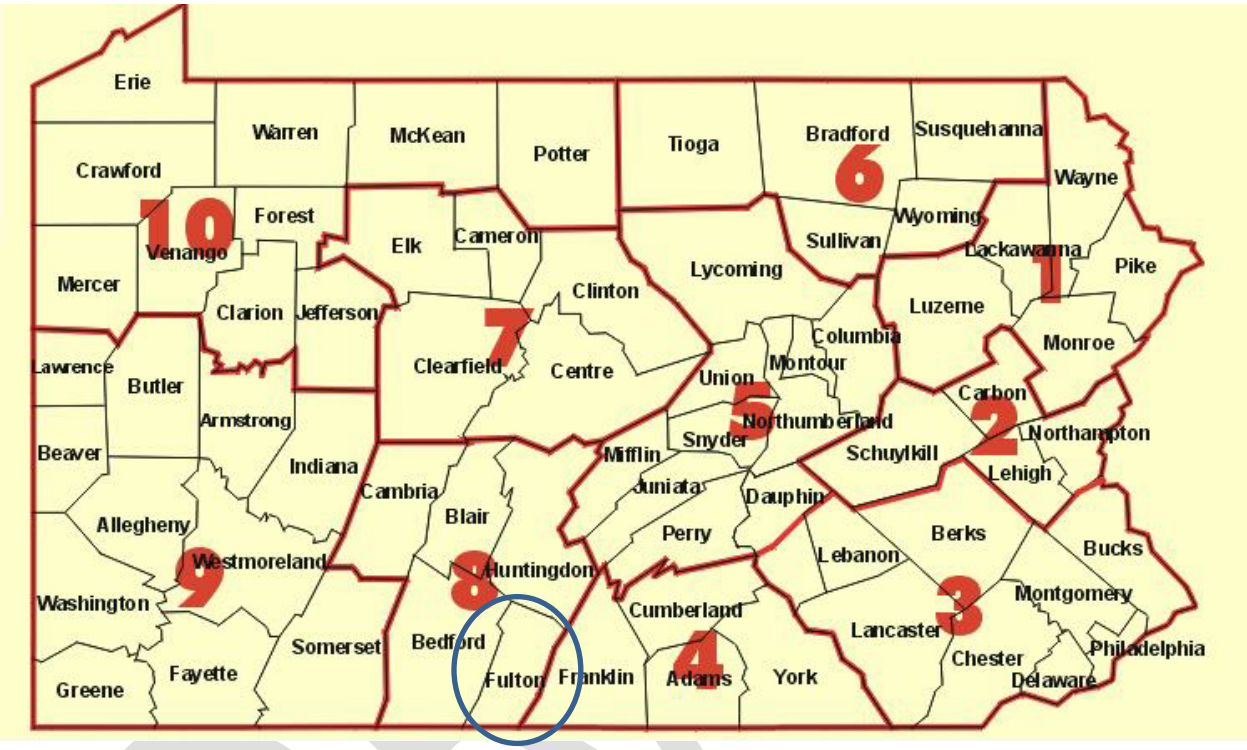
statewide, regional, national, and population-weighted monitoring of drought, temperature, precipitation, and heating/cooling degree day values (NCEI 2023).

According to NOAA, Pennsylvania includes 10 climate divisions: Pocono Mountains, East Central Mountains, Southeastern Piedmont, Lower Susquehanna, Middle Susquehanna, Upper Susquehanna, Central Mountains, South Central Mountains, Southwest Plateau, and Northwest Plateau Climate Division (PSL 2023). Fulton County is within the South-Central Mountains climate division as shown in Figure 4.3.2-1.

Figure 4.3.2-1. Climate Divisions of Pennsylvania



Source: PA State Climatologist n.d.
Note: Fulton County circled in Blue.
The climate divisions for Pennsylvania are: 1 = Pocono Mountains; 2 = East Central Mountains; 3 = Southeastern Piedmont; 4 = Lower Susquehanna; 5 = Middle Susquehanna; 6 = Upper Susquehanna; 7 = Central Mountains; 8 = South Central Mountains; 9 = Southwest Plateau; 10 = Northwest Plateau

Particularly at locations where citizens rely on wells for drinking water, water supplies are vulnerable to the effects of drought and thus can impact the severity of a drought. Residents depending on well water can more easily handle short-term droughts without major inconveniences than populations that rely on surface water. However, longer-term droughts inhibit groundwater aquifers from recharging and can thus extend the problems of well owners for an indeterminate amount of time. Fulton County residents who depend on private domestic wells have this greater "hidden vulnerability" to droughts. According to the United States Geological Survey (USGS) National Water Information System, the average daily domestic self-supplied groundwater withdrawals of fresh water in Pennsylvania was 42 million gallons per day (Mgal/d) to 1 billion gallons per day in 2015 (USGS 2019).

Table 4.3.2-1 lists the number of reported domestic wells within each municipality of Fulton County. The well data was obtained from the Pennsylvania Groundwater Information System (PaGWIS). PaGWIS is maintained by PA DCNR and relies on voluntary submissions of well record data by well drillers; as a result, it is not a complete database of all domestic wells in the county. It is, however, the most complete data set of domestic wells available.

Table 4.3.2-1. Domestic Wells in Fulton County

Municipality	Number of Reported Domestic Wells	Municipality	Number of Reported Domestic Wells
Ayr Township	243	Taylor Township	175
Belfast Township	161	Thompson Township	132
Bethel Township	242	Todd Township	118
Brush Creek Township	144	Union Township	146
Dublin Township	166	Valley-Hi Borough	3
Licking Creek Township	233	Wells Township	109
McConnellsburg Borough	1	**Fulton County**	**1,873**

Source: (PA DCNR 2024)

Note: The total number does not include the 28 who were not assigned to a municipality in the PaGEODE database.

In addition to domestic wells in the county, residents may also receive their water from municipal water providers. According to the Pennsylvania Department of Environmental Protection (PA DEP) Drinking Water Reporting System, Fulton County has four community water systems for potable water: the Wells Tanner Water System, Belfast Township Municipal Authority, McConnellsburg Borough Municipal Authority, and the Leisure Living Retirement Home. Table 4.3.2-2 summarizes information for each community water system in Fulton County.

Table 4.3.2-2. Community Water Systems in Fulton County

Facility Name	Service Area	Population Served	Water Sources	Source Pumping Capacity (gpd)
McConnellsburg Borough Municipal Water Authority	McConnellsburg Borough, Ayr Township, Todd Township	2,000	Wells, Springs, Reservoirs	36,000-576,000
Belfast Township Municipal Authority	Belfast Township	276	Groundwater – one spring	340,000
Wells Tannery Water Authority	Village of Wells Tannery (Wells Township)	95	Groundwater - two wells	10,080-14,400

Source: (PA DEP n.d.)

4.3.2.3 Magnitude

Effects of droughts vary depending on their severity, timing, duration, and location. Some droughts may exert their greatest impact on agriculture, while others may have stronger effects on water supply or recreational activities. Droughts can adversely affect the following significantly:

- Public water supplies for human consumption.
- Rural water supplies for livestock consumption and agricultural operations.
- Water quality.
- Natural soil water or irrigation water for agriculture.
- Water for forests and for fighting forest fires.
- Water for navigation and recreation.

DEP and PEMA manage water supply droughts according to the following conditions (PEMA 2023):

Drought Watch—This is a period to alert government agencies, public water suppliers, water users, and the public regarding potential for future drought-related problems. Drought watches are invoked when three or more drought indicators are present for a county or group of counties. The focus is on increased monitoring, awareness, and preparation for response in the event that conditions worsen. A request for voluntary water conservation is

issued. The objective of voluntary water conservation measures during a drought watch is to reduce water use by 5 percent within the affected areas. Because of varying conditions, individual water suppliers or municipalities may propose more stringent conservation actions.

Drought Warning—This is a drought stage involving a coordinated response to imminent drought conditions and potential water supply shortages through concerted voluntary conservation measures to avoid or reduce shortages; relieve stressed sources; develop new sources; and, if possible, forestall the need to impose mandatory water use restrictions. The objective of voluntary water conservation measures during a drought warning is to reduce overall water use by 10 to 15 percent within the affected areas. Because of varying conditions, individual water suppliers or municipalities may propose more stringent conservation actions.

Drought Emergency—During this drought stage, water management entities assemble all available resources to respond to actual emergency conditions, avoid depletion of water sources, ensure at least minimum water supplies to protect public health and safety, support essential and high-priority water uses, and avoid unnecessary economic upsets. If deemed necessary and if ordered by the Governor during this stage, imposition of mandatory restrictions on nonessential water usage could occur, as provided for in 4 Pennsylvania Code Chapter 119. Objectives of water use restrictions (mandatory or voluntary) and other conservation measures during a drought emergency are to reduce consumptive water use within the affected areas by 15 percent and to reduce total use to the extent necessary to preserve public water system supplies, avoid or mitigate local or area shortages, and ensure equitable sharing of limited supplies.

Local municipalities may, with the approval of the PEMA Council, implement local water rationing to share a rapidly dwindling or severely depleted water supply within designated water supply service areas. These individual water rationing plans, authorized through provisions of 4 Pennsylvania Code Chapter 120, require specific limits on individual water consumption to achieve significant reductions in use. Under both mandatory restrictions imposed by the commonwealth and local water rationing practices, procedures are specified for granting variances in consideration of individual hardships and economic dislocations

The availability and management of water supply is discussed in the 2021 Pennsylvania State Water Plan (DEP n.d.), a joint effort by the Statewide Water Resources Committee and DEP. In 2023, the DEP approved an updated State Water Plan to guide management of Pennsylvania's water resources over a 15-year planning horizon. As a functional planning tool for all Pennsylvania municipalities, counties, and regional planning partnerships, the State Water Plan profiles drought and resource constraints and encourages implementation of new technology and use policies to facilitate reduced water uses and resource demands at critical peak times. The State Water Plan provides inventories of water availability, and an assessment of current and future water use demands and trends. It also offers strategies for improving management of water resources and waterway corridors that aim to reduce damage from extreme drought and flooding conditions (DEP n.d.).

Pennsylvania uses five parameters to assess drought conditions: precipitation deficits, stream flows, groundwater level, soil moisture, and reservoir storage levels. These parameters are detailed below:

Precipitation Deficits

Because rainfall provides the basis for ground surface water resources, measuring the difference in precipitation from the normal (30-year average) tends to be the earliest indicator that a drought is possible in an area. The PA DEP will compare the cumulative precipitation for varying time periods (minimum of 3 months, maximum of 12 months) each month against the normal, 30-year average value for each same time period. Any duration that has less than the normal is considered to have had a deficit, represented by a percentage less than the normal precipitation. Table 4.3.2-3 shows the required deficit values for each time period in order to qualify for each drought stage.

Table 4.3.2-3. Precipitation Deficit Drought Indicators for Pennsylvania

Duration of Deficit Accumulation (Months)	Drought Watch (deficit as percent of normal precipitation)	Drought Warning (deficit as percent of normal precipitation)	Drought Emergency (deficit as percent of normal precipitation)
3	25%	35%	45%

Duration of Deficit Accumulation (Months)	Drought Watch (deficit as percent of normal precipitation)	Drought Warning (deficit as percent of normal precipitation)	Drought Emergency (deficit as percent of normal precipitation)
4	20%	30%	40%
5	20%	30%	40%
6	20%	30%	40%
7	18.5%	28.5%	38.5%
8	17.5%	27.5%	37.5%
9	16.5%	26.5%	36.5%
10	15%	25%	35%
11	15%	25%	35%
12	15%	25%	35%

Source: PEMA 2023

Table 4.3.2-4 lists normal monthly and annual precipitation from 1991 to 2020 (the most current three-decade data available) at the two NOAA weather stations in Fulton County. Data from the NOAA weather stations are available through the National Centers for Environmental Information (NCEI), which compiles monthly and annual normal total precipitation (inches) data retrieved from both NWS Cooperative Network (COOP) and Principal Observation (First-Order) locations throughout the United States.

Table 4.3.2-4. Normal Monthly and Annual Precipitation (total in inches) from 1991 to 2020 at NOAA Weather Stations in Fulton County

Station Name	January	February	March	April	May	June	July	August	September	October	November	December	ANNUAL
Everett	2.63	2.21	3.27	3.88	4.15	4.2	3.62	3.28	3.98	3.17	2.83	3.13	40.35
Saxton 1 W	2.88	2.38	3.6	3.68	4.03	3.67	4.47	3.21	3.7	3.3	3.07	3.15	41.14

Source: NOAA NCDC 2021

Stream Flows

The next earliest indicator that a drought is developing are stream flow measurements. There are 61 USGS stream gages that the DEP currently uses to monitor droughts across the state (PEMA 2023). The DEP calculates and maintains 30-day average values for stream flow based on the entire period of recording for each gage. Compared to precipitation, stream flow measurements lag by about a month or two when signaling a drought. Drought status is determined from stream flows based on percentiles, or exceedances, rather than percentages. Exceedances are similar to percentiles; a 75 percent exceedance flow value means that the current 30-day average flow is exceeded in the stream 75 percent of the time; in other words, the 30-day average flow in the stream is less than that value only 25 percent of the time. Similarly, with a 90 percent exceedance flow value, the 30-day average flows in the stream would be less than that value only 10 percent of the time, and only 5 percent of the time for a 95 percent exceedance. For stream flows, the 75, 90, and 95 percent exceedance 30-day average flows are used as indicators for drought watch, warning, and emergency, respectively.

Groundwater Levels

There are about 80 trillion gallons of groundwater stored in the soil beneath Pennsylvania. Daily groundwater levels are used to calculate the average level of the preceding 30 days. This 30-day value is compared to the values derived from historical records yielding a percentile indicating how much time the groundwater levels

have been below the historical average levels. The USGS also maintains a network of groundwater monitoring wells, just recently upgraded to at least one well in each county. Groundwater is used to indicate drought status in a manner similar to stream flows. Groundwater level exceedances of 75, 90, and 95 percent are used to indicate watch, warning, and emergency status. In this case, it is the 30-day average depth to groundwater that is measured and monitored, again in relation to long-term 30-day averages based on the period of record for each county well.

Soil Moisture

Soil moisture is measured using an algorithm calibrated for relatively homogeneous regions which measures dryness based on temperature and precipitation in the area, information which is provided by NOAA. This generates a value called the Palmer Drought Severity Index (PDSI), which is compiled by the Climate Prediction Center of the National Weather Service on a weekly basis. Table 4.3.2-5 lists PDSI classifications. The PDSI uses 0 to reflect normal status, and negative numbers indicate droughts. For example, 0 is no drought, -2 is moderate drought, and -4 is extreme drought. Positive numbers signify excess precipitation (UCAR 2023).

Table 4.3.2-5. PDSI Classifications

Severity Category	PDSI Value	Drought Status
Extremely wet	4.0 or more	None
Very wet	3.0 to 3.99	None
Moderately wet	2.0 to 2.99	None
Slightly wet	1.0 to 1.99	None
Incipient wet spell	0.5 to 0.99	None
Near normal	0.49 to -0.49	None
Incipient dry spell	-0.5 to -0.99	None
Mild drought	-1.0 to -1.99	None
Moderate drought	-2.0 to -2.99	Watch
Severe drought	-3.0 to -3.99	Warning
Extreme drought	-4.0 or less	Emergency

Source: NDMC 2023

Reservoir Storage Levels

Water level storage in several large public water supply reservoirs (especially three New York City reservoirs in the Upper Armstrong River Basin) is the fifth indicator that the DEP uses for drought monitoring. Depending on the total quantity of storage and the length of the refill period for the various reservoirs, DEP uses varying percentages of storage draw-down to indicate the three drought stages for each of the reservoirs (PEMA 2023).

The availability and management of water supply is discussed in the 2021 Pennsylvania State Water Plan (PADEP 2023), a joint effort by the Statewide Water Resources Committee and PADEP. In 2023, the PADEP Secretary approved an updated State Water Plan to guide management of Pennsylvania's water resources over a 15-year planning horizon. As a functional planning tool for all Pennsylvania municipalities, counties, and regional planning partnerships, the State Water Plan profiles drought and resource constraints and encourages implementation of new technology and use policies to facilitate reduced water uses and resource demands at critical peak times. The State Water Plan provides inventories of water availability, and an assessment of current and future water use demands and trends. It also offers strategies for improving management of water resources and waterway corridors that aim to reduce damage from extreme drought and flooding conditions (PADEP 2023).

4.3.2.4 Past Occurrence

Historical information has been drawn from many sources regarding previous occurrences and losses associated with drought events throughout Pennsylvania and Fulton County. Because so many sources were reviewed for the purpose of developing this plan, loss and impact information pertaining to many events could vary depending on the source. Therefore, accuracy of cited monetary values is based only on the available information identified during research for this plan.

Since 1930, the Commonwealth of Pennsylvania has undergone 10 significant droughts. Since 1955, the Commonwealth has undergone 12 drought events that resulted in a Governor's proclamation or a FEMA-declared disaster or emergency. Fulton County was included in one of these events, and full details are available in PEMA's Pennsylvania Disaster History list. In addition to these events, between 1980 and 2016, PA DEP indicated that Fulton County has undergone 28 drought watch declarations, 11 drought warning declarations, and 12 drought emergency declarations (PEMA 2023).

According to FEMA, between 1954 and 2024, Pennsylvania underwent one drought-related disaster (DR) or emergency (EM) classified as one or a combination of the following disaster types: drought or water shortage. Because these disaster types generally cover a wide region of the Commonwealth, this single disaster may have impacted many counties. However, not all counties were included in the disaster declaration. FEMA, PEMA, and other sources indicate that Fulton County has not been declared a disaster area as a result of a drought-related event (FEMA 2023).

Based on all sources researched, drought events between 1885 and 2024 that have affected Fulton County are identified in Table 4.3.2-6, not all sources have been identified or researched, and therefore Table 4.3.2.4-1 may not include all events that have occurred throughout the county.

Table 4.3.2-6. Past Occurrences of Drought Events from 1885 to 2024

Dates of Event	Event Type	FEMA Declaration Number	USDA Disaster Designation Number	County Designated?	Losses / Impacts / PDSI Value
September 1895 – May 1896	Drought	N/A	N/A	N/A	-4.81 in January 1896
November 1908 – March 1909	Drought	N/A	N/A	N/A	-4.38 in January 1909
November 1909 – December 1909	Drought	N/A	N/A	N/A	-3.99 in November 1909
November 1910 – December 1910	Drought	N/A	N/A	N/A	-3.53 in December 1910
November 1922 – April 1923	Drought	N/A	N/A	N/A	-4.29 in December 1922
July 1930 – July 1931	Drought	N/A	N/A	N/A	-7.13 in January 1931
November 1931 – February 1932	Drought	N/A	N/A	N/A	-3.95 in December 1931
November 1953 – February 1954	Drought	N/A	N/A	N/A	-4.1 in February 1954
October 1963 – December 1963	Drought	N/A	N/A	N/A	-4.12 in December 1963
October 1964 – December 1964	Drought	N/A	N/A	N/A	-3.77 in December 1964
June 1965 – February 1967	Drought	N/A	N/A	N/A	-5.32 in August 1966
July – September 1965	Drought	DR-206	N/A	N/A	-3.68 in August 1965
April 1969 – June 1969	Drought	N/A	N/A	N/A	-3.74 in May 1969
November 1980 – April 1982	Drought Emergency	N/A	N/A	N/A	Not listed
April – December 1985	Drought Watch	N/A	N/A	N/A	Not listed
July – August 1988	Drought Watch	N/A	N/A	N/A	Not listed
August – December 1988	Drought Warning	N/A	N/A	N/A	Not listed
March – May 1989	Drought Watch	N/A	N/A	N/A	Not listed
June – July 1991	Drought Warning	N/A	N/A	N/A	Not listed
July 1991	Drought	N/A	N/A	Yes	Governor Robert P. Casey – Governor's Proclamation

Dates of Event	Event Type	FEMA Declaration Number	USDA Disaster Designation Number	County Designated?	Losses / Impacts / PDSI Value
July 1991 – April 1992	Drought Emergency	N/A	N/A	N/A	Not listed
April – September 1992	Drought Warning	N/A	N/A	N/A	Not listed
September – December 1995	Drought Watch	N/A	N/A	N/A	Not listed
July – November 1997	Drought Watch	N/A	N/A	N/A	Not listed
October 31, 1997	Drought	N/A	N/A	N/A	No losses identified.
December 1998	Drought	N/A	N/A	N/A	No losses identified.
January – March 1999	Drought Warning	N/A	N/A	N/A	Not listed
March – June 1999	Drought Watch	N/A	N/A	N/A	Not listed
June – July 1999	Drought Warning	N/A	N/A	N/A	Not listed
July 1999	Drought	N/A	N/A	Yes	Governor Tom Ridge – Governor's Proclamation, Individual Assistance, Hazard Mitigation Grant Program – Amended to include all 67 counties for an agricultural disaster
July – September 1999	Drought Emergency	N/A	N/A	N/A	Not listed
July 1999	Drought	N/A	N/A	N/A	No losses identified
August 1999	Drought	N/A	N/A	N/A	No losses identified
September 1999 – May 2000	Drought Watch	N/A	N/A	N/A	Not listed
August – December 2001	Drought Watch	N/A	N/A	N/A	Not listed
December 2001 – February 2002	Drought Warning	N/A	N/A	N/A	Not listed
February 2002	Drought and Water Shortage	N/A	N/A	Yes	Governor Mark S. Schweiker – Governor's Proclamation
February – November 2002	Drought Emergency	N/A	N/A	N/A	Not listed
November – December 2002	Drought Watch	N/A	N/A	N/A	Not listed
April – June 2006	Drought Watch	N/A	N/A	N/A	Not listed
August 2007 – January 2008	Drought Watch	N/A	N/A	N/A	Not listed
September – November 2010	Drought Warning	N/A	N/A	N/A	Not listed
August – September 2011	Drought Watch	N/A	N/A	N/A	Not listed
June – July 2015	Drought Watch	N/A	N/A	N/A	Not listed
Jul 16, 2015 – Sept 29, 2015	Excessive Heat and Drought	NA	S3932	Yes	N/A
August 2016 – February 2017	Drought Watch	N/A	S4071	N/A	Not listed

Dates of Event	Event Type	FEMA Declaration Number	USDA Disaster Designation Number	County Designated?	Losses / Impacts / PDSI Value
Nov 2016 – April 2017	Drought	NA	N/A	N/A	(-3.62 PDSI)
Jun 24, 2018 – Jul 21, 2018	Excessive Heat and Drought Conditions	N/A	S4425	N/A	N/A
Aug 15, 2019 – Oct 16, 2019	Drought	N/A	S4602	Yes	N/A
May 5- September 30, 2021	Drought	N/A	S5122	Yes	Drought and Excessive Heat
Jun 15, 2023 – Sept 2023	Drought	N/A	S5601	Yes	Drought Watch
July 9-31, 2024	Drought	N/A	S5724 S5729 S5734	Yes	D2 (severe) drought conditions developed in southern Fulton County on July 9, 2024 and continued through the end of July.
August 1-13, 2024	Drought	N/A	N/A	N/A	D3 (extreme) drought conditions continued in far southwestern Fulton County through early August 2024, with D2 conditions for much of the remainder of the county.

Sources: (USDA 2024) (NOAA NCEI 2024) (PEMA 2023)

Notes: FEMA-Federal Emergency Management Agency, N/A- Not applicable, PDSI- Palmer Drought Severity Index

4.3.2.5 Probability of Future Occurrences

According to the Pennsylvania Climate Impacts Assessment (2021), drought conditions have decreased in the past 20 years relative to the most recent 30-year average. Even though the commonwealth has experienced more precipitation and wet months, drought conditions persist. In addition, based on data from 2000 to 2017, drought frequency by census tract shows the number of drought events as reported by the U.S. Drought Monitor, shown in Figure 4.3.2-2 (PEMA 2023).

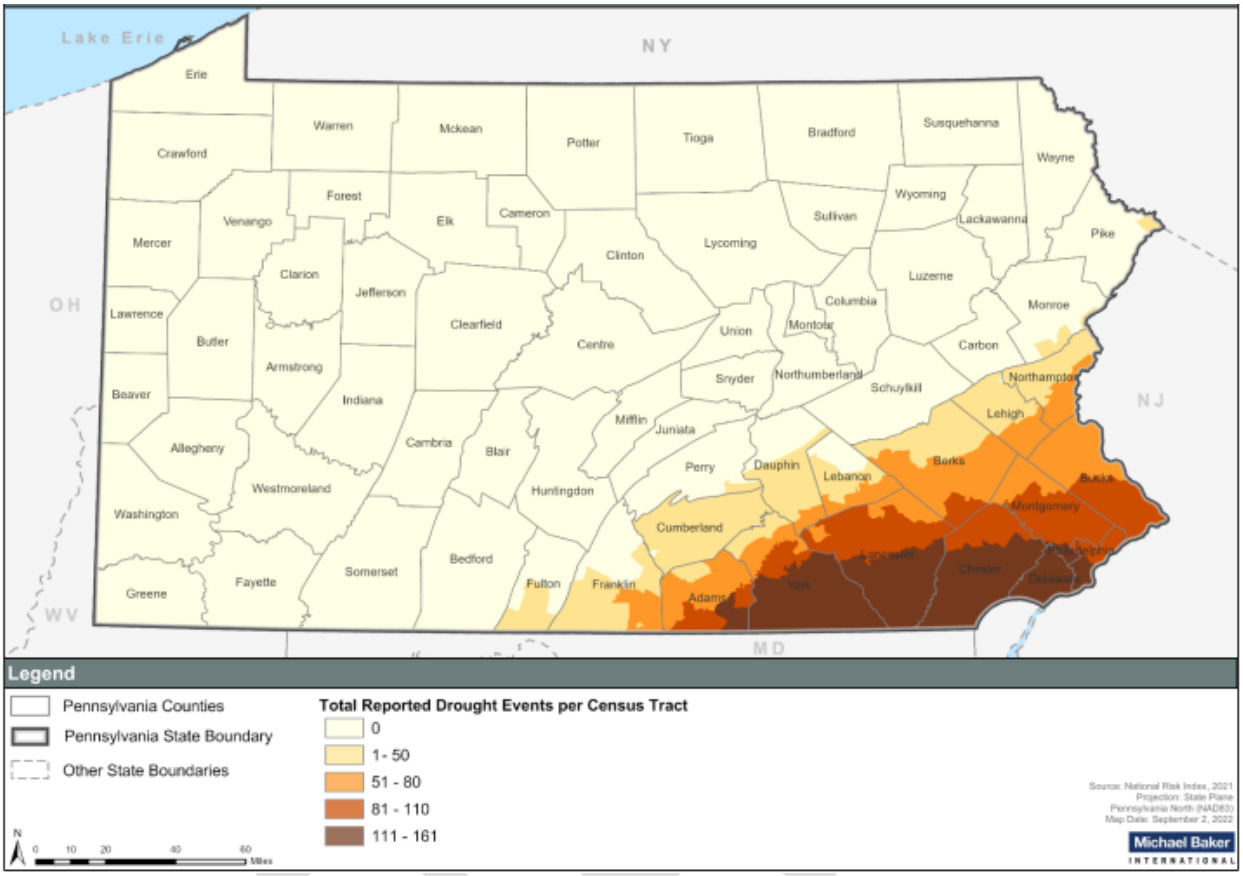
Information on previous drought occurrences in the County was used to calculate the probability of future occurrence of such events, as summarized in Table 4.3.2-7. For this HMP, future occurrences of drought events are considered *highly likely*.

Table 4.3.2-7 Probability of Future Drought Events in Fulton County

Hazard Type	Number of Occurrences Between 1996 and 2024	Percent Chance of Occurring in Any Given Year
Drought	48	100%

Source: (USDA 2024) (NOAA NCEI 2024) (PEMA 2023)

Figure 4.3.2-2. Drought Events per Census Tract, 2000-2017



Source: (PEMA 2023)
Note: Fulton County circled in red

4.3.2.6 Vulnerability Assessment

To understand risk, a community must evaluate assets exposed and vulnerable within the identified hazard area. For the drought hazard, all of Fulton County has been identified as the hazard area. Therefore, all assets (population, structures, critical facilities, and lifelines) described in the County Profile (Section 2) are potentially vulnerable to the drought hazard. The following text evaluates and estimates the potential impact of the drought and water supply deficiency hazard on the county, including:

- Impact on (1) life, health, and safety; (2) general building stock; (3) critical facilities; (4) economy; (5) environment; and (6) future growth and development.
- Expected future conditions on vulnerability.
- Further data collections that will assist understanding this hazard over time.

Impact on Life, Health, and Safety

General Population

For the purposes of this plan, the entire population of the county is considered vulnerable to drought events. Drought conditions can cause a shortage of water available for human consumption and can reduce local firefighting capabilities. Social impacts of a drought include mental and physical stress, public safety threats (increased threat from forest/grass fires), health threats, conflicts among water users, and reduced quality of life.

Socially Vulnerable Population

Socially vulnerable populations are particularly susceptible to drought and the extreme temperatures that sometimes accompany drought conditions because of their age, health conditions, and limited ability to mobilize to shelters, cooling centers, and medical sources. Impacts on the economy and environment may have social implications as well (CDC 2020).

Impact on General Building Stock

A drought is not expected to directly affect any structures, and all are expected to be operational during a drought event. However, droughts contribute to conditions conducive to wildfires. Risk to life and property is greatest in regions where forested areas adjoin urbanized areas (high-density residential, commercial, and industrial). Therefore, all assets in and adjacent to these areas, including population, structures, critical facilities, lifelines, and businesses, are considered vulnerable to wildfire.

Community Lifelines and Other Critical Facilities

Drought events generally do not impact buildings; however, droughts have the potential to impact agriculture-related facilities, critical facilities, and lifelines that are associated with water supplies such as water used for fire-fighting. Community lifelines and other critical facilities in and adjacent to wildfire hazard areas are also considered vulnerable to drought.

Water systems distributing to the population may be impacted by drought conditions. The County's water supply sources are from surface water and unconfined groundwater sources. Water use trends vary from month to month, typically peaking in summer when outdoor and irrigation demands are high (United States Environmental Protection Agency 2010).

Impact on the Economy

A prolonged drought can exert serious direct and indirect economic impacts on a community or across the county. Impacts on agriculture, small business, tourism are likely. Table 4.3.2-8 enumerates the county's farmland acreage exposure to the drought hazard as well as the annual market value of all agricultural products sold, as documented in the 2022 USDA Census of Agriculture. If the County were to lose its agricultural yield because of drought, total losses could amount to over $90 million. Livestock, poultry, and associated products have a potential loss value of about $72 million (USDA 2022)

Table 4.3.2-8. Estimated County Losses Relating to Agricultural Production

Impacted Farmland Acreage	Market Value of All Agricultural Products
93,715	$90,564,000

Source: USDA 2022

Impact on the Environment

Hydrologic drought events result in a reduction of stream flows, reduction of lake/reservoir storage, and reduced groundwater levels. These events have a significant adverse impact on natural soil water and conditions conducive to wildfire. Severe drought events may require prioritization of water uses, with essential uses taking precedent and access to water for other uses restricted or denied altogether (PEMA 2023).

Future Changes That May Impact Vulnerability

Future Growth and Development

Areas targeted for potential future growth and development within the next 5 to 10 years have been identified across the county (further discussed in Section 2.4 of this HMP). Exposure of any new development and new residents to the drought hazard is anticipated.

Expected Future Conditions

Climate is defined not simply as average temperature and precipitation but also by type, frequency, and intensity of weather events. Both globally and at the local level, expected future conditions can alter prevalence and severity of weather extremes, such as droughts. While predicting changes in drought events under a changing climate is difficult, understanding vulnerabilities to potential changes is a critical part of estimating effects of future changing conditions on human health, society, and the environment.

According to the Pennsylvania Climate Impacts Assessment 2021 Update, the likelihood of drought will decrease by the middle of the 21st century as months with above-normal precipitation increase; however, drying of surface soil across the coterminous United States in all seasons is still projected because of enhanced evapotranspiration. Soil moisture at root depth of crops is more useful for estimating agricultural drought.

4.3.2.7 Additional Data and Next Steps

The assessment above identifies vulnerable populations and potential structural and economic losses associated with this hazard of concern. Collection of additional information and actual loss data specific to the plan participants will further enhance Fulton County's vulnerability assessment.

DRAFT

4.3.3 Earthquake

4.3.3.1 Hazard Description

An earthquake is the motion or trembling of the ground produced by sudden displacement of rock, usually within the upper 10-20 miles of the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of underground caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in loss of life and injury to hundreds of thousands of persons, and disrupt the social and economic functioning of the affected area (PEMA 2020).

An earthquake hazard is anything associated with an earthquake that may affect normal human activities (FEMA 2001). This includes the following (USGS 2012):

- Surface faulting—Displacement that reaches the earth's surface during slip along a fault. Commonly occurs with shallow earthquakes, those with an epicenter less than 20 kilometers.
- Ground motion (shaking)—The movement of the earth's surface from earthquakes or explosions. Ground motion or shaking is produced by waves that are generated by sudden slip on a fault or sudden pressure at the explosive source and travel through the earth and along its surface.
- Landslide—A movement of surface material down a slope.
- Liquefaction—A process by which water-saturated sediment temporarily loses strength and acts as a fluid, like when you wiggle your toes in the wet sand near the water at the beach. This effect can be caused by earthquake shaking.
- Tectonic Deformation—A change in the original shape of a material due to stress and strain.
- Seiche—The sloshing of a closed body of water from earthquake shaking.

Liquefaction has been responsible for tremendous amounts of damage in historical earthquakes around the world. Shaking behavior and liquefaction susceptibility of soils are determined by their grain size, thickness, compaction, and degree of saturation. These properties, in turn, are determined by the geologic origin of the soils and their topographic position. Liquefaction occurs in saturated soils, and when it occurs, the strength of the soil decreases, reducing the ability of a soil deposit to support foundations for buildings and bridges.

Soil Types

The National Earthquake Hazard Reduction Program (NEHRP) developed five soil classifications (A to E) distinguished by soil shear-wave velocity that alters the severity of an earthquake; each classification is listed in Table 4.3.3-1. Class A soils (hard rock) reduce ground motion from an earthquake, and Class E soils (soft soils) amplify and magnify ground shaking and increase building damage and losses.

Table 4.3.3-1. NEHRP Soil Classifications

Soil Classification	Description
A	Hard rock
B	Rock
C	Very dense soil and soft rock
D	Stiff soils
E	Soft soils

Source: Federal Emergency Management Agency (FEMA) 2013

The following sections discuss location and extent, range of magnitude, previous occurrence, future occurrence, and vulnerability assessment associated with the earthquake hazard in Fulton County.

4.3.3.2 Location and Extent

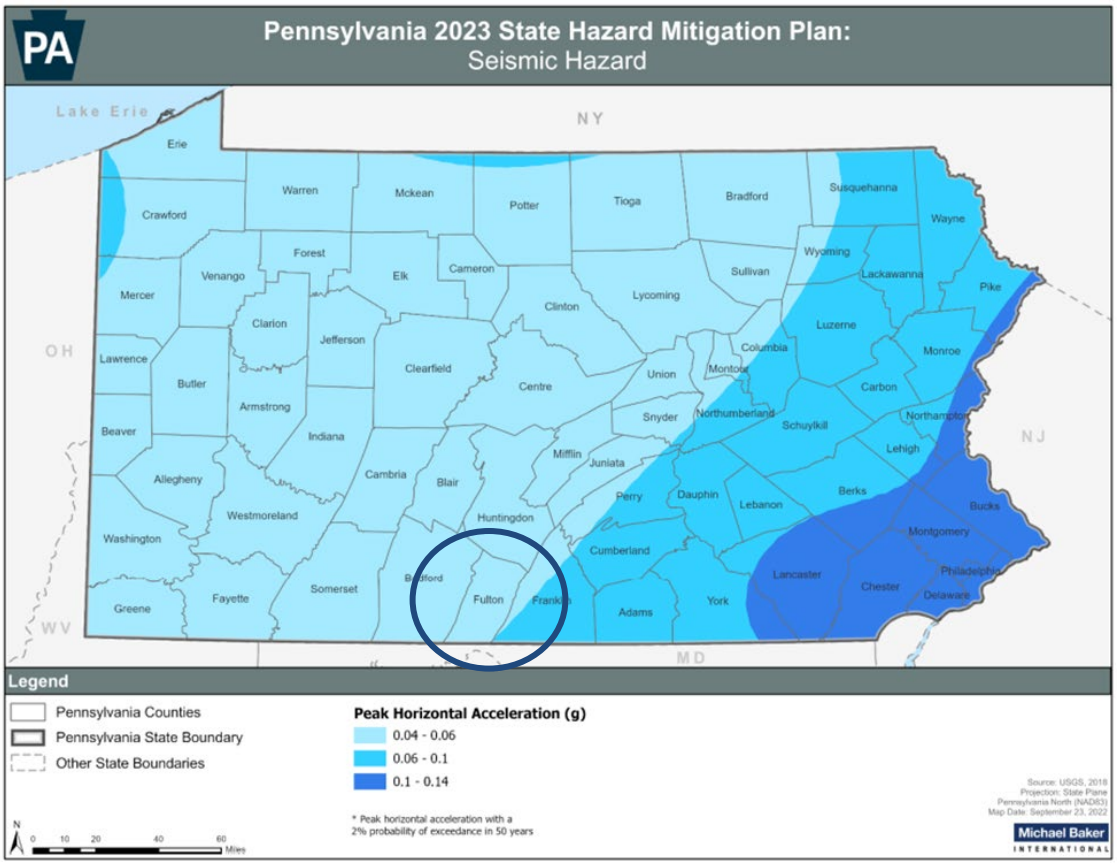
Focal depth and geographic position of the epicenter of an earthquake commonly determine its location. Focal depth of an earthquake is the depth from the Earth's surface to the region where an earthquake's energy originates (the focus or hypocenter). The epicenter of an earthquake is the point on the Earth's surface directly above the hypocenter. Earthquakes usually occur without warning, and their effects can be felt in areas at great distances from the epicenter.

Earthquake events in Pennsylvania typically do not impact areas greater than 100 km from the epicenter. Pennsylvania's strongest earthquakes with in-state epicenters have persistently occurred in an area near Lancaster (PEMA 2023). Areas of Pennsylvania, including Fulton County, may be subject to the effects of earthquakes with epicenters outside the Commonwealth.

Figure 4.3.3-1 shows relative seismic hazard zones in Pennsylvania, as determined by the USGS National Seismic Hazard Mapping Project. Earthquake hazards are highest in the southeastern and far northwestern regions of the Commonwealth (PEMA 2023). Fulton County falls within the lowest hazard zone, with minor earthquake damage is expected in this zone.

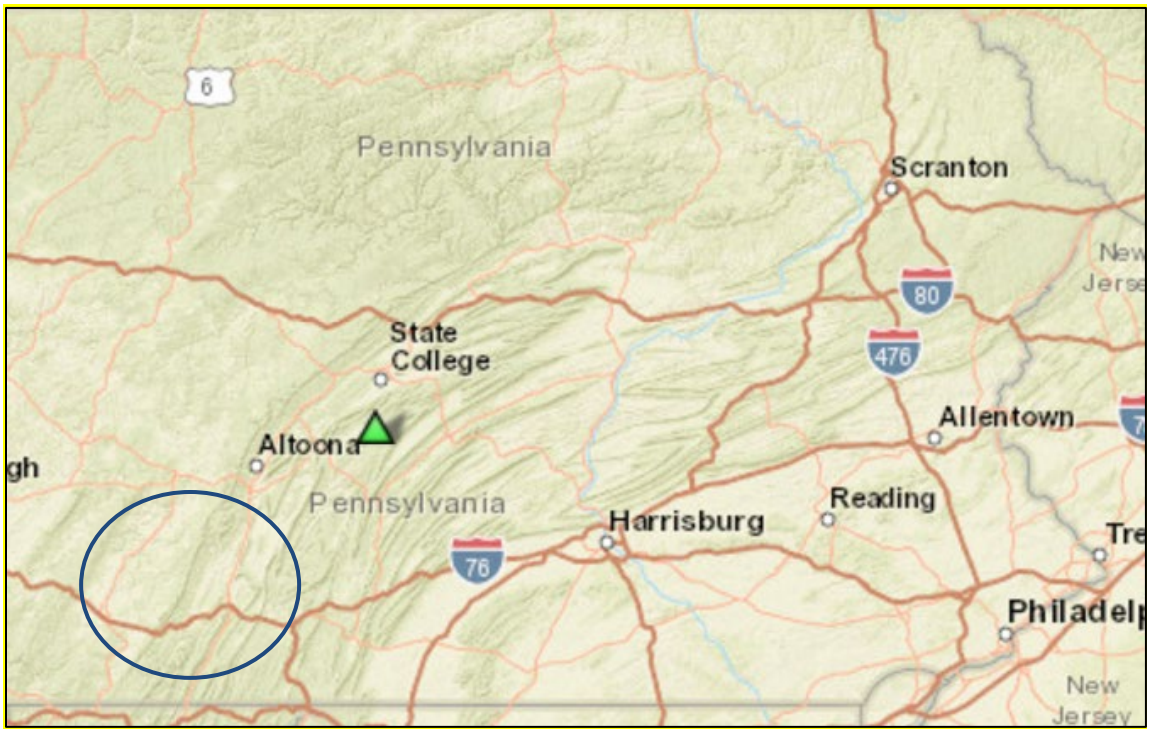
The USGS operates a global network of seismic stations to monitor seismic activity. While no seismic stations are within Fulton County, a nearby station is found in State College, Pennsylvania. Figure 4.3.4-2 shows the locations.

Figure 4.3.3-1. Pennsylvania Earthquake Hazard Zones



Source: PEMA 2023
Note: Fulton County is within the blue oval on the map.

Figure 4.3.3-2. USGS Seismic Stations



Source: *USGS 2017*
Note: *Seismic station location is indicated by green triangle, and Fulton County is within the black oval.*

The USGS provides the website *Did You Feel It?* (http://earthquake.usgs.gov/earthquakes/dyfi/) for citizens to report earthquake experiences and to share information regarding the earthquake and its effects. The website is intended to gather citizens' experiences during an earthquake and incorporate the information into detailed maps to illustrate shaking intensity and damage assessments (USGS 2017).

Earthquakes above a magnitude 5.0 can cause damage near their epicenters, and larger-magnitude earthquakes can cause damage over larger, wider areas. A discussion of previous occurrences of earthquakes in Fulton County appears in the Previous Occurrence section (Section 4.3.3.3) of this profile.

4.3.3.3 Range of Magnitude

Seismic waves are vibrations from earthquakes that travel through the Earth and are recorded on instruments called seismographs. The magnitude or extent of an earthquake is a given value of the earthquake size, or amplitude of the seismic waves, as measured by a seismograph. The Richter magnitude scale (Richter scale) was developed in 1932 as a mathematical device to compare sizes of earthquakes. The Richter scale is the most widely known scale that measures magnitude of earthquakes. It has no upper limit and is not used to express damage. An earthquake in a densely populated area that results in many deaths and considerable damage may have the same magnitude and shock in a remote area that did not undergo any damage. Table 4.3.3-2 lists Richter scale magnitudes and corresponding earthquake effects associated with each magnitude.

Based on historical data of earthquakes with a recorded intensity, little damage is expected from earthquake events. However, since the worst earthquake recorded in Pennsylvania was a magnitude 5.2, a worst-case scenario for this hazard would be if an earthquake of similar magnitude occurred in Fulton County or near the border in an adjacent county, causing mild damage in populated areas.

Table 4.3.3-2. Richter Scale Magnitudes

Richter Magnitude	Earthquake Effects
3.5 or less	Generally not felt, but recorded
3.5 to 5.4	Often felt, but rarely causes damage
Under 6.0	At most, slight damage to well-designed buildings; can cause major damage to poorly constructed buildings over small regions
6.1 to 6.9	Can be destructive up to about 100 kilometers from epicenter
7.0 to 7.9	Major earthquake; can cause serious damage over large areas
8.0 or greater	Great earthquake; can cause serious damage in areas several hundred kilometers across

Source: (PEMA 2023)

The intensity of an earthquake is based on observed effects of ground shaking on people, buildings, and natural features and varies with location. The Modified Mercalli Intensity (MMI) scale expresses the intensity of an earthquake and is a subjective measure that describes the strength of a shock felt at a particular location. The MMI scale records intensity of an earthquake's effects in a given locality according to a scale from I to XII. Descriptions of MMI scales appear in Table 4.3.4-3. Earthquakes that occur in Pennsylvania originate deep within the Earth's crust and not on an active fault. No injury or severe damage from earthquake events has been reported in Fulton County.

Table 4.3.3-3. Modified Mercalli Intensity Scale with Associated Impacts

Scale	Intensity	Description Of Effects	Corresponding Richter Scale Magnitude
I	Instrumental	Detected only on seismographs	<4.2
II	Feeble	Felt only by a few persons at rest, especially on upper floors of buildings.	
III	Slight	Felt quite noticeably indoors, especially on upper floors. Most people do not recognize it as an earthquake (i.e., a truck rumbling).	
IV	Moderate	Can be felt by people walking; dishes, windows, and doors are disturbed.	
V	Slightly Strong	Sleepers are awoken; unstable objects are overturned.	<4.8
VI	Strong	Trees sway; suspended objects swing; objects fall off shelves; damage is slight.	<5.4
VII	Very Strong	Damage is negligible in buildings of good design and construction, slight to moderate in well-built ordinary structures, and considerable in [poorly built or badly designed structures; some chimneys are broken.	<6.1
VIII	Destructive	Damage is slight in specially designed structures; considerable in ordinary, substantial buildings. Moving cars become uncontrollable; masonry fractures, poorly constructed buildings damaged.	<6.9
IX	Ruinous	Some houses collapse; ground cracks; pipes break open; damage is considerable in specially designed structures; buildings are shifted off foundations.	
X	Disastrous	Some well-built wooden structures are destroyed; most masonry and frame structures are destroyed along with foundations. Ground cracks profusely; liquefication and landslides are widespread.	<7.3
XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes, and cables are destroyed.	<8.1
XII	Catastrophic	Total destruction; trees fall; lines of sight and level are distorted; ground rises and falls in waves; objects are thrown upward into the air.	>8.1

Source: (PEMA 2023)

Seismic hazards are often expressed in terms of Peak Ground Acceleration (PGA) and Spectral Acceleration (SA). USGS defines PGA and SA as follows: "PGA is what is experienced by a particle on the ground. SA is approximately what is experienced by a building, as modeled by a particle mass on a massless vertical rod having the same natural period of vibration as the building" (USGS 2019). Both PGA and SA can be measured in *g* (the

acceleration caused by gravity) or expressed as a percent acceleration force of gravity (percent g). For example, at 100 percent g PGA (equivalent to 1.0 g) during an earthquake (an extremely strong ground motion), objects accelerate sideways at the same rate as when they drop from a ceiling. PGA and SA hazard maps provide insight into location-specific vulnerabilities.

PGA is a common earthquake measurement that indicates three factors: (1) geographic area affected, (2) probability of an earthquake at each level of severity, and (3) strength of ground movement (severity) expressed in percent g. In other words, PGA expresses the severity of an earthquake and is a measure of how hard the earth shakes (or accelerates) in a given geographic area (NJOEM 2019) Damage levels from an earthquake vary with the intensity of ground shaking and with the seismic capacity of structures, as noted in Table 4.3.3-4.

Table 4.3.3-4. Damage Levels Experienced in Earthquakes

Ground Motion Percentage	Explanation of Damages
1-2% g	Motions are widely felt by people; hanging plants and lamps swing strongly, but damage levels, if any, are usually very low.
Below 10% g	Usually causes only slight damage, except in unusually vulnerable facilities.
10-20% g	May cause minor-to-moderate damage in well-designed buildings, with higher levels of damage in poorly designed buildings. At this level of ground shaking, only unusually poor buildings would be subject to potential collapse.
20-50% g	May cause significant damage in some modern buildings and very high levels of damage (including collapse) in poorly designed buildings.
≥50% g	May cause higher levels of damage in many buildings, even those designed to resist seismic forces.

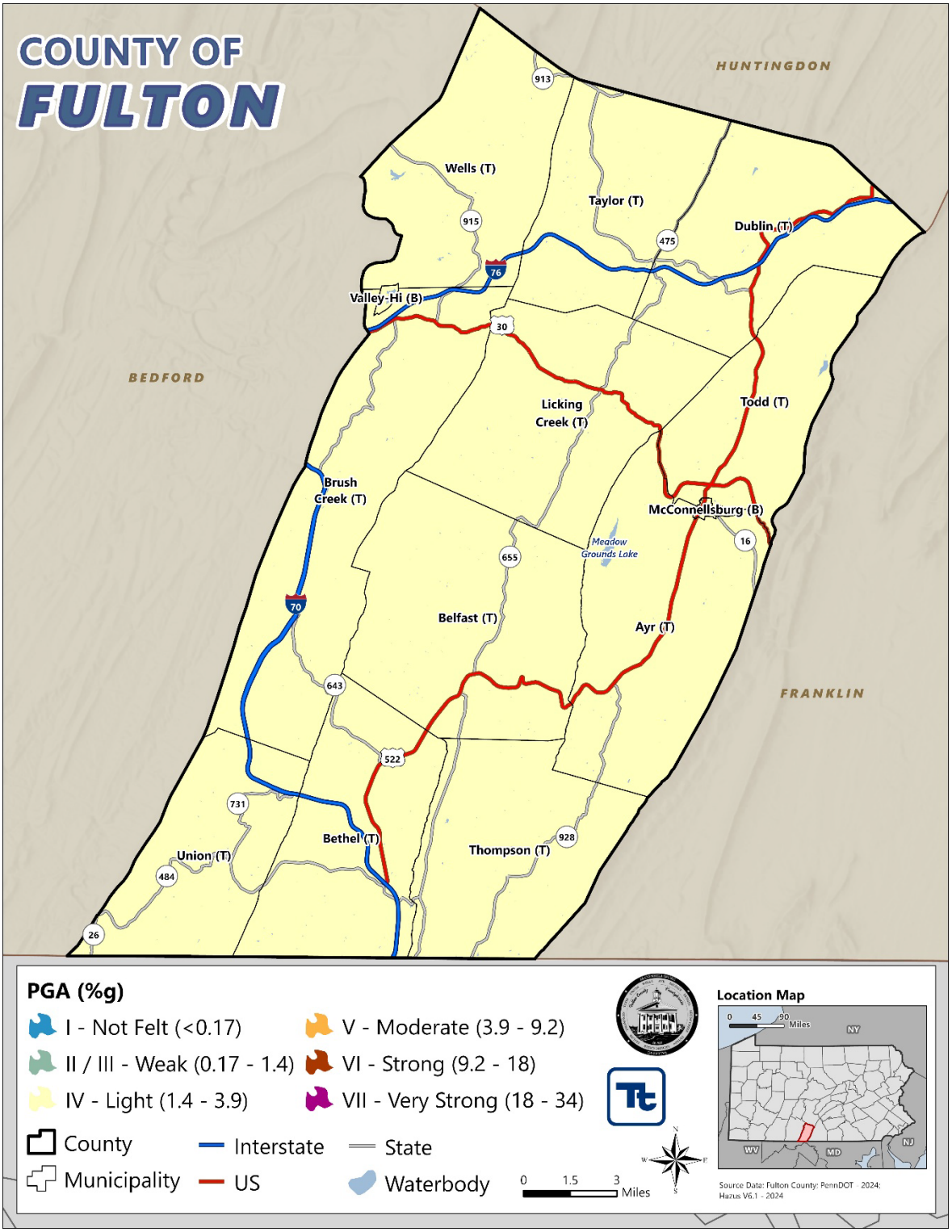
Source: (NJOEM 2019)
Note: % g- Peak Ground Acceleration

National maps of earthquake shaking hazards have been produced since 1948. These maps provide information essential for creating and updating seismic design requirements for building codes, insurance rate structures, earthquake loss studies, retrofit priorities, and land use planning applied in the United States. Scientists frequently revise these maps to reflect new information and knowledge. Buildings, bridges, highways, and utilities built to meet modern seismic design requirements are typically able to withstand earthquakes better than those designed earlier, with less damage and disruption. After thoroughly reviewing the studies, professional organizations of engineers update seismic-risk maps and seismic design requirements specified in building codes (Brown, et al. 2001).

To analyze the earthquake hazard in Fulton County, a probabilistic assessment was conducted for the 500-year mean return period (MRP) in Hazards U.S.–Multi-Hazard (HAZUS-MH) v6.1. A HAZUS analysis evaluates the statistical likelihood that a specific event will occur and the consequences of that event. A 500-year MRP event is an earthquake with a 0.2-percent chance that the mapped ground motion levels (PGA) will be exceeded in any given year.

Figure 4.3.3-3 illustrates the geographic distribution of PGA (percent *g*) across Fulton County for the 500-year MRP event. Potential losses estimated by HAZUS-MH v6.1 for the MRP and the associated PGA are discussed in the Vulnerability Assessment section (Section 4.3.4.6) of this profile.

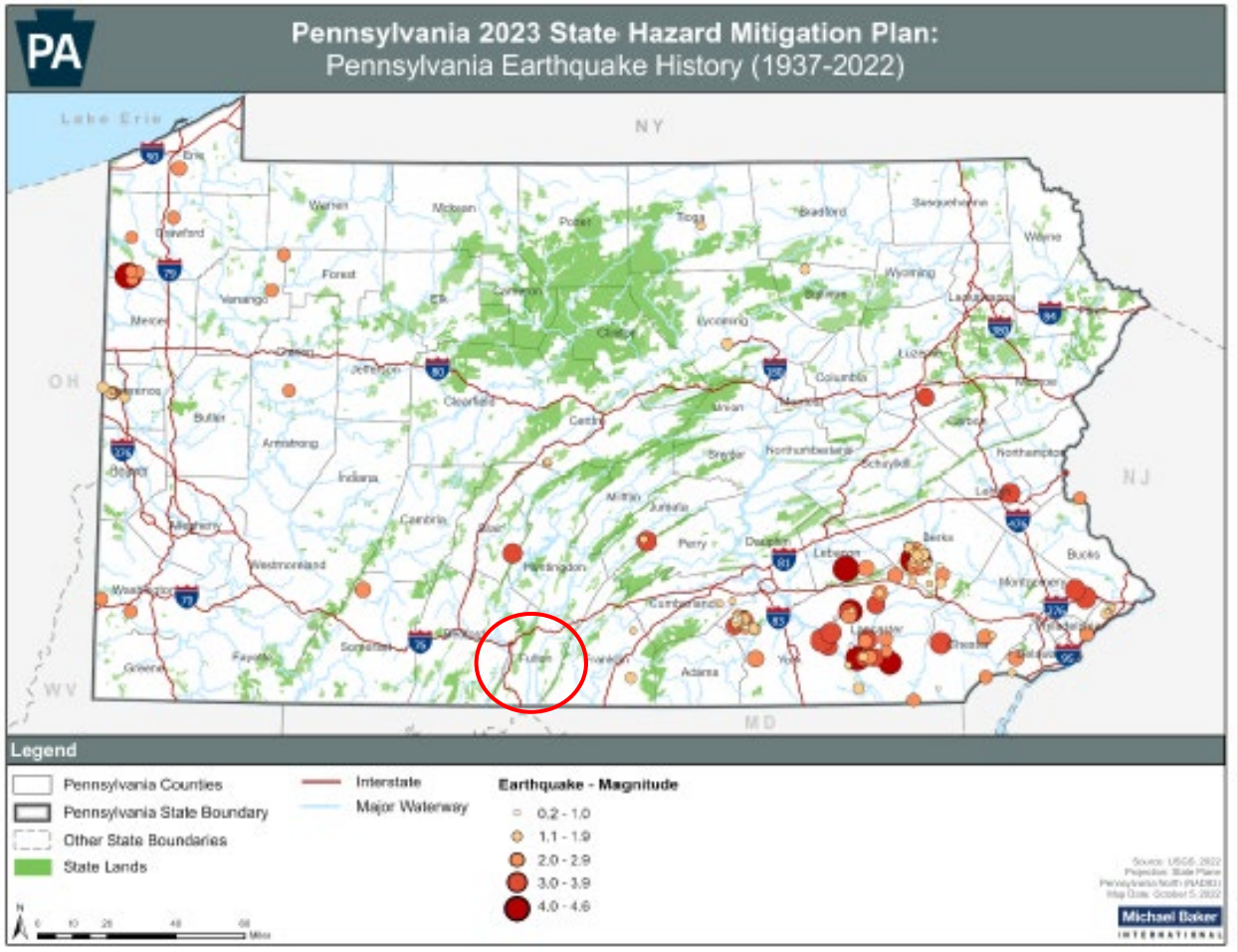
Figure 4.3.3-3 Peak Ground Acceleration in Fulton County, 500-Year MRP Earthquake Event



4.3.3.4 Past Occurrence

The historical record of earthquakes goes back approximately 200 years. In Pennsylvania, about 35 earthquakes have caused light damage since the colonial period. Nearly one-half of these damaging events had out-of-state epicenters (PEMA 2023). Very few earthquakes having a maximum intensity of IV or higher have been centered in areas outside the southeastern part of the Commonwealth (PEMA 2023). Figure 4.3.3-4 is a map of earthquake epicenters in Pennsylvania from 1973 to 2022. This figure shows that Fulton County has not had any earthquake epicenters since 1937. Between 1954 and 2022, Fulton County was not included in any earthquake-related FEMA major disaster (DR) or emergency (EM) declarations (FEMA 2024).

Figure 4.3.3-4. Earthquake Epicenters in Pennsylvania



Source: USGS 2022; PEMA 2023
Note: Fulton County is within the red circle.

According to the USGS, there have been no earthquake epicenters recorded in Fulton County. PEMA's Pennsylvania Disaster History list includes no significant earthquake events in Pennsylvania, and no Federal Emergency Management Agency (FEMA) major disasters (DR) or emergency declarations (EM) have occurred for significant earthquake events in Pennsylvania (FEMA 2019).

Historically, large earthquakes in eastern North America have occurred in three regions: (1) Mississippi Valley near the Town of New Madrid, Missouri; (2) St. Lawrence Valley region of Quebec, Canada; and (3) Charleston, South Carolina. In February 1925, one of the region's largest earthquakes on record occurred (magnitude near 7.0) with its epicenter in a region of Quebec. If a similar-magnitude earthquake would occur in the western part

of the Quebec region, some moderate damage might be expected in one or more counties of Pennsylvania's northern tier. An earthquake with an estimated magnitude of about 7.5 occurred on August 31, 1886, in Charleston, South Carolina. The earthquake was felt in most of Pennsylvania.

Other earthquakes have occurred in east coast areas, including eastern Massachusetts, southeastern New York, and northern New Jersey. Moderate earthquakes occurred in southeastern New York and northern New Jersey and were felt in eastern Pennsylvania. If an earthquake of magnitude 6.0 or greater would occur in that area, damage would likely result in easternmost counties of Pennsylvania, but not in Fulton County.

4.3.3.5 Future Occurrence

Earthquakes cannot be predicted and could occur at any time of the day or year. Major earthquakes are infrequent in the Commonwealth and Fulton County and may occur only once every few hundred years or longer, but the consequences of major earthquakes may potentially be very high. Based on the historical record, the future probability of damaging earthquakes impacting Fulton County is low.

According to the USGS earthquake catalog, between 1950 and 2023, there have been zero earthquakes with an epicenter in Fulton County. Based on available historical data, future occurrences of earthquake events can be considered *unlikely* as defined by the Risk Factor Methodology probability criteria (refer to Section 4.4 of this plan).

4.3.3.6 Vulnerability Assessment

A probabilistic assessment was conducted for the 500-year Mean Return Period (MRP) through a Level 2 analysis in Hazus to analyze the earthquake hazard and provide a range of loss estimates. To understand risk, a community must evaluate what assets are exposed and vulnerable in the identified hazard area. The following text evaluates and estimates the potential impact of the earthquake hazard on the county, including:

- Impact on (1) life, health, and safety; (2) general building stock; (3) critical facilities; (4) economy; (5) environment; and (6) future growth and development.
- Effects of expected future conditions on vulnerability.
- Further data collections will assist in understanding this hazard over time.

Impact on Life, Health, and Safety

Overall, the entire population of Fulton County is exposed to the earthquake hazard. The impact on life, health, and safety would depend on the severity of the event. First responders may also be at risk while responding to earthquake incidents, as they could face difficulties traveling due to limited road access.

Risks to public safety and loss of life from an earthquake in Fulton County are generally minimal. However, higher risks occur in buildings due to structural damage or from falling building ornamentation and chimneys.

Populations most at risk are those in the built environment, particularly near unreinforced masonry construction. Additionally, the elderly (persons over the age of 65 years old) and individuals living below the Census poverty threshold are more susceptible due to factors such as their physical and financial ability to react or respond during a hazard, as well as the locations and construction quality of their housing.

Impact on General Building Stock

The Hazus earthquake model analyzed earthquake impacts on the general building stock in Fulton County. The potential damage to buildings from an earthquake is estimated as losses to building structures and contents. There is a strong correlation between PGA and the damage a building might undergo (FEMA 2022). Figure 4.3.3-3 shows the geographic distribution of PGA across the County for a 500-year MRP earthquake.

In estimating potential loss, Hazus considers building construction type and age. Additional attributes that affect a building's ability to withstand an earthquake include its age, number of stories, and quality of construction. This information was entered into the Hazus model as available from the custom general building inventory developed for this HMP. Hazus evaluates potential building damage in the following categories: none, slight, moderate, extensive, and complete. Table 4.3.3-5 provides definitions of these categories for a light wood-framed building. Definitions for other building types are included in the Hazus technical manual documentation. Unreinforced masonry buildings are most at risk during an earthquake because the walls are prone to collapse outward; steel and wood buildings absorb more of the earthquake's energy.

Building damage because of the 500-year MRP earthquake was estimated using Hazus, as summarized in Table 4.3.4-6. Most of the buildings in Fulton County will not be damaged. Zero buildings will be completely destroyed; zero buildings will incur extensive damage; five buildings will be moderately damaged; and 19 buildings will have slight damage from the 500-year MRP event. Most of the losses would be experienced by the residential occupancy class.

The Hazus results for potential building damage by occupancy class are summarized in Table 4.3.3-7 for the 500-year MRP event. Hazus estimates that there will be $300,047 in damage to structures caused by the 500-year MRP event, with the estimated commercial damage being the most expensive at $170,951.

Table 4.3.3-5. Example of Structural Damage State Definitions for a Light Wood-Framed Building

Damage Category	Description
Slight	Small plaster or gypsum-board cracks at corners of door and window openings and wall-ceiling intersections; small cracks in masonry chimneys and masonry veneer.
Moderate	Large plaster or gypsum-board cracks at corners of door and window openings; small diagonal cracks across shear wall panels exhibited by small cracks in stucco and gypsum wall panels; large cracks in brick chimneys; toppling of tall masonry chimneys.
Extensive	Large diagonal cracks across shear wall panels or large cracks at plywood joints; permanent lateral movement of floors and roof; toppling of most brick chimneys; cracks in foundations; splitting of wood sill plates or slippage of structure over foundations; partial collapse of room-over-garage or other soft-story configurations.
Complete	Structure may have large permanent lateral displacement, may collapse, or be in imminent danger of collapse because of the crippled wall failure or the failure of the lateral load resisting system; some structures may slip and fall off the foundations; large foundation cracks.

Source: FEMA 2015

Table 4.3.3-6. Estimated Buildings Damaged by General Occupancy for 500-year MRP Earthquake Event

Occupancy Class	Total Number of Buildings in Occupancy	Severity of Expected Damage	Earthquake 500-Year Mean Return Period	
			Building Count	Percent Buildings in Occupancy Class
Residential Exposure (Single and Multi-Family Dwellings)	6,530	NONE	6,511	99.7%
		MINOR	15	0.2%
		MODERATE	4	0.1%
		SEVERE	0	0.0%
		DESTRUCTION	0	0.0%

Occupancy Class	Total Number of Buildings in Occupancy	Severity of Expected Damage	Earthquake 500-Year Mean Return Period	
			Building Count	Percent Buildings in Occupancy Class
Commercial Buildings	1,736	NONE	1,731	99.7%
		MINOR	4	0.2%
		MODERATE	1	<0.1%
		SEVERE	0	0.0%
		DESTRUCTION	0	0.0%
Industrial Buildings	9	NONE	9	99.6%
		MINOR	0	0.0%
		MODERATE	0	0.0%
		SEVERE	0	0.0%
		DESTRUCTION	0	0.0%
Government, Religion, Agricultural, and Education Buildings	118	NONE	118	0.0%
		MINOR	0	0.0%
		MODERATE	0	0.0%
		SEVERE	0	0.0%
		DESTRUCTION	0	0.0%

Source: *Hazus V6.1; Fulton County 2024*

Table 4.3.3-7. Estimated Building Value Damaged by the Annualized, 500-Year MRP Earthquake Event

Jurisdiction	Total Replacement Cost Value (RCV)	500-Year Mean Return Period - Estimated Losses				
		Estimated Total Damage	Percent of Total Building and Contents Replacement Cost Value	Estimated Residential Damage	Estimated Commercial Damage	Estimated Damages for All Other Occupancies
Ayr (T)	$1,376,426,042	$97,871	<0.1%	$27,336	$59,559	$10,976
Belfast (T)	$655,413,691	$23,429	<0.1%	$10,990	$10,968	$1,470
Bethel (T)	$994,651,759	$27,371	<0.1%	$12,858	$12,799	$1,713
Brush Creek (T)	$839,701,214	$94	<0.1%	$44	$44	$6
Dublin (T)	$767,305,491	$84	<0.1%	$23	$51	$9
Licking Creek (T)	$840,873,066	$0	0.0%	$0	$0	$0
McConnellsburg (B)	$817,997,653	$45,993	<0.1%	$12,846	$27,989	$5,158
Taylor (T)	$983,050,508	$0	0.0%	$0	$0	$0
Thompson (T)	$416,632,627	$18,164	<0.1%	$8,533	$8,494	$1,137
Todd (T)	$969,356,489	$73,403	<0.1%	$20,502	$44,669	$8,232
Union (T)	$306,763,135	$13,638	<0.1%	$6,407	$6,378	$854
Valley-Hi (B)	$9,954,698	$0	0.0%	$0	$0	$0
Wells (T)	$158,054,723	$0	0.0%	$0	$0	$0
Fulton County (Total)	**$9,136,181,097**	**$300,047**	**<0.1%**	**$99,540**	**$170,951**	**$29,555**

Source: Hazus V6.1; Fulton County 2024; RS Means 2024
Notes: Total amount is sum of damage for all occupancy classes (residential, commercial, and industrial).
B – Borough; Twp. – Township

Impact on Critical Facilities

After consideration of the general building stock exposed to and damaged by each earthquake event, critical facilities were evaluated. All critical facilities in Fuloton County are considered exposed and vulnerable to the earthquake hazard. Additionally, first responders may have limited access to critical facilities due to damaged infrastructure, and electrical/utility fires may increase with disruptions to lines.

In addition, Hazus estimates the time to restore critical facilities to fully functional use. Results are presented as a probability of being functional at specified time increments (days after the event). For example, Hazus might estimate that a facility has a 5 percent chance of being fully functional at Day 3, and a 95 percent chance of being fully functional at Day 90.

As shown in Table 4.3.3-8, Hazus estimates that critical facilities have an average probability of sustaining no damage during a 500-year mean return period, maintaining an average functionality of 99 percent.

Table 4.3.3-8 Estimated Damage to and Loss of Functionality of Critical Facilities and Utilities in Fulton County for the 500-Year MRP Earthquake Event

Name	Average Percent Probability of Sustaining Damage 500-Year Mean Return Period					Average Percent Functionality			
	None	Slight	Moderate	Extensive	Complete	Day 1	Day 7	Day 30	Day 90
Lifelines									
Communications	99.6%	0.3%	0.1%	0.0%	0.0%	99.5%	99.9%	99.9%	99.9%
Energy	99.5%	0.4%	0.1%	0.0%	0.0%	99.4%	99.8%	99.9%	99.9%
Food, Hydration, Shelter	99.5%	0.4%	0.1%	0.0%	0.0%	99.4%	99.8%	99.9%	99.9%
Hazardous Materials	99.5%	0.4%	0.1%	0.0%	0.0%	99.4%	99.8%	99.9%	99.9%
Health and Medical	99.9%	<0.1%	0.0%	0.0%	0.0%	99.9%	99.9%	99.9%	99.9%
Safety and Security	97.4%	1.9%	0.6%	0.1%	0.0%	97.4%	99.1%	99.8%	99.9%
Transportation	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Water Systems	99.5%	0.4%	0.1%	0.0%	0.0%	99.4%	99.8%	99.9%	99.9%

Source: Hazus V6.1; Fulton County 2024

Impact on Economy

Earthquakes also have impacts on the economy, including loss of business function, damage to inventory, relocation costs, wage loss, and rental loss due to the repair/replacement of buildings. Hazus estimates building-related economic losses, including income losses (wage, rental, relocation, and capital-related losses) and capital stock losses (structural, non-structural, content, and inventory losses).

This analysis did not include damage estimates for individual roadway segments and railroad tracks, but it is assumed these features would sustain damage due to ground failure, resulting in interruptions of regional transportation and of the distribution of materials.

Earthquake events can also significantly affect bridges, many of which provide the only access to certain neighborhoods. Because softer soils generally follow floodplain boundaries, bridges that cross watercourses should be considered vulnerable. Another key factor in the degree of vulnerability is the age of facilities and infrastructure, which correlates with building standards in place at the time of construction.

Hazus estimates the volume of debris that may be generated as a result of an earthquake event to enable the study region to manage debris removal and disposal. Debris estimates are divided into two categories: reinforced concrete and steel, which require special equipment to break up before being transported, and brick, wood, and other debris that can be loaded directly onto trucks with bulldozers (FEMA 2022).

Table 4.3.4-12 summarizes the estimated debris generated by the 500-year MRP event. Hazus estimated the generation of over 288 tons of total debris during the 500-year MRP event. The Township of Todd would generate the greatest amount of debris at 76 tons.

Table 4.3.3-9. Estimated Debris Generated by 500-year MRP Earthquake Event

Jurisdiction	Debris Generated by 500-Year Mean Return Period	
	Brick/Wood (tons)	Concrete/Steel (tons)
Ayr (T)	85	16
Belfast (T)	15	2
Bethel (T)	18	3
Brush Creek (T)	0	0
Dublin (T)	0	0
Licking Creek (T)	0	0
McConnellsburg (B)	40	8
Taylor (T)	0	0
Thompson (T)	12	2
Todd (T)	64	12
Union (T)	9	1
Valley-Hi (B)	0	0
Wells (T)	0	0
Fulton County (Total)	**244**	**44**

Source: Hazus V6.1
Notes: B – Borough; Twp. – Township

Impact on the Environment

Earthquakes can lead to numerous, widespread, and devastating environmental impacts. These impacts may include but are not limited to:

- Induced flooding or landslides.
- Poor water quality.
- Damage to vegetation.
- Breakage in sewage, wastewater, or toxic material containment.

Secondary impacts can include train derailments, roadway damage, spillage of hazardous materials (HazMat), and utility interruption.

Future Growth and Development

Human exposure and vulnerability to earthquake impacts in newly developed areas are anticipated to be similar to those currently within the county. Building codes require seismic provisions that should render new

construction less vulnerable to seismic impacts than older, existing construction that may have been built to lower construction standards. Any areas of growth could also be impacted by the flood hazard if within identified hazard areas. The tables and hazard maps included in the jurisdictional annexes contain additional information regarding the specific areas of development that would increase county vulnerability to dam inundation areas.

Estimated population projections provided by the Center of Rural Pennsylvania indicates that Fulton's population will decrease into 2040, decreasing total population to approximately 14,504 persons (The Center of Rural Pennsylvania 2023). This is approximately a 0.5 percent decrease from the county's 2020 population. As more persons move out of earthquake susceptible areas, an decreased amount of the population will be vulnerable to the effects of earthquakes.

Expected Future Conditions

The impacts of certain environmental changes on earthquake probability are unknown. Some scientists suggest that melting glaciers could induce tectonic activity. As ice melts and water runs off, tremendous amounts of weight are shifted on the Earth's crust. As newly freed crust returns to its original, pre-glacier shape, it could cause seismic plates to slip and stimulate volcanic activity, according to research into prehistoric earthquakes and volcanic activity. National Aeronautics and Space Administration (NASA) and USGS scientists found that retreating glaciers in southern Alaska might be opening the way for future earthquakes (NASA, USGS 2023).

Secondary impacts of earthquakes could be magnified by environmental factors. Soils saturated by repetitive storms could undergo liquefaction during seismic activity due to increased saturation. Dams storing increased volumes of water could fail during seismic events. No current models are available to estimate these impacts.

4.3.3.7 Additional Data and Next Steps

Additional data is needed to further refine and enhance the county's vulnerability assessment, which includes identifications of unreinforced masonry critical facilities and privately owned buildings (i.e., residences) via local knowledge and/or pictometry/orthophotos. These buildings may not withstand earthquakes of certain magnitudes and plans to provide emergency response/recovery efforts for these properties can be established.

Ground shaking is the primary cause of earthquake damage to man-made structures, and soft soils amplify ground shaking. One contributor to site amplification is velocity at which rock or soil transmits shear waves (S-waves). The *NEHRP* developed five soil classifications defined by their shear-wave velocity that alter severity of an earthquake. These soil classifications range from A to E, whereby A represents hard rock that reduces ground motions from an earthquake and E represents soft soils that amplify and magnify ground shaking and increase building damage and losses. When this soil information becomes available, it may be incorporated into Hazus to further refine the county's vulnerability assessment.

4.3.4 Environmental Hazards – Hazardous Materials Releases

4.3.4.1 Hazard Description

Hazardous material releases can contaminate air, water, and soils and have the potential to cause injury or death. Dispersion can take place rapidly when transported by water and wind. While often accidental, releases can occur as a result of human carelessness, intentional acts, or natural hazards. When caused by natural hazards, these incidents are known as secondary events (PEMA 2020).

Hazardous materials come in various forms, some of which can cause death, serious injury, or long-lasting health effects, as well as damage to buildings, homes, and other property. Hazardous materials include explosives, flammable solids, substances that become dangerous when wet, oxidizing substances, and toxic liquids. The U.S. Department of Transportation (DOT) categorizes hazardous materials into the following classes:

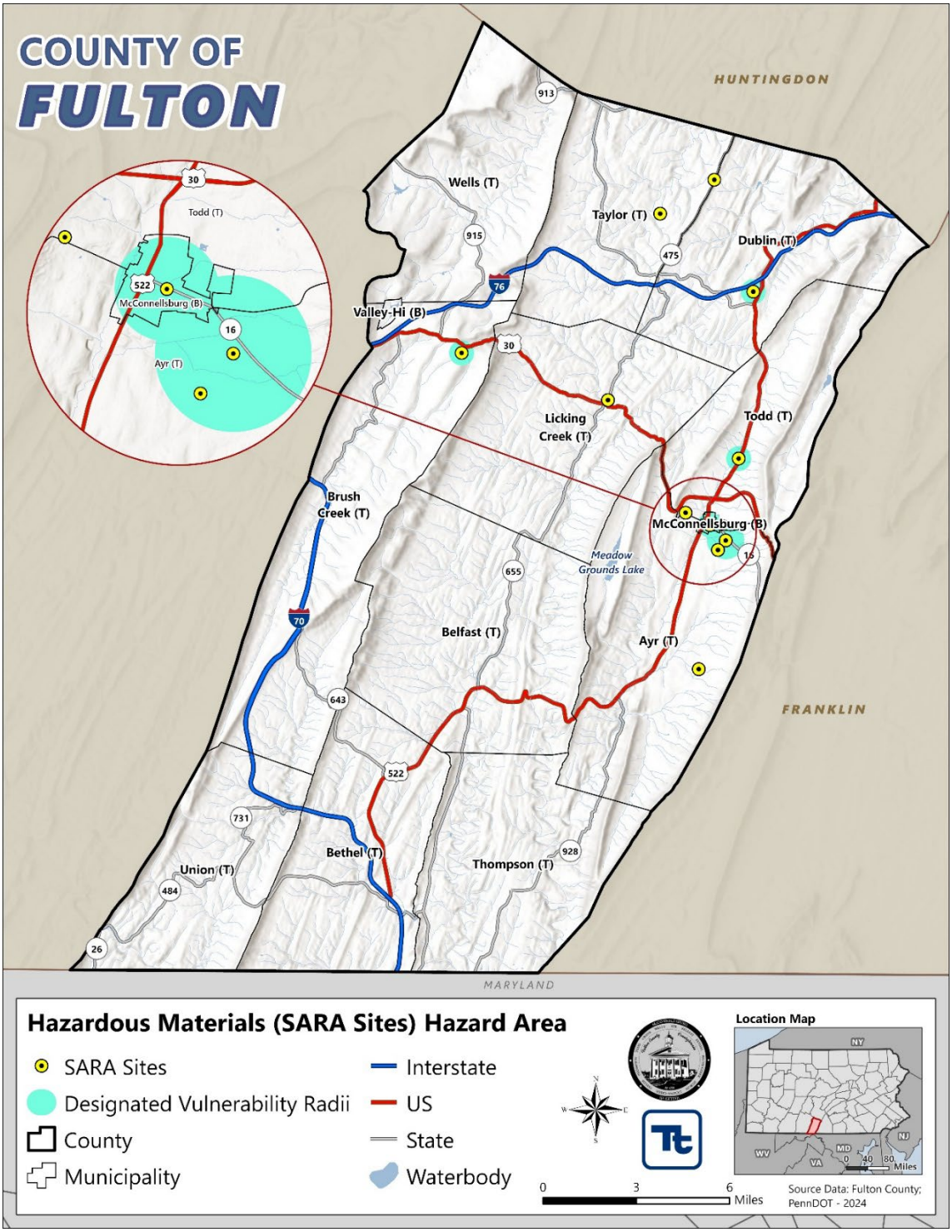
- Class 1: Explosives.
- Class 2: Gases.
- Class 3: Flammable liquids.
- Class 4: Flammable solids.
- Class 5: Oxidizers and organic pesticides.
- Class 6: Poisons and etiologic materials.
- Class 7: Radioactive materials.
- Class 8: Corrosives.
- Class 9: Miscellaneous.

Fulton County is home to 10 identified facilities that utilize, ship, or house chemicals considered hazardous (shown in Figure 4.3.4-1. These facilities have been identified under the Superfund Amendment and Reauthorization Act (SARA) as exceeding the quantity threshold for reporting.

Hazardous materials in transit are defined as a substance or material determined to be capable of posing an unreasonable risk to health, safety, or property when transported. “Unreasonable risk” covers a broad range of health, fire, and environmental considerations. An accident involving a vehicle carrying hazardous materials becomes a hazardous materials release incident if the hazardous material leaks or is involved in a fire, or if the potential for release, fire, or other hazard exists. These hazard events can also occur during production, storage, transportation, use, or disposal of hazardous materials (Ready.gov 2023).

Additionally, Concentrated Animal Feeding Operations (CAFO) will be discussed under this hazard profile. CAFOs have been identified as a priority concern by multiple County residents and municipalities, due to their prevalence in Fulton County. While Animal Feeding Operations (AFOs) provide a valuable resource to the livestock industry and contribute to overall affordability of animal products for consumption, they also contribute to negative environmental and human health impacts. According to the Environmental Protection Agency (EPA), AFOs consist of facilities that keep and raise animals in confined situations, thus congregating animals, feed, manure and urine, dead animals, and overall production operations on a small land area. Operations are considered to be an AFO if the animals are confined at least 45 days in a 12-month period, and if there is no grass or other vegetation in the confinement area during the normal growing season. CAFOs are AFOs that meet certain EPA criteria (regarding number of animals and pollutants/waste management dispersal), and they consist of about 15 percent of all AFOs. Although CAFOs can augment the severity of a number of natural and non-natural hazards, this area is being highlighted under the Environmental Hazards profile, as the CAFO’s greatest impacts connect to the higher quantity of pollutants and waste produced by the animals.

Figure 4.3.4-1. Hazardous Materials Roadway Hazard Area in Fulton County, Pennsylvania



4.3.4.2 Location and Extent

Based on past occurrences, HazMat releases within Fulton County have been accidental and have not been the result of terrorism or a criminal act. While past occurrences have not been deemed intentional, an intentional release of any of these products in large quantity would pose a threat to the local population, economy, and

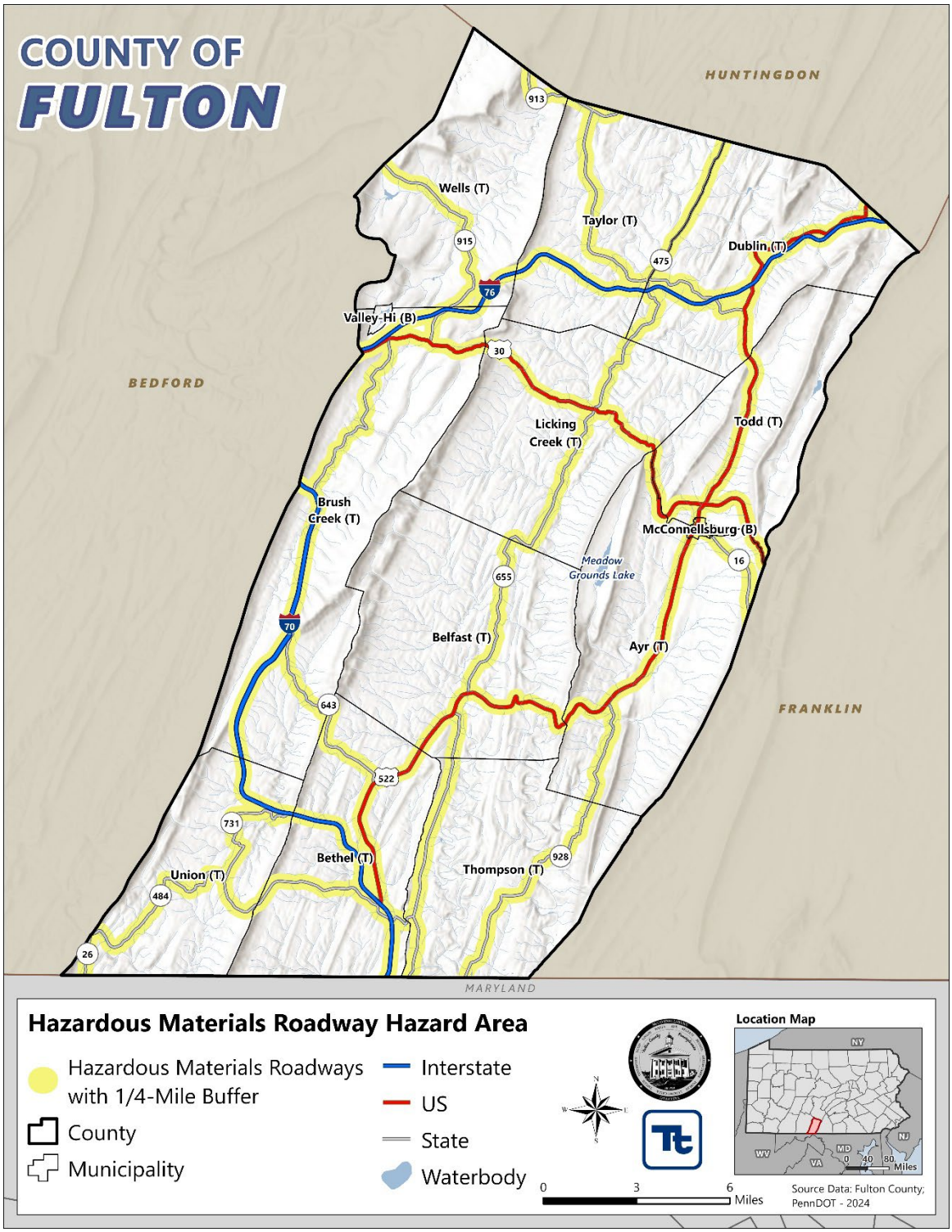
environment resulting in lost revenue, injuries, and deaths. Fulton County is home to 688.6 miles of roadways, including 39.6 miles of interstate highway, 24.2 miles of principal arterial roads, 48.7 miles of minor arterial roads, and over 462.7 miles of local roads (PennDOT 2020). With nearly 700 miles of roadways linking more-populated areas with rural communities, the grid work of roadways facilitates free movement of HazMat throughout the region. The County's mountainous terrain increases its vulnerability to HazMat accidents.

While permitted, identified hazardous substance travel routes are not maintained by the County or regional planning entities. The primary roadways in Fulton County are listed as follows (and shown in Figure 4.3.4-2):

- Pennsylvania Turnpike (I-76).
- Interstate 70 (I-70).
- U.S. Highway 522 (US-522).
- U.S. Highway 30 (US-30).
- PA State Highway 16 (PA-16).

The U.S. Environmental Protection Agency (EPA) tracks management of over 650 toxic chemicals that pose a threat to human health and the environment through the Toxic Release Inventory (TRI). Facilities in certain industries that use or house these chemicals in amounts exceeding specified levels must submit annual reports on how each chemical is managed through recycling, energy recovery, treatment, and releases to the environment. A "release" of a chemical means emission to the air or water, or placement in some type of land disposal. EPA publishes all TRI data in a publicly accessible database in Envirofacts. In 2021, 3 TRI facilities within 20 miles of Fulton County reported to EPA, only 0.85 percent of total TRI releases/transfers in Pennsylvania. (US EPA 2021).

Figure 4.3.4-2. Hazardous Materials Roadway Hazard Area in Fulton County, Pennsylvania



Fulton County is home to approximately 15 CAFOS. The CAFOs are of varying sizes and most contain either turkeys or pigs. Fulton County is home to a greater number of pig CAFOs than turkey CAFOs. No one jurisdiction in the County is noteworthy for being home to more CAFOs than another.

Per EPA regulations, an AFO must meet certain thresholds to be considered a CAFO. CAFOs can be divided by size categories into large, medium, and small. A large CAFO confines a minimum of the number of animals listed in the table below. A medium CAFO confines the number of animals in the range listed in the table below, and also (1) has a man-made ditch or pipe to carry manure or wastewater to surface water or (2) the animals come into contact with surface water that passes through the area where they are confined. A permitting authority may choose to designate a medium-sized facility as a CAFO if found to be a significant contributor of pollutants. A small CAFO confines fewer than the number of animals listed below and has been designated as a CAFO by the permitting authority if it is a significant source of pollutants.

Table 4.3.4-1. Regulatory Thresholds to Define Large, Medium, and Small CAFOs

Animal Sector	Size Thresholds (Number of Animals)		
	Large CAFO	Medium CAFO*	Small CAFO**
Cattle or Cow/Calf Pairs	1,000 or more	300-999	Less than 300
Mature Dairy Cattle	700 or more	200-699	Less than 200
Veal Calves	1,000 or more	300-699	Less than 300
Swine (weighing over 55 pounds)	2,500 or more	750-2,499	Less than 750
Swine (weighing less than 55 pounds)	10,000 or more	3,000-9,999	Less than 3,000
Horses	500 or more	150-499	Less than 150
Sheep or Lambs	10,000 or more	3,000-9,999	Less than 3,000
Turkeys	55,00 or more	16,500-54,999	Less than 16,500
Laying Hens or Broilers (Liquid Manure Handling Systems)	30,000 or more	9,000-29,999	Less than 9,000
Chickens Other than Laying Hens (Other than a Liquid Manure Handling System)	125,000 or more	37,500-124,999	Less than 37,500
Ducks (Other than a Liquid Manure Handling System)	30,000 or more	10,000-29,999	Less than 10,000
Ducks (Liquid Manure Handling System)	5,000 or more	1,500-4,999	Less than 1,500

* Must also meet one of two "method of discharge" criteria to be defined as a CAFO or may be designated.
** Never a CAFO by regulatory definition but may be designated on a case-by-case basis.

Source: EPA 2015

4.3.4.3 Range of Magnitude

Environmental hazard incidents within Fulton County could range from minor petroleum spills to large facility-based incidents that could lead to loss of life and damage to property, environment, and economy. Severity of an incident varies with type of material released and distance and related response time for emergency response teams. Areas within closest proximity to the releases are generally at the greatest risk; however, depending on the material, a release can travel great distances or persist over a long time (e.g., nuclear radiation), resulting in far-reaching effects on people and the environment.

A hazmat release, whether accidental or intentional, can be exacerbated or mitigated by specific circumstances surrounding the event. Exacerbating conditions are characteristics that can enhance or magnify effects of a hazard, and mitigating conditions are characteristics of the target and its physical environment that can reduce the effects of a hazard. These conditions are described below:

- Noncompliance with applicable codes (e.g., fire and building codes) and maintenance failures (e.g., fire protection and containment features) – can substantially increase damage to a facility and to surrounding buildings.
- Geographic location of hazmat site – if occurring within a Special Flood Hazard Area (SFHA), a materials release could cause large-scale water contamination during a flood incident, or a flood incident could compromise production and storage of hazardous chemicals. Stormwaters and floodwaters can also move toxic chemicals swiftly across great distances.
- Weather conditions – affect how the hazard develops.
- Micro-meteorological effects of buildings and terrain – alter dispersion of materials.
- Shielding in the form of sheltering-in-place – protects people and property from harmful effects.

Although most recognized for their pollutant contributions, CAFOs can increase the impacts of a hazard event for a variety of hazards, including public health, security, flooding, fire, transportation accidents, and drought. For this reason, CAFO operations require careful management and supervision. As noted above, CAFOs have been highlighted in the Environmental Hazards profile due to their direct connection with environmentally hazardous events; however, all potential impacts will be noted.

The EPA monitors CAFO sites for pollutant control as improperly managed manure and wastewater can negatively impact the environment and public health. This monitoring occurs via the delegation of federal authority to the Pennsylvania Department of Environmental Protection (PA DEP), which in turn delegates its authority of monitoring CAFO sites to the Pennsylvania State Conservation Commission (PA SCC). The PA SCC delegates its authority to local-level county conservation districts so that monitoring and enforcement can occur on a local level. While monitoring at federal, state, and local levels is designed to be as comprehensive as possible, not all information is available to be tracked due to voluntary report statuses, lack of sufficient resources, and competing governmental priorities. The incomplete records for CAFO sites leads to increased resident concern about the impact of pollutant control for CAFOs on County residents, air quality, land/soil quality, and water quality. Residents have also expressed concern about the voluntary nature of most reporting mechanisms regarding CAFOs, particularly with concern to the management and transport of animal waste and manure. The EPA has also documented this area of weakness. Additionally, while farming operations are required to develop Manure Management Plans, these plans do not need to be kept on file by local-level conservation districts. Although farming operations must provide these plans to enforcement officers upon request, the lack of regular reports and immediate access decreases accountability and lessens the ability of independent confirmation.

Manure and wastewater have the potential to introduce nitrogen and phosphorus, organic matter, sediments, pathogens, heavy metals, hormones, and ammonia to the environment. Potential impacts from any of these pollutants can include excess nutrients in the water (e.g., nitrogen and phosphorus), leading to low levels of dissolved oxygen and fish kills; decomposing organic matter that can contribute to toxic algal blooms; degraded

water resources; respiratory problems in workers and local residents; and increased chance of illness through the exposure of wastes and pathogens in drinking water.

Regarding the increased potential for illness, several scientific publications and institutions (including Science Daily, the Johns Hopkins School of Public Health, and the National Institute of Health) have noted that exposure to CAFO and manure fertilizers may increase the frequency of Methicillin-Resistant Staphylococcus Aureus (MRSA). MRSA is caused by strains of bacteria that have developed resistance to more widely used antibiotics. Staphylococcus (Staph) is a common bacterium on the human body; however, if an antibiotic-resistant strain of Staph enters the human body, it may be resistant to methicillin, amoxicillin, penicillin, oxacillin, and other common medical treatments. Insect-borne diseases also present a greater threat of infection to residents, necessitating CAFO facilities to consider animal care in addition to manure management.

Another potential hazard from CAFOs concerns animal mortality management. Increased animal mortality can contaminate the water table, soil, and air. If animals in a CAFO were to become infected with a highly infectious and fatal virus that leads to a large loss of animals in a short period of time (e.g., a pig CAFO becoming infected with Porcine Epidemic Diarrhea Virus [PEDv]), the facility may have difficulty in adequately disposing of all the animal remains.

While CAFO operations have come under increasing regulations in the past few years to decrease their potential environmental and public health impacts, one area which is still under-regulated is transportation accidents. Manure and animal waste from CAFOs is frequently transported to and from the facility without significant oversight. Were an accident to occur, this could lead to a HazMat incident in the County or in neighboring counties. HazMat incidents could also occur through other forms of manure spills, such as while pumping manure, while removing animal waste from a manure pit, or while applying manure in the field.

The other hazards that could be magnified by a CAFO have been described, with potential impacts, in the list below.

Security – As with other environmental hazards, events can either be accidental or deliberate in nature. While most environmental events in the County would be accidental, CAFO sites should still consider the possibility of deliberate incidents. If a CAFO does not maintain appropriate security measures, it could become a potential terrorist target due to the wide scope and impact of a HazMat incident.
Flooding – A CAFO located near a river or body of water, particularly one with a tendency to flood during storm events, can increase the chance of freshwater and stormwater contamination. The EPA notes that many AFOs currently lack sufficient stormwater management guards. If a local river floods into a CAFO's land, animal waste and manure may enter the stream and, ultimately, contaminate local drinking water.
Fire – Animal waste contains a higher rate of methane and may be a fire hazard if not adequately controlled for. Additionally, if an unrelated wildfire were to occur, the need for animal evacuation could create transportation difficulties.
Drought – Due to the large number of animals maintained in a CAFO, such facilities require a significant amount of drinking water. This could lead to potential exacerbation of water resource management problems during a drought. Additionally, residents have noted concern about the potential for well water contamination should wastewater and other animal waste not be sufficiently regulated.

The worst-case scenario would be a large, uncontrolled release of a toxic gas within a major urban area. In Fulton County, this could take the form of an accident and major rupture of a tanker hauling a toxic or flammable gas in or near McConnellsburg Borough. While little physical property damage is likely from this type of event, potential for injury and death to residents and visitors up to 0.25 mile from the scene is significant. This event would likely overwhelm the medical care capacity within the County and possibly the region. The population vulnerable to such a release includes the 1,056 people in McConnellsburg Borough alone. Other municipalities are vulnerable to HazMat releases along US 522 and other routes. In addition, an event such as this would likely close County offices, causing a major disruption to government operations. The most likely scenario would be a transportation accident resulting in a rupture of a truck's fuel tank, spilling a small quantity of diesel fuel onto the roadway.

4.3.4.4 Past Occurrence

Fulton County is approximately two hours away, by road, from both Baltimore, MD, and Harrisburg, PA. The County's relative proximity to these more urban areas could eventually lead to an increase in transportation of HazMat via road or air. These transportation routes, combined with the fixed-site facilities and end users of HazMat, could be locations of frequent chemical and petroleum-product release incidents throughout the County, with several deemed as serious events.

The County has undergone HazMat release accidents at facilities and along roadways. Most incidents have involved spills of petroleum products or release of natural gas or propane; these incidents have easily been contained. At least one chemical spill of an unknown substance was documented in Thompson Township in 2007, and one call for an abandoned explosive detonation cord was made in Bethel Township in 2004. Fulton County has an annual contract with McCutcheon Enterprises, based out Apollo, Pennsylvania, for cleanup of larger HazMat incidents (previously, the County contracted with Cumberland County's Special Hazards Operation Team [SHOT]). Local records do not indicate any HazMat release accidents or explosions since 2010.

However, these statistics may not be comprehensive. The reporting requirements from the State changed in 2007, allowing State agencies to categorize incidents as something other than "Hazardous Materials." For instance, a vehicle collision resulting in a spill of petroleum products (e.g., gasoline, motor oil) may be reported as a vehicle accident instead of a HazMat release. In the case of an explosion, the explosive event may not be the primary incident. Rather, the incidents may be based on events that led up to an explosion.

Fulton County also tracks releases of chemicals into air, water, or land disposal units. This information is then published by EPA. In 2022, Fulton County disposed of a total of 9,165 pounds of toxic chemicals, with disposal of 1,403 pounds on-site (through air) and 7,762 pounds off-site. The top four TRI chemicals released by air included ethylene glycol (49 percent), manganese (43 percent), nitric acid (5 percent), zinc compounds (3 percent). The top TRI chemicals released off site consisted of manganese (57 percent) and zinc compounds (43 percent). The amount of 2022 TRI releases increased from the 2021 disposal amount of 1,207 pounds.

The County has no instances of manure-related HazMat incidents or spills whose frequency may have been exacerbated by the presence of local CAFOs. Additionally, an incident may not be identified as being connected to or worsened by a nearby CAFO because of voluntary report standards and because this issue is not always noted in the media.

Table 4.3.4-2. Fulton County Manure-related HazMat Incidents

Date	Location	Impacts
March 2002	Brush Creek Tributary	Manure spill of over 770,000 gallons from a concrete pit under a pig farm occurred in Crystal Spring.
July 2004	Buck Hollow Road/Big Cove Tannery	Manure and pollutant spill from a dairy farm resulted in dead fish at hatchery in the area of Big Cove Tannery. Manure contaminated an unnamed tributary to Esther Run.
October 2007	Big Cove Creek	Manure spill of over 200,000 gallons from a dairy farm occurred just north of McConnellsburg.
November 2009	Big Cove Creek	Manure spill occurred at a dairy farm, with an estimated tens of thousands of gallons spilled. Slurry manure flowed about 1,500 feet from the manure storage pit into Big Cove Creek. The Pennsylvania Fish and Boat Commission documented over 1,000 dead fish in a segment of the stream less than a mile long.

4.3.4.5 Future Occurrence

Because of the wide scope of definition of environmental hazards, ranging from a small spill to a large release of a highly volatile or toxic HazMat, incidents can happen at any time. Additionally, the County is home to 10 SARA facilities. Although these facilities follow applicable safety and health regulations and best practices, proximities of the facilities to population centers is a concern for the County.

HazMats are also transported along I-70, I-76, US-30, US-522, PA-26, PA-475, PA-484, PA-643, PA-655, PA-731, PA-913, PA-915. Transportation of HazMat on highways involves tanker trucks or trailers; not surprisingly, trucks are responsible for the greatest number of HazMat incidents. At several points, these transportation routes cross streams within the watersheds that are part of the County's domestic water supply.

As with other environmental hazards, the wide scope and ability for CAFOs to impact environmental releases or other hazard incidents means that an event could occur at any time. This event is difficult to predict as many factors contribute to an event occurrence. Additionally, smaller incidents may occur and not be reported, or they may be labeled as a different type of hazard event. Fulton County is investigating ways to better document CAFO-related environmental events due to local interest in the subject.

While HazMat release incidents in Fulton County have occurred in the past, they are generally considered difficult to predict. Smaller incidents, such as fuel spills, will affect the County many times each year, most likely during refilling of home heating oil tanks, and may not be reported. Although the County does not anticipate severe releases on any regular basis, possibility of this should not be discounted. Based on Risk Factor Methodology Probability Criteria, the likelihood of future occurrences within Fulton County remains likely.

4.3.4.6 Vulnerability Assessment

To understand risk, a community must evaluate the assets exposed and vulnerable in the identified hazard area. The following text evaluates and estimates the potential impact of the hazardous materials release hazard on the county, including:

- Impact on (1) life, health, and safety; (2) general building stock; (3) critical facilities; (4) economy; (5) environment; and (6) future growth and development.
- Expected future conditions.
- Further data collections that will assist in understanding this hazard over time.

A spatial analysis was conducted using various lengths of buffer radii around hazardous material facilities and transportation networks. If a hazardous material incident occurred in or on the facility, pipeline, or transportation network, these buffers would represent the toxin or radiation release area. For the purposes of the assessment, an asset (population, structures, critical facilities, and lifelines) is considered exposed and potentially vulnerable to the hazmat hazard if it is located within these hazardous material buffer areas. The analysis looked at three different hazardous material buffer areas:

- 0.25-mile from a major highway.
- Unique radius for each SARA Type II facility.

Impact on Life, Health, and Safety

Much of the population in Fulton County is exposed to some kind of environmental hazard (Table 4.3.4-3). Several incidents reported in the county are related to petroleum spills, which may have resulted from motor vehicle incidents. First responders' safety may also be at risk during on-scene operations and may have difficulty traveling to incidents due to limited access to roads. First responder resources may be exhausted during environmental hazard events due to a lack of personnel and a higher than normal call volume/demand.

Hazardous material incidents can profoundly impact at-risk populations, posing serious health risks and disrupting daily life. Exposure to toxic substances can lead to immediate health issues like respiratory problems

and skin irritation, while long-term exposure may result in chronic conditions such as cancer. These incidents often force evacuations, causing displacement and significant stress for affected residents. Environmental contamination from hazardous materials can damage soil, water, and air, affecting local agriculture and leading to food insecurity.

Economically, communities may suffer from business closures, job losses, and decreased property values, with the cost of cleanup and healthcare further straining resources. Populations living near hazardous material facilities or transportation routes, often lower-income communities, face heightened vulnerability and may lack the means to effectively respond and recover. Additionally, emergency response teams and healthcare facilities can be overwhelmed, compromising their ability to provide timely and adequate care. At-risk populations for Fulton County potentially exposed to hazardous materials releases are shown in Table 4.3.4-4 and Table 4.3.4-5.

Table 4.3.4-3. Estimated Fulton County Population Vulnerable to Environmental Hazards

Jurisdiction	Total Population (Census Bureau 2022 ACS)	Estimated Population Located in the Hazardous Materials Hazard Areas			
		Number of Persons Located within 1/4 Mile of Hazardous Materials Roadway Routes	Percent of Total	Number of Persons Located within Selected Buffer of Hazardous Materials SARA Sites	Percent of Total
Ayr Township	1,969	725	36.8%	380	19.3%
Belfast Township	1,401	485	34.6%	0	0.0%
Bethel Township	1,443	599	41.5%	0	0.0%
Brush Creek Township	587	290	49.4%	0	0.0%
Dublin Township	1,175	842	71.7%	29	2.5%
Licking Creek Township	1,575	449	28.5%	0	0.0%
McConnellsburg Borough	1,056	1,044	98.9%	1,001	94.8%
Taylor Township	1,164	524	45.0%	0	0.0%
Thompson Township	949	329	34.7%	0	0.0%
Todd Township	1,797	846	47.1%	439	24.4%
Union Township	991	340	34.3%	0	0.0%
Valley-Hi Borough	3	0	0.0%	0	0.0%
Wells Township	435	249	57.2%	0	0.0%
Fulton County	**14,545**	**6,722**	**46.2%**	**1,849**	**12.7%**

Source: U.S. Census Bureau, American Community Survey 2022; Fulton County 2024
Notes: % = Percent; B = Borough; C = City; SARA = Superfund Amendments and Reauthorization Act; Twp = Township

Table 4.3.4-4. Estimated Fulton County Vulnerable Population Located in Hazardous Materials Roadway Routes Hazard Area

Jurisdiction	Estimated Number of Vulnerable Persons Located in the 1/4 Mile of Hazardous Materials Roadway Routes Hazard Area									
	Persons Over 65	Percent of Total	Persons Under 5	Percent of Total	Non-English Speaking Persons	Percent of Total	Persons with a Disability	Percent of Total	Persons in Poverty	Percent of Total
Ayr (T)	193	36.8%	31	36.5%	0	0.0%	146	36.6%	52	36.4%
Belfast (T)	121	34.5%	29	34.1%	5	30.1%	95	34.4%	45	34.6%
Bethel (T)	124	41.5%	19	39.6%	0	0.0%	98	41.2%	48	41.0%
Brush Creek (T)	83	49.1%	4	40.0%	0	0.0%	79	49.1%	34	49.3%
Dublin (T)	184	71.6%	22	71.0%	0	0.0%	144	71.6%	110	71.4%
Licking Creek (T)	90	28.4%	23	28.0%	0	0.0%	86	28.3%	45	28.3%
McConnellsburg (B)	263	98.9%	82	98.8%	0	0.0%	275	98.6%	277	98.6%
Taylor (T)	103	45.0%	23	43.4%	0	0.0%	66	44.9%	48	44.9%
Thompson (T)	54	34.2%	18	34.6%	0	0.0%	51	34.7%	31	34.4%
Todd (T)	162	47.0%	36	46.2%	0	0.0%	132	46.8%	71	47.0%
Union (T)	48	33.8%	18	33.3%	0	0.0%	32	33.3%	28	33.3%
Valley-Hi (B)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Wells (T)	67	57.3%	17	56.7%	0	0.0%	46	56.8%	37	56.9%
Fulton County (Total)	**1,492**	**47.0%**	**322**	**46.6%**	**5**	**30.1%**	**1,250**	**47.9%**	**826**	**53.3%**

Source: U.S. Census Bureau, American Community Survey 2022; Fulton County 2024

Table 4.3.4-5. Estimated Fulton County Vulnerable Population Located in the Radii of SARA Facility

Jurisdiction	Estimated Number of Vulnerable Persons Located in the Vulnerability Radii of SARA Facility									
	Persons Over 65	Percent of Total	Persons Under 5	Percent of Total	Non-English Speaking Persons	Percent of Total	Persons with a Disability	Percent of Total	Persons in Poverty	Percent of Total
Ayr (T)	101	19.3%	16	18.8%	0	0.0%	77	19.3%	27	18.9%
Belfast (T)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Bethel (T)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Brush Creek (T)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%

Jurisdiction	Estimated Number of Vulnerable Persons Located in the Vulnerability Radii of SARA Facility									
	Persons Over 65	Percent of Total	Persons Under 5	Percent of Total	Non-English Speaking Persons	Percent of Total	Persons with a Disability	Percent of Total	Persons in Poverty	Percent of Total
Dublin (T)	6	2.3%	0	0.0%	0	0.0%	5	2.5%	3	1.9%
Licking Creek (T)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
McConnellsburg (B)	252	94.7%	78	94.0%	0	0.0%	264	94.6%	266	94.7%
Taylor (T)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Thompson (T)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Todd (T)	84	24.3%	19	24.4%	0	0.0%	68	24.1%	36	23.8%
Union (T)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Valley-Hi (B)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Wells (T)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Fulton County (Total)	**443**	**13.9%**	**113**	**16.4%**	**0**	**0.0%**	**414**	**15.9%**	**332**	**21.4%**

Source: U.S. Census Bureau, American Community Survey 2022; Fulton County 2024

Impacts on General Building Stock

Jurisdictions that are home to EPA-identified hazardous material facilities should be considered vulnerable to releases from these fixed sites. While buildings and critical facilities may be present within the hazard area of a hazardous materials release, estimating direct damage to these structures and facilities is difficult without additional information regarding the specific event (e.g., type of material, concentration, duration of release, etc.). However, damages to the surrounding environment can result in indirect impacts, such as temporary loss of function due to hazard response or damage in the area.

Economic loss from environmental hazards and explosion incidents ranges from non-recordable to losses exceeding millions of dollars. Impact on the local economy from a single incident is almost impossible to measure because of complexities of predicting losses of work, revenue, and future business.

Transportation of hazardous materials also increases risk of hazardous material releases to those jurisdictions through which carriers pass. Transportation carriers must have response plans in place to address accidents, otherwise the local emergency response team will step in to secure and restore the area. Quick response minimizes the volume and concentration of hazardous materials that disperse through air, water and soil. Economic loss from environmental hazards and explosion incidents ranges from non-recordable to losses exceeding millions of dollars. Impact on the local economy from a single incident is almost impossible to measure because of complexities of predicting losses of work, revenue, and future business.

While buildings may be present within the hazard area, estimating direct damage to these structures and facilities would be difficult. However, damages to the surrounding environment can result in indirect impacts, such as temporary loss of function due to hazard response or damage in the area. As for the population, an assessment occurred of exposure of critical facilities within the 0.25-mile buffer surrounding major roadways, railroads, pipelines, and within specified vulnerability radii of SARA facilities (Table 4.3.4-6 below).

Table 4.3.4-7 and Table 4.3.4-8 list the buildings within the hazardous material hazard areas by general occupancy. The vulnerability analysis estimates that across all hazardous materials hazard areas, residential buildings face the most vulnerability to the hazardous material hazard within 0.25 miles of roadways (2,977), and radii of SARA Sites (704).

Table 4.3.4-6. Total Building Exposed to a Roadway, or SARA Site Hazardous Material Incident

Jurisdiction	Total Number of Buildings (2010 Census Tract)	Estimated Building Stock Located within 1/4 Mile of Hazardous Materials Roadway Routes		Estimated Building Stock Located within the Selected Buffer of SARA Sites	
		Number of Buildings	Percent of Total	Number of Buildings	Percent of Total
Ayr Township	1,164	455	39.1%	257	22.1%
Belfast Township	751	274	36.5%	0	0.0%
Bethel Township	877	384	43.8%	0	0.0%
Brush Creek Township	530	260	49.1%	6	1.1%
Dublin Township	696	505	72.6%	17	2.4%
Licking Creek Township	901	279	31.0%	0	0.0%
McConnellsburg Borough	547	542	99.1%	527	96.3%
Taylor Township	707	335	47.4%	0	0.0%

Jurisdiction	Total Number of Buildings (2010 Census Tract)	Estimated Building Stock Located within 1/4 Mile of Hazardous Materials Roadway Routes		Estimated Building Stock Located within the Selected Buffer of SARA Sites	
		Number of Buildings	Percent of Total	Number of Buildings	Percent of Total
Thompson Township	582	207	35.6%	0	0.0%
Todd Township	874	408	46.7%	227	26.0%
Union Township	437	156	35.7%	0	0.0%
Valley-Hi Borough	29	0	0.0%	0	0.0%
Wells Township	299	161	53.8%	0	0.0%
Fulton County	**8,394**	**3,966**	**47.2%**	**1,034**	**12.3%**

Sources: Fulton County 2024; RS Means 2024
Notes: % = Percent; B = Borough; C = City; Twp = Township

Table 4.3.4-7. Buildings in the ¼ Mile of Hazardous Materials Roadway Routes Hazard Area

Jurisdiction	Buildings in the 1/4 Mile of Hazardous Materials Roadway Routes Hazard Area			
	Residential	Commercial	Industrial	Government, Religion, Agricultural, and Education
Ayr (T)	326	122	2	5
Belfast (T)	192	74	4	4
Bethel (T)	289	84	0	11
Brush Creek (T)	206	50	0	4
Dublin (T)	396	100	1	8
Licking Creek (T)	211	65	0	3
McConnellsburg (B)	362	161	1	18
Taylor (T)	240	89	0	6
Thompson (T)	162	41	0	4
Todd (T)	331	70	0	7
Union (T)	115	35	0	6
Valley-Hi (B)	0	0	0	0
Wells (T)	147	12	0	2
Fulton County (Total)	**2,977**	**903**	**8**	**78**

Source: Fulton County 2024

Table 4.3.4-8. Buildings in the Vulnerability Radii of SARA Facility Hazard Area

Jurisdiction	Buildings in the Vulnerability Radii of SARA Facility			
	Residential	Commercial	Industrial	Government, Religion, Agricultural, and Education
Ayr (T)	171	82	2	2
Belfast (T)	0	0	0	0
Bethel (T)	0	0	0	0
Brush Creek (T)	0	5	0	1
Dublin (T)	14	3	0	0
Licking Creek (T)	0	0	0	0
McConnellsburg (B)	347	161	1	18
Taylor (T)	0	0	0	0
Thompson (T)	0	0	0	0
Todd (T)	172	55	0	0
Union (T)	0	0	0	0
Valley-Hi (B)	0	0	0	0
Wells (T)	0	0	0	0
Fulton County (Total)	**704**	**306**	**3**	**21**

Source: Fulton County 2024

Impacts on Critical Facilities

Potential losses of critical facilities caused by a hazmat incident are difficult to quantify. Potential losses may include inaccessibility, loss of service, contamination, and/or potential structural and content losses if an explosion occurs. The tables below summarize critical facilities and lifelines located within the hazmat buffer area. A total of 1,443 critical facilities are located in Fulton County. Overall, 163 critical facilities are exposed to a roadway hazardous material event and 40 critical facilities are exposed to a SARA site hazardous material facility event, as shown in Table 4.3.4-9 through Table 4.3.4-11.

Table 4.3.4-9. Critical Facility Exposure to a SARA Site Hazardous Material Facility Buffer Areas

Jurisdiction	Number of Facilities int the Vulnerability Radii of SARA Facility, by Lifeline Category									Total Facilities in Hazard Area	
	Communications	Energy	Food, Hydration, Shelter	Hazardous Materials	Health & Medical	Safety & Security	Transportation	Water Systems	Other Critical Facilities	Count	% of Jurisdiction Total
Ayr (T)	0	0	0	2	0	1	0	0	2	**5**	**22.7%**
Belfast (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Bethel (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Brush Creek (T)	6	0	0	1	0	0	0	0	0	**7**	**38.9%**
Dublin (T)	1	0	0	1	0	0	0	0	0	**2**	**7.4%**
Licking Creek (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
McConnellsburg (B)	2	0	9	1	0	11	0	0	2	**25**	**100.0%**
Taylor (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Thompson (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Todd (T)	0	0	0	0	0	1	0	0	0	**1**	**4.0%**
Union (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Valley-Hi (B)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Wells (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Fulton County (Total)	**9**	**0**	**9**	**5**	**0**	**13**	**0**	**0**	**4**	**40**	**17.5%**

Source: Fulton County 2021/2022; HIFLD 2018/2022
Notes: % = Percent; B = Borough; C = City; SARA = Superfund Amendments and Reauthorization Act; Twp = Township

Table 4.3.4-10. Critical Facility Exposure to a Roadway Hazardous Material Facility Buffer Areas

Jurisdiction	Number of Facilities in the 1/4 Mile of Hazardous Materials Roadway Routes Hazard Area, by Lifeline Category									Total Facilities in Hazard Area	
	Communications	Energy	Food, Hydration, Shelter	Hazardous Materials	Health & Medical	Safety & Security	Transportation	Water Systems	Other Critical Facilities	Count	% of Jurisdiction Total
Ayr (T)	1	1	4	1	0	0	0	1	2	**10**	**45.5%**
Belfast (T)	1	0	3	0	0	5	0	1	1	**11**	**68.8%**
Bethel (T)	3	1	6	0	0	7	0	1	2	**20**	**87.0%**
Brush Creek (T)	6	0	2	1	0	1	0	0	0	**10**	**55.6%**
Dublin (T)	3	0	7	1	0	5	0	4	3	**23**	**85.2%**
Licking Creek (T)	3	3	5	1	0	0	0	0	0	**12**	**70.6%**
McConnellsburg (B)	2	0	9	1	0	11	0	0	2	**25**	**100.0%**
Taylor (T)	2	3	4	1	0	7	0	2	1	**20**	**69.0%**
Thompson (T)	0	0	4	0	0	0	0	0	0	**4**	**57.1%**
Todd (T)	4	1	4	0	0	2	0	1	2	**14**	**56.0%**
Union (T)	2	0	4	0	0	1	0	0	2	**9**	**90.0%**
Valley-Hi (B)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Wells (T)	0	0	3	0	0	1	0	0	1	**5**	**71.4%**
Fulton County (Total)	**27**	**9**	**55**	**6**	**0**	**40**	**0**	**10**	**16**	**163**	**71.5%**

Source: Fulton County 2024

Table 4.3.4-11. Lifeline Facility Exposure to Hazardous Material Facility Buffer Areas

FEMA Lifeline Category	Number of Lifelines	Number of Lifelines Located within 1/4 Mile of Hazardous Materials Roadway Routes	Number of Lifelines Located within the Selected Buffer of SARA Sites
Communications	39	27	9
Energy	10	9	0
Food, Hydration, Shelter	79	55	9
Hazardous Materials	10	6	5
Health and Medical	1	0	0
Safety and Security	53	40	13
Transportation	0	0	0
Water Systems	12	10	0
Other Critical Facilities	24	16	4
Fulton County	**228**	**163**	**40**

Source: Fulton County 2024

Impact on the Economy

If a significant hazmat incident occurs, not only would life, safety, and building stock be at risk, but the economy of Fulton County would also be affected. A significant incident within an urban area may force businesses to close for an extended period of time due to contamination or direct damage caused by an explosion. Exact impacts on the economy are difficult to predict, given the uncertainty of the size and scope of potential incidents.

Transportation of hazardous materials also increases risk of hazardous material releases to those jurisdictions through which carriers pass. Transportation carriers must have response plans in place to address accidents, otherwise the local emergency response team will step in to secure and restore the area. Quick response minimizes the volume and concentration of hazardous materials that disperse through air, water, and soil. Economic loss from environmental hazards and explosion incidents ranges from non-recordable to losses exceeding millions of dollars. Impact on the local economy from a single incident is almost impossible to measure because of complexities of predicting losses of work, revenue, and future business.

Impact on the Environment

Hazardous material sites near bodies of water are at high risk in the event of an extreme storm or if high-water levels approach. Such events could release toxins, waste, and other pollutants into the water and greatly impact surrounding habitats. Many of these sites were intentionally constructed in locations believed to be removed from potential contamination or exposure-increasing factors, but floodplain boundary change increases the likelihood that water may reach hazardous material and waste sites.

Future Growth and Development

An increase in development can increase the likelihood of a HazMat incident. Future migration to larger jurisdictions may also increase the likelihood of an incident. As communities grow and develop, the transportation and storage of hazardous materials often increase, leading to a higher risk of incidents. Additionally, new infrastructure projects and industrial activities can introduce more potential sources of hazardous materials, further elevating the risk.

Future growth and development can significantly impact the likelihood of HazMat incidents. As urban areas expand, the density of hazardous materials in transit and storage rises, increasing the chances of accidents. Moreover, the construction of new facilities and the expansion of existing ones can lead to more frequent handling and transportation of hazardous substances, heightening the potential for incidents.

Expected Future Conditions

Hazardous materials releases are human-caused hazards; however, as noted, these events may be the result from natural hazard events. Expected future conditions may potentially increase the frequency and magnitude of flood and severe weather events which may lead to an increased release of hazardous materials into the environment.

4.3.4.7 Additional Data and Next Steps

Based on limited data regarding the probability and potential impact of this hazard, a quantitative loss estimate was not completed for this HMP. Over time, the County can work with appropriate agencies to collect additional data to support mitigation planning, consideration of potential risks, and prioritization of mitigation measures for this hazard.

Fulton County recognizes it must compile and maintain data regarding specific concerns and past losses from this hazard. This data should include specific information regarding damage or loss of life, property, or infrastructure; and any reports pertaining to potential or actual cost and logistics of responding to an event caused by this hazard (locations of road closures, map detours, traffic counts, durations of closures and detours; and costs to respond). This data will be included in future revisions of the HMP and can be used to support future mitigation grant efforts (benefit-cost analysis).

Maintaining a record of frequently transported materials can facilitate development of preparatory measures to respond to a release. Predicting costs needed to respond to a release, remediate the environment, or repair damaged infrastructure would be useful for developing mitigation options.

4.3.5 Environmental Hazards – Gas and Liquid Pipelines

4.3.5.1 Hazard Description

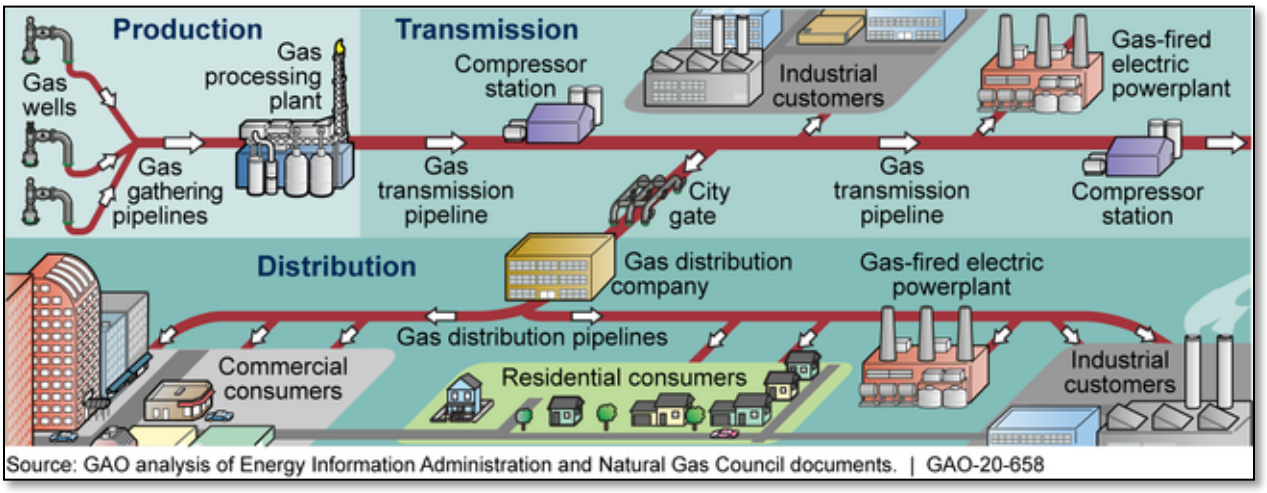
This section provides a profile and vulnerability assessment of the environmental hazards – gas and liquid pipelines profile for the Fulton County Hazard Mitigation Plan (HMP).

According to the Pennsylvania State Hazard Mitigation Plan, there are 58 miles of natural gas transmission pipelines, and 16 miles liquid petroleum lines within Fulton County. Pipeline failures are low-probability, potentially high-consequence events. Although gas and liquid pipeline failures are infrequent, the hazardous and inflammable materials released by these events can pose a significant threat to public safety and the built and natural environment. Explosions associated with pipeline failures, for example, can cause severe injury to nearby residents and destroy homes and other property (PEMA 2023).

Pipeline systems are defined by federal regulations as all parts of a pipeline facility through which a hazardous liquid or gas moves, including piping, valves, pumps or compressors, metering and delivery stations, and storage and breakout tanks (PEMA 2023). Although pipelines are typically located underground, they may also be located aboveground when dictated by operational considerations (such as connections to pump and compressor stations) or environmental conditions (such as geological characteristics).

Natural gas pipelines are the most common type of pipeline in the United States and serve to transport natural gas from the point of production to the point of use. Three major types of pipelines move natural gas: gathering lines, transmission lines, and distribution lines (PEMA 2023). Figure 4.3.5-1 shows the entire supply chain from gathering to distribution. Gas transmission lines are large pipelines (6 to 48 inches in diameter) and are designed to transport natural gas long distances at high pressures (often 200 – 1,500 psi), while gas distribution lines are smaller (1/2 to 2 inches in diameter) and transport natural gas shorter distances at relatively low pressures (Pipeline Safety Trust 2015).

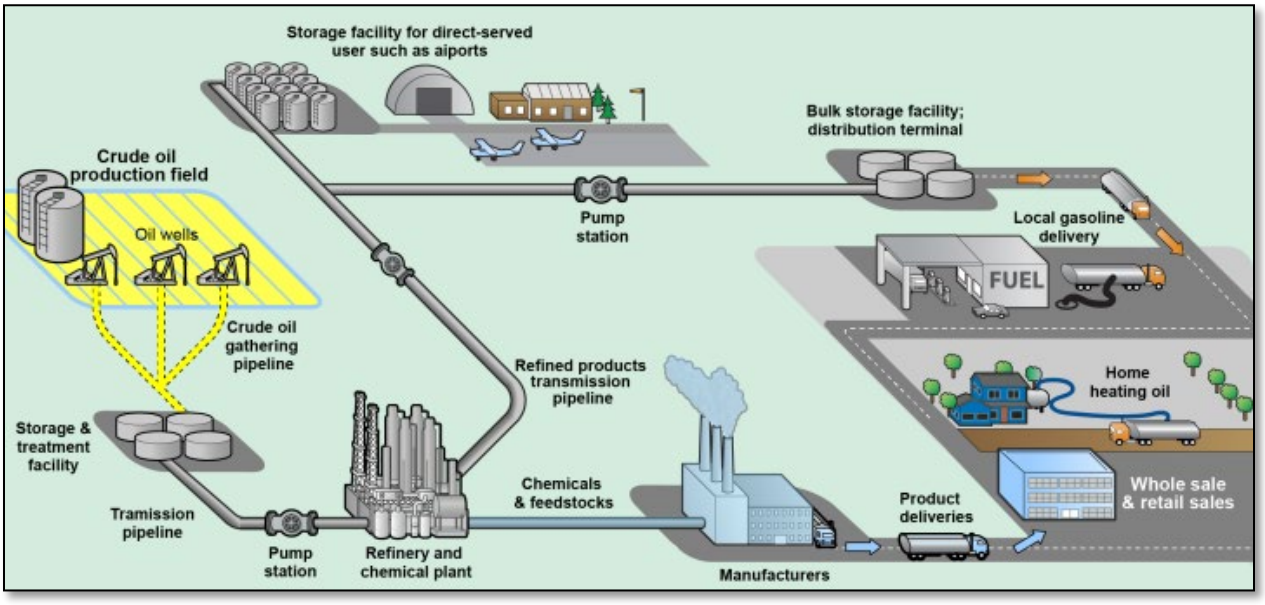
Figure 4.3.5-1. Diagram of Natural Gas Pipeline System



Liquid petroleum pipelines are the second most common type of pipeline in the United States and serve to transport crude oil, refined products, and highly volatile liquids (HVLs) to local distribution networks (PEMA 2023). The system for doing so has the same three categories of pipelines, as shown in Figure 4.3.5-2. Gathering lines are typically 2 to 8 inches in diameter, transmission lines are larger, cross-country pipelines (are 8 to 48 inches in diameter), and refined product lines are similar but typically smaller than transmission ones at 8 to 42

inches in diameter (PEMA 2023). Tanker trucks take the refined petroleum products the last few miles from the storage terminals to gas stations and homes.

Figure 4.3.5-2. Diagram of Liquid Petroleum Pipeline System



Source: GAO, Association of Oil Pipe Lines and Pipeline and Hazardous Materials Safety Administration 2021

Product release into the local environment can derive from a fixed facility or occur at any location along a pipeline route and may be the result of carelessness, technical failure, external incidents, or an intentional act against the facility or container. Release of certain products considered hazardous materials (hazmat) can immediately and adversely impact the general population, causing effects ranging from inconvenient evacuations to personal injury and even death. Moreover, any release can compromise the local environment through contamination of soil, groundwater, or local flora and fauna.

4.3.5.2 Location and Extent

Pipelines within the Commonwealth of Pennsylvania are regulated by several different agencies. Although Fulton County has no regulatory authority over pipeline operators, the county can be engaged in the environmental review of proposals and coordinating emergency services response. Some of the county-level departments involved include the Planning Commission, Water Resources Authority, Conservation District, Facility and Parks, and Department of Emergency Services. Federal and state agencies involved in pipeline safety and regulations include the following:

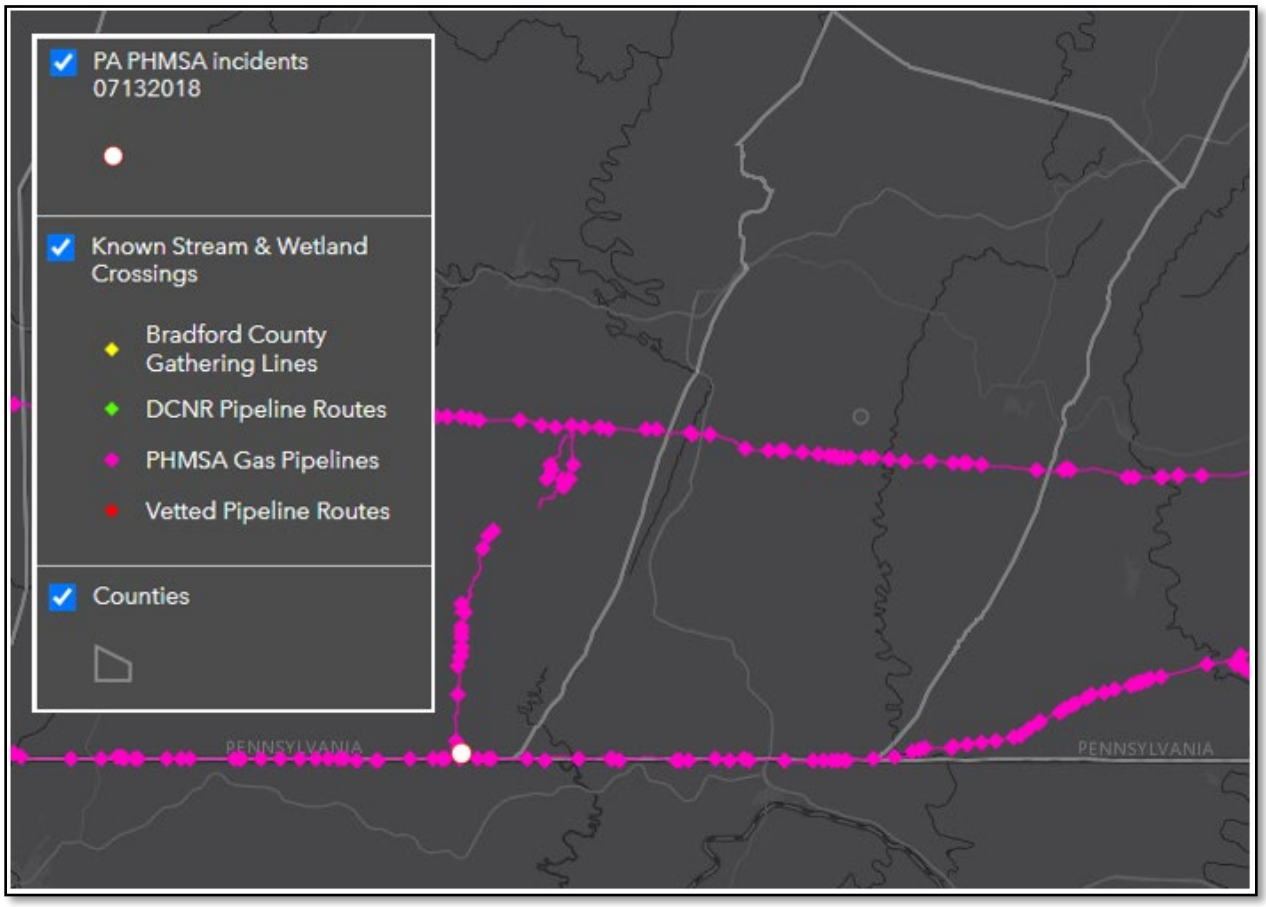
- Federal Energy Regulatory Commission (FERC) is an independent agency of the United States government that regulates the interstate transmission of electricity, natural gas, and oil and reviews proposals to build Liquefied Natural Gas (LNG) terminals and interstate natural gas pipelines.
- The U.S. Department of Transportation (USDOT) oversees the safety of pipelines and transportation infrastructure.
- Pipeline and Hazardous Materials Safety Administration (PHMSA) develops and enforces regulations for a safe, reliable, and environmentally sound pipeline transportation system.
- The Public Utility Commission (PUC) enforces safety standards for pipeline facilities.

- The Pennsylvania Department of Environmental Protection (PADEP) has regulatory authority over any pipeline crossing of a wetland or waterway.

Fulton County has a total of 58 miles of natural gas transmission pipelines and 16 miles of liquid petroleum pipelines, and a detailed map of these pipeline locations is illustrated in Figure 4.3.5-3. On a broader scale, locations of major pipelines across Pennsylvania are compiled by the U.S. Energy Information Administration (EIA) and shown in Figure 4.3.5-4

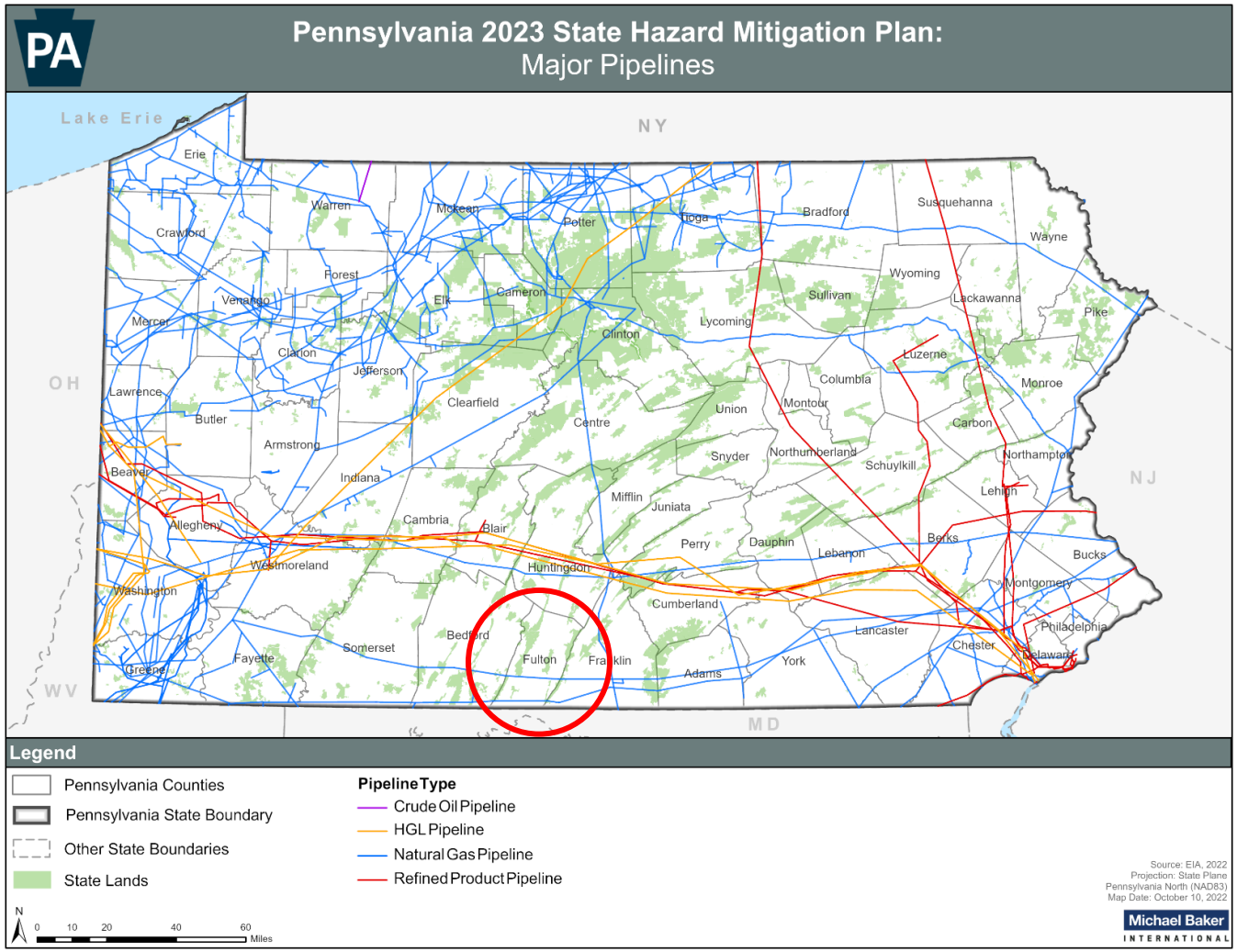
The EIA defines major pipelines as interstate trunk lines and selected intrastate lines (as well as gathering lines for natural gas) and assembles pipeline data from the Federal Energy Regulatory Commission, industry sources, and other publicly available sources. The network of natural gas pipelines is particularly dense in the northwestern part of the state (PEMA 2023).

Figure 4.3.5-3. Pipelines in Fulton County, PA



Source: PA DCNR 2025

Figure 4.3.5-4. Major Pipelines of Pennsylvania



Source: PEMA 2023
Note: Fulton County is indicated by the red oval

4.3.5.3 Range of Magnitude

Many factors determine the magnitude of the hazard posed by pipeline failures, including the chemicals released, the failure mode of the pipeline, the operating conditions of the pipeline at the time of the incident, and the characteristics of the surrounding area. Impacts to life and property can result from inhalation or ingestion of toxins, exposure to a fire or explosion, or exposure to contaminated soils or drinking water (FEMA, 2015). These impacts may include:

- Serious injuries or fatalities.
- Damage to buildings and infrastructure.
- Disruptions and closures to critical infrastructure and services, including transportation routes and emergency medical services.
- Residential, commercial, and industrial energy supply losses.
- Disruption of local businesses and regional economies.
- Displacement of residential communities or businesses.

4.3.5.4 Past Occurrence

There have been no recorded pipeline incidents in Fulton County.

4.3.5.5 Future Occurrence

Because of the wide scope of the definition of environmental hazards, ranging from a small spill to a large release of a highly volatile or toxic hazardous material, incidents can and will happen at any time. Although these facilities follow applicable safety and health regulations and best practices, proximity of facilities to population centers is a concern for the county.

The best available data on gas and liquid pipeline events was used to calculate the probability of future events in the County. Information from the PHMSA, and the 2023 Commonwealth of Pennsylvania HMP were used to identify these events. Based on these previous occurrences, the probability of future gas and liquid pipeline events on an annual basis is *unlikely*, as defined by the Risk Factor Methodology probability criteria (see Section 4.4).

4.3.5.6 Vulnerability Assessment

To understand risk, a community must evaluate the assets exposed and vulnerable in the identified hazard area. The following text evaluates and estimates the potential impact of the hazardous materials release hazard on the county, including:

- Impact on (1) life, health, and safety; (2) general building stock; (3) critical facilities; (4) economy; (5) environment; and (6) future growth and development.
- Expected future conditions.
- Further data collections that will assist in understanding this hazard over time.

Impact on Life, Health, and Safety

Gas and liquid pipelines are critical components of the energy infrastructure, providing essential services to communities. However, their presence and operation can have significant impacts on the population within Fulton County.

Pipelines, while essential for transporting energy resources, pose several risks to the general population. These include potential leaks, explosions, and environmental contamination. Such incidents can lead to property damage, health hazards, and disruptions in daily life. The presence of pipelines also necessitates stringent safety measures and emergency response plans to mitigate these risks.

At-risk populations, including low-income households, elderly individuals, and those with disabilities, are disproportionately affected by the presence of pipelines. Studies have shown that counties with higher scores indicating vulnerability tend to have a higher density of pipeline infrastructure (NCSU 2021). This correlation suggests that these communities are at greater risk of facing adverse effects such as water and air pollution, public health issues, and safety concerns.

In Fulton County, at-risk populations may lack the resources to effectively respond to and recover from pipeline-related incidents. Limited access to healthcare, financial constraints, and inadequate housing can exacerbate the impacts of such events. Additionally, these populations may have less influence in decision-making processes related to pipeline siting and safety regulations, further increasing their vulnerability

Impacts on General Building Stock

Potential losses to the general building stock caused by a hazmat incident is difficult to quantify. The degree of damages to the general building stock depends on the scale of the incident. Potential losses may include inaccessibility, loss of service, contamination, and/or potential structural and content losses if an explosion occurs. The closure of waterways, railroads, airports, and highways as a result of a hazmat incident has the potential to impact the ability to deliver goods and services efficiently. Potential impacts may have local, regional, or statewide effects depending on the magnitude of the event and level of service disruptions.

Impacts on Critical Facilities

Potential losses of critical facilities caused by a pipeline incident are difficult to quantify. Potential losses may include inaccessibility, loss of service, contamination, and/or potential structural and content losses if a failure occurs.

Impact on the Economy

If a significant pipeline incident occurs, not only would life, safety, and building stock be at risk, but the economy of Fulton County would also be affected. A significant incident within an urban area may force businesses to close for an extended period of time because of contamination or because of direct damage caused by an explosion. Exact impacts on the economy are difficult to predict, given the uncertainty of the size and scope of potential incidents.

Impact on the Environment

Should a pipeline failure occurs during a natural disaster, access to the pipeline may be restricted, waterlines for fire suppression may be compromised, and response personnel and resources may be limited. In addition, the potential threat of a pipeline failure can be amplified by natural hazard events that are accompanied by winds, thunderstorms, or floods. These conditions can spread contamination more quickly and exacerbate the threat to local water supplies, air quality, soil, and agriculture (PEMA 2023).

Future Growth and Development

An increase in development and population can heighten the vulnerability of gas and liquid pipeline incidents by raising population density, which heightens the risk of casualties and property damage. Construction activities associated with new developments can inadvertently damage pipelines, while increased demand for energy can strain existing infrastructure. Rapid development may also challenge regulatory oversight and emergency response capabilities. Additionally, changes in land use and environmental conditions can affect pipeline stability.

Expected Future Conditions

As temperatures change, excessive heat on containers that contain hazmat may alter the material properties. In addition, hazardous substances stored at fixed locations in the floodplain may experience an increase in flood events due to the project changes in increased precipitation events, magnitude, and frequency.

4.3.5.7 Additional Data and Next Steps

The assessment above identifies vulnerable populations and potential structural and economic losses associated with this hazard of concern. Collection of additional information and actual loss data specific to the plan participants will further enhance Fulton County's vulnerability assessment.

4.3.6 Flood, Flash Flood, Ice Jam

4.3.6.1 Hazard Description

This section provides a profile and vulnerability assessment of the flood hazard in Fulton County. Flooding is the temporary condition of partial or complete inundation of normally dry land, and it is the most frequent and costly of all natural hazards in Pennsylvania. Flash flooding is usually a result of heavy localized precipitation falling in a short time period over a given location, often along mountain streams and in urban areas where much of the ground is covered by impervious surfaces. Winter flooding can include ice jams, which occur when warm temperatures and heavy rain cause snow to melt rapidly. Snow melt combined with heavy rains can cause frozen rivers to swell, breaking the ice layer on top of a river. The ice layer often breaks into large chunks, which float downstream, piling up in narrow passages and near other obstructions such as bridges and dams (PEMA 2020).

For the purpose of this HMP update and as deemed appropriate by the Planning Team, riverine, flash, ice-jam, and stormwater/urban flooding are the main hazard types of concern for Fulton County. These types of flooding are further discussed in the following sections.

Riverine Floods

Riverine floods are the most common flood type and occur along a channel. Channels are defined features on the ground that carry water through and out of a watershed. They may also be called rivers, creeks, streams, or ditches. When a channel receives too much water, the excess water flows over its banks and inundates low-lying areas. These floods usually occur after heavy rains, heavy thunderstorms, or snowmelt, and can be slow or fast-rising, and generally develop over a period of hours to days (FEMA n.d.).

Flash Floods

According to the National Weather Service (NWS), flash floods are a rapid and extreme flow of high water into a normally dry area, or a rapid water level rise in a stream or creek above a predetermined flood level, beginning within 6 hours of the causative event (e.g., intense rainfall, dam failure, or ice jam) (NWS 2015)

Flash floods can occur very quickly and with very little warning. This type of flood can be deadly because it produces rapid rises in water levels and has devastating flow velocities. Urban areas are more susceptible to flash floods because a high percentage of the surface area is impervious (PEMA 2023). The elapsed time before flash flooding occurs may vary in different parts of the country. Ongoing flooding can intensify to flash flooding, where intense rainfall results in a rapid surge of rising floodwaters (NWS 2015). A flash flood can have a dangerous wall of roaring water that carries rocks, mud, and other debris and can sweep away most things in its path. Flash floods usually result from intense storms dropping large amounts of rain within a brief period with little or no warning and can reach their peak within only a few minutes. They normally occur in the summer during the thunderstorm season. The most severe flooding conditions usually occur when direct rainfall is augmented by snowmelt. If the soil is saturated or frozen, stream flow may increase because of the inability of the soil to absorb additional precipitation (NOAA NSSL 2023).

Ice Jam Floods

An ice jam is an accumulation of ice that acts as a natural dam and restricts the flow of a body of water. Ice jams occur when warm temperatures and heavy rains cause rapid snow melt. The melting snow, combined with the heavy rain, causes frozen rivers to swell. The rising water breaks the ice layers into large chunks, which float downstream and often pile up near narrow passages and obstructions (bridges and dams). Ice jams may build up to a thickness great enough to raise the water level and cause flooding (NOAA SciJinks 2024)

Ice jams are of two different types: freeze-up and breakup. Freeze-up jams occur in the early to mid-winter when floating ice may slow or stop due to a change in water slope as it reaches an obstruction to movement. Breakup jams occur during periods of thaw, generally in late winter and early spring. The ice cover breakup is usually

associated with a rapid increase in runoff and corresponding river discharge caused by heavy rainfall, snowmelt, or warmer temperatures (PEMA 2023).

Stormwater and Shallow Flooding

Stormwater flooding described below is caused by local drainage issues and high groundwater levels. Heavy precipitation may produce flooding in areas other than delineated floodplains or along recognizable channels. According to PEMA, since 1993, 96 percent of flooding reported to the NWS in Pennsylvania occurred outside of the 100-year floodplain (PEMA 2023).

If local conditions cannot accommodate intense precipitation through a combination of infiltration and surface runoff, water may accumulate and cause flooding problems. During winter and spring, frozen ground and snow accumulations may contribute to inadequate drainage and localized ponding. Flooding issues of this nature generally occur in areas with flat gradients and generally increase with urbanization, which speeds the accumulation of floodwaters because of impervious areas. Shallow street flooding can occur unless channels have been improved to account for increased flows (FEMA 2022).

High groundwater levels can be a concern and cause problems even without surface flooding. Basements are susceptible to high groundwater levels. Seasonally high groundwater is common in many areas, while elsewhere high groundwater occurs only after long periods of above-average precipitation (FEMA 2022).

Urban drainage flooding is caused by increased water runoff due to urban development and drainage systems. Drainage systems are designed to remove surface water from developed areas as quickly as possible to prevent localized flooding on streets and other urban areas. They make use of a closed conveyance system that channels water away from an urban area to surrounding streams. This bypasses the natural processes of water filtration through the ground, containment, and evaporation of excess water. Since drainage systems reduce the amount of time the surface water takes to reach surrounding streams, flooding in those streams can occur more quickly and reach greater depths than those prior to development in that area (FEMA 2005)

4.3.6.2 Location and Extent

Flooding in Pennsylvania is typically associated with abnormally high and intense rainfall amounts. It can also be caused by sudden snowmelt, landslides, or dam failures. In Pennsylvania, flooding usually occurs in the summer; however, it has occurred during the winter months as well.

Floodplains are found in lowland areas adjacent to rivers, streams, creeks, lakes, or other bodies of water that become inundated during a flood. The size of a floodplain depends on the recurrence interval of a given flood. A 1-percent annual chance floodplain (also referred to as the 100-year floodplain) is smaller than the floodplain associated with a flood that has a 0.2-percent annual chance of occurring (PEMA 2023). Floodplain maps of each Fulton County jurisdiction are available at the end of this profile. These maps show locations of both the 1-percent chance annual floodplain and the 0.2-percent chance annual floodplain.

Flooding is the most significant natural hazard in Fulton County. The Potomac River is less than 2 miles away from the county's most southern border, and the county is home to numerous small creeks and tributaries. Fulton County has two lakes of mentionable size: Cowans Gap Lake and Meadow Grounds Lake. Two-thirds of Fulton County's streams flow into the Potomac River Basin. The Potomac drainage area includes 14,679 square miles in the four states of Maryland, Pennsylvania, Virginia, and West Virginia as well as in the District of Columbia. Fulton County lies in the Conococheague/Antietam sub-basin of the Potomac River.

Additionally, about one-third of the county's streams flow into the Juniata River, which is a sub-basin of the Susquehanna River Basin. The Juniata sub-basin encompasses a 3,406-square-mile area and includes Huntingdon and Blair Counties and portions of Somerset, Bedford, Franklin, Perry, Juniata, Snyder, Mifflin, Centre, Cambria, and Fulton Counties. A very small portion of the county is also within the Wills Creek/Evitts Creek/Town Creek sub-basin.

Table 4.3.6-1 lists total land areas within the 1 percent and 0.2 percent annual chance flood zones calculated via a spatial analysis referencing the 2017 Digital Flood Insurance Rate Map (DFIRM).

Table 4.3.6-1. Total Land Areas in the 1 Percent and 0.2 Percent Annual Chance Flood Zones (Acres)

Jurisdiction	Total Land Area (Excluding Waterbodies) (acres)	1% Flood Event Hazard Area		0.2% Flood Event Hazard Area	
		Area (acres)	% of Total	Area (acres)	% of Total
Ayr (T)	29,491	1,067	3.6%	1,068	3.6%
Belfast (T)	32,211	1,695	5.3%	1,695	5.3%
Bethel (T)	23,705	676	2.9%	676	2.9%
Brush Creek (T)	34,950	846	2.4%	846	2.4%
Dublin (T)	23,687	1,239	5.2%	1,239	5.2%
Licking Creek (T)	28,474	1,406	4.9%	1,406	4.9%
McConnellsburg (B)	230	2	0.9%	2	1.0%
Taylor (T)	20,775	814	3.9%	814	3.9%
Thompson (T)	24,253	1,757	7.2%	1,757	7.2%
Todd (T)	18,497	418	2.3%	418	2.3%
Union (T)	19,486	469	2.4%	469	2.4%
Valley-Hi (B)	233	7	2.8%	7	2.8%
Wells (T)	23,923	636	2.7%	636	2.7%
Fulton County (Total)	**279,916**	**11,032**	**3.9%**	**11,033**	**3.9%**

Source: Fulton County, FEMA 2011

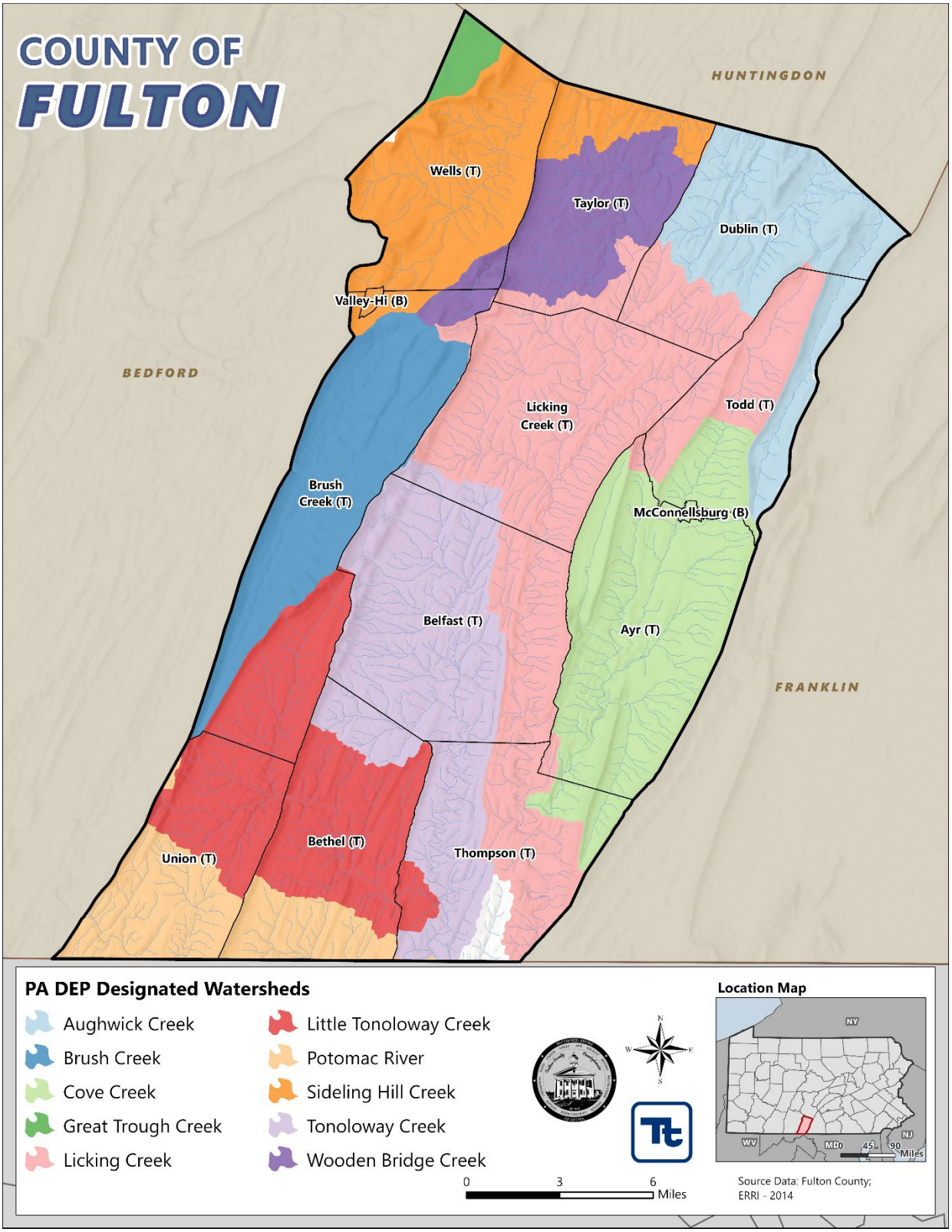
Fulton County Stormwater Management Plan Overview

In accordance with the 1978 Pennsylvania Stormwater Management Act (Act 167), counties are required to prepare stormwater management plans on a watershed-by-watershed basis that provide for improved management of stormwater impacts associated with development of land. In December 2008, Fulton County developed and implemented Phase I of the Act 167 County-Wide Plan Stormwater Management Plan. This phase of the plan includes the Scope of Study – Establishing procedures used to prepare the plan. These procedures are determined by an overall survey of:

- Specific watershed characteristics and hydrologic conditions.
- Stormwater-related problems and significant obstructions.
- Alternative measures for control.
- Goals, objectives, solution strategies, and estimated costs for Phase 2 of the plan.

In June 2010, Fulton County published Phase II of the Act 167 County-Wide Plan Stormwater Management Plan. The Phase II Stormwater Management Plan includes stormwater runoff modeling for each watershed in Fulton County. The plan identifies the following PADEP-designated watersheds and associated streams for which Act 167 studies were prepared. Figure 4.3.6-1 shows PADEP-designated watersheds in Fulton County.

Figure 4.3.6-1 PA DEP Designated Watersheds, Fulton County



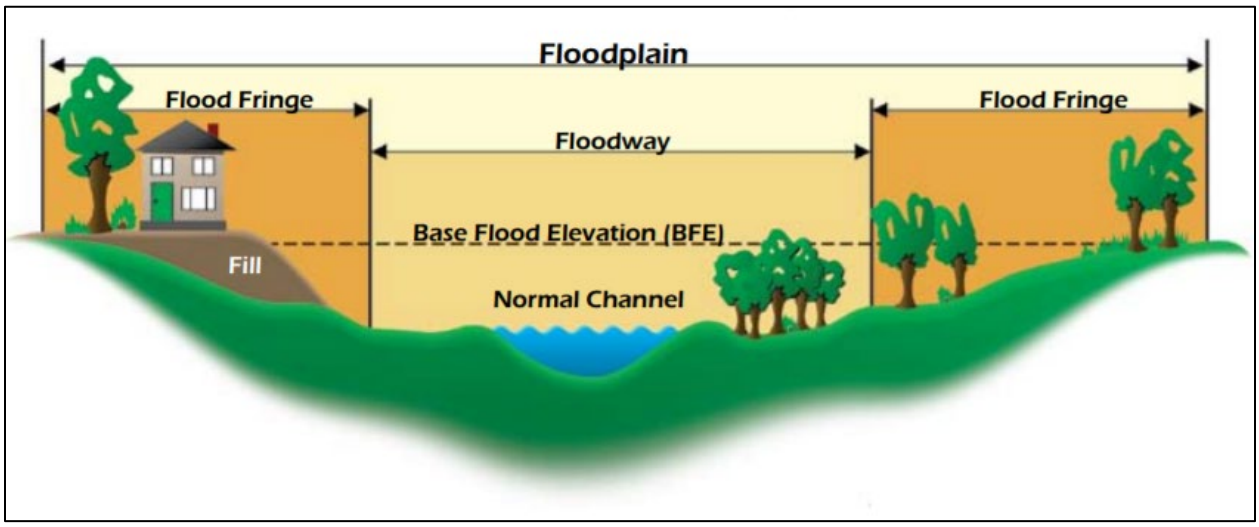
FEMA Regulatory Flood Zones

According to the Federal Emergency Management Agency (FEMA), flood hazard areas are defined as areas on a map shown to be inundated by a flood of a given magnitude. These areas are determined by using statistical analyses of records of river flow, storm tides, and rainfall; information obtained through consultation with the community; floodplain topographic surveys; and hydrologic and hydraulic analyses. Flood hazard areas are delineated on FEMA's Flood Insurance Rate Maps (FIRMs), which are official maps of a community on which the Federal Insurance and Mitigation Administration has delineated both Special Flood Hazard Areas (SFHAs) and the risk premium zones applicable to the community. These maps identify SFHAs, the location of a specific property in relation to the SFHA, the Base Flood Elevation (BFE) (1-percent annual chance) at a specific site, the magnitude of a flood hazard within a specific area, undeveloped coastal barriers where flood insurance is not available, and regulatory floodways and floodplain boundaries (1-percent and 0.2-percent annual chance floodplain boundaries (FEMA 2005). Fulton County's FIRMs can be accessed online via the FEMA Flood Map Service Center (https://msc.fema.gov/portal).

The land area covered by floodwaters of the base flood is the SFHA on a FIRM. It is the area where the National Flood Insurance Program's (NFIP) floodplain management regulations must be enforced, and the area where mandatory purchase of flood insurance applies. This regulatory boundary is a convenient tool for assessing vulnerability and risk in flood-prone communities because many communities have maps showing the extent of the base flood and likely depths that will occur.

The 1-percent annual chance flood is referred to as the base flood. As defined by NFIP, the BFE on a FIRM is the elevation of a base flood event or a flood that has a 1-percent chance of occurring in any given year. The BFE describes the exact elevation of the water that will result from a given discharge level, which is one of the most important factors used in estimating potential damage within a given area. A structure within a 1-percent annual chance floodplain has a 26-percent chance of undergoing flood damage during the term of a 30-year mortgage. The 1-percent annual chance floodplain is a regulatory standard used by federal agencies and most states to administer floodplain management programs. The 1-percent annual chance floodplain is used by NFIP as the basis for insurance requirements nationwide. FIRMs also depict 0.2-percent annual chance flood designations (FEMA 2005). Figure 4.3.6-2 depicts the SFHA, the BFE, the flood fringe, and the floodway areas of a floodplain for the 1 percent annual chance flood.

Figure 4.3.6-2. Floodplain Illustration



Source: FEMA 2009

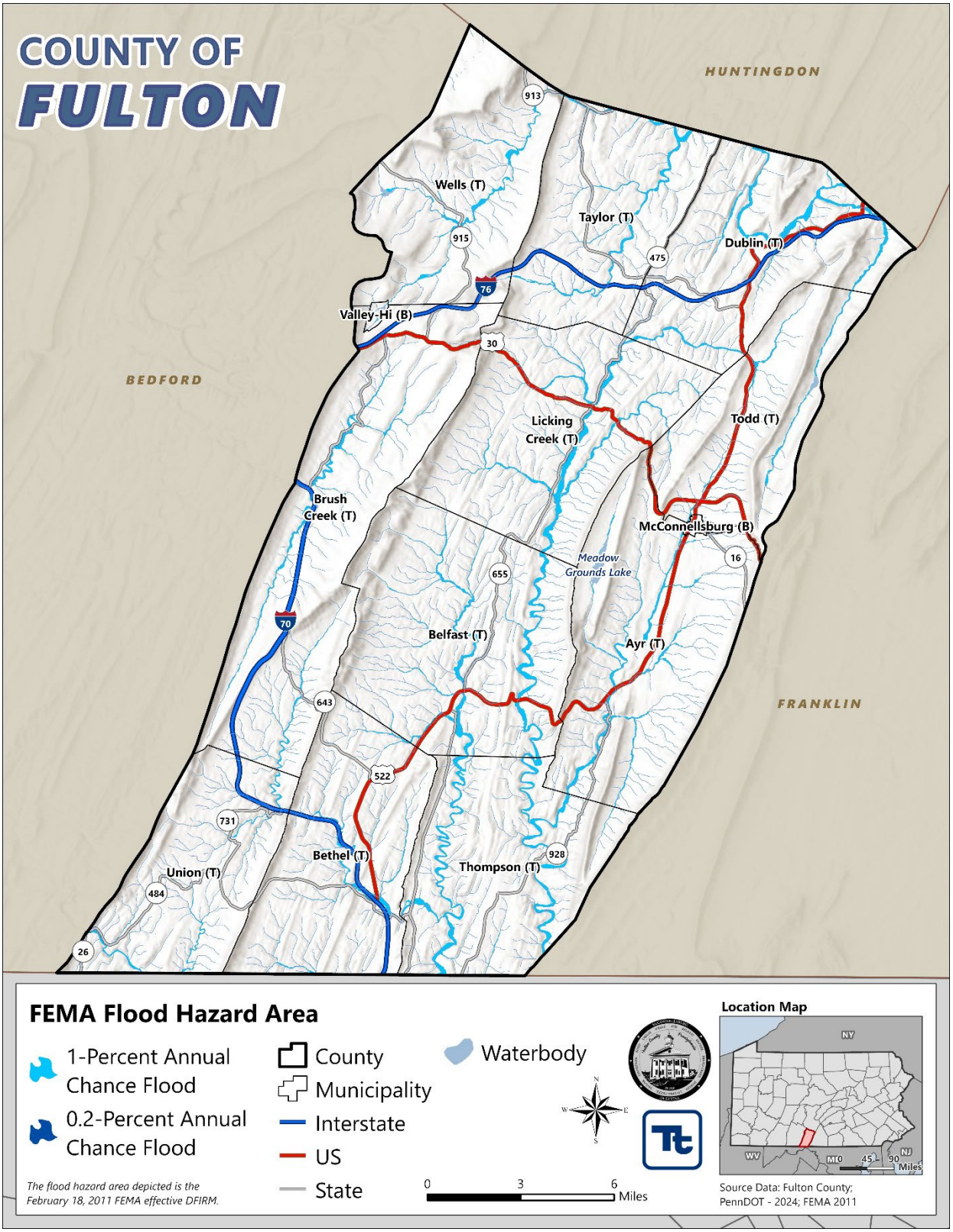
The SFHA serves as the primary regulatory boundary used by FEMA and Pennsylvania. Fulton County's effective map date is February 18,2011. Digitized FIRMs (DFIRMs), Flood Risk Products, FIRMs, and other flood hazard information can be used to identify the expected spatial extent of flooding from a 1-percent and 0.2-percent annual chance event. The FEMA Flood Risk Database was considered the best available data at the time the draft Plan was developed.

Figure 4.3.6-3 shows the FEMA flood hazard areas located in Fulton County. It maps the County's floodplains as depicted on the Risk Map products in the Flood Risk Database used in the vulnerability assessment. Maps of each municipality's flood zones are included at the end of this profile. While the FIRMs provide a credible source to document the extent and location of the flood hazard, there are limitations to the accuracy of the data reflected on these maps. As such, it is noted that FIRMs are based on the existing hydrology conditions at the time of the map's preparation. FIRMs are not set up to account for the possible changes in hydrology that can occur over time.

At the time this plan was written, the 2011 DFIRMs were considered the best available and were used for the risk analysis. Maps of each municipality's flood zones are shown at the end of this profile.

While the FIRMs provide a creditable source to document extent and location of the flood hazard, accuracy of data reflected on these maps has limitations. Notably, FIRMs are based on existing hydrological conditions at the time of map preparation. FIRMs are not set up to account for possible changes in hydrology over time.

Figure 4.3.6-3. FEMA Flood Hazard Areas in Fulton County



Flood Insurance Study

In addition to FIRMs and DFIRMs, FEMA also provides FIS of entire counties and individual jurisdictions. These studies aid in administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. They are narrative reports of countywide flood hazards, including descriptions of flood areas studied and engineered methods used, principal flood problems, flood protection measures, and graphic profiles of flood sources (FEMA 2016). The countywide FIS for Fulton County was last completed in 2011, at the same time as the DFIRM revisions.

Ice Jam Hazard Areas

Ice jams are common in northeastern United States, and the Commonwealth of Pennsylvania is not an exception. The ice jam database, maintained by the Ice Engineering Group at the USACE Cold Regions Research and Engineering Laboratory (CRREL), currently consists of over 18,000 records from across the United States. According to the USACE-CRREL, Fulton County underwent or may have been impacted by three historical ice jam incidents between 1780 and 2019 (USACE 2021). Ice jams have formed along Tonoloway Creek. Historical events are further mentioned in the "Previous Occurrences" section of this hazard profile.

USGS Stream Gages

The USGS National Water Information System collects surface water data from more than 850,000 stations across the country. The time-series data describes stream levels, stream flow (discharge), reservoir and lake levels, surface water quality, and rainfall. The data is collected by automatic recorders and manual field measurements at the gage locations. USGS uses stream gages to determine the severity of flood at different points along a body of water. USGS operates stream gages throughout Fulton County, including several on the county's border. USGS Gage 01613050, Tonoloway Creek near Needmore, PA, is the only gage within Fulton County. Occasional discharge measurements and annual maximums were recorded starting in 1965 to the current year, however, no flood stage has been determined for this station. USGS gage 01613000, Potomac River at Hancock, MD, boarders Fulton County. This river reached a maximum of 47.60 ft on March, 18, 1936.

4.3.6.3 Range of Magnitude

Riverine and Flash Flooding

Both localized and widespread floods are considered hazards when people and property are affected. Injuries and deaths can occur when people are swept away by flood currents, or bacteria and disease are spread by moving or stagnant flood waters. Most property damage results from inundation by sediment-filled water. A large amount of rainfall over a short period of time can result in flash floods. Small amounts of rain can cause flooding in areas with frozen soil or saturated soils from a previous event, or if the rain is concentrated in areas with impervious surfaces (PEMA 2023).

Several factors determine the severity of floods, including rainfall intensity and duration, topography, ground cover, and even the rate of snowmelt. Water runoff is greater in areas with steep slopes and little or no vegetative ground cover, and many areas in Pennsylvania have relatively steep slopes that promote quick surface water runoff. Most storms track from west to east; however, some originate in the Great Lakes or the Atlantic Ocean (PEMA 2023). Rainfall in Pennsylvania is about average for the eastern United States. Rainfall intensity is grouped according to the following three categories (AMS 2024):

- **Light rain** – precipitation rate is 0.01 inch and 0.10 inches/hour
- **Moderate rain** – precipitation rate is 0.11 inch and 0.30 inches/hour
- **Heavy rain** – precipitation rate is > 0.30 inches/hour

The severity of a flood depends not only on the amount of water that accumulates within a period of time but also on the land's ability to manage this water. One element is the size of rivers and streams in an area, but an equally important factor is the land's absorbency. When it rains, the soil acts as a sponge, absorbing rainfall.

When the soils are saturated (or frozen), however, rainfall at the surface cannot infiltrate the ground as efficiently, and what results is runoff.

In the case of riverine or flash flooding, once a river reaches flood stage, the flood extent or severity categories used by NWS include minor flooding, moderate flooding, and major flooding. Each category has a definition based on property damage and public threat. For Fulton County, the magnitude of flooding events can range from Minor to Major depending on the circumstances (NOAA/NWS n.d.).

Table 4.3.6-2. NWS Categories for Riverine/Flash Flooding

Flooding Category	Definition
Action Stage	The stage, when reached by a rising stream, lake, or reservoir, represents the level where the NWS or a partner/user needs to take some type of mitigation action in preparation for possible significant hydrologic activity.
Minor Flooding	Flooding that incurs minimal or no property damage but possibly some public threat or inconvenience.
Moderate Flooding	Flooding results in some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations are necessary.
Major Flooding	When there is extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations are necessary.
Record Flooding	Flooding that equals or exceeds the highest stage or discharge at a given site during the period of record-keeping.

Source: (NOAA n.d.)

In Fulton County, there are seasonal differences in how floods are caused. In the winter and early spring (February to April), major flooding has occurred as a result of heavy rainfall on dense snowpacks throughout contributing watersheds, although the snowpack is generally moderate during most winters. Winter floods also have resulted from runoff of intense rainfall on frozen ground, and local flooding has been exacerbated by ice jams in streams and creeks.

Summer floods have occurred from intense rainfall on dry, hard-packed, or previously saturated soils. Summer thunderstorms deposit large quantities of rainfall over a short period of time and have also produced flash flooding. In addition, the county has been experiencing more intense rainfall from tropical storms and hurricanes in late summer and early fall.

Fulton County's worst flood was associated with Hurricane Agnes in 1972. The county underwent widespread flooding and flash flooding. The damage was so severe that the county was declared a major disaster area in June 1972. Specific information on damages due to Hurricane Agnes were unavailable for this update. Another significant flooding scenario mirrors the January 1995 flooding. Several inches of rain poured down on several inches of snow that had already fallen. Many homes reported basement and first-floor flooding. Some homes were severely damaged, one of which could not be repaired. Several businesses were damaged as well. A local car dealership had most of its inventory of vehicles floating down the creek. The County Commissioners filed a Declaration of Disaster for this incident. As a result, municipalities and homeowners gained assistance through low-interest loans offered by FEMA.

4.3.6.4 Past Occurrence

Many sources provided historical information regarding previous occurrences and losses associated with flooding events throughout the State of Pennsylvania and Fulton County. With so many sources reviewed for the purpose of this Hazard Mitigation Plan (HMP), loss and impact information regarding many events could vary depending on the source. Therefore, accuracy of monetary figures discussed is based only on available information identified during research for this HMP.

According to the National Oceanic and Atmospheric Administration's National Center for Environmental Information (NOAA-NCEI) storm event database, Fulton County underwent 17 flood events between January

1, 1950, and June 1, 2018 (the dates for which data are available). Total property damages as a result of these flood events were estimated at $15,000,000. This total also includes damages to other counties.

Between 1954 and 2024, the Commonwealth of Pennsylvania underwent 52 FEMA-declared, flood-related disaster declarations (DR) or emergencies classified as one or a combination of the following disaster types: flood, flash flooding, severe storms, hurricanes, and high wind. Typically, these disasters covered a wide region of the State; therefore, they may have impacted many counties. However, not all counties were included in the disaster declarations (FEMA 2019). Fulton County was included in 11 of the declarations, as listed in Table 4.3.6-3.

Based on all sources researched, known flooding events resulting in property damages that have affected Fulton County and its municipalities are listed in Table 4.3.6-3. No deaths or injuries caused by flooding have been recorded in Fulton County. With flood documentation for the Commonwealth of Pennsylvania so extensive, not all sources have been identified or researched. Therefore, the table below may not include all events that have occurred throughout the county.

Table 4.3.6-3. Flooding Events between 1972 and 2024 in Fulton County

Date of Event	Event Type	Location	FEMA Declaration Number (if applicable)	County Designated?	Losses/Impacts
6/23/1972	Hurricane/Flood	Fulton County	DR-340	Y	Hurricane Agnes. Eligible for individual and public assistance.
7/1974	Flash Flood	Fulton County	N/A	Y	Ft. Littleton Scout Camp.
9/26/1975	Flood	Fulton County	DR-485	Y	Eligible for individual and public assistance.
1/19/2006-2/1/2006	Flood	Fulton County	DR-1093	Y	Eligible for individual and public assistance.
1/19/1996	Flash Flood	Fulton County	N/A	N/A	Countywide impact.
1/19/1996	Flood	Fulton County	N/A	N/A	Regional impact.
6/20/1996	Flash Flood	Fulton County	N/A	N/A	Road flooding occurred along Route 522 about 5 miles south of McConnellsburg.
7/19/1996	Flash Flood	Fulton County	N/A	N/A	Countywide impact.
8/14/1996	Flash Flood	Fulton County	N/A	N/A	Heavy rains flooded the road south of Harrisonville.
9/06/1996	Flash Flood	Fulton County	N/A	N/A	Northern parts of Fulton County were hit with heavy rains from the remnants of Hurricane Fran.
9/13/1996	Flash Flood	Fulton County	N/A	N/A	Thunderstorms dropped up to 8 inches of rain in 4 hours in McConnelsburg, flooding roads across the county. Fifty new and 20 used cars were swept away from Fulton Motors in McConnellsburg. Two homes were destroyed and 80 were damaged.
7/02/1997	Flash Flood	Fulton County	N/A	N/A	Heavy rains flooded roads and small streams in McConnellsburg. A car dealer moved cars to prevent damage.
11/07/1997	Flash Flood	Fulton County	N/A	N/A	Regional impact.
5/01/2003	Flash Flood	Fulton County	N/A	N/A	15,000 in property damage. Heavy rainfall of between 3 and 6 inches within 2 hours produced flash flooding in southern Fulton County. Most of the flooding occurred between the towns of Needmore and Big Cove. Portions of Route 522, Barnett's Run Road, Hess Road, and Gem Bridge Road were closed due to flooding. A significant amount of culvert and road damage occurred on Gem Bridge Road. Between 30 and 35 loads of shale and 150 tons of rock were hauled in for repair to roadways. A mudslide along Route 655 near Quarry Hill required extensive cleanup. One family briefly evacuated their home due to rising water in the yard and basement.

Date of Event	Event Type	Location	FEMA Declaration Number (if applicable)	County Designated?	Losses/Impacts
9/08/2004-09/09/2004	Flood	Fulton County	DR-1555	Y	Severe storms and flooding associated with Tropical Depression Frances. Major disaster declaration declared on 09/19/2004 for Individual Assistance.
9/17/2004-10/01/2004	Severe Storms/Flooding	Fulton County	DR-1557	Y	Tropical Depression Ivan. Governor Edward G. Rendell; AS OF 10/19/04 - Presidential - Major Disaster (Individual Assistance and Public Assistance).
9/9/2004	Flood	Fulton County	N/A	N/A	4½ inches of rainfall at the northern tier of the county to 8 inches in Buck Valley, resulting in road closures, fallen branches, and sporadic telephone interruptions. Roads impacted included SR 484, SR 2004, SR 4008, US 522.
9/17/2004	Flood	Fulton County	N/A	N/A	Regional impact.
9/28/2004	Flood	Fulton County	N/A	N/A	The remnants of Hurricane Jeanne moved northeast along the east slopes of the Appalachians during Tuesday, September 28, eventually moving off the mid-Atlantic Coast by early Tuesday evening. However, a large plume of tropical moisture northwest of the system produced widespread heavy rainfall across south central Pennsylvania during Tuesday, with rainfall amounts of 2 to 4 inches. This rainfall, combined with excessively wet soil and swollen rivers from the remnants of two antecedent tropical systems, produced mainly minor flooding across portions of south central Pennsylvania, with several road closures and some basement flooding reported.
9/17/2004-10/1/2004	Hurricane/Flood	Fulton County	DR-1557	Y	Pennsylvania Tropical Depression Ivan. Eligible for individual and public assistance.
8/29/2005-10/1/2005	Hurricane/Flood	Fulton County	EM-3235	Y	Pennsylvania Hurricane Katrina Evacuation. Eligible for public assistance.
6/2006	Flood	Fulton County	N/A	Y	Governor Edward G. Rendell; Presidential - Major Disaster for Individual Assistance, Public Assistance, and Hazard Mitigation.
3/5/2008	Flood	Fulton County	N/A	N/A	Heavy rain and flooding caused several road closures: - PA 655 N & S of US 30 - Licking Creek Township - Thompson Township - Todd Township

Date of Event	Event Type	Location	FEMA Declaration Number (if applicable)	County Designated?	Losses/Impacts
					Water rescue activated. Area impacted was in Dublin Township.
5/23/2009	Flood	Fulton County	N/A	N/A	Severe weather/flooding—vehicle with two occupants stranded. Area impacted was in Belfast Township and included Pleasant Ridge Rd. (RT 655) 1 mile off Great Cove Rd. (RT 522).
1/25/2010	Flood	Fulton County	N/A	N/A	Heavy rain caused flooding and closed several roads in the county. Route 522 North (Great Cove Road) between Route 30 and Hustontown was closed, along with Route 655. Dublin Mills Road and Witter Road in Taylor Township were also closed.
3/13/2010	Flood	Fulton County	N/A	N/A	Heavy rainfall between 1 and 3 inches combined with snowmelt to produce areal flooding. The flooding closed a portion of Dublin Mills Road along Sideling Hill Creek in the far northern part of the county near the Fulton Huntingdon line.
8/26/2011	Hurricane/Flood	Fulton County	N/A	N/A	Governor's Proclamation for Hurricane Irene. Applicable to entire state (i.e., no specific counties designated).
9/3/2011-10/15/2011	Hurricane/Flood	Fulton County	EM-3340	Y	Remnants of Tropical Storm Lee. Eligible for public assistance.
10/26/2012	Hurricane/Flood	Fulton County	N/A	N/A	Governor's Proclamation for Hurricane Sandy. Applicable to entire state (i.e., no specific counties designated).
10/26/2012-11/8/2012	Hurricane/Flood	Fulton County	EM-3356/DR-4099	Y	Hurricane Sandy. Eligible for Public Assistance.
06/01/2018	Flash Flood	McConnellsburg	N/A	N/A	Reservoir Road a Cloverleaf Court was flooded and impassable.
06/01/2018	Flash Flood	McConnellsburg	N/A	N/A	Great Cove Creek was out of its banks and flowing over a bridge on Confederate Road.
05/03/2019	Flood	Harrisonville	N/A	N/A	Flooding caused Black Bear Road to be shut down until 06/02/2019.
04/11/2021	Flood	Dickey's Mountain	N/A	N/A	Heavy rain resulted in flooding on Licking Creek. A man crossing a flooded road, was swept away, and was later found deceased.
08/31/2021	Hurricane/Flood	Fulton County	DR-4618	Y	Remnants of Hurricane Ida
08/21/2022	Flash Flood	Cito	N/A	N/A	A slow moving thunderstorm brought flash flooding to a small portion of Fulton County on the afternoon of August 21st. Several roads reported high water

Date of Event	Event Type	Location	FEMA Declaration Number (if applicable)	County Designated?	Losses/Impacts
					and debris. Road flooding was reported in the Cito area.

Source: (NOAA NCEI 2024)

Based on review of the CRREL database, Table 4.3.6-4 lists the ice jam events that have occurred in or near the County between 1780 and 2024. Events listed below that occurred outside of the county were included because they were close enough to the county borders to cause possible flooding impacts on Fulton County. Information regarding losses associated with these reported ice jams was limited.

Table 4.3.6-4. Ice Jam Events in Fulton County between 1780 and 2019

City (Additional Geographic Identifier)	River	Jam Date	Water Year	Gage Number	Impact
Needmore (Belfast Township)	Tonoloway Creek	1/5/1990	1990	01613050	Maximum annual gage height of 4.49 feet due to an ice jam reported at USGS gage Tonoloway Creek near Needmore, at 0745 hours on January 5, 1990. Estimated average daily discharge 20 cfs.
Needmore (Belfast Township)	Tonoloway Creek	2/2/1981	1981	01613050	Ice jam reported on February 2, 1982 (average daily discharge 20 cfs compared to 0.7 cfs previous day) and February 11, 1982 (average daily discharge 61 cfs compared to 2.5 cfs previous day) at USGS gage Tonoloway Creek near Needmore. No stages given. Maximum annual gage height of 6.38 feet due to ice jam reported on February 20, with average daily discharge of 181 cfs (compared to 23 cfs previous day).
Needmore (Belfast Township)	Tonoloway Creek	2/13/1971	1971	01613050	The estimated water discharge was 100 cfs. Maximum gage height was 7.37 feet.
Outside Fulton County					
Gapsville (Bedford County)	Brush Creek	2/27/1936	1936	1561000	USGS did not record a gage height on February 27, 1936, on Brush Creek at Gapsville, PA, due to backwater from ice.
Sylvan (Franklin County)	Licking Creek	1/15/40	1940	1613500	Maximum annual gage height of 8.60 feet, affected by backwater from ice, reported at USGS gage Licking Creek near Sylvan, on January 15, 1940.
Three Springs (Huntingdon County)	Aughwick Creek	2/24/1979	1979	1564500	No stage reported, average daily discharge 1340 cfs (140 cfs previous day).
Three Springs (Huntingdon County)	Aughwick Creek	1/22/1959	1959	1564500	Maximum annual gage height of 11.4 feet, affected by backwater from ice, reported at USGS gage Aughwick Creek near Three Springs, on January 22, 1959. Bankfull stage 6 feet. Discharge not determined; maximum for year.
Orbisonia (Huntingdon County)	Aughwick Creek	2/28/1935	1935	1564000	USGS recorded a gage height of 9.2 feet on February 28, 1935 on Augwick Creek near Orbisonia, PA, due to backwater from ice.

Source:USACE 2019
Notes: Although events were reported for Fulton County, information pertaining to every event was not easily ascertainable; therefore, this table may not list all ice jams in the County.
cfs Cubic feet per second
CRREL Cold Regions Research and Engineering Laboratory
USGS U.S. Geological Survey

4.3.6.5 Future Occurrence

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of flood waters) and the related probability of occurrence. The NFIP uses historical records to determine the probability of occurrence for different extents of flooding. The probability of occurrence is expressed in percentages as the chance of a flood of a specific extent occurring in any given year.

The NFIP recognizes the 1 percent annual chance flood, also known as the *base flood*, as the standard for identifying properties subject to federal flood insurance purchase requirements. A 1 percent annual chance flood is a flood that has a one percent chance of occurring over a given year. The DFIRMs identify areas subject to the 1 percent and 0.2 percent annual chance flooding. Areas subject to 2 percent and 10 percent annual chance events are not shown on maps; however, water surface elevations associated with these events are included in the flood source profiles contained in the Flood Insurance Study Report. Table 4.3.6-5 shows a range of flood recurrence intervals and associated probabilities of occurrence.

Table 4.3.6-5. Recurrence intervals and associated probabilities of occurrence

Flood Recurrence Interval	Chance of Occurrence in Any Given Year (%)	Flows
5 year	20	Extreme
10 year	10	Heavy to extreme
25 year	4	Moderate
50 year	2	Light to moderate
100 year	1	Light
500 year	0.2	Mild

Given the history of flood events that have impacted Fulton County, future flooding events of varying degrees are likely to occur. The fact that the elements required for flooding exist and that major flooding has occurred throughout the county in the past suggests that many people and properties are at risk from the flood hazard in the future.

For the 2025 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of flooding events for Fulton County. Information from NOAA NCEI storm events database, FEMA, Pennsylvania State Climatologist, and the CRREL ice jam database were used to identify the number of flood events that occurred between 1950 and 2024. Using these sources ensures the most accurate probability estimates possible. The table below shows these statistics, as well as the annual average number of events and the estimated percent chance of an incident occurring in a given year.

Table 4.3.6-6. Probability of Future Flooding Events

Hazard Type	Number of Occurrences Between 1950 and 2024	Recurrence Interval (in Years) (# Years/Number of Events)	Percent Chance of Occurrence in Any Given Year
Flash Flood	12	4.0	25%
Flood	21	2.2	46%
Ice Jam	3	10.0	10%
Total	36	1.3	75%

Sources: NOAA NCEI 2022; FEMA 2022; USACE 2022

It is estimated that Fulton County will continue to experience direct and indirect impacts of flooding events annually that may induce secondary hazards such as infrastructure deterioration or failure, utility failures, power outages, water quality and supply concerns, and transportation delays, accidents, and inconveniences. Therefore,

the future occurrence of floods in Fulton County has been adjusted and characterized as *likely,* when taking into consideration flash flooding, as defined by the Risk Factor Methodology probability criteria (see Section 4.4).

4.3.6.6 Vulnerability Assessment

The 1 and 0.2 percent annual chance flood events were examined to evaluate Fulton County's flood risk. Polygons representing the 1 and 0.2 percent annual chance events from the FEMA Risk Map products dated February 2011 were used to estimate exposure. Figure 4.3.6-3 presented earlier in this section illustrates the flood boundaries used for the vulnerability assessment. The 1 percent annual chance flood depth grid generated for the FEMA Risk Map program was imported into FEMA's Hazus model and a riverine analysis was processed to estimate potential losses. To understand risk, a community must evaluate what assets are exposed and vulnerable in the identified hazard area. The following text evaluates and estimates the potential impact of the flood hazard on the county, including:

- Impact on (1) life, health and safety; (2) general building stock; (3) critical facilities; (4) economy; (5) environment; and (6) future growth and development.
- Expected future conditions on vulnerability.
- Further data collections that will assist understanding this hazard over time.

Impact on Life, Health, and Safety

The impacts of flooding on life, health, and safety depend on several factors including the severity of the event and whether or not adequate warning time is provided to residents. It is assumed that the population living in or near floodplain areas that could be impacted by a flood would be exposed. However, exposure should not be limited only to those who reside within a defined hazard zone, but to everyone who may be affected by a hazard event (e.g., people are at risk while traveling in flooded areas, or their access to emergency services is compromised during an event, as well as the first responders' safety); the degree of that impact varies and is not strictly measurable.

Based on the spatial analysis, an estimated 134 people live in the SFHA (or 1-percent annual chance event floodplain) and an estimated 134 people are located in the 0.2-percent annual chance flood event floodplain (Table 4.3.6-7). In the event of a flood hazard, these residents could be displaced from their homes, requiring them to seek temporary shelter with friends, family, or emergency shelters. Licking Creek Township has the greatest estimated number of individuals residing in the floodplain—approximately 31 people in the 1-percent and 31 people in the 0.2-percent chance flood boundaries, respectively. For this project, the potential population exposed is used as a guide for planning purposes.

Table 4.3.6-7 Estimated Fulton County Population Exposed to the 1 percent and 0.2 percent Flood Hazard Area

Jurisdiction	Total Population (Census Bureau 2020 Decennial)	Estimated Population Located in the Flood Hazard Areas			
		Number of Persons Located in the 1-percent Annual Chance Flood Event Hazard Area	Percent of Jurisdiction Total	Number of Persons Located in the 0.2-percent Annual Chance Flood Event Hazard Area	Percent of Jurisdiction Total
Ayr (T)	1,969	20	1.0%	20	1.0%
Belfast (T)	1,401	12	0.9%	12	0.9%
Bethel (T)	1,443	8	0.6%	8	0.6%
Brush Creek (T)	587	4	0.7%	4	0.7%
Dublin (T)	1,175	10	0.9%	10	0.9%
Licking Creek (T)	1,575	31	2.0%	31	2.0%
McConnellsburg (B)	1,056	8	0.8%	8	0.8%

Jurisdiction	Total Population (Census Bureau 2020 Decennial)	Estimated Population Located in the Flood Hazard Areas			
		Number of Persons Located in the 1-percent Annual Chance Flood Event Hazard Area	Percent of Jurisdiction Total	Number of Persons Located in the 0.2-percent Annual Chance Flood Event Hazard Area	Percent of Jurisdiction Total
Taylor (T)	1,164	19	1.6%	19	1.6%
Thompson (T)	949	0	0.0%	0	0.0%
Todd (T)	1,797	5	0.3%	5	0.3%
Union (T)	991	2	0.2%	2	0.2%
Valley-Hi (B)	3	0	0.0%	0	0.0%
Wells (T)	435	15	3.4%	15	3.4%
Fulton County (Total)	**14,545**	**134**	**0.9%**	**134**	**0.9%**

Source: US Census Bureau, ACS 2022; FEMA 2011
Note: B – Borough; C – City; Twp. – Township

Of the population exposed, the most vulnerable include the economically disadvantaged and the population over the age of 65. Economically disadvantaged populations are more vulnerable because they are likely to evaluate their risk and make decisions to evacuate based on net economic impact on their families. The population over the age of 65 is also more vulnerable because they are more likely to seek or need medical attention that may not be available because of isolation during a flood event, and they may have more difficulty evacuating. They also may need to seek or need medical attention that may not be available due to isolation during a flood event. Within Fulton County, approximately 3,177 people are over the age of 65 and 1,550 people are below the poverty level. Licking Creek Township, which has the most people in the floodplain, the largest elderly population (age over 65 years) of six, and the highest number of citizens living below the poverty level three in the 1 and 0.2 percent annual .

Using 2020 U.S. Census data, Hazus estimates the potential sheltering needs as a result of a 1 percent annual chance flood event. For the 1 percent flood event, Hazus estimates 288 people will be displaced, and 65 people will seek short-term sheltering. Licking Creek Township would have the greatest displaced population (54 people) and Ayr Townshup will have the greatest number of persons seeking short-term shelter (16 people). These statistics, by jurisdiction, are presented in Table 4.3.6-8. The estimated displaced population and number of persons seeking short-term sheltering differs from the number of persons exposed to the 1 percent annual chance flood, because the displaced population numbers take into consideration that not all residents will be significantly impacted enough to be displaced or to require short-term sheltering during a flood event.

Table 4.3.6-8 Estimated Population Displaced or Seeking Short-Term Shelter from the 1Percent Annual Chance Flood Event

Jurisdiction	Total Population (Census Bureau 2020 Decennial)	1-Percent Annual Chance Flood Event	
		Displaced Population	Persons Seeking Short-Term Sheltering
Ayr (T)	1,969	46	16
Belfast (T)	1,401	27	4
Bethel (T)	1,443	21	4
Brush Creek (T)	587	11	2
Dublin (T)	1,175	34	3
Licking Creek (T)	1,575	54	10
McConnellsburg (B)	1,056	11	9
Taylor (T)	1,164	24	1
Thompson (T)	949	19	2

Jurisdiction	Total Population (Census Bureau 2020 Decennial)	1-Percent Annual Chance Flood Event	
		Displaced Population	Persons Seeking Short-Term Sheltering
Todd (T)	1,797	15	8
Union (T)	991	7	2
Valley-Hi (B)	3	0	0
Wells (T)	435	19	4
Fulton County (Total)	**14,545**	**288**	**65**

Source: Hazus v6.1
Notes: B – Borough; C – City; Twp. – Township; The population displaced and seeking shelter was calculated using 2020 U.S. Census data, which is the default demographic database for HAZUS-MH v6.1; Displaced and Short-Term Shelter Populations are rounded down.

Total number of injuries and casualties resulting from typical riverine flooding is generally limited because of advance weather forecasting, blockades, and warnings. Therefore, injuries and deaths generally are not anticipated if proper warning occurs and precautions are in place. Warning time for flash flooding is often limited. Flash flood events are frequently associated with other natural hazard events, such as earthquakes, landslides, or severe weather, which limits their predictability and compounds the hazard. Populations without adequate warning of the event are highly vulnerable to this hazard. Ongoing mitigation efforts should help to avoid the most likely cause of injury—persons trying to cross flooded roadways or channels. Mitigation action items addressing this issue are included in Section 6 (Mitigation Strategy) of this plan.

Cascading impacts may also include exposure to pathogens such as mold. After flood events, excess moisture and standing water contribute to growth of mold in buildings. Mold may present a health risk to building occupants, especially those with already compromised immune systems such as infants, children, the elderly, and pregnant women. The degree of impact will vary and is not strictly measurable. Mold can grow in as short a period as 24-48 hours in wet and damaged areas of buildings that have not been properly cleaned. Very small mold spores can easily be inhaled, creating potential for allergic reactions, asthma episodes, and other respiratory problems. Buildings should be properly cleaned and dried out to safely prevent mold growth (CDC 2023)

Mold and mildew are not the only public health risk associated with flooding. Flood waters can be contaminated by pollutants such as sewage, human and animal feces, pesticides, fertilizers, oil, asbestos, and rusting building materials. Common public health risks associated with flood events also include:

- Unsafe food.
- Contaminated drinking and washing water and poor sanitation.
- Mosquitos and animals.
- Carbon monoxide poisoning.
- Secondary hazards associated with re-entering/cleaning flooded structures.
- Mental stress and fatigue.

Current loss estimation models, such as Hazus, are not equipped to measure public health impacts. The best mitigation measures for these impacts is to be aware that they can occur, educate the public on prevention, and be prepared to address these vulnerabilities in responding to flood events.

Impact on General Building Stock

After consideration of the population exposed and vulnerable to the flood hazard, the built environment was evaluated. Exposure to the flood hazard includes those buildings within the flood zone. Potential damage is the modeled loss that could occur to the exposed inventory, including structural and content value.

The potential damage caused by flood events is the modeled loss that could occur to the exposed building stock measured by the structural and content replacement cost value. Table 4.3.6-9 and

Table 4.3.6-10 summarizes these results. In total, 93 structures, or 1.1 percent of the building stock, totaling an estimated $348 million in replacement cost value, are within the 1 percent annual chance flood zone; and 93 structures, or 1.1 percent of the building stock, totaling an estimated $348 million in replacement cost value, are within the 0.2 percent flood zone.

Table 4.3.6-11 and Table 4.3.6-12 display the buildings by general occupancy class for the 1 and 0.2 percent annual chance flood hazard areas. Fulton County has 65 residential buildings located within both the 1 and 0.2 percent flood hazard zones, which is the highest number among all occupancy classes.

Furthermore, Hazus estimated potential damage to buildings in Fulton County for the 1 percent annual chance flood event. Table 4.3.6-13 summarizes these results. In total, Hazus estimates $59.2 million in potential building damage. Hazus estimates $1.4 million in residential building loss.

Table 4.3.6-9 Estimated Buildings in the 1% Annual Chance Flood Hazard Area

Jurisdiction	Total Number of Buildings	Jurisdiction Total Replacement Cost Value	Buildings in the 1% Annual Chance Flood Hazard Area			
			Number of Builidngs	Percent of Total	Replacement Cost Value	Percent of Total
Ayr (T)	1,164	$1,376,426,042	12	1.0%	$6,244,987	0.5%
Belfast (T)	751	$655,413,691	7	0.9%	$13,195,409	2.0%
Bethel (T)	877	$994,651,759	10	1.1%	$93,716,337	9.4%
Brush Creek (T)	530	$839,701,214	5	0.9%	$33,086,436	3.9%
Dublin (T)	696	$767,305,491	6	0.9%	$11,342,202	1.5%
Licking Creek (T)	901	$840,873,066	18	2.0%	$66,977,630	8.0%
McConnellsburg (B)	547	$817,997,653	4	0.7%	$2,703,576	0.3%
Taylor (T)	707	$983,050,508	17	2.4%	$106,091,900	10.8%
Thompson (T)	582	$416,632,627	0	0.0%	$0	0.0%
Todd (T)	874	$969,356,489	3	0.3%	$1,678,193	0.2%
Union (T)	437	$306,763,135	1	0.2%	$348,946	0.1%
Valley-Hi (B)	29	$9,954,698	0	0.0%	$0	0.0%
Wells (T)	299	$158,054,723	10	3.3%	$12,492,913	7.9%
Fulton County (Total)	**8,394**	**$9,136,181,097**	**93**	**1.1%**	**$347,878,529**	**3.8%**

Source: Fulton County 2024; RS Means 2024; FEMA 2011

Table 4.3.6-10. Estimated Buildings in the 0.2% Annual Chance Flood Hazard Area

Jurisdiction	Total Number of Buildings	Jurisdiction Total Replacement Cost Value	Buildings in the 0.2% Annual Chance Flood Hazard Area			
			Number of Builidngs	Percent of Total	Replacement Cost Value	Percent of Total
Ayr (T)	1,164	$1,376,426,042	12	1.0%	$6,244,987	0.5%
Belfast (T)	751	$655,413,691	7	0.9%	$13,195,409	2.0%
Bethel (T)	877	$994,651,759	10	1.1%	$93,716,337	9.4%
Brush Creek (T)	530	$839,701,214	5	0.9%	$33,086,436	3.9%
Dublin (T)	696	$767,305,491	6	0.9%	$11,342,202	1.5%
Licking Creek (T)	901	$840,873,066	18	2.0%	$66,977,630	8.0%
McConnellsburg (B)	547	$817,997,653	4	0.7%	$2,703,576	0.3%
Taylor (T)	707	$983,050,508	17	2.4%	$106,091,900	10.8%
Thompson (T)	582	$416,632,627	0	0.0%	$0	0.0%
Todd (T)	874	$969,356,489	3	0.3%	$1,678,193	0.2%
Union (T)	437	$306,763,135	1	0.2%	$348,946	0.1%
Valley-Hi (B)	29	$9,954,698	0	0.0%	$0	0.0%
Wells (T)	299	$158,054,723	10	3.3%	$12,492,913	7.9%
Fulton County (Total)	**8,394**	**$9,136,181,097**	**93**	**1.1%**	**$347,878,529**	**3.8%**

Source: Fulton County 2024; RS Means 2024; FEMA 2011

Table 4.3.6-11. Builidngs in the 1% Annual Chance Flood Hazard Area by General Occupancy Class

Jurisdiction	Buildings in the 1% Annual Chance Flood Hazard Area by General Occupancy Class			
	Residential	Commercial	Industrial	Government, Religion, Agricultural, and Education
Ayr (T)	9	3	0	0
Belfast (T)	5	1	1	0
Bethel (T)	4	5	0	1
Brush Creek (T)	3	2	0	0
Dublin (T)	5	1	0	0
Licking Creek (T)	15	3	0	0
McConnellsburg (B)	3	1	0	0
Taylor (T)	9	8	0	0
Thompson (T)	0	0	0	0
Todd (T)	2	1	0	0
Union (T)	1	0	0	0
Valley-Hi (B)	0	0	0	0
Wells (T)	9	1	0	0
Fulton County (Total)	**65**	**26**	**1**	**1**

Source: Fulton County 2024; FEMA 2011

Table 4.3.6-12. Buildings in the 0.2 Percent Annual Chance Flood Hazard Area by General Occupancy Class

Jurisdiction	Buildings in the 1% Annual Chance Flood Hazard Area by General Occupancy Class			
	Residential	Commercial	Industrial	Government, Religion, Agricultural, and Education
Ayr (T)	9	3	0	0
Belfast (T)	5	1	1	0
Bethel (T)	4	5	0	1
Brush Creek (T)	3	2	0	0
Dublin (T)	5	1	0	0
Licking Creek (T)	15	3	0	0
McConnellsburg (B)	3	1	0	0
Taylor (T)	9	8	0	0
Thompson (T)	0	0	0	0
Todd (T)	2	1	0	0
Union (T)	1	0	0	0
Valley-Hi (B)	0	0	0	0
Wells (T)	9	1	0	0
Fulton County (Total)	**65**	**26**	**1**	**1**

Source: Fulton County 2024; FEMA 2011

Table 4.3.6-13 Estimated General Building Stock Potential Loss to the 1 Percent Annual Chance Flood Event

Jurisdiction	Total Replacement Cost Value (RCV)	Estimated Loss for All Occupancies	Percent Total	Estimated Loss for Residential Properties	Estimated Loss for Commercial Properties	Estimated Loss for All Other Occupancies
Ayr (T)	$1,376,426,042	$291,478	<0.1%	$158,457	$133,020	$0
Belfast (T)	$655,413,691	$2,311,662	0.4%	$60,409	$2,125	$2,249,128
Bethel (T)	$994,651,759	$27,345,754	2.7%	$87,732	$27,258,022	$0
Brush Creek (T)	$839,701,214	$456,771	0.1%	$21,333	$435,438	$0
Dublin (T)	$767,305,491	$1,491,994	0.2%	$80,259	$1,411,735	$0
Licking Creek (T)	$840,873,066	$10,321,536	1.2%	$327,123	$9,994,414	$0
McConnellsburg (B)	$817,997,653	$2,936	<0.1%	$0	$2,936	$0
Taylor (T)	$983,050,508	$11,826,347	1.2%	$387,040	$11,439,308	$0
Thompson (T)	$416,632,627	$0	0.0%	$0	$0	$0
Todd (T)	$969,356,489	$74,006	<0.1%	$61,904	$12,103	$0
Union (T)	$306,763,135	$0	0.0%	$0	$0	$0
Valley-Hi (B)	$9,954,698	$0	0.0%	$0	$0	$0
Wells (T)	$158,054,723	$5,039,920	3.2%	$193,902	$4,846,018	$0
Fulton County (Total)	**$9,136,181,097**	**$59,162,404**	**0.6%**	**$1,378,159**	**$55,535,117**	**$2,249,128**

Source: Hazus V6.1; Fulton County 2024; RS Means 2024
Note: All Other Occupancies include Agriculture, Government, Education, and Religion

NFIP Statistics

In addition to total building stock modeling, individual data on flood policies, claims, repetitive loss (RL), and severe repetitive loss (SRL) properties were analyzed.

According to May 2018 data (the most recent data available for this plan update), Fulton County has 1,907 NFIP policies, totaling $464,398,700 in coverage. Since 1978, there have been 2,486 total claims for NFIP policies in the county for a total of $40,013,226 in losses paid (PEMA 2019).

According to Section 1361A of the National Flood Insurance Act (NFIA), as amended, 42 *United States Code* (U.S.C.) 4102a, the definition of a SRL property is a residential property covered by an NFIP flood insurance policy, and for which at least one of the following sets of claim payments have occurred:

- At least four NFIP claim payments (including building and contents) over $5,000 each, with the cumulative amount payments for these claims exceeding $20,000
- At least two separate payments for claims (building payments only), with the cumulative amount of the building portion of these payments exceeding the market value of the building

Moreover, for both above, at least two of the referenced claims must have occurred within any 10-year period and must have been submitted separately on dates more than 10 days apart.

An RL property is defined by FEMA's Flood Mitigation Assistance (FMA) Program as an NFIP-insured structure that incurred flood-related damage on two occasions, and for which the cost of repair equaled or exceeded 25 percent of the market value of the structure at the time of each such flood.

According to data from December 2024, Fulton County has one RL and zero SRL properties throughout the County. Table 4.3.6-14 summarizes RL properties in Fulton County.

Table 4.3.6-14 Total and Mitigated Repetitive Loss Properties in Fulton County

	Single-Family		2-4 Family		Other Residential		Non-Residential		Total	
	Total	Mit	Total	Mit	Total	Mit	Total	Mit	Total	Mit
Ayr (T)	-	-	-	-	-	-	-	-	-	-
Belfast (T)	-	-	-	-	-	-	-	-	-	-
Bethel (T)	-	-	-	-	-	-	-	-	-	-
Brush Creek (T)	-	-	-	-	-	-	-	-	-	-
Dublin (T)	-	-	-	-	-	-	-	-	-	-
Licking Creek (T)	1	0	-	-	-	-	-	-	1	0
McConnellsburg (B)	-	-	-	-	-	-	-	-	-	-
Taylor (T)	-	-	-	-	-	-	-	-	-	-
Thompson (T)	-	-	-	-	-	-	-	-	-	-
Todd (T)	-	-	-	-	-	-	-	-	-	-
Union (T)	-	-	-	-	-	-	-	-	-	-

	Single-Family		2-4 Family		Other Residential		Non-Residential		Total	
Valley-Hi (B)	-	-	-	-	-	-	-	-	-	-
Wells (T)	-	-	-	-	-	-	-	-	-	-
Fulton County (Total)	**1**	**0**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**0**

Source: (FEMA 2024)
Note: This information was provided by OpenFEMA Dataset.

Impact on Critical Facilities

It is important to determine the critical facilities and infrastructure within the county that may be at risk to flooding (riverine, dam failure, flash/stormwater flooding), and that may be impacted should damage occur. Critical services during and after a flood event may not be available if facilities are directly damaged or transportation routes to access these critical facilities are impacted. Roads that are blocked or damaged can isolate residents and can prevent access throughout the planning area to many service providers needing to get to vulnerable populations or to make repairs. Utilities, such as overhead power, cable, and phone lines, could also be vulnerable because of damage to utility poles by standing water or the surge of water from a dam failure event. Loss of these utilities could create additional isolation issues for the inundation zones.

Critical facility exposure to the 1 percent and 0.2 percent annual chance flood hazard event boundary was examined. Table 4.3.6-15 lists critical facilities and utilities within the 1 percent annual change flood boundary. Table 4.3.6-16 lists critical facilities and utilities within the 0.2 percent annual change flood boundary. Section 4.4 (Hazard Vulnerability Summary) provides more information about the critical facilities and lifelines in Fulton County. Of the nine critical facilities located in both the 1 and 0.2 percent annual chance flood event boundary, the safety and security sector has the greatest number (three) of lifelines in each flood hazard area.

Table 4.3.6-15 Critical Facilities within the 1 Percent Annual Chance Flood Boundary

Jurisdiction	Number of Facilities in the 1% Annual Chance Flood Hazard Area, by Lifeline Category									Total Facilities in Hazard Area	
	Communications	Energy	Food, Hydration, Shelter	Hazardous Materials	Health & Medical	Safety & Security	Transportation	Water Systems	Other Critical Facilities	Count	% of Jurisdction Total
Ayr (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Belfast (T)	0	0	0	0	0	0	0	1	0	**1**	**6.3%**
Bethel (T)	1	0	0	0	0	0	0	1	0	**2**	**8.7%**
Brush Creek (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Dublin (T)	0	0	0	0	0	1	0	0	0	**1**	**3.7%**
Licking Creek (T)	0	1	0	1	0	0	0	0	0	**2**	**11.8%**
McConnellsburg (B)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Taylor (T)	0	1	0	0	0	2	0	0	0	**3**	**10.3%**
Thompson (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Todd (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Union (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Valley-Hi (B)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Wells (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Fulton County (Total)	**1**	**2**	**0**	**1**	**0**	**3**	**0**	**2**	**0**	**9**	**3.9%**

Source: Fulton County 2025; FEMA 2011

Table 4.3.6-16. Critical Facilities within the 0.2 Percent Annual Chance Flood Boundary

Jurisdiction	Number of Facilities in the 0.2% Annual Chance Flood Hazard Area, by Lifeline Category									Total Facilities in Hazard Area	
	Communications	Energy	Food, Hydration, Shelter	Hazardous Materials	Health & Medical	Safety & Security	Transportation	Water Systems	Other Critical Facilities	Count	% of Jurisdction Total
Ayr (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Belfast (T)	0	0	0	0	0	0	0	1	0	**1**	**6.3%**
Bethel (T)	1	0	0	0	0	0	0	1	0	**2**	**8.7%**
Brush Creek (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Dublin (T)	0	0	0	0	0	1	0	0	0	**1**	**3.7%**
Licking Creek (T)	0	1	0	1	0	0	0	0	0	**2**	**11.8%**
McConnellsburg (B)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Taylor (T)	0	1	0	0	0	2	0	0	0	**3**	**10.3%**
Thompson (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Todd (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Union (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Valley-Hi (B)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Wells (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Fulton County (Total)	**1**	**2**	**0**	**1**	**0**	**3**	**0**	**2**	**0**	**9**	**3.9%**

Source: Fulton County 2024; FEMA 2011

Impact on the Economy

For impact on the economy, estimated losses from a flood event are considered. Losses include but are not limited to general building stock damage, agricultural losses, business interruption, and impacts on tourism and tax base within Fulton County. Damage to general building stock can be quantified by use of Hazus as discussed above. Other economic components such as loss of facility use, functional downtime, and social economic factors are less susceptible to measurement with a high degree of certainty. In areas that are directly flooded, renovations of commercial and industrial buildings may be necessary, disrupting associated services.

Hazus estimates the amount of debris generated from a 1 percent annual chance flood event. The model breaks down debris into three categories because of the different types of equipment needed to handle debris: (1) finishes (dry wall, insulation, etc.), (2) structural (wood, brick, etc.), and (3) foundations (concrete slab and block, rebar, etc.). Table 4.3.6-17 summarizes the debris Hazus estimates to result from a 1 percent annual chance flood event, which is an estiamted 438 tons of debris. Notably, this table lists estimated debris generated only by riverine flooding and does not include additional potential damage and debris possibly generated by force of wind.

Table 4.3.6-17. Estimated Debris Generated from the 1 Percent Annual Chance Flood Event

Jurisdiction	1-Percent Annual Chance Flood Event			
	Total (tons)	Finish (tons)	Structure (tons)	Foundation (tons)
Ayr (T)	34	28	2	4
Belfast (T)	34	9	14	11
Bethel (T)	10	6	2	1
Brush Creek (T)	12	11	0	1
Dublin (T)	13	10	1	2
Licking Creek (T)	79	77	1	1
McConnellsburg (B)	4	4	0	0
Taylor (T)	161	157	1	2
Thompson (T)	63	33	17	13
Todd (T)	7	6	0	0
Union (T)	7	4	2	1
Valley-Hi (B)	0	0	0	0
Wells (T)	13	11	1	1
Fulton County (Total)	**438**	**357**	**42**	**39**

Source: Hazus V6.1

Impact on the Environment

As Fulton County and its jurisdictions evolve with changes in population and density, flood events may increase in frequency and/or severity as land use changes, more structures are built, and impervious surfaces expand. Flood extents for the 1 percent and 0.2 percent annual chance flood event will continue to evolve alongside natural occurrences such as climate change and/or severe weather events. These flood events will inevitably impact Fulton County's natural and local environment.

Furthermore, the environmental impacts of a dam failure event can include significant water quality and debris disposal issues. Flood waters can back up sanitary sewer systems and inundate wastewater treatment plants, causing raw sewage to contaminate residential and commercial buildings and the flooded waterway. The contents of unsecured containers of oil, fertilizers, pesticides, and other chemicals get added to flood waters. Hazardous materials may be released and distributed widely across the floodplain. Water supply and wastewater treatment facilities could be offline for weeks. After the flood waters subside, contaminated and flood-damaged building materials and contents must be properly disposed of. Contaminated sediment must be removed from

buildings, yards, and properties. In addition, severe erosion is likely; such erosion can negatively impact local ecosystems.

Severe flooding will affect these natural areas and can ultimately be disruptive to species that reside in these natural habitats.

Future Growth and Development

Any areas of growth could be impacted by the flood hazard if within identified hazard areas. The tables and hazard maps included in the jurisdictional annexes contain additional information regarding the specific areas of development that would increase county vulnerability to dam inundation areas.

Estimated population projections provided by the Center of Rural Pennsylvania indicates that Fulton County's population will continue to increase into 2040, increasing total population to approximately 15,407 persons (The Center of Rural Pennsylvania 2021). As more people move into flood zones, an increased amount of the population will be vulnerable to flood hazards.

Expected Future Conditions

Climate is defined not simply as average temperature and precipitation but also by type, frequency, and intensity of weather events. Both globally and at the local scale, climate change can alter the prevalence and severity of extremes such as flood events. While predicting changes in flood events under a changing climate is difficult, understanding vulnerabilities to potential changes is a critical part of estimating future climate change impacts on human health, society, and the environment (EPA 2024).

The 2021 Pennsylvania Climate Impact Assessment indicated that Pennsylvania is very likely to undergo increased temperatures and precipitation in the 21st century (PADEP 2021). An increase in variability of temperature and precipitation may lead to increased frequency and/or severity of storm events. Summer floods and general stream flow variability are projected to increase because of increased variability in precipitation. Even with the anticipated increase in winter precipitation as rain rather than snow, increased winter temperatures and a reduced snowpack may decrease rain-on-snow events and, thus, major flooding events in Pennsylvania. This conclusion, however, remains speculative until further studies can validate it. Future improvements in modeling smaller-scale climatic processes are expected and will lead to improved understanding of how the changing climate will alter temperature, precipitation, storms, and flood events in Pennsylvania (PADEP 2021).

Next Steps

Fulton County will work to updated building and critical facility inventories to develop more precise modeling of flood impacts in future updates.

4.3.6.7 Additional Data – Flood Hazard Maps

As mentioned earlier, each of the participating jurisdictions can view their flood hazard map at the end of this profile. With this higher level of detail, each map illustrates the location of the 1-percent and 0.2-percent annual chance flood hazard areas (if applicable) along with the identified critical/lifeline facilities located within each jurisdiction.

Figure 4.3.6-4. Ayr Township Flood Hazard Area

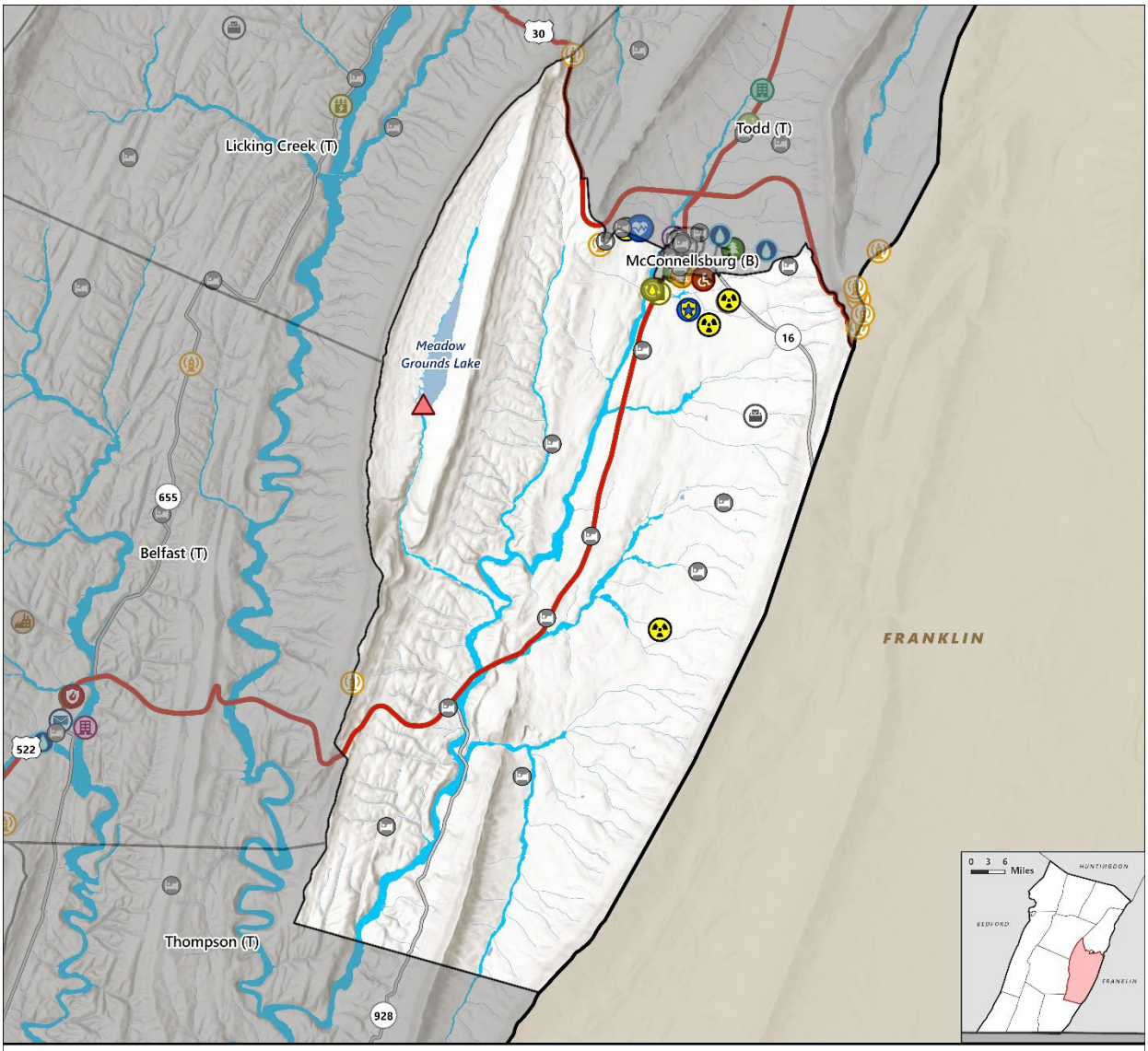


Figure 4.3.6-5. Belfast Township Flood Hazard Area

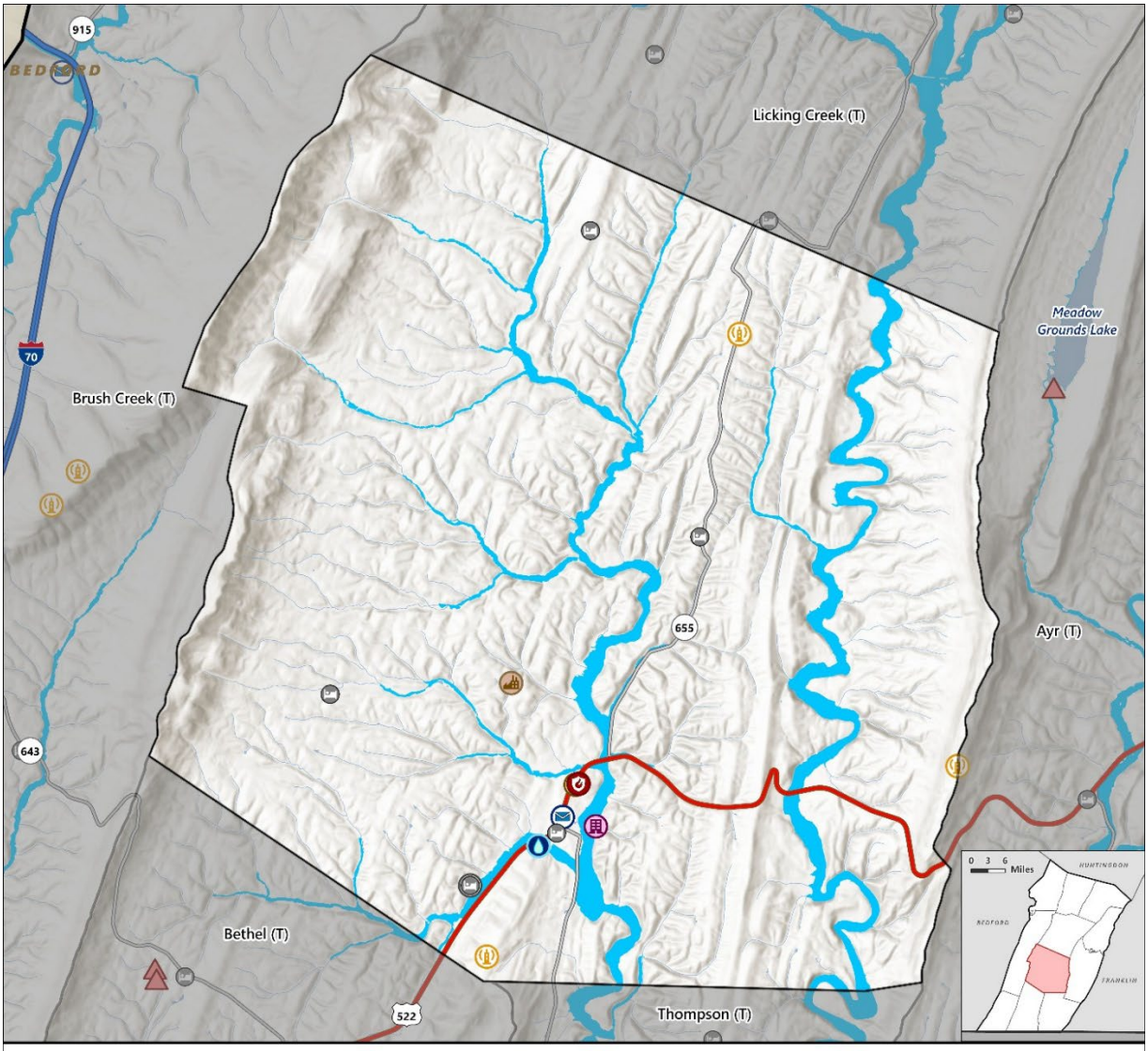


Figure 4.3.6-6. Bethel Township Flood Hazard Area

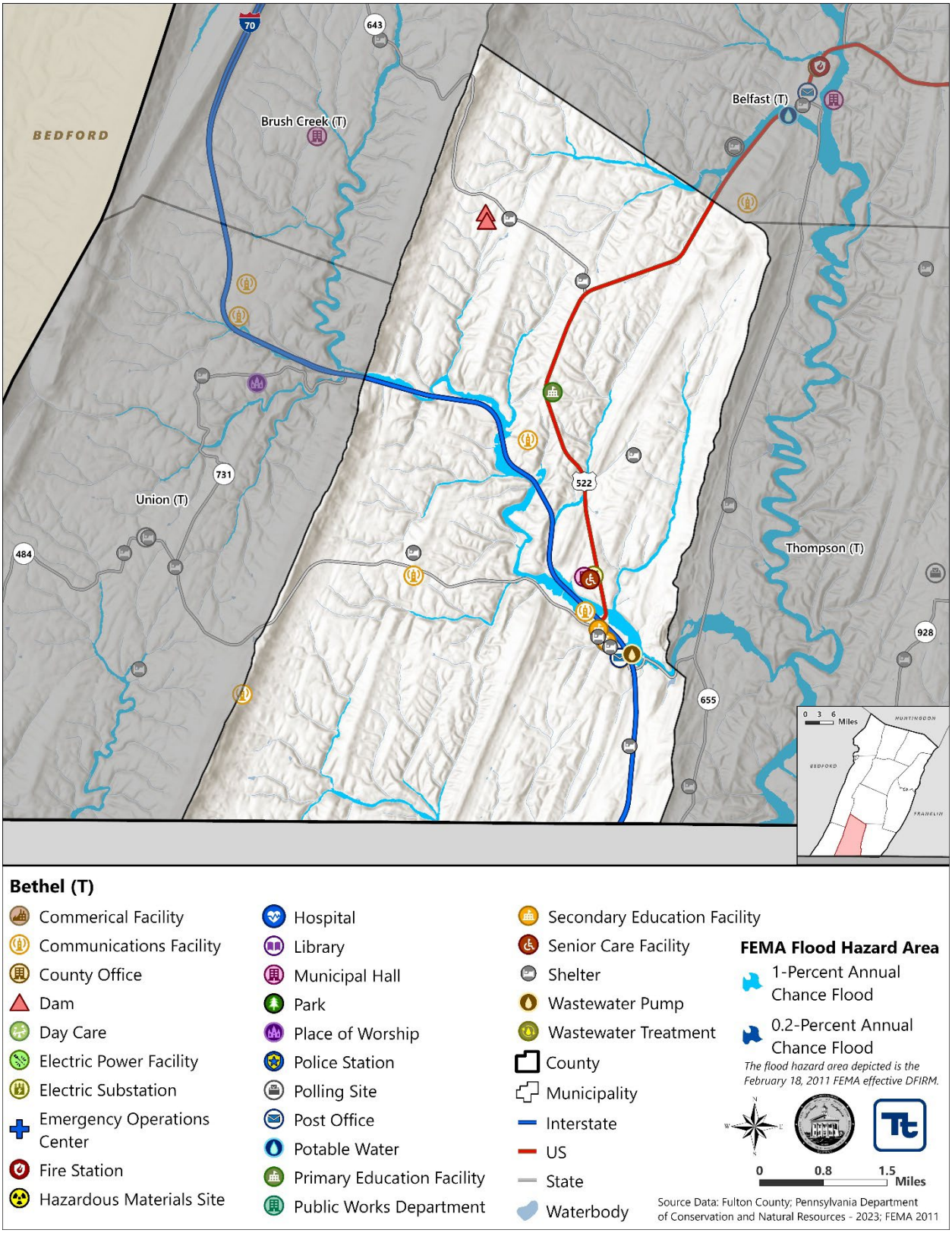


Figure 4.3.6-7 Brush Creek Township Flood Hazard Area

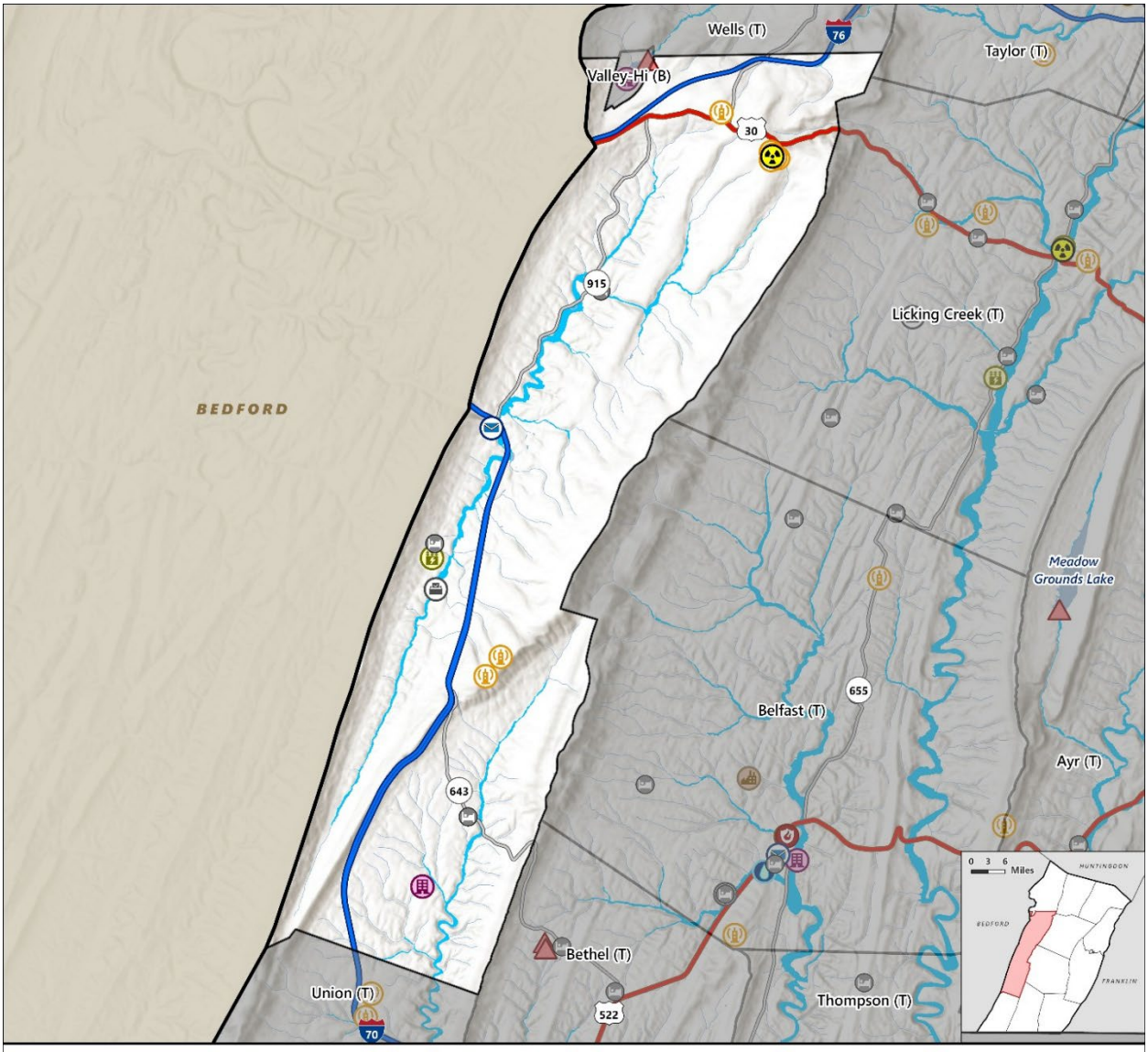


Figure 4.3.6-8 Dublin Township Flood Hazard Area

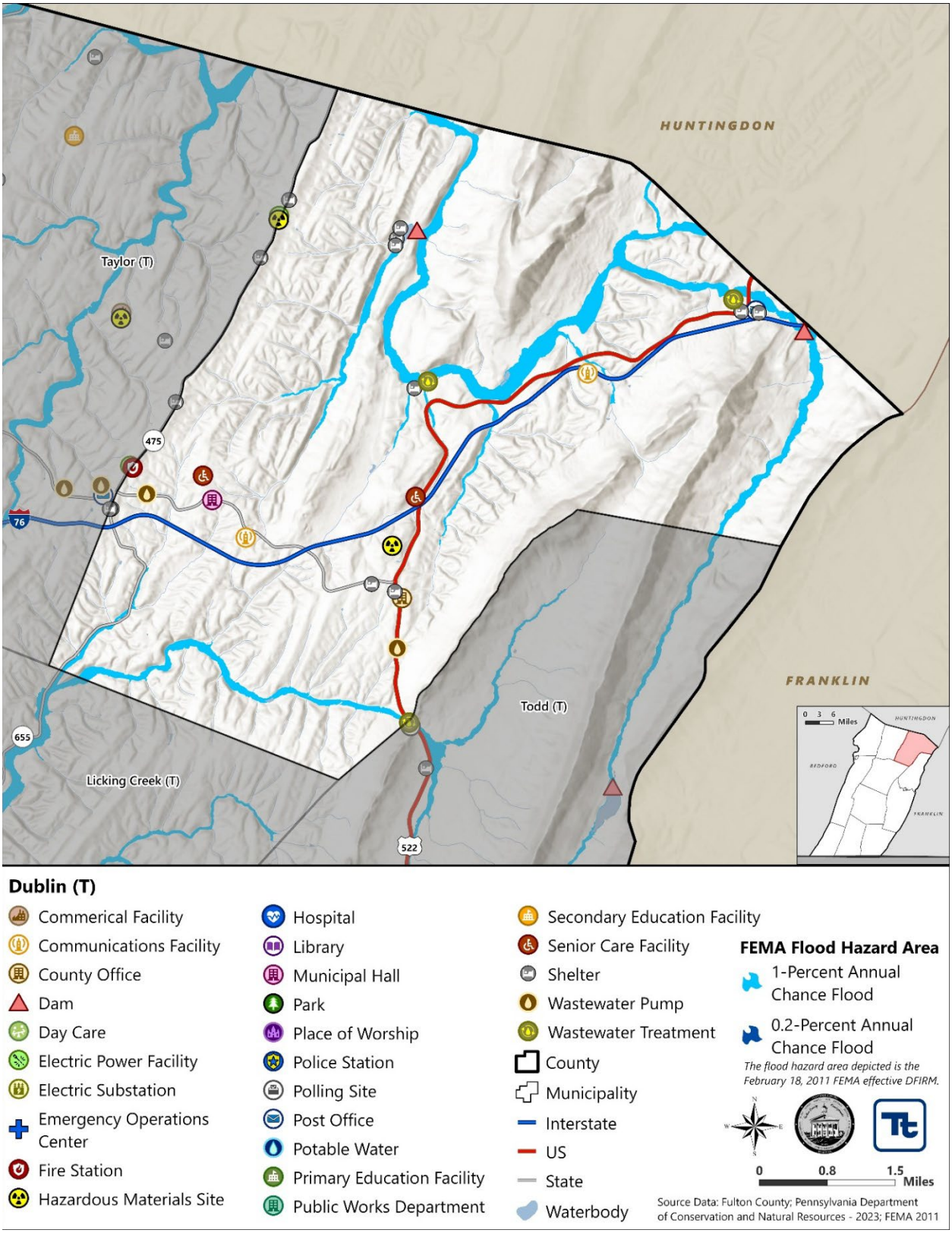


Figure 4.3.6-9 Licking Creek Township Flood Hazard Area

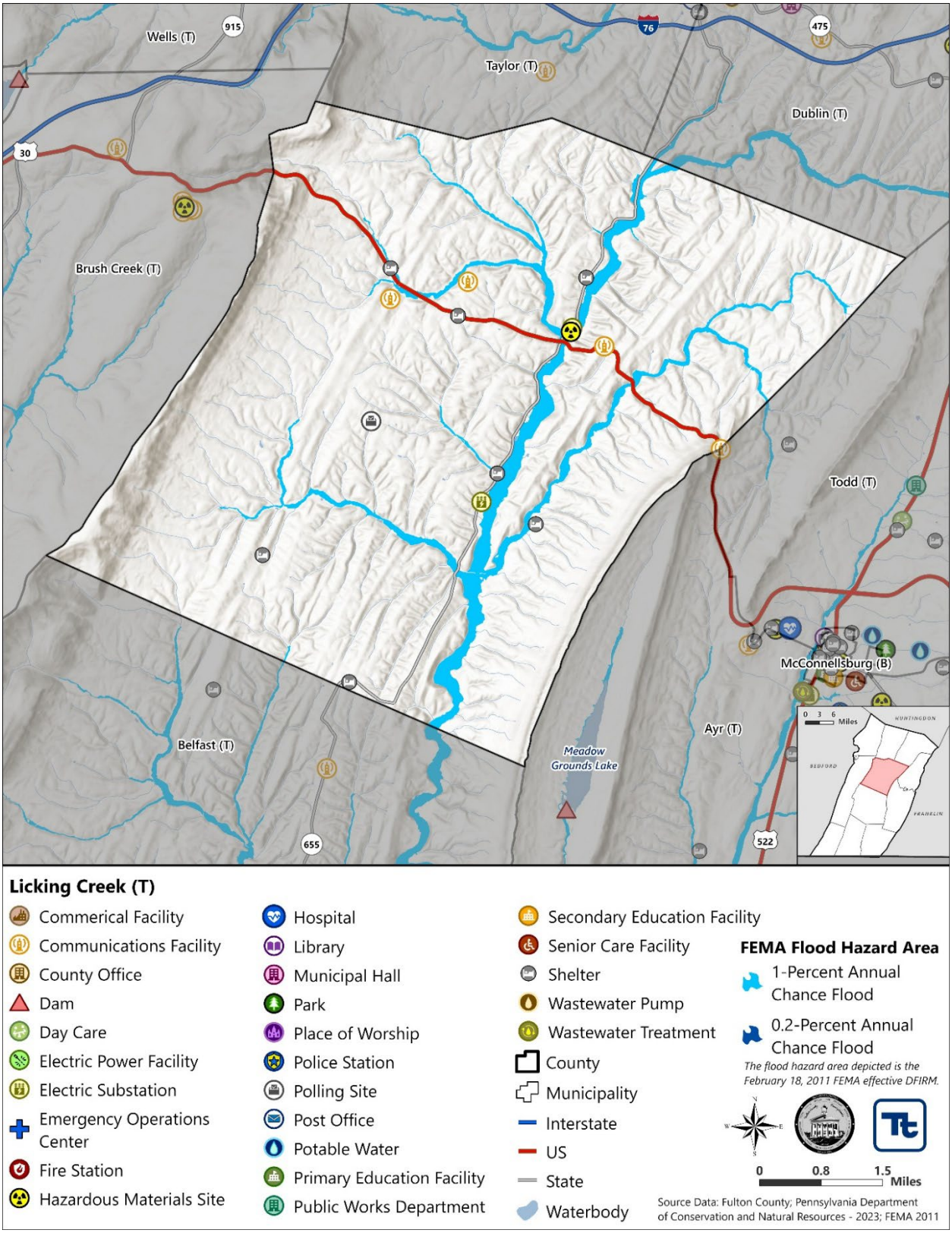


Figure 4.3.6-10 McConnellsburg Borough Flood Hazard Area

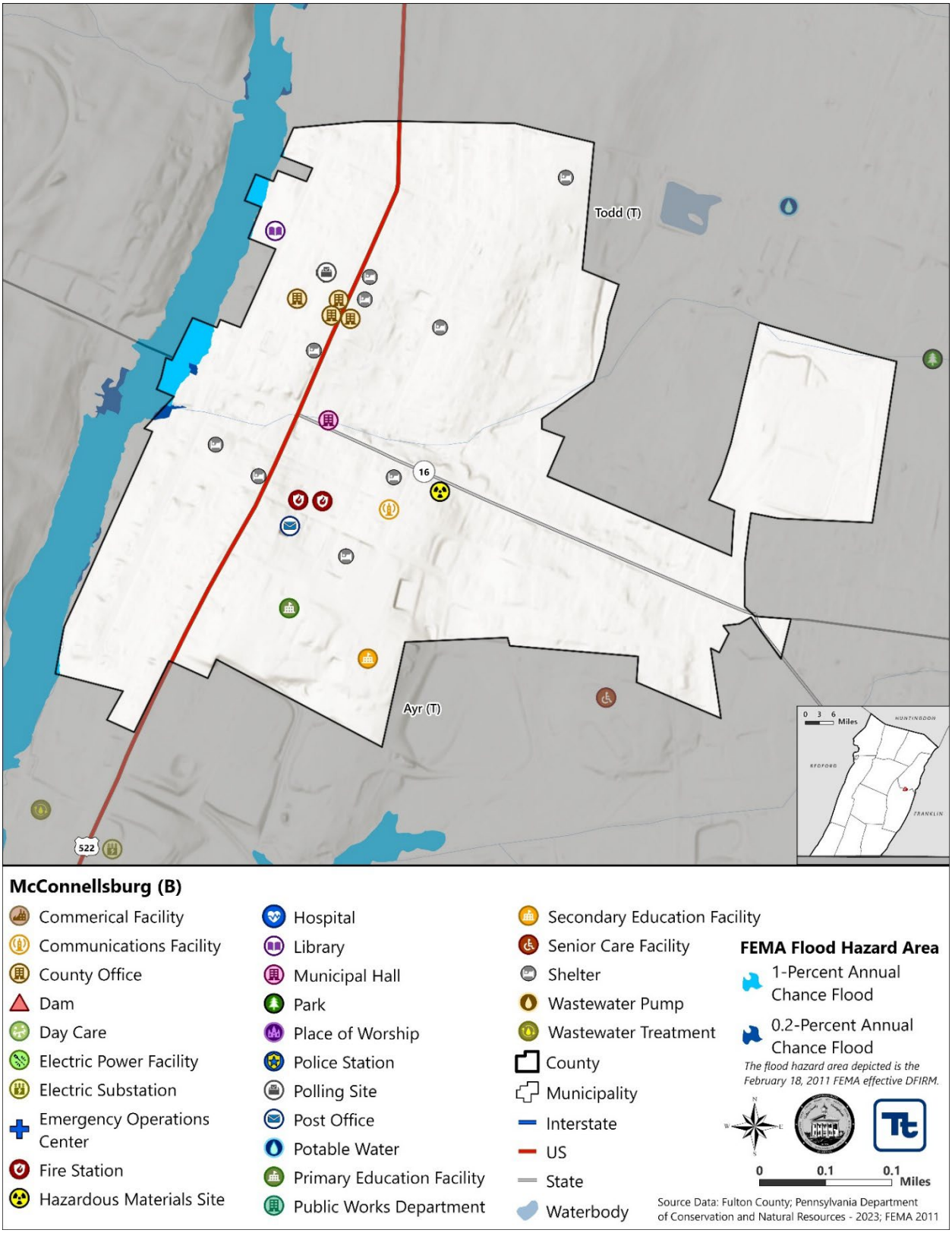
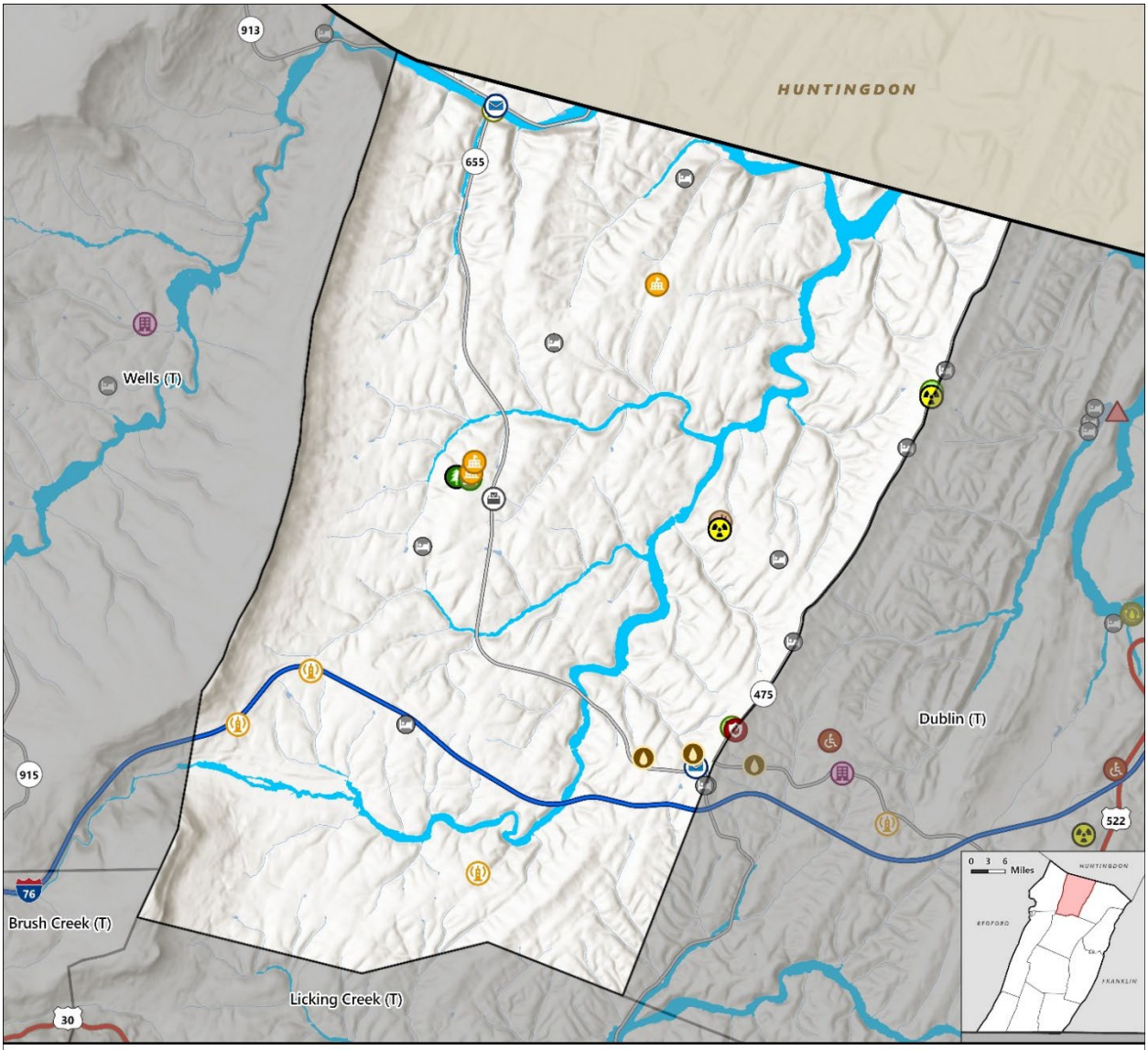


Figure 4.3.6-11 Taylor Township Flood Hazard Area



Taylor (T)

- Commerical Facility
- Communications Facility
- County Office
- Dam
- Day Care
- Electric Power Facility
- Electric Substation
- Emergency Operations Center
- Fire Station
- Hazardous Materials Site
- Hospital
- Library
- Municipal Hall
- Park
- Place of Worship
- Police Station
- Polling Site
- Post Office
- Potable Water
- Primary Education Facility
- Public Works Department
- Secondary Education Facility
- Senior Care Facility
- Shelter
- Wastewater Pump
- Wastewater Treatment
- County
- Municipality
- Interstate
- US
- State
- Waterbody

FEMA Flood Hazard Area

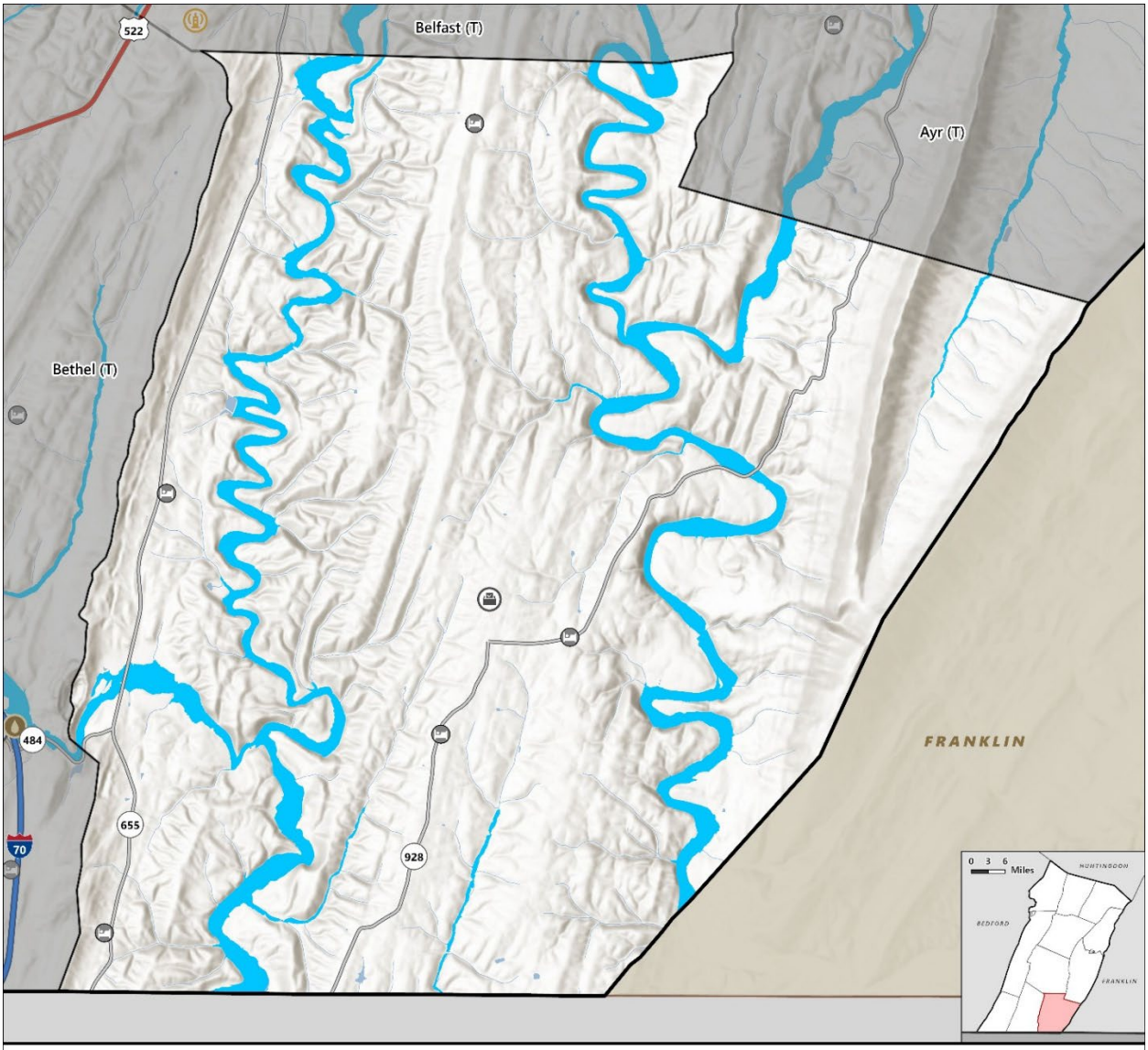
- 1-Percent Annual Chance Flood
- 0.2-Percent Annual Chance Flood

The flood hazard area depicted is the February 18, 2011 FEMA effective DFIRM.

0 0.5 1 Miles

Source Data: Fulton County; Pennsylvania Department of Conservation and Natural Resources - 2023; FEMA 2011

Figure 4.3.6-12 Thompson Township Flood Hazard Area



Thompson (T)

- Commerical Facility
- Communications Facility
- County Office
- Dam
- Day Care
- Electric Power Facility
- Electric Substation
- Emergency Operations Center
- Fire Station
- Hazardous Materials Site
- Hospital
- Library
- Municipal Hall
- Park
- Place of Worship
- Police Station
- Polling Site
- Post Office
- Potable Water
- Primary Education Facility
- Public Works Department
- Secondary Education Facility
- Senior Care Facility
- Shelter
- Wastewater Pump
- Wastewater Treatment
- County
- Municipality
- Interstate
- US
- State
- Waterbody

FEMA Flood Hazard Area

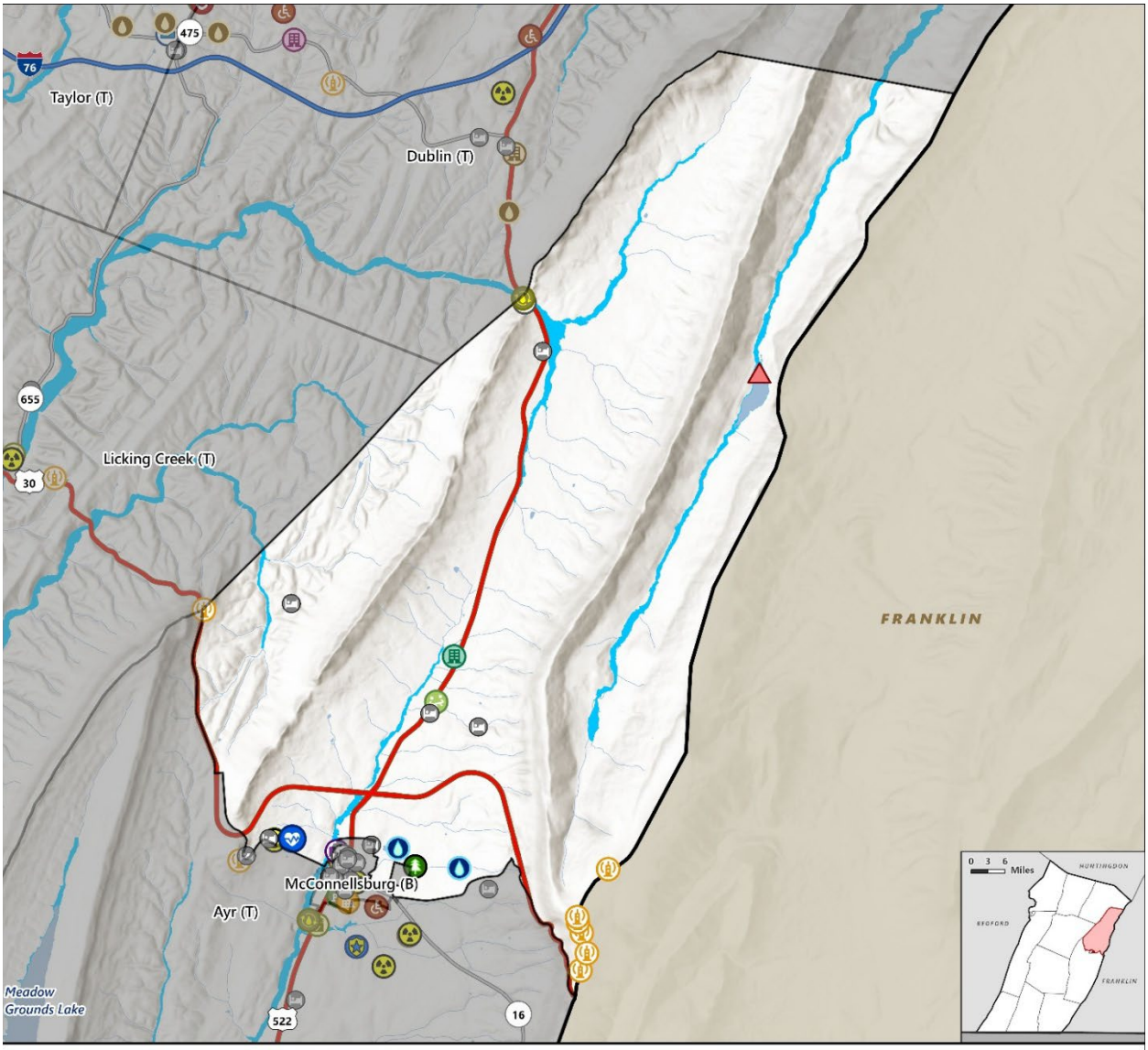
- 1-Percent Annual Chance Flood
- 0.2-Percent Annual Chance Flood

The flood hazard area depicted is the February 18, 2011 FEMA effective DFIRM.

0 0.5 1 Miles

Source Data: Fulton County; Pennsylvania Department of Conservation and Natural Resources - 2023; FEMA 2011

Figure 4.3.6-13 Todd Township Flood Hazard Area



Todd (T)

- Commerical Facility
- Communications Facility
- County Office
- Dam
- Day Care
- Electric Power Facility
- Electric Substation
- Emergency Operations Center
- Fire Station
- Hazardous Materials Site
- Hospital
- Library
- Municipal Hall
- Park
- Place of Worship
- Police Station
- Polling Site
- Post Office
- Potable Water
- Primary Education Facility
- Public Works Department
- Secondary Education Facility
- Senior Care Facility
- Shelter
- Wastewater Pump
- Wastewater Treatment
- County
- Municipality
- Interstate
- US
- State
- Waterbody

FEMA Flood Hazard Area

- 1-Percent Annual Chance Flood
- 0.2-Percent Annual Chance Flood

The flood hazard area depicted is the February 18, 2011 FEMA effective DFIRM.

0 0.8 1.5 Miles

Source Data: Fulton County; Pennsylvania Department of Conservation and Natural Resources - 2023; FEMA 2011

Figure 4.3.6-14 Union Township Flood Hazard Area

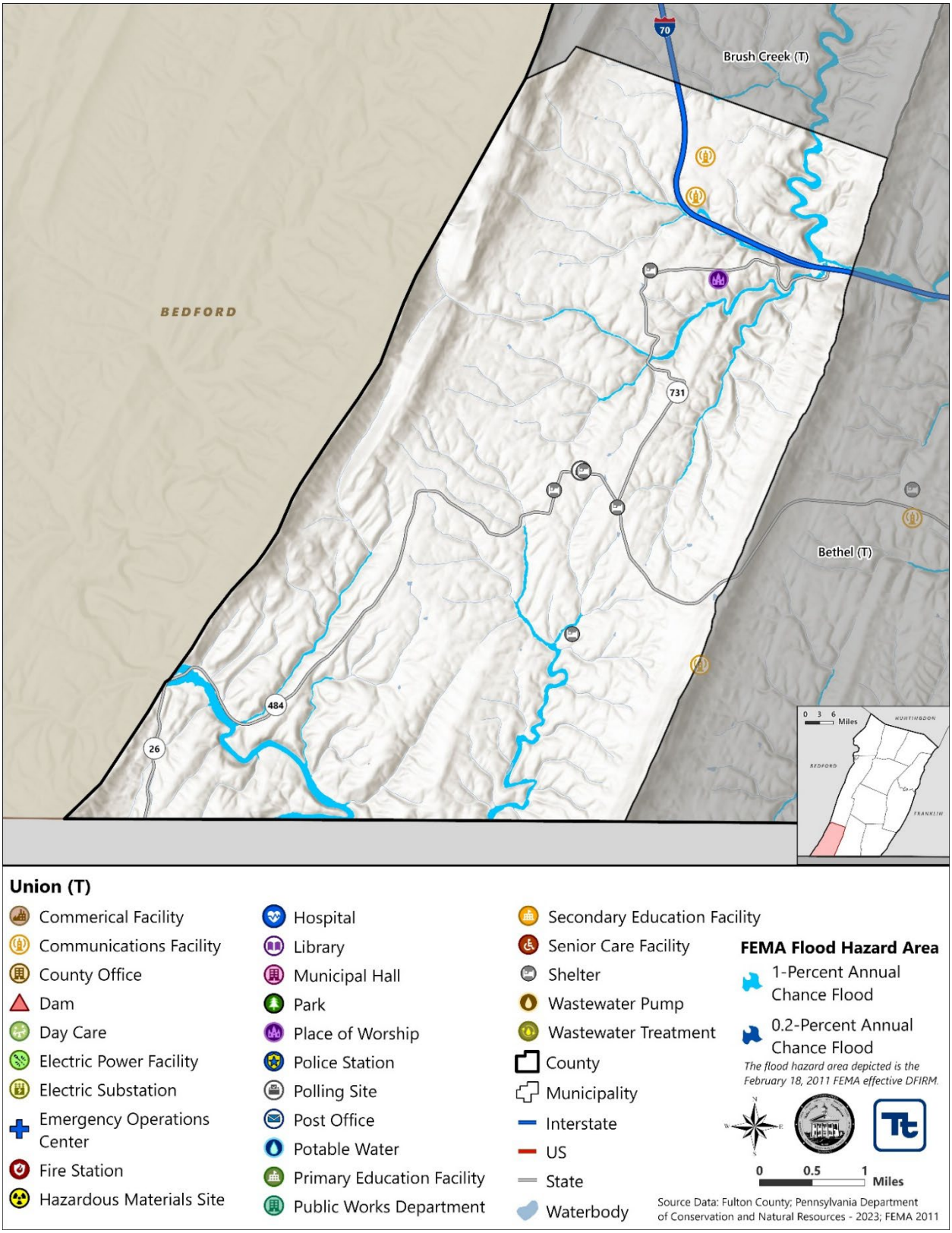


Figure 4.3.6-15 Valley-Hi Borough Flood Hazard Area

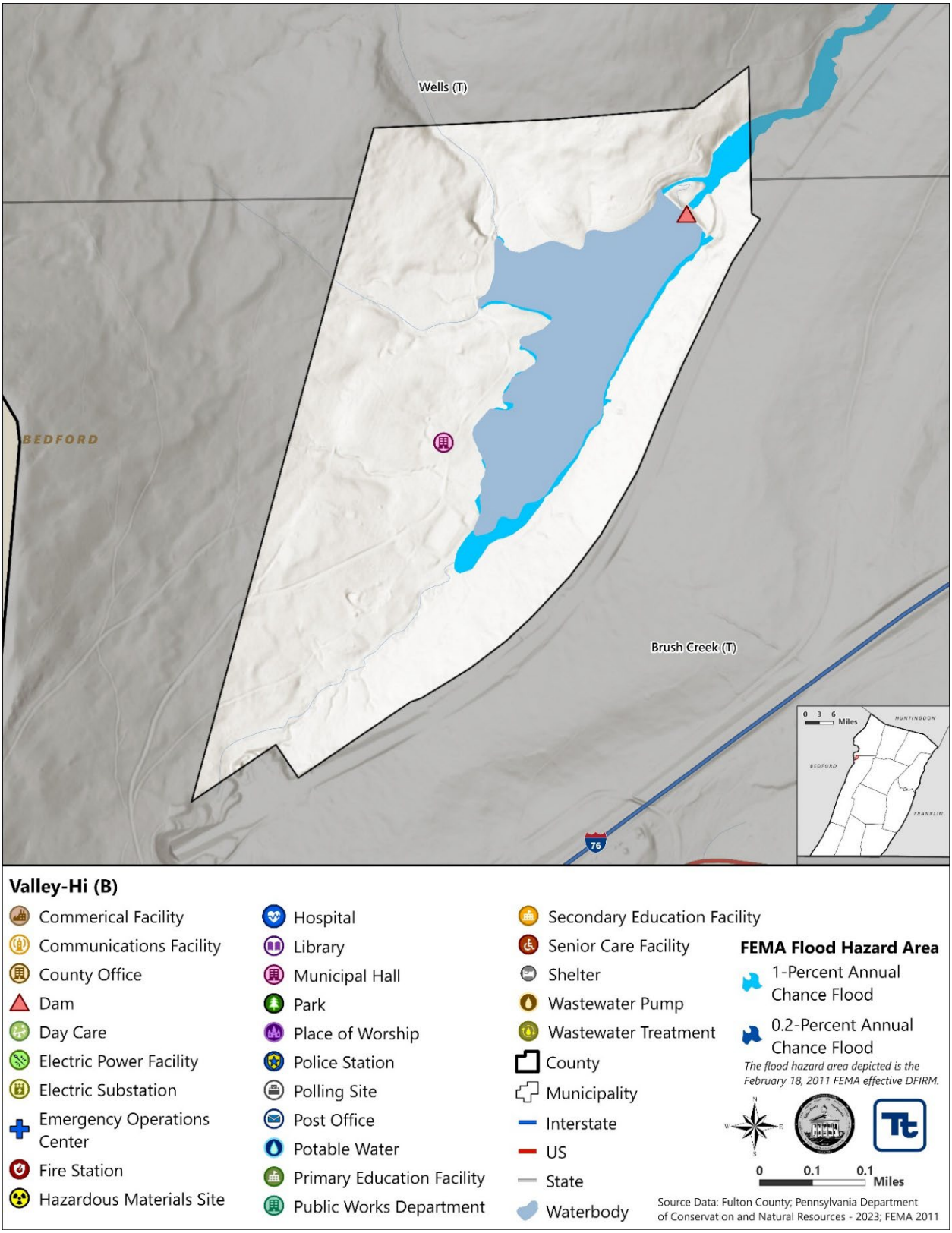
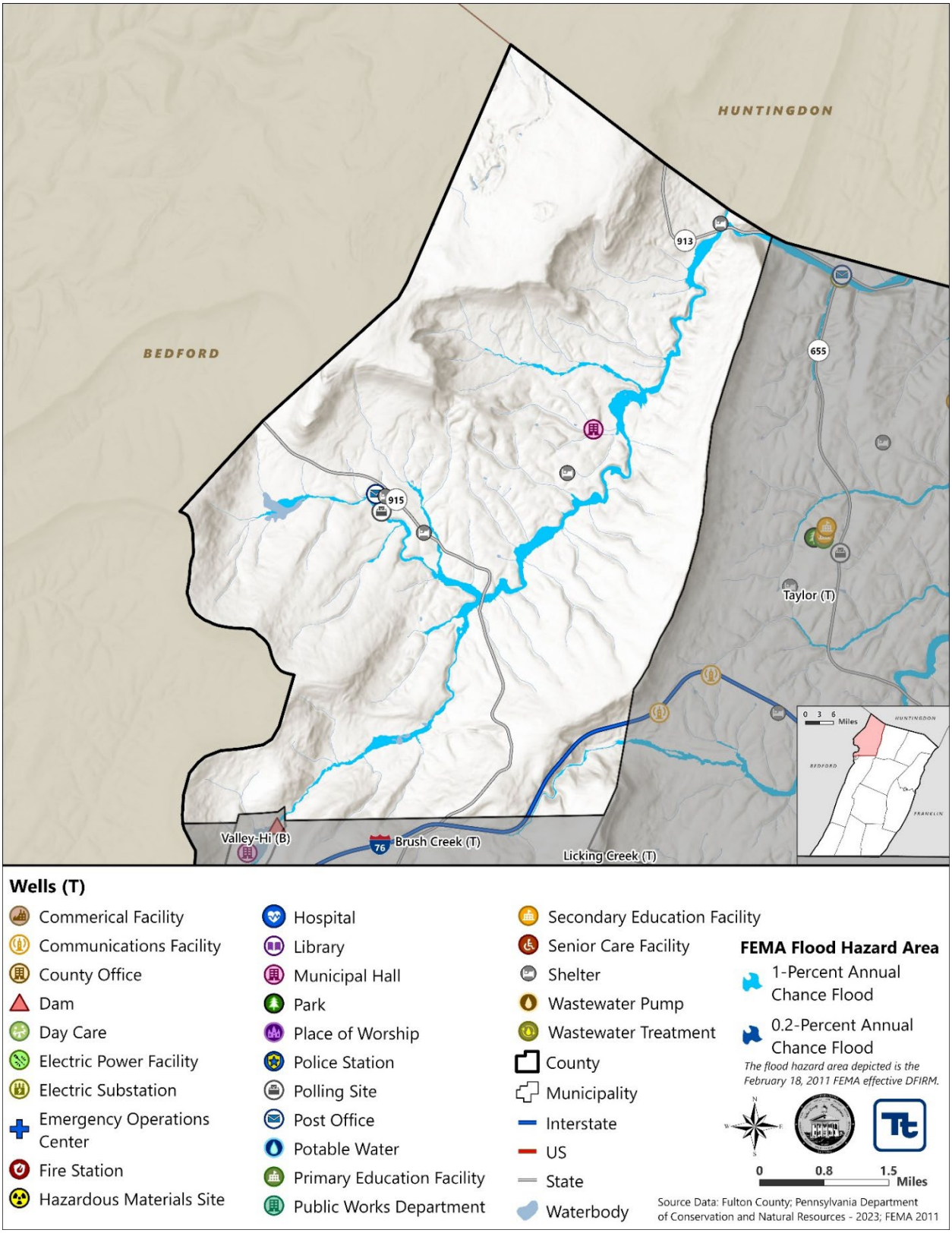


Figure 4.3.6-16 Wells Township Flood Hazard Area



4.3.7 Hailstorm

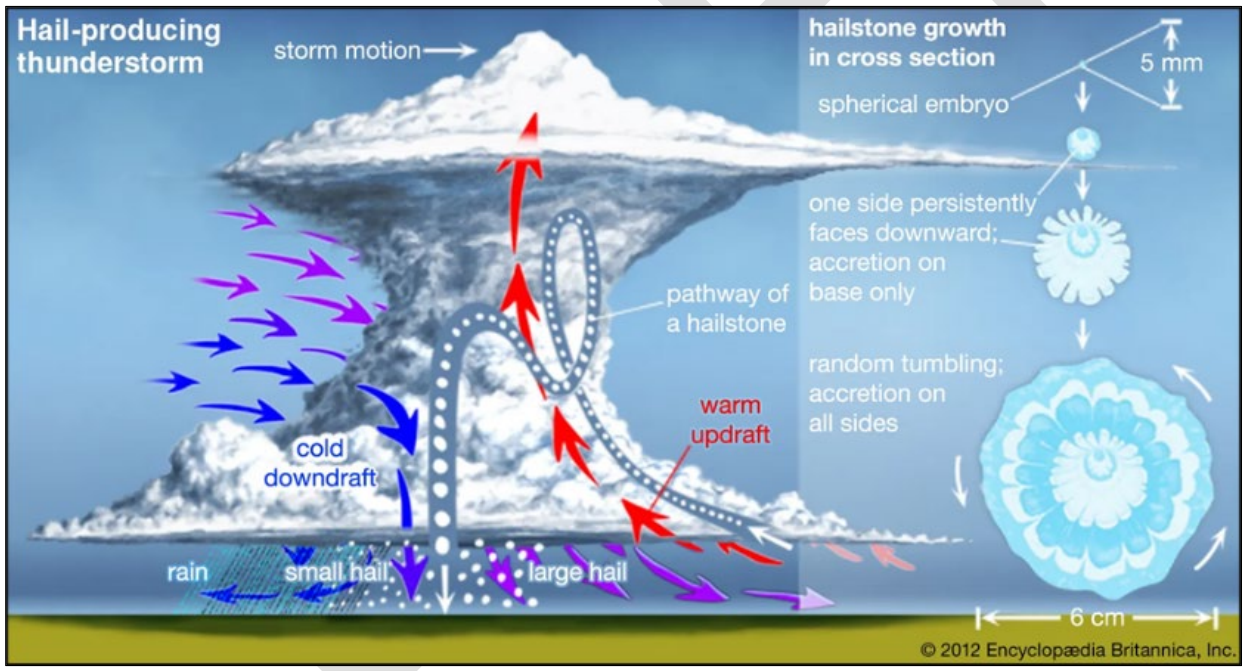
4.3.7.1 Hazard Description

This section describes the location and extent, range of magnitude, past occurrence, future occurrence, and vulnerability assessment for the hailstorm hazard for Fulton County.

Hailstorms occur when ice crystals form within a low-pressure front due to the rapid rise of warm air into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until, having developed sufficient weight, they fall as precipitation in the form of balls or irregularly shaped masses of ice greater than 0.75 inches in diameter. Hailstorms can cause significant damage to homes, vehicles, livestock, and people (PEMA 2020). Figure 4.3.7-1 illustrates the process that occurs in hail formulation.

The size of hailstones is directly related to the size and severity of the storm. The higher the temperatures at the earth's surface, the greater the strength of the updrafts, and the greater amount of time the hailstones are suspended, giving them more time to increase in size. Damage to crops and property is typically the most significant impact of hailstorms (MRCC 2023).

Figure 4.3.7-1. Hail Formation



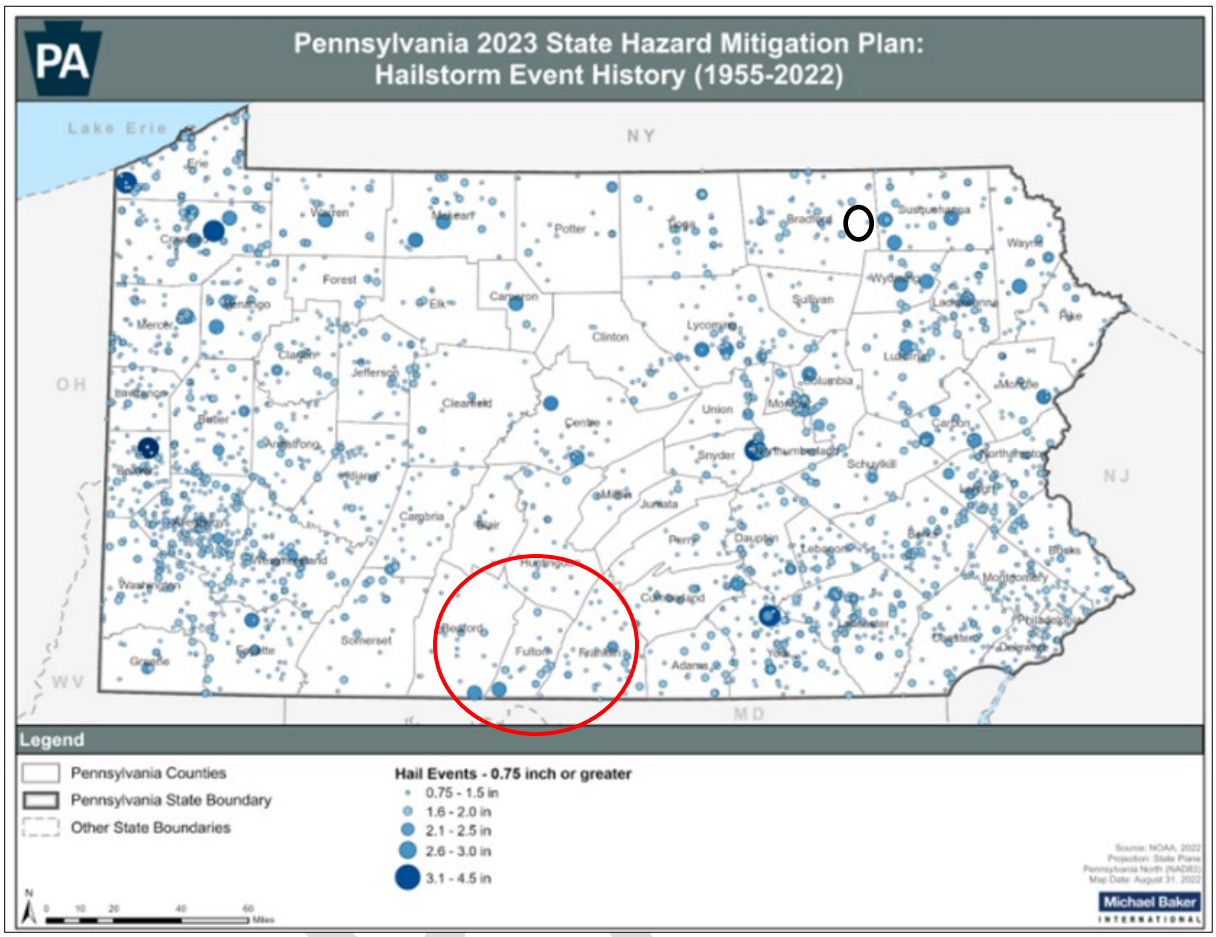
Source: Encyclopedia Britannica, 2012

4.3.7.2 Location

Hail caused over $3.5 billion in damages in 2022, a rise of more than $1 billion from 2021 due to an increase in insurance claims and dynamic economic conditions (III 2022). Hail occurs most frequently in states within the southern and central plains; however, hail damage is possible throughout the entire United States because hail may accompany a thunderstorm (NSSL 2023).

Hailstorm events can occur in all areas of Fulton County, affecting the entire planning region equally. On average, Fulton County experiences up to six hail days annually with hailstones exceeding 2.1 inches in diameter. Figure 4.3.7-2 shows the number of recorded hailstorm events in Fulton County by magnitude.

Figure 4.3.7-2. Number of Days of Hail per Year in the U.S.



Source: PEMA 2023
Note: Fulton is indicated by the red oval

4.3.7.3 Range of Magnitude

Hail can vary in size from less than one inch to several inches in diameter and can cause significant damage to crops and property. Damage depends on the size, duration, and intensity of hail precipitation. Individuals who do not seek shelter could face serious injury. Automobiles and aircraft are particularly susceptible to damage. Effects of other hazards associated with thunderstorms (strong winds, intense precipitation, and lightning) often occur concurrently because hail precipitation usually occurs during thunderstorms.

Fulton County has experienced hail ranging in size from 0.75 to 2.75 inches in diameter. No deaths or injuries due to hail have been recorded in the county (NCEI 2024). The largest recorded hail in Fulton County occurred on May 26, 2002, when thunderstorms produced baseball-sized hail near Buck Valley. The most damaging hailstorm in Fulton County occurred on May 26, 2011. During this storm event, hail fell across the county and caused over $100,000 in damage.

Hail can be produced during many different types of storms. Typically, hail occurs during thunderstorm events. The size of hail is estimated by comparing it with a known object. During most hailstorms, hail is produced in a variety of sizes, and only the very largest hail stones pose serious risk to people who are exposed. Table 4.3.7-1 shows the various sizes of hail as compared to real-world objects.

Table 4.3.7-1. Hail Size

Size	Inches in Diameter	Updraft Speed (mph)
BB	<0.25	< 24
Pea	0.25	24
Marble	0.50	35
Dime	0.70	38
Penny	0.75	40
Nickel	0.88	46
Quarter	1.0	49
Half-dollar	1.25	54
Walnut	1.5	60
Golf Ball	1.75	64
Billiard Ball	2.125	71
Tennis Ball	2.5	77
Baseball	2.75	81
Teacup	3.0	84
Softball	4.0	98
Grapefruit	4.5	103

Source: (NWS n.d.)

4.3.7.4 Past Occurrence

Hailstorms occur as a routine part of severe weather in Fulton County. The potential for hailstorms exists throughout the County, with a few minor incidents occurring each year. While the future occurrence of hailstorms in the County can be considered likely, Fulton County has a low potential for significant hail events based on previous records.

A hailstorm event is defined as a storm with hail that is 0.75 inch or greater in diameter. Previous versions of the Commonwealth of Pennsylvania HMP found that approximately 96 percent of hailstorm events occurred during the months of April, May, June, July, August, and September. In addition, approximately 87 percent of historic events occurred during the afternoon or evening. These results are consistent with the relationship between hail and thunderstorms, which most often occur during late spring, summer, and early fall months (PEMA 2023).

The NOAA-NCEI Storm Events database includes reports of hail appearing during storm incidents in Fulton County from 1950 to December 2024, as shown in Table 4.3.7-2. According to these reports, Fulton County has experienced hail ranging in size from 0.75 inch to 2.75 inches in diameter, with no deaths, injuries, or property damages reported to NOAA. Neither Fulton County, nor the Commonwealth of Pennsylvania has ever received a federal disaster declaration because of a hail event.

Table 4.3.7-2. Recorded Hail events from 1988-2024 in Fulton County

Date	Location	Diameter (in)	Deaths	Injuries	Property Damage ($)	Crop Damage ($)
5/16/1988	Fulton County	1	0	0	0	0
7/10/1995	Town Hill	1	0	0	0	0
6/4/1996	Big Cove Tannery	0.75	0	0	0	0
7/30/1996	Gracey	1.75	0	0	0	0
7/14/2000	Big Cove Tannery	1.75	0	0	2,000	0
5/26/2002	Buck Vly	2.75	0	0	0	0
5/26/2002	Needmore	1.5	0	0	0	0
6/13/2007	Akersville	0.75	0	0	0	0
5/26/2011	Dickeys Mtn	2	0	0	0	0
6/29/2012	Sideling Hill	1.75	0	0	0	0
6/29/2012	Sideling Hill	1	0	0	0	0

Date	Location	Diameter (in)	Deaths	Injuries	Property Damage ($)	Crop Damage ($)
6/24/2013	Cito	1.75	0	0	0	0
6/24/2013	Webster Mill	1.75	0	0	0	0
8/7/2013	Burnt Cabins Strip	1	0	0	0	0
5/23/2019	Needmore	1	0	0	0	0
6/4/2020	McConnellsburg	1.5	0	0	0	0
6/4/2020	McConnellsburg	1	0	0	0	0
6/4/2020	Harrisonville	1	0	0	0	0
6/4/2020	Webster Mill	1.5	0	0	0	0
6/4/2020	McConnellsburg	1	0	0	0	0

Source: NOAA NCEI 2025, Fulton County 2019

4.3.7.5 Probability of Future Occurrence

The formation of a hailstorm is not possible to predict with more than a few days' lead time. The past occurrences described above, however, indicate that hailstorm events in Fulton County present a 60.6 percent approximate probability of occurrence in any given year.

Table 4.3.7-3. Fulton County Hailstorm Future Occurrence

Hazard Type	Number of Occurrences Between 1988 and 2020	Percent Chance of Occurrence in Any Given Year
Hailstorm	20	60.6%

Source: (NCEI 2024)

Future occurrences of hailstorms can be considered *likely* as defined by the Risk Factor Methodology probability criteria (further discussed in Section 4.4).

4.3.7.6 Vulnerability Assessment

To understand risk, a community must evaluate the assets that are exposed or vulnerable within the identified hazard area. Regarding hailstorm events, the entire county has been identified as the hazard area. Therefore, all assets in Fulton County (population, structures, critical facilities, and lifelines), as described in the County Profile (Section 2), are vulnerable.

Overview of Vulnerability

The entire County, including all critical infrastructure, is vulnerable to the effects of hail, as the storm cells that produce the hailstorm hazard can develop over any part of the region. The area of damage caused by these storms is relatively small because a single storm is unlikely to cause widespread devastation but may cause damage within a focused area.

Hail can cause serious damage to automobiles, aircraft, skylights, livestock, and crops. Areas of the County with large amounts of farmland and high agricultural yields are more likely to be affected by the hailstorm hazard.

Impact on Life, Health, and Safety

The entire population of Fulton County is considered exposed to the hailstorm hazard. People outdoors (for example, pursuing recreational activities and farming) are considered most vulnerable to the hazard because they ordinarily would receive little to no warning, and shelter may not be available to them. Moving to a lower-risk location decreases a person's vulnerability.

Impact on General Building Stock

Hailstorms can significantly impact building stock in Fulton County. Facilities most vulnerable to hail damage include those with large roof surfaces, older construction materials, or limited structural reinforcement, many of which are found in both urban and rural areas. Historical records indicate that Fulton County has experienced property damage from hail events, including one documented incident resulting in $2,000 in property damage (per NCEI records). Although hailstorms are unpredictable, they have the potential to cause substantial damage to residential, commercial, and public buildings. Current loss estimates are based on historical property damage data and the presence of vulnerable structures throughout the County.

Impact on Critical Facilities

Full functionality of critical facilities such as police, fire, and medical services are essential for any emergency response during and after a hailstorm event. The structures that compose these critical facilities are largely constructed of concrete and masonry; therefore, these are unlikely to face significant structural damage from a hailstorm event. Because power interruption can occur, backup power is recommended for critical facilities and infrastructure.

Impact on the Economy

As discussed above in, Fulton County has not experienced historical hailstorm property damage and significant crop damage ($2,000 in property damage claims per NCEI records). However, given the unpredictability of hailstorms, significant property and crop damage is possible during any hailstorm event. Jurisdictional loss estimation is based on lost agricultural revenues throughout the County. The USDA Census of Agriculture enumerates farmland acreage by county, as well as the annual market value of all agricultural products sold by county, from year 2022. If a hailstorm would eliminate the entire agricultural yield in Fulton County, total losses on the County's 501 farms could reach $90,564,000 (USDA 2022).

Impact on the Environment

Damage to trees, shrubbery, and other vegetation may occur during hailstorm events through defoliation. Unless there are compounding stresses, natural vegetation can typically recover over time following the event (PEMA 2023)

Future Growth and Development

Areas targeted for potential future growth and development within the next 5 to 10 years have been identified across Fulton County and are further discussed in Section 2.4 of this HMP. New developments and new residents are expected to be exposed to the hailstorm hazard in the future.

Expected Future Conditions

The definition of "climate" includes not only average temperature and precipitation, but also the type, frequency, and intensity of weather events. On both global and local scales, shifts in weather patterns could influence the prevalence and severity of extreme events such as hailstorms. While predicting changes in storm behavior is complex, understanding vulnerabilities to potential shifts in weather extremes is a critical part of assessing future risks to human health, society, and the environment (US EPA 2021).

As directed by the Climate Change Act (Act 70 of 2008), Pennsylvania's Department of Environmental Protection (PADEP) initiated a study of potential impacts of global climate change on the Commonwealth. The 2021 Pennsylvania Climate Impact Assessment found that Pennsylvania is likely to experience increased temperatures over the 21st century. Greater variability in temperature and precipitation may lead to more frequent and severe hailstorm events. As modeling of smaller-scale atmospheric processes, such as thunderstorms and hailstorms, continues to improve, so too will our understanding of how expected future conditions may influence the behavior and intensity of these storm events in Pennsylvania. (PA DEP 2021).

DRAFT

4.3.7.7 Additional Data and Next Steps

The assessment above identifies vulnerable populations and potential structural and economic losses associated with this hazard of concern. Collection of additional information and actual loss data specific to the plan participants will further enhance Fulton County's vulnerability assessment.

DRAFT

4.3.8 Landslide

4.3.8.1 Hazard Description

This section provides a profile and vulnerability assessment of the landslide hazard in Fulton County. According to the U.S. Geological Survey (USGS), the term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows (USGS n.d.). Landslides are classified by type of material involved and the type of movement. In addition, they are classified at the rate of movement and the water content of the material. Movement rates range from inches over many years to many feet per second (USGS 2004).

Landslides can be caused by a variety of factors, including earthquakes, storms, fire, and human modification of land. Areas that are generally prone to landslide hazards include previous landslide areas, areas on or at the base of slopes, the base of drainage hallows, developed hillsides with leach field septic systems, and areas recently burned by forest and brush fires (PEMA 2023).Human activities that contribute to slope failure include altering the natural slope gradient, increasing soil water content, and removing vegetation cover.

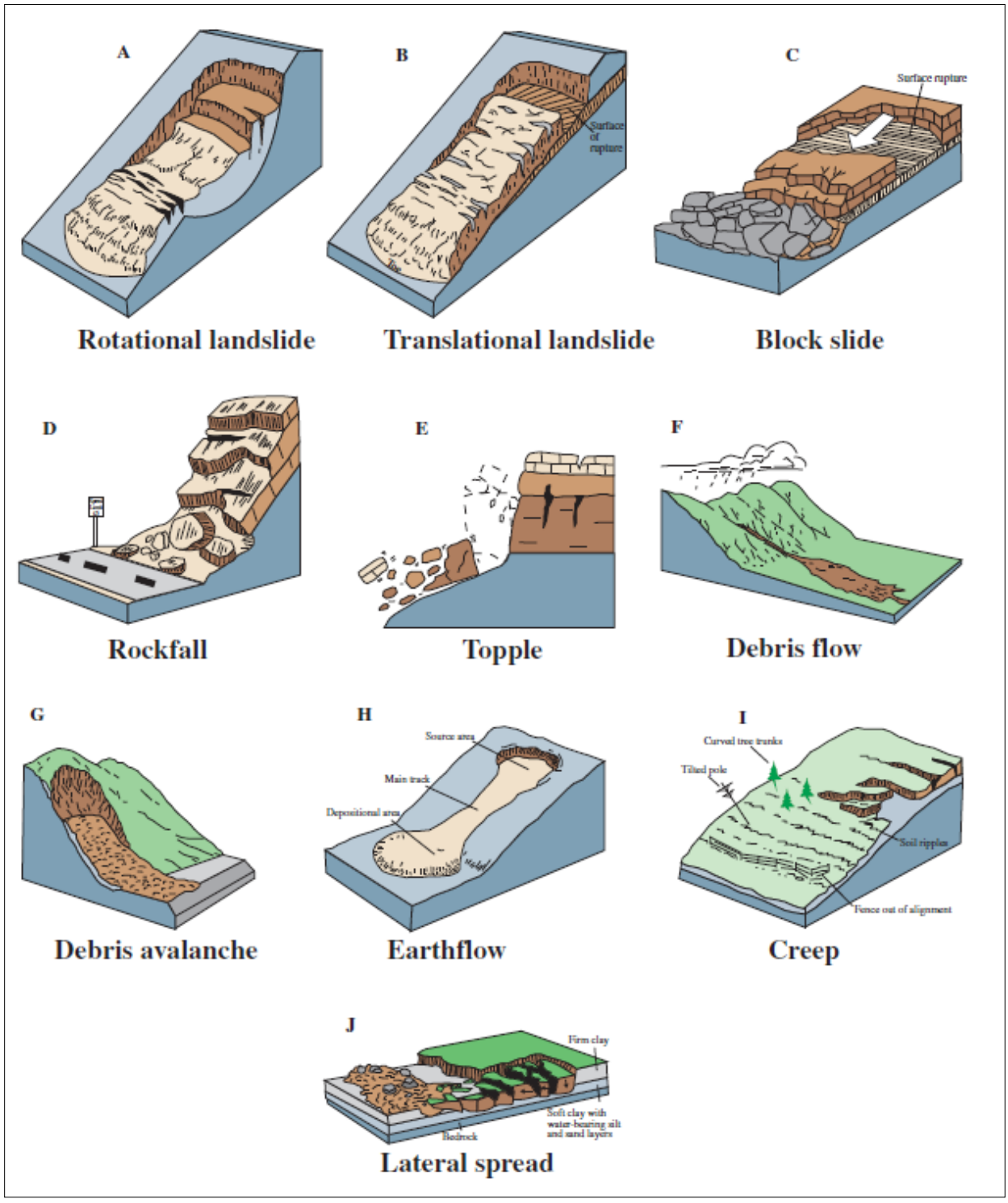
Landslide Types

The most common types of landslides are described as follows and are illustrated in Figure 4.3.8-1.

A. **Rotational slides**—Slides in which the surface of rupture is curved upward, and the slide movement rotates parallel to the ground surface.
B. **Translational slides**—Slides in which the mass moves along a roughly flat surface with little rotation.
C. **Block slide -** A translational slide in which the moving mass consists of a single unit or a few closely related units that move downslope as a relatively coherent mass.
D. **Falls**—Abrupt movements of geologic materials, such as rocks and boulders, that become detached from steep slopes or cliffs. Falls are strongly influenced by gravity, weathering, and the presence of water in a mineral's pores.
E. **Topples**—Slides involving the forward rotation of a unit about some point under the actions of gravity and forces exerted by surrounding objects or by fluids in cracks.
F. **Debris flows**—Rapid mass movements in which loose soil, rock, organic matter, air, and water mobilize as a slurry that flows downslope. Commonly caused by intense surface water flow due to heavy rain or rapid snowmelt that erodes loose soil or rock on steep slopes.
    a. **Post-Wildfire Debris Flows**—Debris flows resulting from post-fire conditions, where burned soil surfaces enhance rainfall runoff that concentrates and picks up debris as it moves.
G. **Debris avalanches**—Debris flows that travel faster than about 10 miles per hour (mph). Speeds over 20 mph are not uncommon, and speeds over 100 mph, although rare, can occur. The slurry can travel miles from its source, growing as it descends, picking up trees, boulders, cars, and anything else in its path.
H. **Earthflows**—Landslides with an "hourglass" shape. The slope material liquefies and runs out, forming a bowl or depression at the head.
    a. **Mudflow –** This is an earthflow consisting of material that is wet enough to flow rapidly and contains at least 50 percent sand-, silt-, and clay-sized particles. This is sometimes referred to as "mudslides".
I. **Creep**—Slow, steady, downward movements of slope-forming soil or rock. Creep is indicated by curved tree trunks, bent fences or retaining walls, tilted poles or fences, and small soil ripples or ridges.

J. **Lateral Spreads**—Slides on very gentle slopes or flat terrain caused by liquefaction, the process whereby saturated, loose sediments are transformed from a solid into a liquefied state. The failure starts suddenly in a small area and spreads rapidly.

Figure 4.3.8-1. Major Types of Landslides



Source: (USGS 2004).

4.3.8.2 Location and Extent

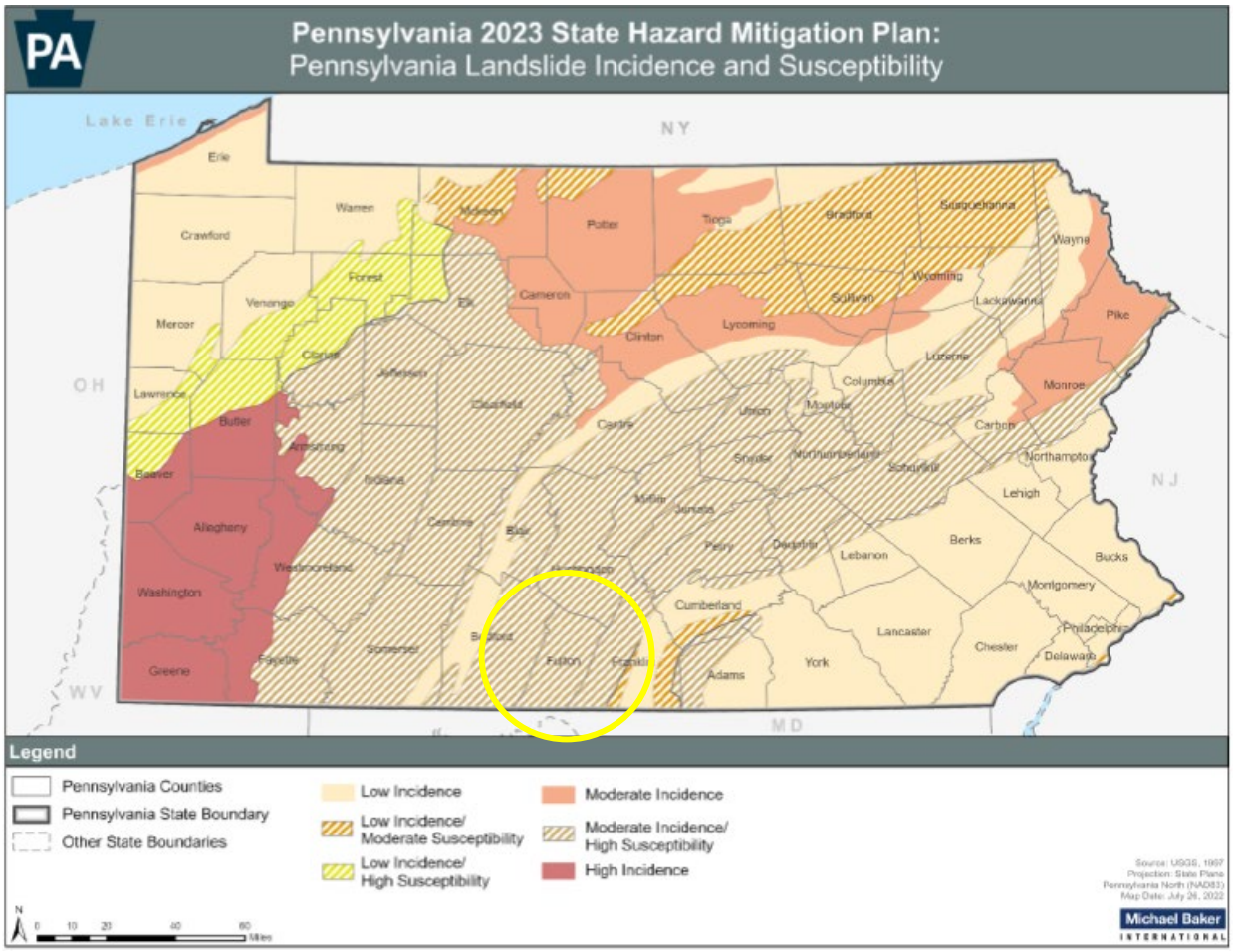
Landslides have occurred in many parts of Pennsylvania but are most abundant and dangerous in the Appalachian Plateaus of western and north-central Pennsylvania (PEMA 2023). According to Pennsylvania's Department of Conservation and Natural Resources, most major and minor highways have sections cut in rock or soil that can lead to slope failure. Steep mountain slopes across Pennsylvania have experienced debris avalanches associated with extreme rainfall or rain-on-snow events. Additionally, urban and rural land development is increasing the number of landslide occurrences (Delano and Wilshusen 2001).

To determine the extent of a landslide hazard, the affected areas need to be identified, and the probability of the landslide occurring within some time period needs to be assessed. Natural variables that contribute to the potential for landslide activity in a given area include soil properties, topographic position and slope, and historical incidence. USGS mapping of landslide potential in the United States bases the hazard on landslide incidence and susceptibility, as defined below (Radbruch-Hall 2013):

- Landslide incidence is the number of landslides that have occurred in a given geographic area. Unusually high precipitation or changes in existing conditions can initiate landslide movement in areas where rocks and soils have experienced numerous landslides in the past. In the USGS mapping, high incidence means greater than 15 percent of a given area has been involved in landsliding; medium incidence means that 1.5 to 15 percent of an area has been involved; and low incidence means that less than 1.5 percent of an area has been involved.
- Landslide susceptibility is defined as the probable degree of response of geologic formations to natural or artificial cutting, to loading of slopes, or to unusually high precipitation. Landslide susceptibility depends on slope angle and the geologic material underlying the slope. Landslide susceptibility only identifies areas potentially affected and does not imply a time frame when a landslide might occur. High, medium, and low susceptibility are delimited by the same percentages used for classifying the incidence of landsliding.

Figure 4.3.8-2 shows the landslide-susceptible areas across the Commonwealth. Most of Fulton County is noted as having moderate incidence and high susceptibility to landslides. For the purposes of this planning effort, any area with a slope greater than 25 percent is considered the hazard area. Figure 4.3.8-3 shows that almost every municipality in the county has at least some areas with 25 percent or greater steepness.

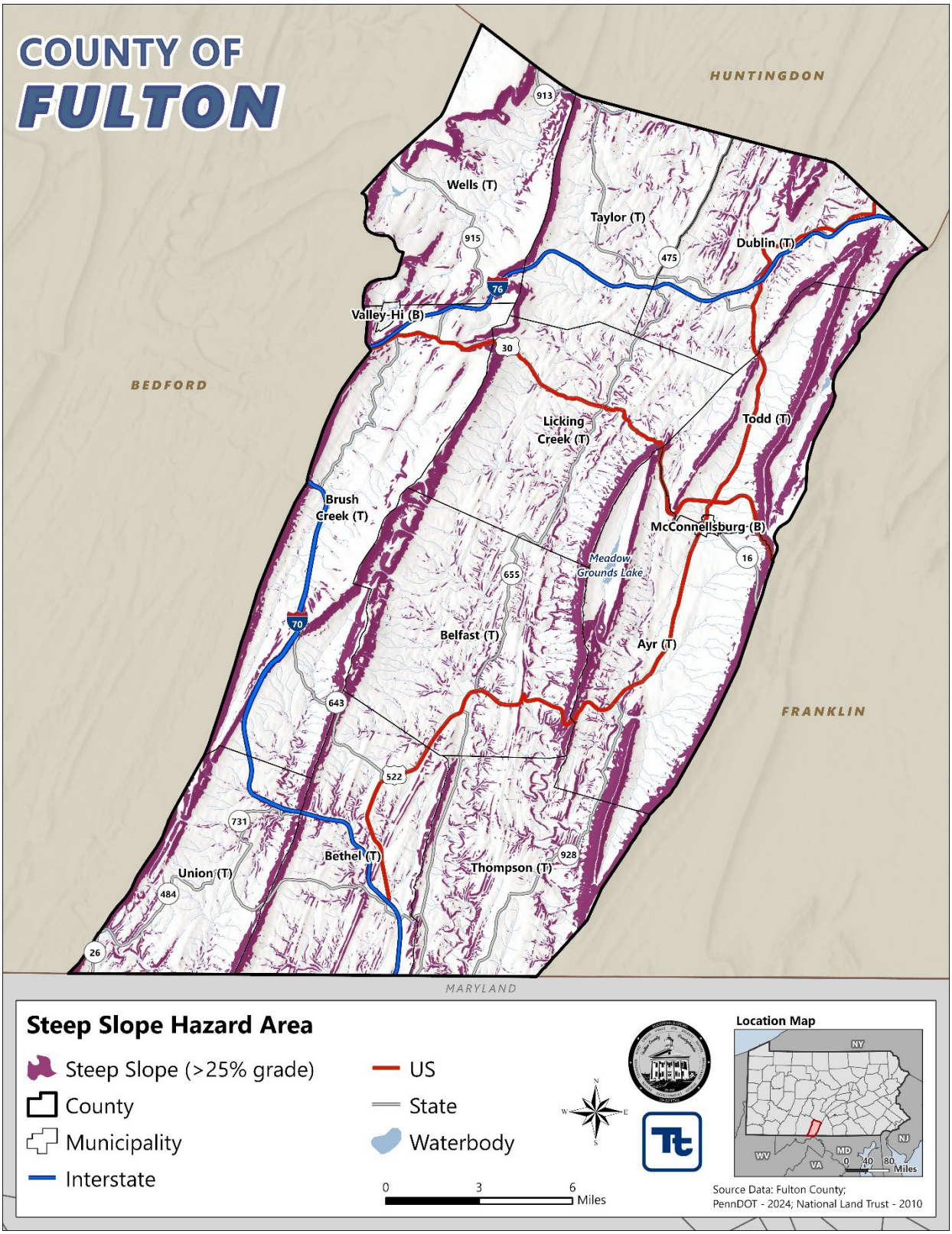
Figure 4.3.8-2. Areas of Pennsylvania Susceptible to Landslides



Source: *PEMA 2023*

Note: *The yellow circle indicates the approximate location of Fulton County. The eastern portion of Fulton County is shown as having a moderate incidence and high susceptibility to landslide.*

Figure 4.3.8-3. Landslide Hazard Area in Fulton County



4.3.8.3 Range of Magnitude

Landslides have the potential to damage transportation routes, utilities, and buildings. They can also create travel delays and other side effects. Deaths and injuries caused by landslides are rare in Pennsylvania, and most landslides in the commonwealth are moderate to slow moving, damaging things rather than people. Almost all of the known deaths caused by landslides have occurred when rockfalls or other slides along highways have involved vehicles. Storm-induced debris flows are the only other type of landslide likely to cause death and injuries (PEMA 2023).

PennDOT and large municipalities incur substantial costs due to landslide damage and to extra construction costs for new roads in known landslide-prone areas. A PennDOT estimate in 1991 showed an average of $10 million per year in landslide repair contracts across the Commonwealth and a similar amount in mitigation costs for grading projects (Delano and Wilshusen 2001).

The impact of landslides on the environment depends on the size and specific location of the event. In general, impacts include (PEMA 2023):

- Changes to topography.
- Damage or destruction of vegetation.
- Potential diversion or blockage of water in the vicinity of streams, rivers, etc.
- Increased sediment runoff both during and after the event.

Fulton County's worst-case scenario would be an event similar to one in Beaver County in 1942 (PEMA 2018). In that event, 150 cubic yards of rock fell from a highway cut onto a bus. Twenty-two people were killed, and four others were injured.

4.3.8.4 Past Occurrence

A comprehensive inventory of landslide events across the commonwealth is not available, and the USGS does not maintain a formal inventory of landslides. However, the USGS Landslide Hazards Program collects data as events are reported to the agency (PEMA 2023). Outside of impacts on important transportation routes, landslide history is not documented as completely as other hazards. Because landslides are not always seen, historical landslide occurrences in Fulton County are not well known.

Neither the Federal Emergency Management Agency (FEMA), the National Centers for Environmental Information (NCEI), nor the County have any records of landslides in the county. Between 1954 and 2024, FEMA issued a disaster (DR) or emergency (EM) declaration for Pennsylvania for one geological hazard-related event, classified as severe storms, flooding, and mudslide. This declaration (DR-1649-PA) did not include Fulton County.

4.3.8.5 Future Occurrence

Based upon risk factors but lack of occurrences, it is unlikely landslides will occur in Fulton County in the future. However, severity of the landslides can vary depending on the type and location of the event. Landslide probabilities are largely a function of surface geology but are also influenced by both weather and human activities.

If mismanaged, intense development in steeply sloped areas could increase the frequency of a landslide occurrence. Periods of intense rain or snowmelt can also increase the risk of landslides. Building and road construction are contributing development factors to landslides, as they can often undermine or steepen otherwise stable soil. Increased deforestation and soil disturbances caused by development on sloped areas further increases these risks. As timbering and development of sloped land continue, the risk of significant

landslides increases. The probability of future occurrence of landslides in Fulton County, according to FEMA's National Risk Index, is very low and has score of 8.3 (FEMA NRI 2025)

Based on available historical data, the future occurrence of landslides can be considered *unlikely* as defined by the Risk Factor Methodology probability criteria (refer to Section 4.4).

4.3.8.6 Vulnerability Assessment

To understand risk, a community must evaluate what assets are exposed and/or vulnerable to the identified hazard. Because of the lack of spatially delineated landslide hazard areas in the county, a spatial analysis referenced areas with slopes greater than 25 percent to delineate the landslide hazard area. Slope degrees greater than 25 percent are categorized as the most at-risk slopes in the study.

Impact on Life, Health, and Safety

Generally, a landslide event would be an isolated incidence and impact the populations within the immediate area of the incident. Specifically, the populations located downslope of the landslide hazard areas are particularly vulnerable to this hazard. In addition to causing damage to residential buildings and displacing residents, landslide events can block off or damage major roadways and inhibit travel for emergency responders or populations trying to evacuate the area.

Table 4.3.8-1 summarizes the population located in the landslide-susceptible hazard area or areas where slopes have degree angles greater than 25 percent. Ayr Township has the greatest number of persons located in the landslide-susceptible hazard area, with 66 people, or 3.4 percent of its total population.

Table 4.3.8-1. Estimated Fulton County Population Vulnerable to the Landslide Hazard Area

Jurisdiction	American Community Survey 5-Year Population Estimates (2022)	Population in the Steep Slope (>25% Slope Angle) Hazard Area	
		Number of Persons	% of Jurisdiction Total
Ayr (T)	1,969	66	3.4%
Belfast (T)	1,401	37	2.6%
Bethel (T)	1,443	35	2.4%
Brush Creek (T)	587	4	0.7%
Dublin (T)	1,175	10	0.9%
Licking Creek (T)	1,575	31	2.0%
McConnellsburg (B)	1,056	0	0.0%
Taylor (T)	1,164	2	0.2%
Thompson (T)	949	18	1.9%
Todd (T)	1,797	17	0.9%
Union (T)	991	5	0.5%
Valley-Hi (B)	3	0	0.0%
Wells (T)	435	0	0.0%
Fulton County (Total)	**14,545**	**225**	**1.5%**

Sources: U.S. Census Bureau, American Community Survey 2022; Natural Lands Trust 2010

At risk populations (e.g., the elderly and low-income populations) are particularly vulnerable to a landslide event. Table 4.3.8-2 displays the vulnerable persons located in the hazard area by jurisdiction. There are approximately 3,177 persons over 65, and 10 percent of the population is living below the poverty level in Fulton County

(Census 2022). Ayr Township has the greatest elderly population (17 people) and the greatest low-income population (4 people). Ayr Township is also the jurisdiction with greatest number of exposed persons (66). Economically disadvantaged populations are more vulnerable because they may be unable to evacuate their homes due to a lack of transportation, lack of a safe place to which to evacuate, or lack of financial resources (e.g., cannot afford temporary lodging). The population over the age of 65 is more vulnerable because they are more likely to seek or need medical attention, which may not be available because of isolation during an emergency; they may also have more difficulty evacuating. Special consideration should be taken when planning for disaster preparation, response, and recovery for these vulnerable groups.

Table 4.3.8-2. Estimated Fulton County Vulnerable Population Vulnerable to the Landslide Hazard Area

Jurisdiction	Estimated Number of Vulnerable Persons Located in the Steep Slope (>25% Slope Angle) Hazard Area									
	Persons Over 65	Percent of Total	Persons Under 5	Percent of Total	Non-English Speaking Persons	Percent of Total	Persons with a Disability	Percent of Total	Persons in Poverty	Percent of Total
Ayr (T)	17	3.2%	2	2.4%	0	0.0%	13	3.3%	4	2.8%
Belfast (T)	9	2.6%	2	2.4%	0	0.0%	7	2.5%	3	2.3%
Bethel (T)	7	2.3%	1	2.1%	0	0.0%	5	2.1%	2	1.7%
Brush Creek (T)	1	0.6%	0	0.0%	0	0.0%	1	0.6%	0	0.0%
Dublin (T)	2	0.8%	0	0.0%	0	0.0%	1	0.5%	1	0.6%
Licking Creek (T)	6	1.9%	1	1.2%	0	0.0%	6	2.0%	3	1.9%
McConnellsburg (B)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Taylor (T)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Thompson (T)	3	1.9%	1	1.9%	0	0.0%	2	1.4%	1	1.1%
Todd (T)	3	0.9%	0	0.0%	0	0.0%	2	0.7%	1	0.7%
Union (T)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Valley-Hi (B)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Wells (T)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Fulton County (Total)	**48**	**1.5%**	**7**	**1.0%**	**0**	**0.0%**	**37**	**1.4%**	**15**	**1.0%**

Source: U.S. Census Bureau, American Community Survey 2022; Natural Lands Trust 2010

Impact on General Building Stock

In general, the built environment located in the landslide-susceptibility area and the population, structures, and infrastructure located downslope are vulnerable to this hazard. Landslides also have the potential of destabilizing the foundation of structures, which may result in monetary losses to businesses and residents. There are 111 buildings with a replacement cost value of $98 million located in the landslide hazard area countywide (1.1 percent of the total replacement cost value of the county). Ayr Township has the greatest number of buildings and estimated replacement cost value located in the landslide-susceptible hazard area, with 31 buildings totaling more than $10 million in replacement cost value. Table 4.3.8-3 summarizes the exposed building stock located in the landslide-susceptibility area throughout the county by jurisdiction.

In addition, Fulton County has a total of 104 residential buildings, and seven commercial buildings within the landslide-susceptible hazard area, as shown in Table 4.3.8-4.

Table 4.3.8-3. Estimated General Building Stock Exposure to the Landslide Hazard Area

	Jurisdiction Total Buildings		Buildings in the Steep Slope (>25% Slope Angle) Hazard Area			
			Number of Buildings		Replacement Cost Value	
Jurisdiction	Count	Replacement Cost Value	Count	% of Jurisdiction Total	Value	% of Jurisdiction Total
Ayr (T)	1,164	$1,376,426,042	31	2.7%	$10,348,880	0.8%
Belfast (T)	751	$655,413,691	15	2.0%	$4,762,223	0.7%
Bethel (T)	877	$994,651,759	19	2.2%	$36,638,779	3.7%
Brush Creek (T)	530	$839,701,214	3	0.6%	$1,169,441	0.1%
Dublin (T)	696	$767,305,491	5	0.7%	$1,700,139	0.2%
Licking Creek (T)	901	$840,873,066	16	1.8%	$5,222,144	0.6%
McConnellsburg (B)	547	$817,997,653	0	0.0%	$0	0.0%
Taylor (T)	707	$983,050,508	1	0.1%	$348,946	<0.1%
Thompson (T)	582	$416,632,627	12	2.1%	$35,488,951	8.5%
Todd (T)	874	$969,356,489	7	0.8%	$2,202,899	0.2%
Union (T)	437	$306,763,135	2	0.5%	$697,892	0.2%
Valley-Hi (B)	29	$9,954,698	0	0.0%	$0	0.0%
Wells (T)	299	$158,054,723	0	0.0%	$0	0.0%
Fulton County (Total)	**8,394**	**$9,136,181,097**	**111**	**1.3%**	**$98,580,294**	**1.1%**

Sources: Fulton County 2024; RS Means 2024; Natural Lands Trust 2010
Note: B – Borough; T – Township

Table 4.3.8-4. Estimated Buildings by General Occupancy in the Landslide Hazard Area

	Buildings in the Steep Slope (>25% Slope Angle) Hazard Area			
	Residential	Commercial	Industrial	Government, Religion, Agricultural, and Education
Ayr (T)	30	1	0	0
Belfast (T)	15	0	0	0
Bethel (T)	17	2	0	0
Brush Creek (T)	3	0	0	0
Dublin (T)	5	0	0	0
Licking Creek (T)	15	1	0	0
McConnellsburg (B)	0	0	0	0
Taylor (T)	1	0	0	0
Thompson (T)	9	3	0	0
Todd (T)	7	0	0	0
Union (T)	2	0	0	0
Valley-Hi (B)	0	0	0	0
Wells (T)	0	0	0	0

	Buildings in the Steep Slope (>25% Slope Angle) Hazard Area			
	Residential	Commercial	Industrial	Government, Religion, Agricultural, and Education
Fulton County (Total)	**104**	**7**	**0**	**0**

Impact on Critical Facilities

Landslides pose a risk to critical facilities in Fulton County. One such facility is located within the identified landslide hazard area. This facility, situated in Bethel Township, is classified as a lifeline and falls under the Communications sector.

Impact on the Economy

Landslides can impose direct and indirect impacts on society. Direct costs include actual damage sustained by buildings, property, and infrastructure. Indirect costs include cleanup costs, business interruption, loss of tax revenues, reduced property values, and loss of productivity. Landslides also threaten transportation corridors, fuel and energy conduits, and communication lines (Spiker and Paula 2003). All major roadways and transportation routes located in, and downslope of, the landslide hazard areas may be vulnerable to a landslide event. Landslide damage to general building stock would impact Fulton County's tax base and the local economy.

Impact on the Environment

A landslide alters the landscape. Its impacts on the environment include the following (PEMA 2023):

- Changes to topography.
- Damage or destruction of vegetation.
- Potential diversion or blockage of water in the vicinity of streams, rivers, etc.
- Increased sediment runoff both during and after the event.
- Loss of forest productivity.

Future Growth and Development

New development within the landslide hazard areas is considered exposed to the landslide risks. As residential and recreational development increases on and near steep slopes, the hazards from these events will also increase.

Estimated population projections provided by The Center of Rural Pennsylvania indicate that Fulton County's population will decrease into 2040, decreasing the total population to 14,504 persons (Center for Rural Pennsylvania 2023). This is approximately a 0.5 percent decrease from the County's 2020 population. Persons that move into areas with steep slope are at greater risk to be impacted if a landslide were to occur.

Expected Future Conditions

Determining the direct impact of future conditions on landslides is challenging. However, several environmental factors may increase the likelihood of landslides. For example, wildfires can reduce vegetative cover along steep slopes, weakening soil stability due to the loss of root systems. Additionally, more intense rainfall events can lead to greater soil saturation on these slopes. Under such conditions, assets located on or at the base of steep slopes in the County may face an elevated risk of landslides.

4.3.8.7 Additional Data and Next Steps

For future Hazard Mitigation Plan (HMP) updates, additional factors used to determine landslide susceptibility besides steep slope could allow for more accurate development of exposure and potential loss estimates.

4.3.9 Pandemic and Infectious Disease

4.3.9.1 Hazard Description

A pandemic is a global outbreak of disease that occurs when a new virus causing serious illness emerges in the human population and spreads easily in a sustained manner. Infectious disease outbreaks may be widely dispersed geographically, impact large numbers of the population, and arrive in waves lasting several months at a time (PEMA 2023).

A pandemic outbreak has several recognizable characteristics, including rapid, large-scale (potentially global) spread causing (1) overloaded healthcare systems; (2) inadequate medical supplies; (3) medical supply shortages; and (4) a disrupted economy and society. Pandemics typically result from infectious diseases. An infectious disease, as defined by the World Health Organization (WHO 2023) is caused by pathogenic organisms (e.g., bacteria, viruses, fungi, or parasites) that spread from one person to another, whether through direct or indirect contact. Zoonotic disease is a type of infectious disease that occurs when animals transmit a disease to humans (WHO 2023). Although any infectious disease can reach pandemic levels, the 2019 Coronavirus (COVID-19), is the most recent pandemic the United States has faced.

For the purpose of the Fulton County Hazard Mitigation Plan (HMP) update, the following infectious diseases will be discussed in further detail: COVID-19, influenza, and West Nile Virus (WNV).

4.3.9.2 Location and Extent

Pandemic and infectious disease events can affect large populations, potentially including the entire population of Pennsylvania. The size and extent of an infected population is dependent upon how easily the illness is spread, the mode of transmission, and the amount of contact between infected and uninfected individuals. Viruses that transmit from person to person generally spread much faster than vector-borne diseases. The transmission rates of pandemic illnesses are often higher in denser areas where there are large concentrations of people. Pandemic events can occur after other natural disasters, particularly floods, when there is the potential for bacteria to grow and contaminate water (van Seventer and Hochberg 2017).

4.3.9.3 Range of Magnitude

Severity of a pandemic disease depends on several factors, including the aggressiveness of the disease, ease of transmission, and factors associated with the impacted community (e.g., access to medical care, demographic data, and population density). Advancements in medical technologies have greatly reduced the number of deaths caused by influenza, a disease most likely to reach pandemic scale in Pennsylvania. Consequently, global effects of various influenza outbreaks have declined over the past century. High-risk populations considered more vulnerable to various pandemic diseases are described in the vulnerability assessment presented in Section 4.3.13.5.

COVID-19

Transmission and Symptoms

COVID-19 is a disease caused by a virus named SARS-CoV-2. It can be very contagious and spreads quickly from person to person. The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes (PEMA 2023). Viruses like COVID-19 constantly change through mutation, which sometimes result in a new variant of the virus. Some changes and mutations may allow the virus to spread more easily or make it resistant to treatments and vaccines. It is essential to track and monitor the incidence of variants during a pandemic to effectively respond to changing trends in transmission and patient care (CDC 2022b).

COVID-19 most often causes respiratory symptoms that can resemble a cold, the flu, or pneumonia. COVID-19 may attack more than a person's lungs and respiratory system. Other parts of the body may also be affected by

the disease. Most people with COVID-19 have mild symptoms, but some people become severely ill, and over 1 million people have died in the United States from COVID-19. Older people, and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness (WHO n.d.).

Some people who have been infected with COVID-19 can experience long-term effects from the infection, known as post- COVID conditions (PCC) or long COVID. PCCs can include a wide range of ongoing health problems that can last weeks, months, or years. General symptoms of PCC can include fatigue, fever, difficulty breathing, chest pain, heart palpitations, headache, dizziness, diarrhea, and joint or muscle pain. These are more often found in people who had severe COVID-19 illness, but anyone who has been infected with COVID-19 can experience PCCs. Those not vaccinated and who become infected may have a higher risk of developing PCCs, than people previously vaccinated. In some cases, a person with PCCs may not have tested positive for the virus or known they were infected (CDC 2024).

Prevention and Testing

There are several actions individuals and communities can take to reduce transmission of COVID-19 and reduce risk of severe illness from the virus. Personal protective equipment such as N95 face masks can reduce spread by protecting the wearer from airborne particles. People infected with the COVID-19 virus can isolate themselves to prevent spreading the virus to others. Contact tracing is a practice that can help reduce the spread of infectious disease. Someone who tests positive for COVID-19 identifies people they have been in close contact with recently to the contact tracer. The contact tracer then takes the time to reach out to each identified person to notify them that they may have been exposed to COVID-19. They can refer individuals to different support services as needed, with the primary goal to get the individual tested for COVID-19 and follow isolation guidelines to stop the spread (CDC n.d.).

There are four approved or authorized COVID-19 vaccines in the United States (CDC 2023). Two are mRNA vaccines, one is a protein subunit vaccine, and one is a viral vector vaccine. People who are up to date on COVID-19 vaccines and boosters have lower risk of severe illness, hospitalization, and death from COVID-19 than those who are unvaccinated or who have only received the primary series.

There are different testing options to identify current infection with COVID-19 (PEMA 2023). The two main types of tests are nucleic acid amplification tests (NAATs) and antigen tests. NAATs, such as PCR-based tests, are most often performed in a laboratory. They are typically the most reliable tests for people with or without symptoms. Antigen tests are rapid tests which product results in 15 to 30 minutes. They are less reliable than NAATs, especially for people who do not have symptoms. Antigen tests are also produced for at-home self-test options.

Influenza

Influenza, also known as the flu, is a contagious disease caused by the influenza virus that most commonly attacks the respiratory tract in humans. Pandemic influenza is easily transmitted, but advances in medical technologies have greatly reduced the number of deaths caused by influenza (Doshi 2008). The magnitude of a pandemic may be exacerbated by the fact that an influenza pandemic will cause outbreaks across the United States, limiting the ability to transfer assistance from one jurisdiction to another. Additionally, effective preventive and therapeutic measures, including vaccines and other medications, will likely be in short supply or will not be available (PEMA 2023).

Pandemic flu should not be confused with seasonal flu. Seasonal flu is a less severe concern because of its regularity of occurrence and predictability. Table 4.3.9-1 lists key differences between pandemic and seasonal flu.

Table 4.3.9-1. Seasonal Flu vs. Pandemic Flu

Pandemic Flu	Seasonal Flu
Rarely happens (three times in 20th century).	Happens annually and usually peaks in January or February.
People have little or no immunity because they have no previous exposure to the virus.	Sufferers usually have some immunity built up from previous exposure.
Healthy people may be at increased risk for serious complications.	Usually only people in vulnerable populations, not healthy adults, are at risk of serious complications.
Healthcare providers and hospitals may be overwhelmed.	Healthcare providers and hospitals can usually meet public and patient needs.
Vaccine probably would not be available in the early stages of a pandemic.	Vaccine is available for annual flu season.
Effective antivirals may be in limited supply	Adequate supplies of antivirals are usually available.
Number of deaths could be high (U.S. death toll during the 1918 pandemic was approximately 675,000).	Seasonal flu-associated deaths in the United States over 30 years ending in 2007 have ranged from about 3,000 per season to about 49,000 per season.
Symptoms may be more severe.	Symptoms include fever, cough, runny nose, and muscle pain.
May cause major impact on the general public, such as widespread travel restrictions and school or business closings.	Usually causes minor impact on the general public; some schools may close, and sick people are encouraged to stay home.
Potential for severe impact on domestic and world economy.	Manageable impact on domestic and world economy.

Source: Flu.gov 2015

Approximately 12,470 Americans died from H1N1 within a roughly 1-year period from April 2009 to April 2010 (CDC 2019). Between October 2014 and late May 2015, 6.4 percent of deaths were attributable to pneumonia and influenza—below the epidemic threshold of 6.6 percent (an epidemic occurs when the incidence rate exceeds the expected rate but is not at the magnitude of a pandemic) (EPA 2024d).

In 2014, CDC updated the Pandemic Intervals Framework (PIF), which describes the progression of an influenza pandemic using six intervals. The framework is used to guide planning for an influenza pandemic and provides recommendations for risk assessment, decision-making, and action in the United States. Descriptions of the CDC pandemic intervals are presented in Table 4.3.9-2.

Table 4.3.9-2. CDC Pandemic Intervals Framework

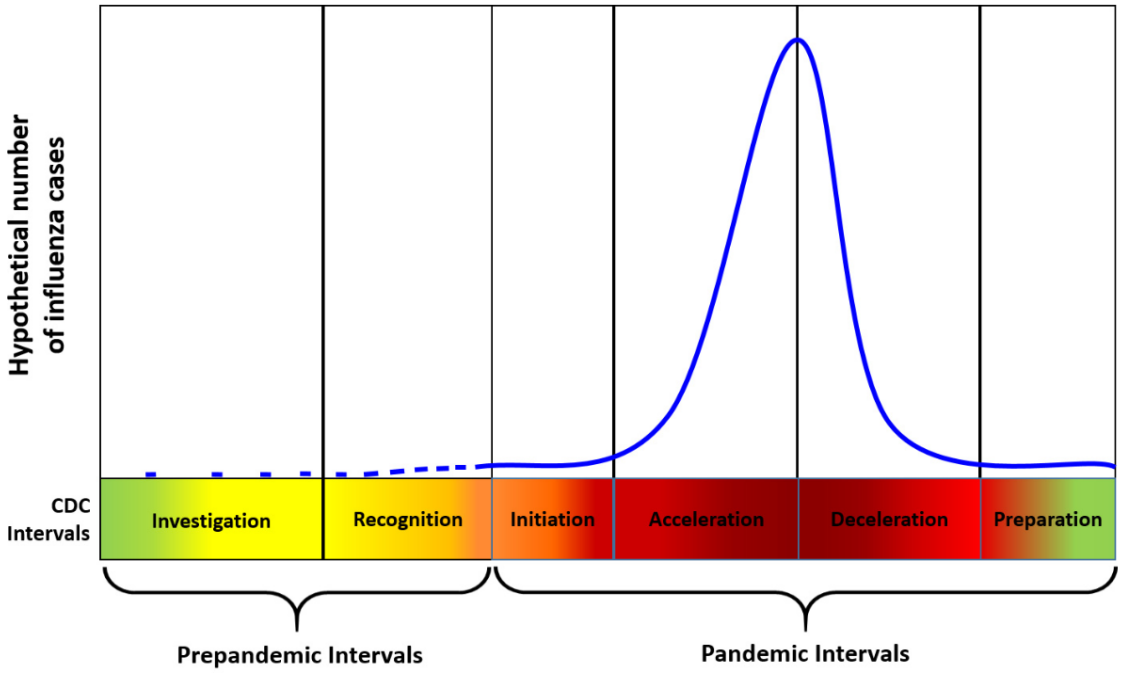
Interval	Description
Interval 1: Investigation of cases of novel influenza A virus infection in humans	When novel influenza A viruses are identified in people, public health actions focus on targeted monitoring and investigation. This can trigger a risk assessment of that virus with the Influenza Risk Assessment Tool, which is used to evaluate whether the virus has the potential to cause a pandemic.
Interval 2: Recognition of increased potential for ongoing transmission of a novel influenza A virus	When increasing numbers of human cases of novel influenza A illness are identified and the virus has the potential to spread from person to person, public health actions focus on control of the outbreak, including treatment of sick persons.
Interval 3: Initiation of a pandemic wave	A pandemic occurs when people are easily infected with a novel influenza A virus that has the ability to spread in a sustained manner from person to person.

Interval	Description
Interval 4: Acceleration of a pandemic wave	The acceleration (or "speeding up") is the upward epidemiological curve as the new virus infects susceptible people. Public health actions at this time may focus on the use of appropriate non-pharmaceutical interventions in the community (e.g., school and child-care facility closures, social distancing), as well the use of medications (e.g., antivirals) and vaccines, if available. These actions combined can reduce the spread of the disease and prevent illness or death.
Interval 5: Deceleration of a pandemic wave	The deceleration (or "slowing down") happens when the number of reported pandemic influenza cases consistently decreases in the United States. Public health actions include continued vaccination, monitoring of pandemic influenza A virus circulation and illness, and reducing the use of non-pharmaceutical interventions in the community (e.g., school closures).
Interval 6: Preparation for future pandemic waves	When pandemic influenza has subsided, public health actions include continued monitoring of pandemic influenza A virus activity and preparing for potential additional waves of infection. It is possible that a second pandemic wave could have higher severity than the initial wave. An influenza pandemic is declared "ended" when enough data show that the reported cases of influenza virus worldwide are similar to cases of seasonal influenza virus in the way they spread and the severity of the illness they can cause.

Source: CDC 2024

Conclusion of Interval 6 leads to the post-peak period, where the pandemic is declared "ended" when enough data show that the influenza virus, worldwide, presents similar to a seasonal influenza virus. Despite a decrease in activity, countries still must be prepared for additional waves of the pandemic. Pandemic waves can be separated by a period of months leading to a long recovery time, to guarantee entry of the pandemic into the post-pandemic interval (CDC 2014). Figure 4.3.9-1 illustrates the six intervals of pandemic influenza described by CDC.

Figure 4.3.9-1 Preparedness and Response Framework for Novel Influenza A Virus Pandemics



Source: CDC 2024

West Nile Virus

West Nile virus is a vector-borne disease that can cause headache, high fever, neck stiffness, disorientation, tremors, convulsions, muscle weakness, paralysis, and, in its most serious form, death. This virus is spread via mosquito bite and is therefore aided by warm temperatures and wet climates conducive to mosquito breeding.

West Nile Virus has high rate of asymptomatic cases—almost 80 percent of cases. The other 20 percent of cases result in mild infection, called West Nile fever, lasting two to seven days. About one in 150 cases results in severe neurological disease or death. Since the appearance of West Nile virus in Pennsylvania in 2000, the worst year was 2003 when 237 Pennsylvanians were infected with the virus and 9 people died (PEMA 2023). The virus is typically more serious in older adults (Johns Hopkins Medicine 2024).

4.3.9.4 Past Occurrence

Several pandemic influenza outbreaks have occurred worldwide over the past 100 years, as listed in Table 4.3.9-3. Deaths occurred in the United States as a result of Spanish Flu, Asian flu, and Hong Kong Flu outbreaks. In the United States, about 675,000 people died while 22 million caught the Spanish Flu (1918-1920). Pennsylvania, one of the states that was hit the hardest, faced over 60,000 deaths (Shetty 2018). Most deaths resulting from Asian flu occurred between September 1957 and March 1958; within the United States, approximately 70,000 people died, and approximately 15 percent of the population of Pennsylvania was affected. The first cases of Hong Kong Flu in the United States were detected in September 1968, with deaths peaking between December 1968 and January 1969 (Global Security 2009). As of August 2010, H1N1 was in a post-pandemic period. The COVID-19 virus has no "past occurrence" data, as it was first reported in 2019.

Table 4.3.9-3. Previous Pandemic Outbreaks

Date	Pandemic/Subtype	Worldwide Deaths (Approx.)
1918-1920	Spanish Flu/H1N1	50 Million
1957-1958	Asian Flu/H2N2	1.5-2 Million
1968-1969	Hong Kong Flu/H3N2	1 Million
2009-2010	Swine Flu/H1N1	> 18,000
2019- ongoing	COVID-19	7.1 Million of 6/12/2024

Source: CDC 2010, WHO 2024

Fulton County was included in two major disaster (DR) or emergency (EM) declarations for pandemic or infectious disease related events, as list in Table 4.3.9-4 (FEMA 2024). Based on all sources researched, known pandemic and infectious disease events that have affected Fulton County and its municipalities resulting in significant case counts, are also listed in Table 4.3.9-4. The table may not include all events that occurred in or impacted Fulton County if additional events are reported in sources other than those reviewed for this HMP.

Table 4.3.9-4. Pandemic and Infectious Disease Events Between 1950 and 2024 in Fulton County

Date of Event	Event Type	Location	FEMA Declaration Number	County Designated?	Details
September 2018 – September 2019	Biological	Countywide	N/A	N/A	Influenza—298 cases reported in Fulton County
September 2019 – September 2020	Biological	Countywide	N/A	N/A	Influenza—371 cases reported in Fulton County
January 20, 2020 – May 11, 2023	Biological	Statewide	EM-3441	Yes	COVID-19

Date of Event	Event Type	Location	FEMA Declaration Number	County Designated?	Details
January 20, 2020 – May 11, 2023	Biological	Statewide	DR-4506	Yes	COVID-19 Pandemic
October 2021 – October 2022	Biological	Countywide	N/A	N/A	Influenza—214 cases reported in Fulton County
October 2022 – September 2023	Biological	Countywide	N/A	N/A	Influenza—246 cases reported in Fulton County

Source: FEMA 2024; PA DOH 2024
Note: West Nile Virus data goes from 1999 to 2023, however, zero were reported for Fulton during this time; Influenza data goes from 2018 to 2023, and the 2020-2021 data is not available because influence activity was abnormally low likely due to COVID-19 mitigation measures according to the PA DOH.

The 2019 to 2023 COVID-19 pandemic is the worst-case pandemic event on record in Pennsylvania and in the United States. Between 2020 and 2023, there have been 71 deaths attributed to COVID-19 in Fulton County and over 5,041 documented cases (PEMA 2023).

4.3.9.5 Future Occurrence

The best available data on infectious disease events was used to calculate the probability of future such events in the County. Information from Pennsylvania Department of Health, the 2023 Commonwealth of Pennsylvania HMP, and FEMA were used to identify the number of events that occurred between 2020 and 2023. Table 4.3.9-5 shows these statistics, as well as the estimated percent chance of an incident occurring in a given year. Based on these statistics there is a 100-percent chance of a pandemic or infectious disease event occurring in any given year in Fulton County. Therefore, the future occurrence of pandemic and infectious disease events in the County is considered *highly likely,* as defined by the Risk Factor Methodology probability criteria (shown in Table 4.4-1 in Section 4.4 of this HMP).

Table 4.3.9-5. Probability of Future Pandemic or Infectious Disease Events

Hazard Type	Number of Occurrences Between 2020 and 2023	% Chance of Occurrence in Any Year
COVID-19	5,041	100%
Influenza	831	100%
West Nile Virus	0	0%
Total	5,872	100%

Source: PA DOH 2024; CDC 2024
Note: The number of hazard occurrences is calculated using the number of occurrences between 2020 and 2023; Influenza 2020-2021 data is not available because influence activity was abnormally low, likely due to COVID-19 mitigation measures according to the PA DOH.

4.3.9.6 Vulnerability Assessment

A qualitative assessment was performed to evaluate local assets' vulnerability to and potential impacts from the pandemic and infectious disease hazard.

Life, Health, and Safety

General Population

Pandemics and infectious diseases can also affect first responders in many ways including the need for more personal protection equipment to keep them safe and able to perform job duties. There is also an added layer of complexity to triaging patient care and a higher patient volume during pandemics.

Depending on the characteristics of the disease or virus, certain population groups can be at higher risk of infection than others. About 60 percent of hospitalizations related to seasonal flu and 90 percent of flu-related deaths occur among people 65 and older. However, during the H1N1 pandemic, 90 percent of hospitalizations and 87 percent of H1N1-related deaths occurred in people younger than 65 (CDC 2010). As with seasonal flu, people with underlying health conditions face a much higher probability of contracting H1N1. Schools, convalescent centers, and other institutions are highly conducive to faster transmission of pandemic diseases.

Table 4.3.9-6 shows the demographic change in children and the elderly from 2020 through 2023 in Fulton County. Fulton County has seen population increases for individuals over 65 years of age. Therefore, Fulton County is more vulnerable to both seasonal influenza and pandemic influenza, such as the H1N1 pandemic.

Table 4.3.9-6. Demographic Trends for Vulnerable Populations

Vulnerable Population	ACS 5-Year Pop Est. 2020	ACS 5-Year Pop Est. 2023	2020 to 2023 Change
Under 5 years	710	691	-19
18 years and over	11,610	12,045	+435
65 years and over	3,086	3,228	+142

Source: 2020 – 2023 American Community Survey 5-Year Estimates

Impact on General Building Stock and Critical Facilities

No structures are anticipated to be directly impacted by a pandemic or infectious disease. However, structures, especially critical facilities, could be damaged due to the lack of maintenance personnel due to the personnel being sick. This is especially true of critical facilities and businesses with processes (e.g., chemical reactions) that occur continuously.

Pandemics and infectious diseases can have profound impacts on community lifelines and critical facilities. The COVID-19 pandemic, for instance, strained healthcare systems, disrupted supply chains, and affected essential services such as water, electricity, and transportation. Workforce shortages due to illness or quarantine measures further exacerbated these disruptions, leading to reduced capacity and efficiency in critical infrastructure (CISA 2021). Essential services may be disrupted by insufficient staffing, insecure supply chains, and fragile critical infrastructure. These vulnerabilities can lead to significant disruptions in vital services during pandemics.

Impact on the Economy

The impact disease outbreaks have on the economy and estimated dollar losses are difficult to measure and quantify. Costs associated with the activities and programs implemented to conduct surveillance and address pandemic have not been quantified in available documentation. Instead, activities and programs implemented by the County to address this hazard are described below, all of which could impact the local economy.

The COVID-19 outbreak in 2020-2022 resulted in significant negative impacts to economic activity in the County, commonwealth, and country due to the identified need to enforce social distancing and quarantine conditions until the disease spread was lessened. During the height of the COVID outbreak, all non-essential businesses were forced to close. The virus outbreak has also had a deleterious impact on government finances

due to tax delinquency and user fees loss. Decreased revenues can lead to service cuts and prevent the county and community from procuring necessary supplies to weather the outbreak. Though the full-scale of the economic fallout is yet to be quantified, the economic impact from the pandemic was clearly felt in Fulton County.

Smaller-scale disease outbreaks can also cause negative economic impacts, though the extent of impact is variable.

Impact on the Environment

A pandemic and infectious disease has no direct impact on the environment. However, pandemics and infectious disease can have the following cascading impacts to the environment (not an exhaustive list):

- Pollution of land and waterways/waterbodies due to prophylactic supplies (e.g., masks) being improperly disposed of (e.g., littered).
- Environmental contamination due to waste being improperly disposed of or treated, due to lack of personnel to carry out proper disposal procedures.
- Environmental contamination due to runaway chemical reactions causing releases of hazardous materials from facilities (see General Building Stock and Critical Facilities).
- A lack of environmental regulators due to them being sick can reduce the effectiveness of environmental programs or requirements, having a detrimental impact on the environment

Future Changes That May Impact Vulnerability

Future Growth and Development

As described in Section 2, Fulton County is projected to see a declining population through at least 2040. A declining population and reduced population density could help reduce the spread of infectious diseases, lowering overall vulnerability to this hazard. Risks could increase in any municipalities that see a population increase (Center for Rural Pennsylvania 2023).

Expected Future Conditions

The relationship between changing future conditions and increase in infectious diseases is difficult to predict with certainty; however, there may be linkages between the two. Changes in the environment may create a more livable habitat for vectors carrying disease as suggested by the Centers for Disease Control and Prevention (CDC 2022a). Localized changes in climate and human interaction may also be a factor in the spread of disease.

This relationship is somewhat controversial. The notion that rising temperatures will increase the number of mosquitoes that can transmit malaria among humans (rather than just shift their range) has been the subject of debate over the past decade. Some believe that changing weather conditions may affect the spread of disease, while others are not convinced. However, many researchers point out that climate is not the only force at work in increasing the spread of infectious diseases into the future. Other factors, such as expanded rapid travel and evolution of resistance to medical treatments, are already changing the ways pathogens infect people, plants, and animals. As future conditions accelerate, it is likely to work synergistically with many of these factors, especially in populations increasingly subject to massive migration and malnutrition (WHO 2020).

4.3.9.7 Additional Data and Next Steps

For future plan updates, Fulton County will work with stakeholders to identify the long-term impacts of pandemics and infectious disease outbreaks, and the long-term solutions that can be implemented to reduce vulnerability to these events. Fulton County will work with the healthcare coalition and other health sector stakeholders to increase participation by these groups in future plan updates.

4.3.10 Radon Exposure

4.3.10.1 Hazard Description

Radon is a natural gas that cannot be seen, smelled, or tasted. It is a noble gas that originates from the natural radioactive decay of uranium and thorium. It is a large component of the natural radiation to which humans are exposed and can pose a serious threat to public health when it accumulates in poorly ventilated residential and occupational settings. According to the U.S. Environmental Protection Agency (EPA), radon is estimated to cause more than 20,000 lung cancer deaths per year, second only to smoking as the leading cause of lung cancer (EPA 2024). An estimated 40 percent of the homes in Pennsylvania are believed to have elevated radon levels (DEP 2024).

4.3.10.2 Location and Extent

Radioactivity caused by airborne radon has been recognized for many years as an important component in the natural background radioactivity exposure of humans. However, it was not until the 1980s that the wide geographic distribution of elevated radon levels in houses and the possibility of extremely high radon concentrations in houses were recognized. In 1984, routine monitoring of employees leaving the Limerick nuclear power plant near Reading, PA, showed that readings from one employee frequently exceeded expected radiation levels, yet only natural, non-fission-product radioactivity was detected on him. Radon levels in his home were detected around 2,500 picocuries per liter (pCi/L), much higher than the 4 pCi/L guideline set by EPA or even the 67 pCi/L limit for uranium miners. As a result of this event, the Reading Prong section of Pennsylvania where this person lived became the focus of the first large-scale radon scare in the world (PEMA 2023).

Radon (Rn-222), which has a half-life of 3.8 days, is a widespread hazard. The distribution of radon correlates with the distribution of radium (Ra-226), its immediate radioactive parent, and with uranium, its original ancestor. Because of the short half-life of radon, the distance radon atoms travel from their parent before they decay is generally limited to extents of feet or tens of feet (PEMA 2023). The following three sources of radon in residences are now recognized (PEMA 2023):

- Radon in soil air flows into the house.
- Radon dissolved in water from private wells and exsolved during water usage; this source is rarely a problem in Pennsylvania.
- Radon emanates from uranium-rich building materials (such as concrete blocks or gypsum wallboard); this source also is not known to be a problem in Pennsylvania

The Environmental Protection Agency (EPA) has created a map of radon zones that identifies areas across the U.S. with the potential for elevated indoor radon levels (EPA 2023). Each county across the country is classified as having a low (Zone 3), moderate (Zone 2), or high (Zone 1) radon hazard potential. Most counties across the Commonwealth, particularly counties in eastern Pennsylvania, have a high hazard potential for indoor radon. According to the EPA map of radon zones, Fulton County is in Zone 1 (counties with predicted average indoor radon screening levels greater than 4 pCi/L).

Figure 4.3.10-1 illustrates radon entry points into a home.

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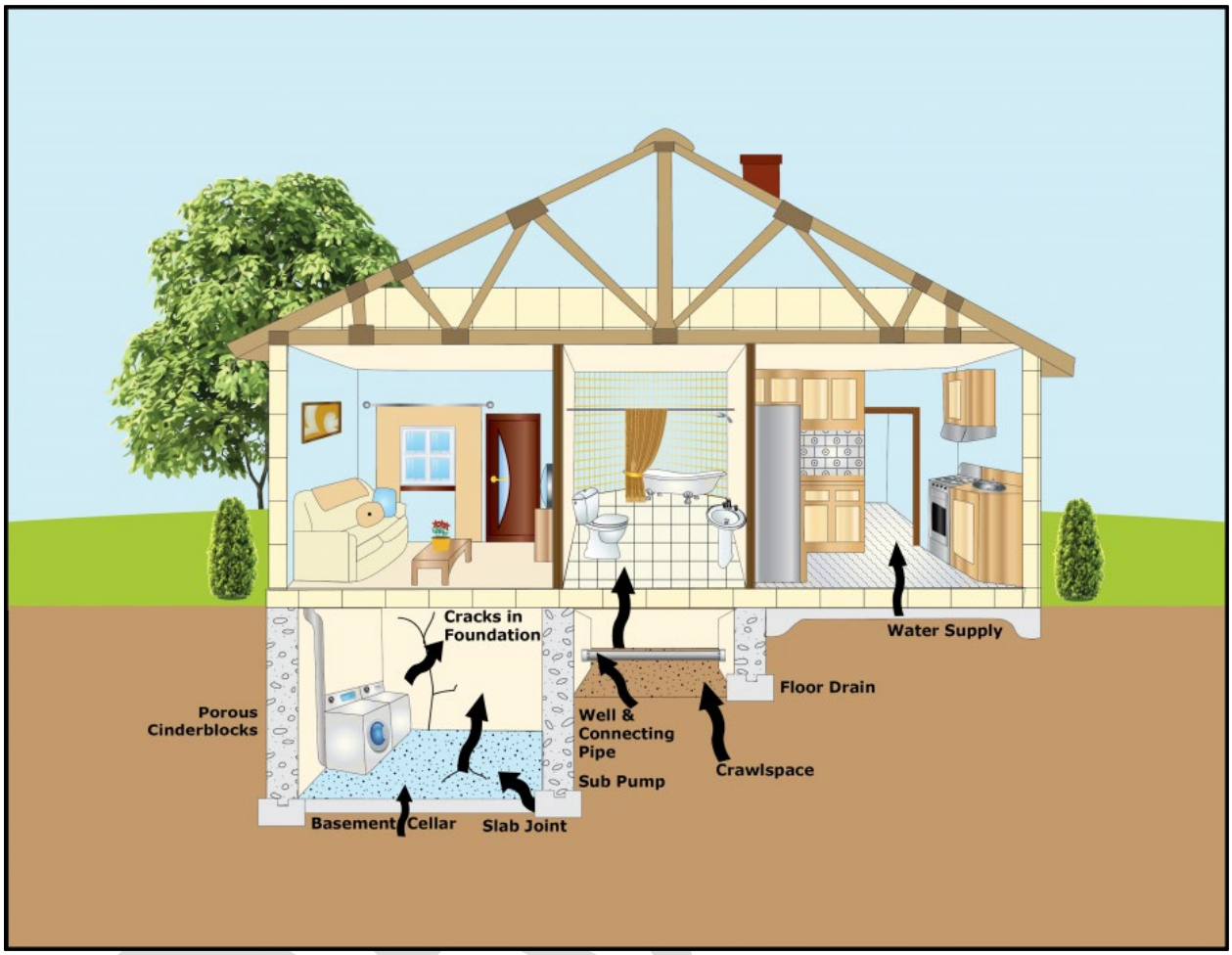
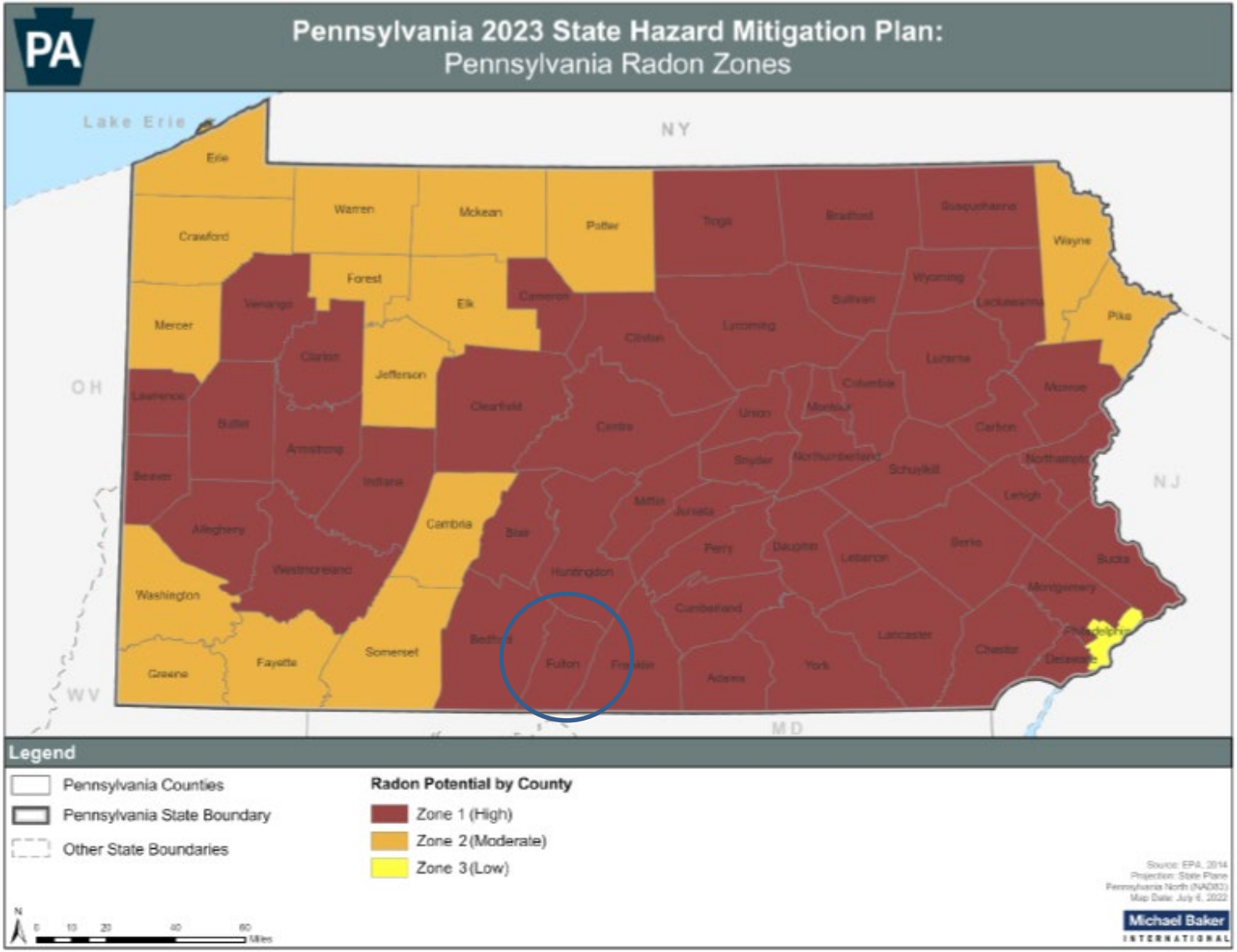
Figure 4.3.10-1. Potential Radon Entry Points into a House



Source: (EPA 2018)

Each county in Pennsylvania is classified as having a low, moderate, or high radon hazard potential. A majority of counties across the Commonwealth, particularly counties in eastern Pennsylvania, have a high hazard potential. Western Pennsylvania counties, however, are not completely immune from the threat of radon, as high potential for radon exposure exists within nine western counties. The average indoor radon screening level within high-exposure counties exceeds 4 pCi/L. Fulton County is in Zone 1 – High Radon Potential, as noted on Figure 4.3.10-2 below.

Figure 4.3.10-2. Radon Hazard Zones in Pennsylvania



Source: PEMA, 2023 (Fulton County is identified by the blue circle.)

High radon levels were initially thought to be exacerbated in tightly sealed houses, although it is now recognized that rates of airflow into and out of houses, plus the location of air inflow and the radon content of air in the surrounding soil, are key factors affecting radon concentrations. Air must be drawn into a house to compensate for outflows of air from the house caused by a furnace, fan, thermal "chimney" effect, or wind effects. If the upper part of the house is tight enough to impede influx of outdoor air (radon concentration generally below 0.1 pCi/L), an appreciable fraction of the air may be drawn in from the soil or fractured bedrock through the foundation and slab beneath the house, or through cracks and openings for pipes, sumps, and similar features. Soil gas typically contains from a few hundred to a few thousand pCi/L of radon; therefore, even a small rate of soil gas inflow can lead to elevated radon concentrations in a house (PEMA 2023).

Radon concentration in soil gas depends on a number of soil properties, the importance of which are still being evaluated. In general, 10 to 50 percent of newly formed radon atoms escape the host mineral of their parent radium and gain access to the air-filled pore space. The radon content of soil gas clearly tends to be higher in soils containing higher levels of radium and uranium, especially if the radium occupies a site on or near the surface of a grain from which the radon can easily escape. The amount of pore space in the soil and its permeability for airflow, including cracks and channels, are important factors determining radon concentration in soil gas and its rate of flow into a house. Soil depth and moisture content, mineral host and form for radium, and other soil properties may also be important. Fractured zones may supply air having radon concentrations similar to those in deep soil for houses built on bedrock (PEMA 2023).

Areas where houses have high levels of radon can be divided into the following three groups in terms of uranium content in rock and soil:

- Areas of **very elevated uranium content** (above 50 parts per million [ppm]) around uranium deposits and prospects have very high levels of radon, but the hazard normally is restricted to within a few hundred feet of the deposit. In Pennsylvania, these localities occupy an insignificant area.
- Areas of common rock having **higher than average uranium content** (five to 50 ppm) include rock types such as granitic and felsic alkali igneous rocks and black shales in Pennsylvania. High uranium values in rock or soil and high radon levels in houses in the Reading Prong are associated with Precambrian granitic gneisses commonly containing 10 to 20 ppm uranium but locally containing more than 500 ppm uranium. Elevated uranium occurs in black shales of the Devonian Marcellus Formation and possibly the Ordovician Martinsburg Formation in Pennsylvania. High radon values are locally present in areas underlain by these formations.
- Areas of soil or bedrock that have **normal uranium content but properties that promote high radon levels** in houses are incompletely understood at present. Relatively high soil permeability can lead to high radon concentrations, the clearest example being houses built on glacial eskers. Limestone-dolomite soils also appear to be predisposed to high radon levels in houses, perhaps because of the deep clay-rich residuum where radium is concentrated by weathering on iron oxide or clay surfaces, coupled with moderate porosity and permeability. The importance of carbonate soils is indicated by an exceedance of four pCi/L in 93 percent of a sample of houses built on limestone-dolomite soils near State College, Centre County, and an exceedance of 20 pCi/L in 21 percent of that sample of houses, even though uranium levels in the underlying bedrock are all within the normal range of 0.5 to five ppm (PEMA 2023).

According to the Pennsylvania State HMP, radon tends to exist as a gas or as a dissolved atomic component in groundwater. The most problematic source of radon in houses in Pennsylvania soil gas that flows into the house. Even a small rate of soil gas inflow can lead to elevated radon concentrations in a house. The State HMP indicates that current data on abundance and distribution of radon in Pennsylvania homes are incomplete and biased, but the plan identifies general patterns (PEMA 2023).

Multiple areas of Fulton County have had higher than average radon level test results. The areas and test results are shown in more detail in Table 4.3.10-1.

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4.3.10.3 Range of Magnitude

Exposure to radon is the second leading cause of lung cancer after smoking. Radon exposure is the number one cause of lung cancer among non-smokers. As stated earlier, radon is responsible for more than 21,000 lung cancer deaths every year. Lung cancer is the only known effect on human health from exposure to radon in air and, thus far, no evidence indicates that children are at greater risk of lung cancer than adults. The main hazard is actually from the radon-daughter products (polonium-218, lead-214, bismuth-214), which may become attached to lung tissue and induce lung cancer by their radioactive decay (EPA 2022). Table 4.3.10-1 lists (1) cancer risks from exposure to radon at various levels for smokers and non-smokers, (2) lung cancer risks from radon exposure compared to cancer risks from other hazards for smokers and non-smokers, and (3) action thresholds.

Table 4.3.10-1. Radon Risk for Smokers and Non-Smokers

Radon Level (picoCuries per liter [pCi/L])	Cancer Rate per 1,000 People with Lifetime Exposure	Comparative Cancer Risk of Radon Exposure	Action Threshold
SMOKERS			
20	About 260 people could get lung cancer	250 times the risk of drowning	Fix structure
10	About 150 people could get lung cancer	200 times the risk of dying in a home fire	
8	About 120 people could get lung cancer	30 times the risk of dying in a fall	
4	About 62 people could get lung cancer	5 times the risk of dying in a car crash	
2	About 32 people could get lung cancer	6 times the risk of dying from poison	Consider fixing structure between 2 and 4 pCi/L
1.3	About 20 people could get lung cancer	(Average indoor radon level)	Reducing radon levels below 2 pCi/L is difficult
0.4	About 3 people could get lung cancer	(Average outdoor radon level)	
NON-SMOKERS			
20	About 36 people could get lung cancer	35 times the risk of drowning	Fix structure
10	About 18 people could get lung cancer	20 times the risk of dying in a home fire	
8	About 15 people could get lung cancer	4 times the risk of dying in a fall	
4	About 7 people could get lung cancer	The risk of dying in a car crash	
2	About 4 people could get lung cancer	The risk of dying from poison	Consider fixing structure between 2 and 4 pCi/L
1.3	About 2 people could get lung cancer	(Average indoor radon level)	Reducing radon levels below 2pCi/L is difficult
0.4	-	(Average outdoor radon level)	

Source: (EPA 2024)
Note: Risk may be lower for former smokers.
** Lifetime risk of lung cancer deaths from EPA Assessment of Risks from Radon in Homes (EPA 402-R-03-003).*
*** Comparison data calculated using the Centers for Disease Control and Prevention's 1999-2001 National Center for Injury Prevention and Control Reports.*

According to EPA, the average radon concentration in the indoor air in homes in the United States is about 1.3 pCi/L.EPA recommends that homes be repaired if the radon level is 4 pCi/L or more. However, EPA also recommends that Americans consider fixing their home if radon levels are between 2 and 4 pCi/L because there is no known safe level of exposure to radon. As listed in Table 4.3.10-1, a smoker exposed to radon has a much higher risk of lung cancer.

The worst-case scenario for radon exposure would be caused by a large area of tightly sealed homes inducing high levels of exposure to residents over a prolonged period of time, without awareness of this by the residents. This worst-case scenario exposure then could lead to a large number of people contracting cancer attributed to the radon exposure (PEMA 2023). The most likely scenario is a single household exposed to a very low concentration of radon, with no adverse health effects.

4.3.10.4 Past Occurrence

Current data on abundance and distribution of radon as it affects individual houses in the Commonwealth of Pennsylvania in general is considered incomplete and potentially biased (PEMA 2023). Fulton County is not an exception. The EPA has estimated that the national average indoor radon concentration is 1.3 pCi/L and the level for action is 4.0 pCi/L; however, they have estimated that the average indoor concentration in Pennsylvania basements is about 7.1 pCi/L and 3.6 pCi/L on the first floor (PADEP 2022).

PADEP Bureau of Radiation Protection (Bureau) provides homeowners with information on how to test for radon in their houses. If results of a test reported to the Bureau exceed 4 pCi/L, the Bureau works to help the homeowner repair the house so as to mitigate high radon levels. The total number of tests reported to the Bureau since 1990 and test results by zip code are accessible on the Bureau's website. However, to best approximate the average for an area, this information is provided only if more than 30 tests within that area were reported (PADEP 2022).

The Bureau collected the sufficient number of radon results from residences in 4 zip codes within Fulton County to allow them to report the findings (summarized in Table 4.3.10-2). PADEP does not publish results unless a zip code has had at least 30 tests conducted. PADEP only publishes the average and maximum results for a zip code; it does not offer a range of results for a zip code, municipality, or region. The PADEP Radon Division recommends that ***all*** homeowners test for radon, regardless of test results within their respective zip codes. Despite a low average text result within a zip code, many homes in that zip code may have elevated radon levels.

Table 4.3.10-2. Radon Level Tests and Results by Zip Codes in Fulton County

ZIP Code	Location	Area in Home	Number of Tests	Maximum Result (pCi/L)	Average Result (pCi/L)
17229	Fort Littleton	Basement	40	64.7	10.1
		First Floor	Insufficient Data	Insufficient Data	Insufficient Data
17233	McConnelsburg	Basement	154	72.1	11.9
		First Floor	Insufficient Data	Insufficient Data	Insufficient Data
17224	Fort Loudon	Basement	61	36.9	6.7
		First Floor	Insufficient Data	Insufficient Data	Insufficient Data
17238	Needmore	Basement	55	333.2	37.3
		First Floor	Insufficient Data	Insufficient Data	Insufficient Data

Source: PADEP 2023

4.3.10.5 Probability of Future Occurrence

Radon exposure is inevitable given present soil, geologic, and geomorphic factors across Pennsylvania. Residents who live in housing developments within areas where radon levels previously have been found to be significantly high will continue to be more susceptible to exposure. However, new incidents of concentrated exposure may occur with future development or deterioration of older structures. Exposure can be limited by conducting proper testing within both existing and future developments and implementing appropriate mitigation measures (PEMA 2023).

As part of a 2014 initiative to raise awareness, EPA implemented the "Test, Fix, Save a Life" radon action campaign to highlight radon testing and mitigation as a simple and affordable step to significantly reduce the risk of lung cancer. Through this initiative, the "Test, Fix, Save a Life" mantra specifies activities and facts for the public regarding radon poisoning, as indicated below (EPA 2022):

Test: All homes with or without basements should be tested for radon. Affordable, do-it-yourself radon test kits are available online and at home improvement and hardware stores, or you can hire a qualified radon tester.
Fix: EPA recommends taking corrective action to fix radon levels at or above 4 pCi/L and contacting a qualified radon-reduction contractor. In most cases, a system with a vent pipe and fan is used to reduce radon. Addressing high radon levels often costs the same as other minor home repairs.
Save a Life: More than 20,000 Americans die from radon-related lung cancer each year. By decreasing elevated levels in the home, residents can help prevent lung cancer while creating a healthier home.

Future occurrences of radon exposure can be considered *highly likely* as defined by the Risk Factor Methodology probability criteria (discussed in Section 4.4).

4.3.10.6 Vulnerability Assessment

A qualitative assessment was performed to evaluate local assets' vulnerability to and potential impacts from the radon hazard.

Impact on Life, Health, and Safety

General Population

For the purposes of this plan, the entire population of the county is assumed to be at risk of radon exposure. Radon is responsible for more than 21,000 of lung cancer deaths every year. Lung cancer is the only known effect on human health from exposure to radon in air, and thus far, no evidence indicates that children are at greater risk of lung cancer than adults (EPA 2024e).

Impact on General Building Stock and Critical Facilities

While the entire general building stock and critical facility inventory in Fulton County is exposed to radon, radon does not result in direct damage to structures and facilities. Rather, engineering methods installed to mitigate human exposure to radon in structures results in economic costs described in the following subsection.

Impact on the Economy

The EPA has concluded that an average radon mitigation system costs $1,200. The EPA also states that current state surveys indicate one home in five has elevated radon levels. Based on this information, radon loss estimation is factored by assuming that 20 percent of the residential buildings within High Potential (Level 1) counties have elevated radon levels, and each would require a radon mitigation system installed at the EPA-estimated average of $1,200 (PEMA 2023). Therefore, within Fulton County, estimated radon mitigation costs for residential structures could exceed $8 million. However, this total could be higher based on the number of households in the County with radon levels exceeding 4 pCi/L.

Impact on the Environment

Radon exposure exerts minimal environmental impacts. Because of the relatively short half-life of radon, it tends to affect only living and breathing organisms such as humans or pets that are routinely within contained areas (basement or house) near the source from which the gas is released (PEMA 2023).

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Future Changes That May Impact Vulnerability

Future Growth and Development

Given the entirety of Fulton County has been determined at risk for the radon exposure hazard, any new construction development will be exposed to this risk. Measures to reduce human exposure to radon in structures are readily available and can be incorporated during new construction at significantly lower cost and greater effectiveness than retrofitting existing structures to implement these measures.

Expected Future Conditions

The primary factors that influence radon entry into a home include: radon content of the soil; pressure differential between the interior of the home and the soil; the air exchange rate for the home; the moisture content surrounding the home; and the presence and size of entry pathways (Field 2010). These factors can be affected by environmental shifts to different degrees. Environmental shifts may also affect the depositional environment within the home resulting in changes to the delivered dose by radon decay products. Additionally, the EPA stated that the relative concentration of radon to its decay products, and the ability to deliver dose, is impacted by numerous factors including building ventilation rate, decay product attachment to aerosols, and particle deposition rate on surface. All these factors could be impacted by housing as well as behavioral changes driven directly or indirectly by environmental shifts.

4.3.10.7 Additional Data and Next Steps

The assessment above identifies human health and economic losses associated with this hazard of concern; however, these estimates are based on national epidemiological statistics and generalized estimates of costs to mitigate structures in Fulton County. Because specific structural conditions affect human exposure to radon, direct radon measurements within facilities are necessary to properly assess the level of health risk and indicate the need for mitigation measures. Furthermore, the EPA recommends that new construction projects consider radon exposure risk and installation of mitigation measures as appropriate.

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4.3.11 Subsidence and Sinkholes

4.3.11.1 Hazard Description

Land subsidence is a gradual settling or sudden sinking of the ground surface due to the movement of subsurface materials. A sinkhole is a subsidence feature resulting from the sinking of surficial material into a pre-existing subsurface void. Subsidence and sinkholes are geologic hazards that can impact roadways and buildings and disrupt utility services. Subsidence and sinkholes are most common in areas underlain by limestone and can be exacerbated by human activities such as water, natural gas, and oil extraction (PEMA 2020).

Subsidence can also result from earthquakes, soil compaction, erosion, and mining activity. Mine subsidence, in particular, is a concern in areas with underground coal and clay mines and occurs when the ground surface shifts due to the collapse of mine structures such as roofs, floors, or pillars (DCNR 2022a).

Sinkholes are typically found in regions underlain by carbonate bedrock, such as limestone and dolomite, which are prevalent in central and eastern Pennsylvania. These features form naturally through the physical and chemical weathering of bedrock. Water moving through fractures and bedding planes dissolves the rock, creating underground voids. Over time, the overlying material may collapse into these voids, forming surface depressions and contributing to karst topography. Common karst features include sinkholes, linear depressions, and caves. These features may not appear immediately and can develop after significant surface activity or added weigh (USGS 2021).

As stated in the 2023 Pennsylvania State Hazard Mitigation Plan, there are two common causes of subsidence in the State: 1) dissolution of carbonate rock such as limestone or dolomite and 2) mining activity. In the first case, water passing through naturally occurring fractures and bedding planes dissolves bedrock leaving voids below the surface. Eventually, overburden on top of the voids collapses, leaving surface depressions resulting in karst topography. Characteristic structures associated with karst topography include sinkholes, linear depressions, and caves. Often, sub-surface solution of limestone will not result in the immediate formation of karst features. Collapse sometimes occurs only after a large amount of activity, or when a heavy burden is placed on the overlying material (PEMA 2023).

The following sections discuss the location and extent, range of magnitude, previous occurrence, future occurrence, and vulnerability assessment associated with the subsidence/sinkhole hazard for Fulton County.

4.3.11.2 Location and Extent

Approximately 17.7 percent of Fulton County (77.58 square miles) is underlain by carbonate bedrock, such as limestone. The County has a very low susceptibility to sinkholes and subsidence related to abandoned underground mines; however, surface mines are present throughout the area (Fulton County 2019).

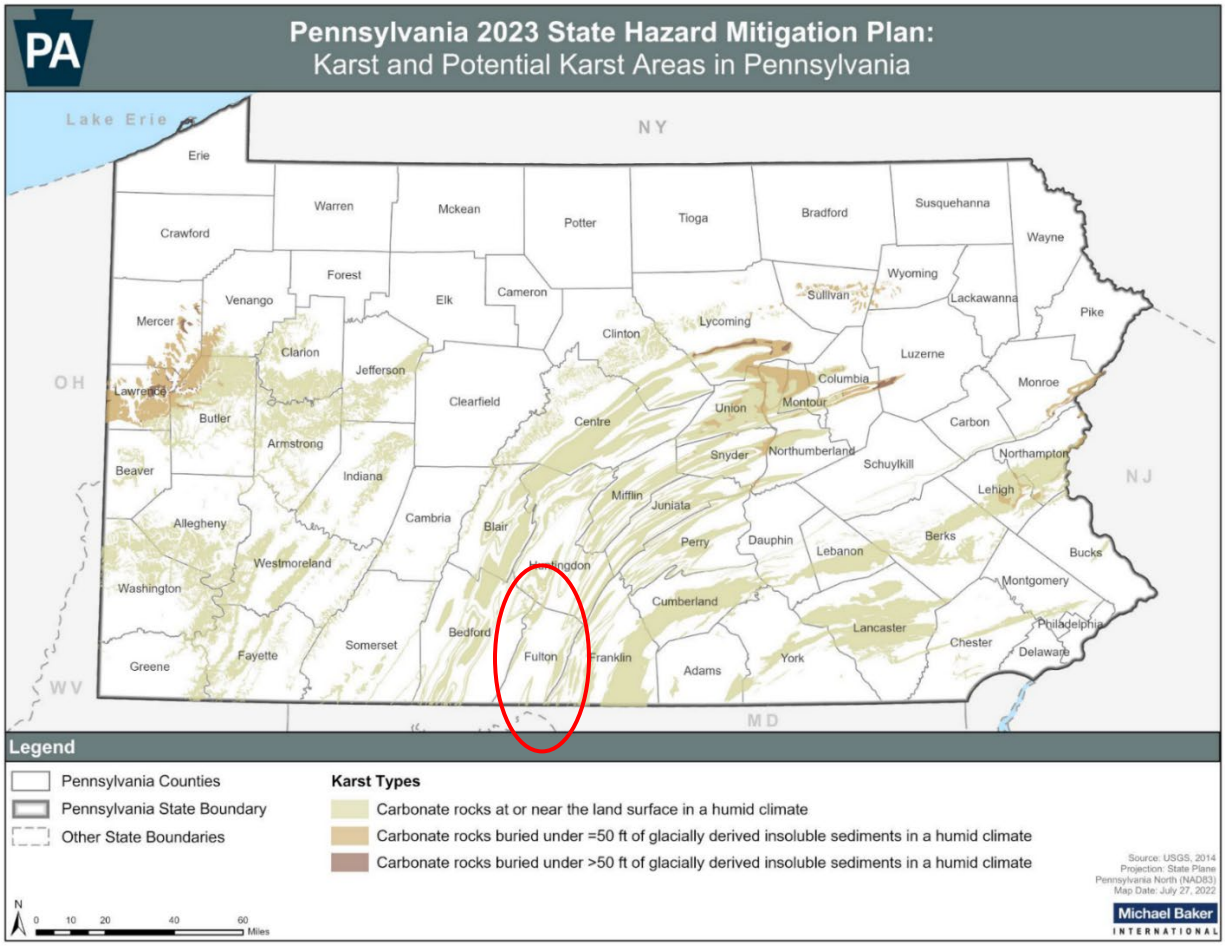
Figure 4.3.11-1 highlights regions in Pennsylvania subject to natural subsidence due to limestone bedrock. Figure 4.3.11-2 more specifically shows the distribution of carbonate bedrock, abandoned mine areas, and digitized mine locations within Fulton County. The following municipalities contain near-surface limestone deposits:

- Ayr Township
- Bethel Township
- Dublin Township
- McConnellsburg Borough
- Thompson Township
- Todd Township

While karst features are less common in urbanized areas, human activities such as leaking water pipes, stormwater conveyance structures, construction, and land grading can contribute to localized subsidence or sinkhole formation by altering water flow and dissolving rock over time. Mining activities may also induce subsidence, particularly where mine cover is thin or where bedrock is less conducive to sinkhole formation.

To better evaluate karst hazards in areas underlain by soluble rock, mapped locations of observed sinkholes and surface depressions in Pennsylvania are illustrated in Figure 4.3.11-3.

Figure 4.3.11-1. Areas in Pennsylvania with Karst or Potential for Karst Development



Source: PEMA 2023
Note: Fulton County indicated by red oval

Figure 4.3.11-2. Sinkhole Hazard Area

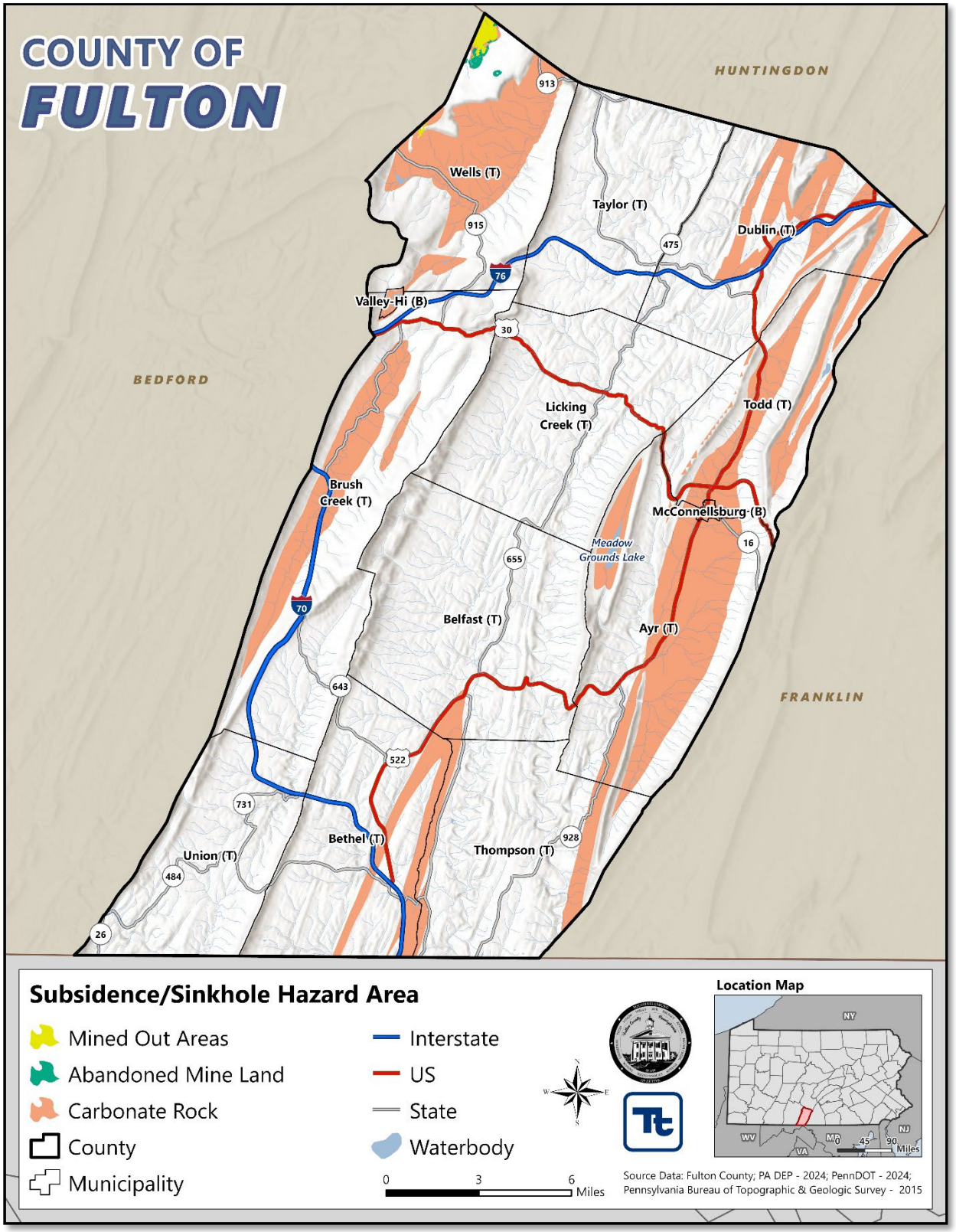
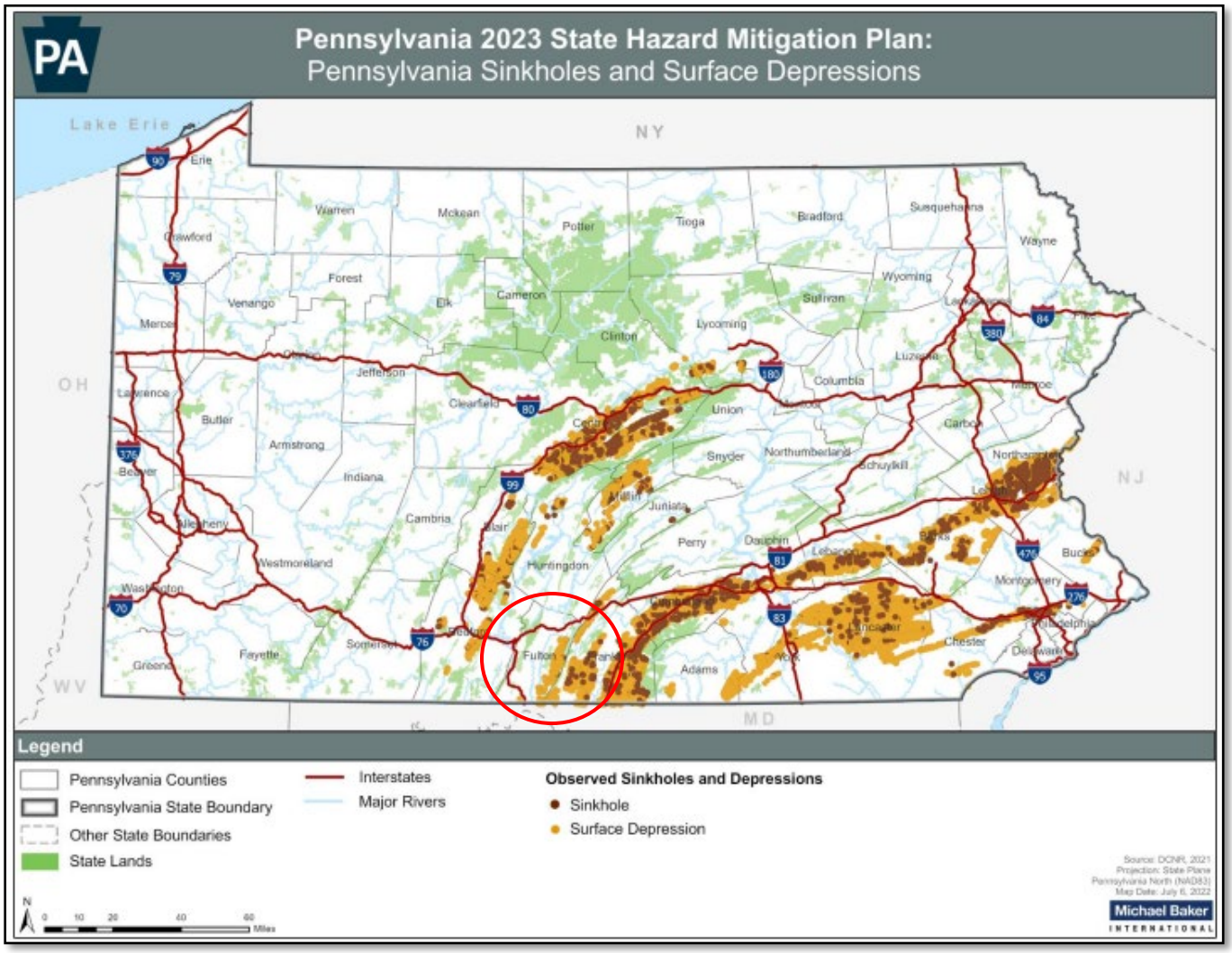


Figure 4.3.11-3. Pennsylvania Sinkholes and Surface Depression



Source: PEMA 2023
Note: Fulton County indicated by red oval.

4.3.11.3 Range of Magnitude

Based on the geologic formations underlying parts of Fulton County, subsidence and sinkhole events may occur gradually or abruptly. Events could result in minor elevation changes or deep, gaping holes in the ground surface. Abrupt subsidence and sinkhole events can cause severe damage in urban environments; gradual events can be addressed before significant damage occurs. If long-term subsidence or sinkhole formation is not recognized and mitigation measures are not implemented, fractures or complete collapse of building foundations and roadways may result.

Sinkholes also may have negative effects on local groundwater. Groundwater in limestone and other similar carbonate rock formations can be easily polluted, because water moves readily from the earth's surface down through solution cavities and fractures, thus undergoing very little filtration. Contaminants of concern include sewage, fertilizers, herbicides, pesticides, and industrial products.

The worst-case scenario for sinkholes in Fulton County would be a series of large sinkholes opening in Ayr Township. Long swaths of the Township have near-surface limestone, making it vulnerable to sinkholes. This series of sinkholes could close roads, cause power outages, prevent the delivery of emergency services, and cause injuries or death to the Township's residents.

4.3.11.4 Past Occurrence

According to the 2023 Pennsylvania State HMP and DCNR Pennsylvania Geologic Data Exploration mapper, there have been five recorded sinkholes in Fulton County (PEMA 2023) (DCNR 2022). Because large-scale or fast-moving subsidence events can trigger landslides, landslides can be an indication of a potentially greater or secondary hazard.

4.3.11.5 Probability of Future Occurrence

Although sinkhole occurrence will continue to be a possibility in Fulton County, the probability of a sinkhole or subsidence event is difficult to estimate because of the low number of previous events. Areas to monitor for future sinkhole and subsidence events based on their geologic bedrock are listed above in Section 4.3.11.2.

Table 4.3.11-1. Probability of Future Sinkhole and Subsidence Events

Hazard Type	Number of Occurrences Between 1950 and 2023	Percent Chance of Occurrence in Any Given Year
Subsidence and Sinkholes	5	6.8%

Source: (DCNR 2022) (PEMA 2023)
Note: % = Percent

Potential losses caused by sinkhole formation are difficult to calculate for all existing buildings, critical facilities, and infrastructure, because the hazard area may affect so much of the County. Based on the lack of karst geology, but presence of filled ground and utilities, the future occurrence of subsidence and sinkholes can be considered *possible* as defined by the Risk Factor Methodology probability criteria (see Table 4.4.1-1).

4.3.11.6 Vulnerability Assessment

To understand risk, a community must evaluate the assets that are exposed or vulnerable in the identified hazard area. The following section includes an evaluation and estimation of potential sinkhole and subsidence impacts on the county, including:

- Data and methodology used for the evaluation.
- Impacts on life, health, and safety; general building stock; critical facilities; economy; environment; and future growth and development.
- Expected Future Conditions.

- Further data collections that will increase understanding of this hazard over time.

Impact on Life, Health, and Safety

To estimate the number of individuals exposed to the hazard, the total population of each municipality was divided by the number of residential buildings to calculate an average population per residential structure. This average was then applied to the number of residential structures intersecting the carbonate bedrock area. Table 4.3.11-2 summarizes the estimated population exposed to this hazard by municipality.

Among all jurisdictions, only the Town of Wells intersects with the mined-out hazard area, with an estimated 16 individuals, representing approximately 3.7 percent of the town's total population.

Table 4.3.11-3 shows the estimated number of vulnerable persons located in the carbonate rock hazard area by jurisdiction.

Table 4.3.11-2. Estimated Population Located over Carbonate Bedrock

Jurisdiction	American Community Survey 5-Year Population Estimates (2022)	Estimated Population Exposed	Percent Total
Ayr (T)	1,969	1,101	55.9%
Belfast (T)	1,401	111	7.9%
Bethel (T)	1,443	136	9.4%
Brush Creek (T)	587	180	30.7%
Dublin (T)	1,175	227	19.3%
Licking Creek (T)	1,575	0	0.0%
McConnellsburg (B)	1,056	1,056	100.0%
Taylor (T)	1,164	0	0.0%
Thompson (T)	949	63	6.6%
Todd (T)	1,797	1,201	66.8%
Union (T)	991	0	0.0%
Valley-Hi (B)	3	3	100.0%
Wells (T)	435	423	97.2%
Fulton County (Total)	**14,545**	**4,501**	**30.9%**

Source: U.S. Census Bureau, American Community Survey 2022; Pennsylvania Bureau of Topographic and Geologic Survey 2015
Notes: % - Percent; B = Borough; C = City; Twp. = Township

Table 4.3.11-3. Estimated Number of Vulnerable Persons Located in the Carbonate Rock Hazard Area

Jurisdiction	Estimated Number of Vulnerable Persons Located in the Carbonate Rock Hazard Area									
	Persons Over 65	Percent of Total	Persons Under 5	Percent of Total	Non-English Speaking Persons	Percent of Total	Persons with a Disability	Percent of Total	Persons in Poverty	Percent of Total
Ayr (T)	293	55.9%	47	55.3%	0	0.0%	223	55.9%	79	55.2%
Belfast (T)	27	7.7%	6	7.1%	1	6.0%	21	7.6%	10	7.7%
Bethel (T)	28	9.4%	4	8.3%	0	0.0%	22	9.2%	11	9.4%
Brush Creek (T)	52	30.8%	3	30.0%	0	0.0%	49	30.4%	21	30.4%
Dublin (T)	49	19.1%	6	19.4%	0	0.0%	38	18.9%	29	18.8%
Licking Creek (T)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
McConnellsburg (B)	265	99.6%	83	100.0%	0	0.0%	279	100.0%	280	99.6%

Jurisdiction	Estimated Number of Vulnerable Persons Located in the Carbonate Rock Hazard Area									
	Persons Over 65	Percent of Total	Persons Under 5	Percent of Total	Non-English Speaking Persons	Percent of Total	Persons with a Disability	Percent of Total	Persons in Poverty	Percent of Total
Taylor (T)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Thompson (T)	10	6.3%	3	5.8%	0	0.0%	9	6.1%	5	5.6%
Todd (T)	230	66.7%	52	66.7%	0	0.0%	188	66.7%	100	66.2%
Union (T)	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Valley-Hi (B)	3	100.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Wells (T)	113	96.6%	29	96.7%	0	0.0%	78	96.3%	63	96.9%
Fulton County (Total)	**1,070**	**33.7%**	**233**	**33.7%**	**1**	**6.0%**	**907**	**34.7%**	**598**	**38.6%**

Source: U.S. Census Bureau, American Community Survey 2022; Pennsylvania Bureau of Topographic and Geologic Survey 2015
Note: % = Percent

Impact on General Building Stock

Table 4.3.11-4 summarizes the number of buildings built on carbonate bedrock and the total replacement cost of these buildings by jurisdiction. There are 2,658 buildings, with a replacement cost value (RCV) of approximately $3.5 billion, built on lands with carbonate bedrock. The Township of Ayr has the greatest number of buildings on carbonate bedrock—692 buildings (59.5 percent of its total building stock) with an estimated replacement cost of $971 million.

Table 4.3.11-5 lists the buildings located within the carbonate bedrock hazard area by general occupancy. The residential occupancy is the most exposed to the carbonate rock hazard area with 623 total buildings. The Township of Ayr holds the highest number of resident buildings (495) in the carbonate rock hazard area.

Only one jurisdiction has buildings located within the mined-out hazard area: the Town of Wells. It contains 10 buildings, representing 3.3 percent of the jurisdiction's total—with a RCV of $4 million. All 10 buildings are classified as residential.

Table 4.3.11-4. Estimated Building Stock Located in the Carbonate Rock Hazard Area

Jurisdiction	Jurisdiction Total Buildings		Buildings in the Carbonate Rock Hazard Area			
			Number of Buildings		Replacement Cost Value	
	Count	Replacement Cost Value	Count	% of Jurisdiction Total	Value	% of Jurisdiction Total
Ayr (T)	1,164	$1,376,426,042	692	59.5%	$971,233,539	70.6%
Belfast (T)	751	$655,413,691	55	7.3%	$76,752,966	11.7%
Bethel (T)	877	$994,651,759	102	11.6%	$293,605,803	29.5%
Brush Creek (T)	530	$839,701,214	183	34.5%	$336,459,873	40.1%
Dublin (T)	696	$767,305,491	126	18.1%	$153,103,860	20.0%
Licking Creek (T)	901	$840,873,066	0	0.0%	$0	0.0%
McConnellsburg (B)	547	$817,997,653	547	100.0%	$817,997,653	100.0%
Taylor (T)	707	$983,050,508	0	0.0%	$0	0.0%
Thompson (T)	582	$416,632,627	42	7.2%	$105,673,148	25.4%
Todd (T)	874	$969,356,489	592	67.7%	$627,451,937	64.7%
Union (T)	437	$306,763,135	0	0.0%	$0	0.0%
Valley-Hi (B)	29	$9,954,698	29	100.0%	$9,954,698	100.0%
Wells (T)	299	$158,054,723	290	97.0%	$145,825,034	92.3%
Fulton County (Total)	**8,394**	**$9,136,181,097**	**2,658**	**31.7%**	**$3,538,058,511**	**38.7%**

Source: Fulton County 2024; RS Means 2024; Pennsylvania Bureau of Topographic and Geologic Survey 2015
Notes: % - Percent; B = Borough; C = City; Twp. = Township

Table 4.3.11-5. Buildings in Carbonate Rock by General Occupancy

Jurisdiction	Residential	Commercial	Industrial	Government, Religion, Agricultural, and Education
Ayr (T)	495	185	3	9
Belfast (T)	44	9	2	0
Bethel (T)	66	35	0	1
Brush Creek (T)	128	52	0	3
Dublin (T)	107	18	0	1
Licking Creek (T)	0	0	0	0
McConnellsburg (B)	366	162	1	18
Taylor (T)	0	0	0	0

Jurisdiction	Residential	Commercial	Industrial	Government, Religion, Agricultural, and Education
Thompson (T)	31	11	0	0
Todd (T)	470	114	0	8
Union (T)	0	0	0	0
Valley-Hi (B)	29	0	0	0
Wells (T)	249	37	0	4
Fulton County (Total)	**1,985**	**623**	**6**	**44**

Source: Fulton County 2024; Pennsylvania Bureau of Topographic and Geologic Survey 2015
Note: % = Percent

Impact on Critical Facilities

A total of 75 critical facilities are located within the carbonate rock hazard area (Table 4.3.11-6). The sector with the highest number of facilities is Food, Hydration, and Shelter, with 26 facilities, followed by Safety and Security, which has 22.

Table 4.3.11-6. Number of Facilities in the Carbonate Rock Hazard Area, by Lifeline Category

Jurisdiction	Number of Facilities in the Carbonate Rock Hazard Area, by Lifeline Category									Total Facilities in Hazard Area	
	Communications	Energy	Food, Hydration, Shelter	Hazardous Materials	Health & Medical	Safety & Security	Transportation	Water Systems	Other Critical Facilities	Count	% of Jurisdiction Total
Ayr (T)	0	1	6	3	0	3	0	1	3	**17**	**77.3%**
Belfast (T)	1	0	1	0	0	0	0	1	0	**3**	**18.8%**
Bethel (T)	0	0	1	0	0	0	0	0	0	**1**	**4.3%**
Brush Creek (T)	0	1	2	0	0	2	0	0	1	**6**	**33.3%**
Dublin (T)	1	0	1	0	0	1	0	2	0	**5**	**18.5%**
Licking Creek (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
McConnellsburg (B)	2	0	9	1	0	11	0	0	2	**25**	**100.0%**
Taylor (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Thompson (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Todd (T)	0	1	2	1	1	1	0	1	2	**9**	**36.0%**
Union (T)	0	0	0	0	0	0	0	0	0	**0**	**0.0%**
Valley-Hi (B)	0	0	0	0	0	2	0	0	0	**2**	**100.0%**
Wells (T)	0	0	4	0	0	2	0	0	1	**7**	**100.0%**
Fulton County (Total)	**4**	**3**	**26**	**5**	**1**	**22**	**0**	**5**	**9**	**75**	**32.9%**

Impact on the Economy

Subsidence and sinkholes can severely impact roads and infrastructure. As noted earlier, carbonate formations underlie almost 17.7 percent of the County. Major roadways that serve the County include Interstate I-70, I-76; Routes US-30, US-522; and multiple State Routes, including PA-475, PA-484, PA-655, PA-913, PA-915, and PA-928. Portions of each of these roadways are located in the identified subsidence and sinkhole hazard area. It is not possible to estimate potential future economic losses caused by subsidence and sinkhole events at this time.

Impact on the Environment

The presence of sinkholes can result in increased potential for groundwater contamination. Due to their porous nature, sinkholes are sometimes used as instruments for enhancing groundwater recharge. However, if hazardous materials are spilled at a recharge point, groundwater can quickly be contaminated due to the lack of soil substrate which normally would slow migrating contaminants. Vegetation is usually damaged during abrupt subsidence events. However, re-growth takes place over time. Land subsidence can also result in more frequent and expansive flooding and changes in river canal and drain flow systems.

Future Growth and Development

An increase in development and population can increase likelihood of a sinkhole incident. Future migration to larger jurisdictions may also increase the likelihood of an incident. Recently, sinkholes have been correlated to land use practices, especially from groundwater pumping and from construction and development practices. Sinkholes may form when the land surface is changed, such as when industrial and runoff-storage ponds are created. The weight of new material can trigger an underground collapse of supporting material, causing a sinkhole. Additionally, the overburden sediments that cover buried cavities in the aquifer systems are balanced by groundwater fluid pressure. Groundwater helps keep the surface soil in place. Pumping groundwater for urban water supply and irrigation can produce new sinkholes. If pumping results in a lowering of groundwater levels, then underground structural failure, sinkholes may occur as well (USGS 2018). Geological make-up should be considered for future development; certain soils, such as limestone, are more prone to sinkholes.

Expected Future Conditions

Climate is defined not simply as average temperature and precipitation but also by the type, frequency, and intensity of weather events. Both globally and at the local level, climate change has the potential to alter the prevalence and severity of weather extremes (EPA 2022).

Expected future conditions, such as longer growing seasons, increased temperatures, and the potential for more intense but less frequent summer rainfall—may influence the availability of water resources. As noted earlier in this profile, changes to the water balance in an area (including excessive groundwater withdrawal, redirecting surface water, creating artificial ponds, and drilling new wells) can lead to sinkhole formation. These actions may also accelerate the natural degradation of bedrock, increasing the likelihood of sinkholes. As more data becomes available regarding regional environmental trends, it will be important to assess how these evolving conditions may affect Fulton County's vulnerability to subsidence and sinkhole events.

4.3.11.7 Additional Data and Next Steps

While it is not possible to predict when and where the next event may take place, the Fulton County emergency services, including local fire and police departments, are well-equipped and prepared to respond to emergencies as they arise. The status of subsidence and sinkhole risk in Fulton County will continue to be monitored, and ongoing and new mitigation efforts will continue to be developed.

4.3.12 Tornado, Windstorm

4.3.12.1 Hazard Description

This section provides a profile and vulnerability assessment of the tornado and windstorm hazard. The wind hazard includes various types of wind events, including windstorms and tornadoes, which are defined below.

A tornado appears as a rotating, funnel-shaped cloud that extends from a thunderstorm to the ground with whirling winds that can reach 250 miles per hour (mph). Damage paths can be greater than 1 mile wide and 50 miles long. Tornadoes typically develop from either a severe thunderstorm or hurricane as cool air rapidly overrides a layer of warm ai2r. Tornadoes typically move at speeds between 30 and 125 mph and can generate combined wind speeds (forward motion and speed of the whirling winds) exceeding 300 mph. The lifespan of a tornado rarely is longer than 30 minutes (FEMA 1997). Tornadoes can occur at any time of the year, with peak seasons at different times for different states (NSSL 2013). In Pennsylvania, peak occurrence of tornadoes is May through July (NWS 2023).

Wind is air moving from high to low pressure. It is the rough horizontal movement of air (as opposed to an air current) caused by uneven heating of the Earth's surface. It occurs at all scales, from local breezes generated by heating of land surfaces and lasting tens of minutes to global winds resulting from solar heating of the Earth (FEMA 1997). Types of damaging winds include straight-line winds, downdrafts, downbursts, microbursts, gust fronts, derecho, bow echoes, and hook echoes, described as follows (NSSL 2023):

- **Straight-line Wind** is any thunderstorm wind not associated with rotation (e.g., tornadic winds). Straight-line winds are movements of air from areas of higher pressure to areas of lower pressure—the greater the difference in pressure, the stronger the winds.
- A **Downdraft** is a small-scale column of air that rapidly sinks toward the ground and usually results in a downburst.
- A **Downburst** is a strong downdraft with horizontal dimensions larger than 2.5 miles, resulting in an outward burst of damaging winds on or near the ground. It is usually associated with thunderstorms but can occur with rainstorms too weak to produce thunder.
- A **Microburst** is a small, concentrated downburst that produces an outward burst of damaging winds near the surface. It is typically short-lived, lasting only 5 to 10 minutes, with maximum wind speeds of up to 168 miles per hour (mph).
- A **Gust Front** is the leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. It is characterized by a wind shift, temperature drop, and gusty winds ahead of a thunderstorm.
- A **Derecho** is a widespread and long-lived windstorm associated with thunderstorms that are often curved. By definition, if the wind damage swath extends more than 240 miles (about 400 kilometers) and includes wind gusts of at least 58 mph (93 km/h) or greater along most of its length, then the event may be classified as a derecho.
- A **Bow Echo** is a radar echo that is linear but bent outward in a bow shape. Damaging straight-line winds often occur near the center of a bow echo (crest). Bow echoes can be more than 300 kilometers long, last for several hours, and produce extensive swaths of wind damage on the ground.
- A **Hook Echo** is a radar echo that is the most recognized and well-known radar signature for a tornadic supercell. This "hook-like" feature occurs when the strong counter-clockwise winds circling the mesocyclone (rotating updraft) are strong enough to wrap precipitation around the rain-free updraft area of the storm.

High winds other than tornados occur in all parts of the United States. Wind begins with differences in air pressures and occurs through rough horizontal movement of air caused by uneven heating of the earth's surface. Wind occurs at all scales, from local breezes lasting a few minutes to global winds resulting from solar heating of the earth. High winds are often associated with other severe weather events such as thunderstorms, tornadoes,

nor'easters, hurricanes, and tropical storms. Table 4.3.12-1 lists wind classifications used by the National Weather Service (NWS).

Table 4.3.12-1. NWS Wind Descriptions

Descriptive Term	Sustained Wind Speed (mph)
Hurricane force	≥74
Strong, dangerous, high or damaging	40-73
Very windy	30-40
Windy	20-30
Breezy, brisk, or blustery	15-25
Light, or light and variable wind	5-15 or 10-20
None	0-5

Source: (NWS 2024)
Note: mph: Miles per hour, NWS: National Weather Service

4.3.12.2 Location and Extent

Tornadoes and windstorms can occur throughout Fulton County, though events are usually localized. Tornadoes can occur at any time during the day or night but are most frequent during late afternoon into early evening, the warmest hours of the day, and most likely to occur during the spring and early summer months of March through June. Tornado movement is characterized in two ways: direction and speed of spinning winds, and forward movement of the tornado, also known as the storm track (PEMA 2023). The forward motion of the tornado's path can be a few hundred yards or several hundred miles in length. The width of tornadoes can vary greatly but generally range in size from less than 100 feet to over a mile in width. Some tornadoes never touch the ground and are short-lived, while others may touch the ground several times. Between 1950 and 2020, six tornadoes have been recorded in Fulton County. Figure 4.3.12-1 shows the tornadoes in and around Fulton County.

All of Fulton County experiences straight-line winds and windstorms. Straight-line winds and windstorms occur on a region-wide scale. While such winds usually accompany tornadoes, straight-line winds are caused by the movement of air from areas of higher pressure to areas of lower pressure. Stronger winds are the result of greater differences in pressure. Windstorms are generally defined with sustained wind speeds of 40 mph or greater lasting for one hour or longer, or winds of 58 mph or greater for any duration. Wind events can vary in spatial size from small microscale events which take place over only a few hundred meters to large-scale synoptic wind events often associated with warm or cold fronts (PEMA 2023).

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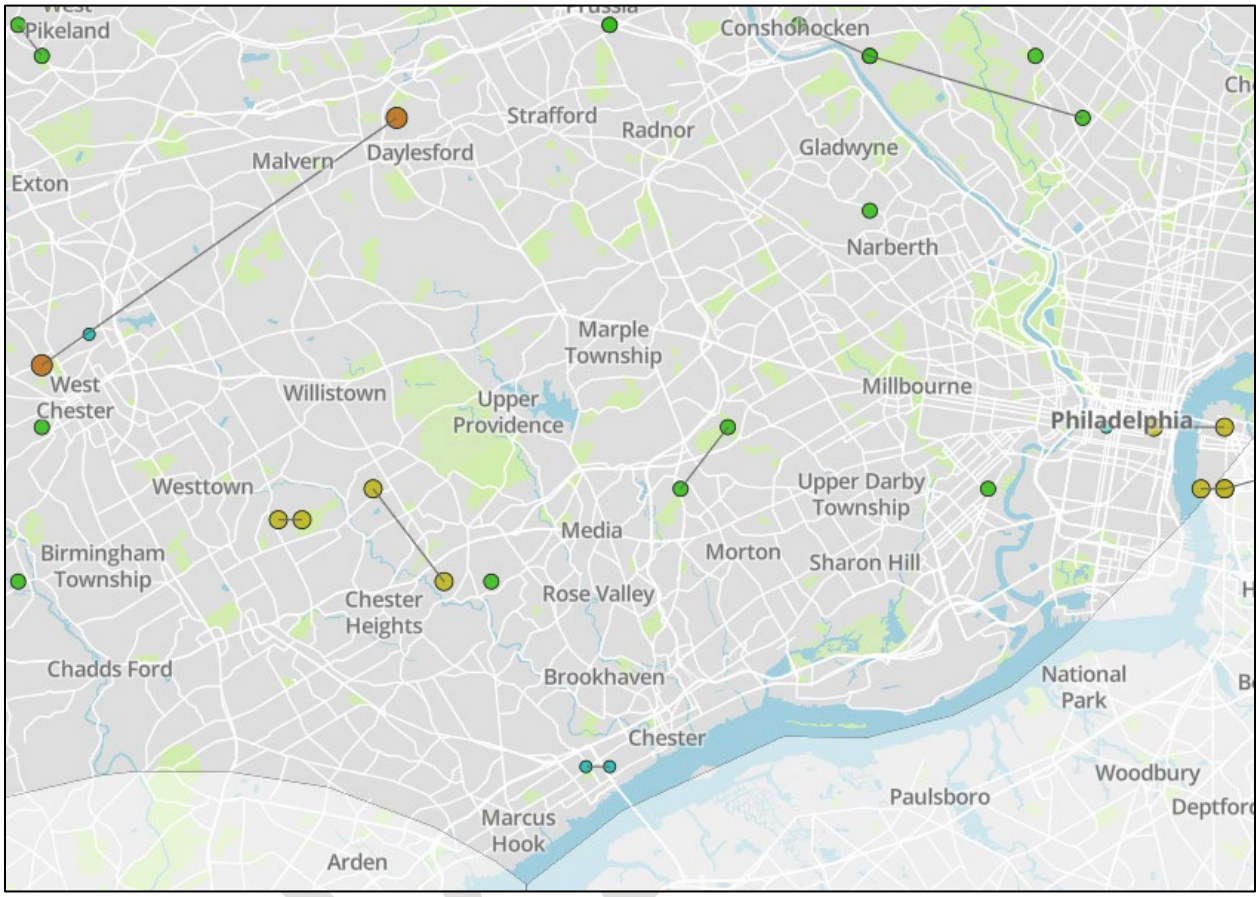
Figure 4.3.12-1. Tornadoes in Fulton County, 1950 to 2024



Source: (York Daily Record 2024)
*Note: *** Enhanced Fujita Scale describes the strength of the tornado based on the amount and type of damage caused by the tornado. The F-scale of damage will vary in the destruction area; therefore, the highest value of the F-scale is recorded for each event. EF0 – Light Damage (40 – 72 mph), EF1 – Moderate Damage (73 – 112 mph), EF2 – Significant damage (113 – 157 mph), EF3 – Severe Damage (158 – 206 mph), EF4 – Devastating Damage (207 – 260 mph), EF5 – Incredible Damage (261 – 318 mph)*

4.3.12.3 Range of Magnitude

Windstorms are generally defined as sustained wind speeds of 40 mph or greater, lasting for 1 hour or longer, or winds of 58 mph or greater for any duration. A tornado's magnitude is classified according to the Enhanced Fujita Scale (EF Scale), further discussed below.

The Enhanced Fujita Scale, also known as the "EF-Scale," measures tornado strength and associated damages. The EF-Scale is an update to the earlier Fujita Scale, also known as the "F-Scale," which was published in 1971. The EF-Scale provides engineered wind estimates and better damage descriptions. It classifies United States tornadoes into six intensity categories, as shown in Table 4.3.12-2, based upon the estimated maximum winds occurring within the wind vortex. Since its implementation by the National Weather Service in 2007, the EF-Scale has become the definitive metric for estimating wind speeds within tornadoes based upon damage to buildings and structures. F-Scale categories with corresponding EF-Scale wind speeds are also provided since previous tornado occurrences are described based on the F-Scale (PEMA 2023, NOAA NWS, 2022f).

Although the F Scale has been in use for more than 30 years, it has limitations. The primary limitations are lack of Damage Indicators (DI), no account of construction quality and variability, and no definitive correlation between damage and wind speed. These limitations have led to inconsistent rating of tornados and, in some cases, overestimates of tornado wind speeds. The limitations encouraged and induced development of the

Enhanced Fujita Scale (EF Scale). The Texas Tech University Wind Science and Engineering (WISE) Center, along with a forum of nationally renowned meteorologists and wind engineers from across the country, developed the EF Scale (TTU 2006).

The EF Scale became operational on February 1, 2007. It is used to assign tornadoes a rating based on estimated wind speeds and related damage. When tornado-related damage is surveyed, it is compared to a list of DIs and Degrees of Damage (DOD), which help better estimate the range of wind speeds produced by the tornado. From that, a rating is assigned, similar to that of the F Scale, with six categories from EF0 to EF5, representing increasing degrees of damage. The EF Scale was revised from the original F Scale to reflect better examinations of tornado damage surveys. This scale was developed with consideration to the designs of most structures (TTU 2006). details each of the six categories of the EF Scale.

Table 4.3.12-2. Enhanced Fujita Damage Scale

EF Scale Number	Intensity Phrase	Wind Speed (mph)	Type of Damage Done
EF0	Light tornado	65–85	Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
EF1	Moderate tornado	86-110	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	Significant tornado	111-135	Considerable damage. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	Severe tornado	136-165	Severe damage. Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	Devastating tornado	166-200	Devastating damage. Well-constructed houses and whole-frame houses completely leveled; cars thrown, and small missiles generated.
EF5	Incredible tornado	>200	Incredible damage. Strong-frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air over distances exceeding 100 meters (109 yards); high-rise buildings undergo significant structural deformation; incredible phenomena occur.

Source: (NWS 2024)
Note: mph: Miles per hour

The EF Scale takes into account more variables than the original F Scale in assigning a wind speed rating to a tornado. The EF Scale incorporates 28 DIs, such as building type, structures, and trees. There are eight DODs for each DI, ranging from the beginning of visible damage to complete destruction of the DI. Table 4.3.12-3 lists the 28 DIs, with a description of construction typical for each DI. Each DOD in every category is assigned an estimated expected wind speed, a lower boundary of wind speed, and an upper boundary of wind speed.

Table 4.3.12-3. EF Scale Damage Indicators

Number	Damage Indicator	Abbreviation	Number	Damage Indicator	Abbreviation
1	Small barns, farm outbuildings	SBO	15	School – 1-story elementary (interior or exterior halls)	ES
2	One- or two-family residences	FR12	16	School – junior or senior high school	JHSH
3	Single-wide mobile home	MHSW	17	Low-rise (1-4 story) building	LRB
4	Double-wide mobile home	MHDW	18	Mid-rise (5-20 story) building	MRB

Number	Damage Indicator	Abbreviation	Number	Damage Indicator	Abbreviation
5	Apartment, condominium, townhouse (3 stories or less)	ACT	19	High-rise (over 20 stories)	HRB
6	Motel	M	20	Institutional building (hospital, government. or university)	IB
7	Masonry apartment or motel	MAM	21	Metal building system	MBS
8	Small retail building (fast food)	SRB	22	Service station canopy	SSC
9	Small professional (doctor office, branch bank)	SPB	23	Warehouse (tilt-up walls or heavy timber)	WHB
10	Strip mall	SM	24	Transmission line tower	TLT
11	Large shopping mall	LSM	25	Free-standing tower	FST
12	Large, isolated ("big box") retail building	LIRB	26	Free-standing pole (light, flag, luminary)	FSP
13	Automobile showroom	ASR	27	Tree – hardwood	TH
14	Automotive service building	ASB	28	Tree – softwood	TS

Source: (NWS 2024)

Events after February 2007 are classified based on the EF Scale. Previous occurrences and losses associated with historical tornado events, described in the Past Occurrences section of this hazard profile, are classified based on the F Scale.

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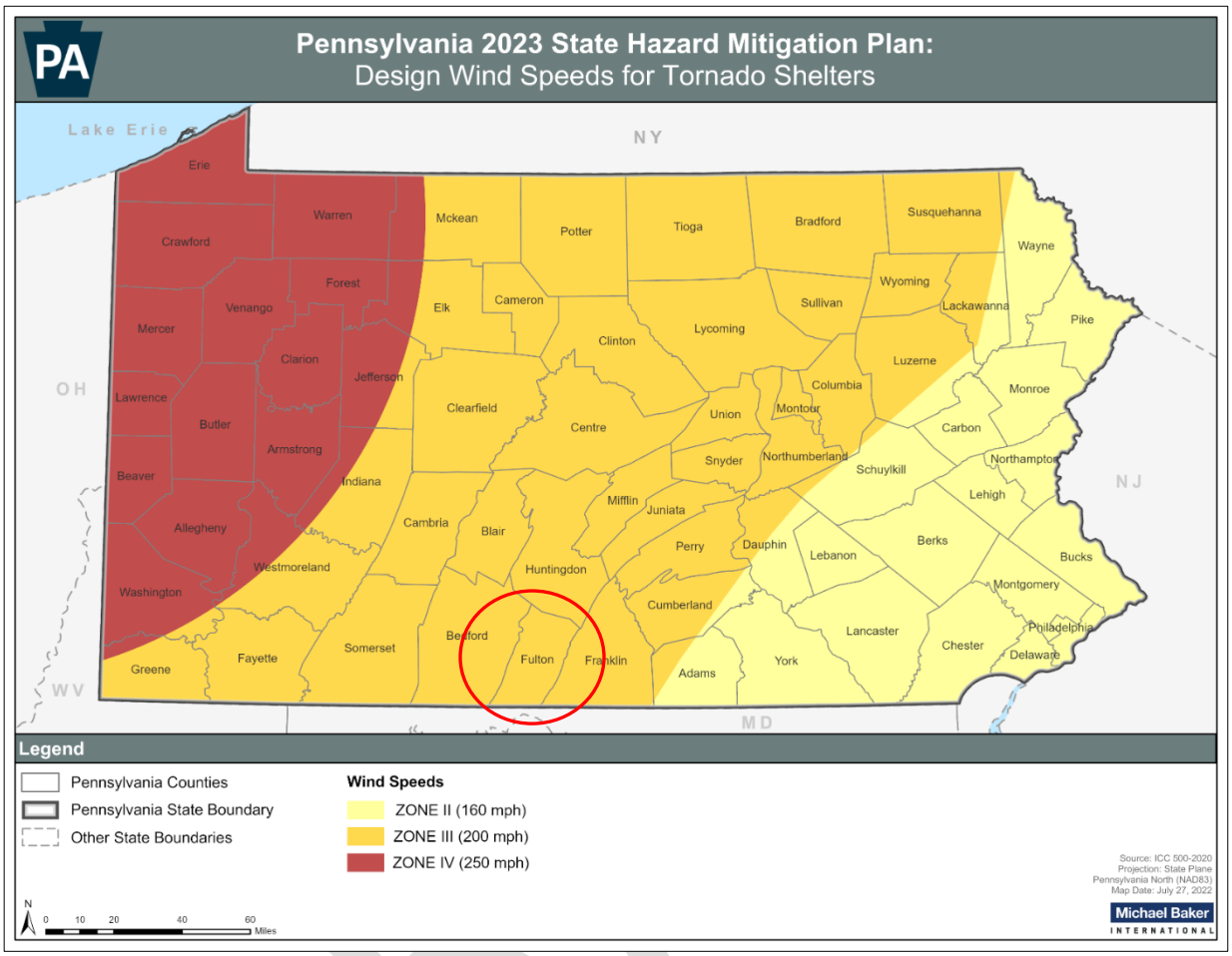
Figure 4.3.12-2. Design Wind Speeds for Tornado Shelters



Source: PEMA 2023
Note: The red circle indicates the approximate location of Fulton County.

Figure 4.3.12-2, shown above, shows wind speed zones developed for the design of tornado shelters. It identifies worst-case wind speeds that could occur across the United States to be used as the basis for design and evaluation of the structural integrity of shelters and critical facilities. According to the figure, Fulton County falls within Zone III, meaning design wind speeds for shelters and critical facilities should be able to withstand a 3-second gust up to 200 mph, regardless of whether the gust is the result of a tornado, hurricane, tropical storm, or windstorm event. Therefore, these structures should be able to withstand speeds experienced in an EF3 tornado.

Since tornado events are typically localized, environmental impacts are rarely widespread. However, where these events occur, severe damage to plant species is likely. This includes loss of trees and an increased threat of wildfire in areas where dead trees are not removed. Hazardous material facilities should meet design requirements for the wind zones identified in Figure 4.3.12-2 in order to prevent release of hazardous materials into the environment.

4.3.12.4 Past Occurrence

Between 1954 and 2024, Pennsylvania was included in two FEMA declared tornado- and windstorm-related major disaster declarations (DR) or emergencies (EM). Generally, disasters cover a wide region of the Commonwealth; therefore, many counties could have experienced various types of impacts. Of those declarations, Fulton County was not included in either (FEMA 2023).

The NOAA-NCEI Storm Events database records tornado and windstorm events. According to the database, six tornadoes were recorded in Fulton County between 1950 and 2024. These tornadoes include four with an intensity of F/EF1, and two with an intensity of F/EF0. Between 1950 and 2024, there has been 1 strong wind event, 13 high wind events, and 74 thunderstorm wind events, according to the NOAA-NCEI Storm Events database.

For this HMP update, known tornado and major windstorm events that have impacted Fulton County between 1950 and December 2024 are identified in Table 4.3.12-4. Tornadoes, and wind events that resulted in a disaster declaration or caused injuries, fatalities, or over $10,000 in damage, are listed in the table. With documentation for Pennsylvania and Fulton County being extensive, not all sources have been identified or researched. Table 4.3.12-4 documents events listed in the NOAA-NCEI database and the Storm Prediction Center severe weather database. In addition to the events listed in Table 4.3.12-4.

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Table 4.3.12-4. Tornado and Windstorm Events, 2009 to 2024

Dates of Event	Event Type	Location	Magnitude	Losses / Impacts
December 2, 2009	High Wind	Fulton County	50 Kts.	Non-thunderstorm wind gusts between 50 and 60 mph toppled numerous trees and power lines across Fulton County. The high winds caused sporadic power outages to approximately less than 100 Allegheny Power customers. $25,000 in damages were reported.
February 6, 2009	Thunderstorm Wind	Knobsville	50 Kts.	A severe thunderstorm snapped off about 30 trees near Cowans Gap State Park near the Fulton/Franklin County border. $5,000 in damages were reported.
July 29, 2009	Thunderstorm Wind	Dickey's Mountain	60 Kts.	Thunderstorm winds estimated near 70 mph tore a portion of a metal roof from a large barn and knocked down several trees in Dickeys Mountain. $7,500 in damages were reported.
February 5, 2010	Thunderstorm Wind	Dickey's Mountain	50 Kts.	Thunderstorm winds estimated near 60 mph toppled several trees on Creek Road just north of Route 928. $5,000 in damages were reported.
May 26, 2011	Thunderstorm Wind	Cove Mills	50 Kts.	Thunderstorm winds estimated near 60 mph produced structural damage near Cove Mills. $5,000 in damages were reported.
May 26, 2011	Thunderstorm Wind	Cove Mills	50 Kts.	Thunderstorm winds estimated near 60 mph knocked down numerous trees and utility wires in several communities surrounding Cove Mills. $10,000 in damages were reported.
January 6, 2012	Thunderstorm Wind	Needmore	50 Kts.	Thunderstorm winds estimated near 60 mph knocked down trees and utility wires in Needmore. $5,000 in damages were reported.
June 29, 2012	Thunderstorm Wind	Needmore	50 Kts.	Thunderstorm winds estimated near 60 mph knocked down trees in Needmore. $5,000 in damages in reported.
May 31, 2015	Thunderstorm Wind	Gem	50 Kts.	Thunderstorm winds estimated near 60 mph knocked down trees and wires near the intersection of Great Cove and Timber Ridge Roads near Needmore. $1,000 in damages were reported.
June 16, 2016	Tornado	Northcraft	EF-0	Tornado touched down near Barnes Gap in Fulton County. It was a small brief tornado that moved through a wooded area crossing Route 484 Buck Valley Road just northeast of Barnes Gap. Trees were snapped and uprooted in different directions indicating a cyclonic pattern. Much greater damage occurred from a 3-mile-wide swath over 5 miles long of scattered straight-line wind damage and hail from this storm. Peak winds were estimated at 80 mph. There were no injuries or fatalities.
April 8, 2017	Tornado	Needmore	EF-1	The tornado touched down near Pleasant Grove Road (State Road 3007) and traveled northeastward for about 5 minutes, snapping and uprooting several swaths of trees along its path. It was estimated that approximately 150 trees were snapped or downed by the tornado. $5,000 in damages were reported.
April 8, 2017	Thunderstorm Wind	McConnellsburg	52 Kits.	A severe thunderstorm producing winds estimated near 60 mph knocked down trees and wires near McConnellsburg. $4.000 in damages were reported.
April 19, 2019	Tornado	Fulton County	EF-1	The tornado touched down approximately one mile west-southwest of Knobsville, just west of East Dutch Corner Road. Trees were uprooted and snapped along the path of the tornado, and a home just off of Breezy Point Road received considerable damage, including the loss of a chimney and a porch roof. Peak winds were estimated at 100 mph. $25,000 in damages were reported.

Dates of Event	Event Type	Location	Magnitude	Losses / Impacts
April 19, 2019	Thunderstorm Wind	Knobsville	61 Kts.	A severe thunderstorm producing winds estimated near 70 mph knocked down trees near Knobsville. $12,000 in damages were reported.
May 29, 2019	Thunderstorm Wind	Burnt Cabins	52 Kts.	A severe thunderstorm producing winds estimated near 60 mph knocked down a barn and multiple pine trees near Burnt Cabins. $10,000 in damages were reported
May 29, 2019	Tornado	Enid	EF-1	An EF1 tornado touched down near Wells Tannery in Fulton County on the afternoon of May 29, 2019. The tornado produced maximum winds estimated near 100 mph along a path that was about 3/4 of a mile long, and a maximum path width of approximately 50 yards. $35,000 in damages were reported.
July 21, 2019	Thunderstorm Wind	McConnellsburg	52 Kts.	A severe thunderstorm producing winds estimated near 60 mph knocked down numerous trees near McConnellsburg.
June 4, 2020	Thunderstorm Wind	Needmore	52 Kts.	A severe thunderstorm producing winds estimated near 60 mph knocked down trees and wires near Needmore.
July 21, 2020	Thunderstorm Wind	McConnellsburg	52 Kts.	A severe thunderstorm producing winds estimated near 60 mph knocked down multiple trees in McConnellsburg and knocked down trees and wires across Route 522 near Back Run Road, closing the roadway to traffic.
April 30, 2021	High Wind	Fulton County	52 Kts.	High winds were estimated to have gusted to near 60 mph in Fulton County on April 30, 2021.
June 30, 2021	Thunderstorm Wind	McConnellsburg	52 Kts.	A severe thunderstorm producing winds estimated near 60 mph brought down trees and wires on W Wood Street.
July 12, 2022	Thunderstorm Wind	Lashley	52 Kts.	A severe thunderstorm producing winds estimated near 60 mph knocked down trees across Buck Valley Road.
July 23, 2022	Thunderstorm Wind	Sideling Hill	52 Kts.	A severe thunderstorm producing winds estimated near 60 mph knocked down a few trees between the 5000 block of Pleasant Grove Road and Flickerville Road.
June 26, 2023	Thunderstorm Wind	Bills Place	52 Kts.	A severe thunderstorm producing winds estimated near 60 mph knocked down trees and power lines in northern Fulton County.
July 15, 2023	Thunderstorm Wind	Dott	52 Kts.	A severe thunderstorm producing winds estimated near 60 mph knocked down trees across Mallard Run Road east of Buck Valley.
August 7, 2023	Thunderstorm Wind	Stoneybreak, Emmaville	52 Kts.	A severe thunderstorm producing winds estimated near 60 mph knocked down road signs and blew them across Interstate 70 south of Crystal Spring.

Source: FEMA 2017; (NOAA 2024); Fulton County 2019
Notes: (1) Monetary figures within this table were U.S. Dollar (USD) figures calculated during or within the approximate time of the event. If such an event would occur in the present day, monetary losses would be considerably higher in USDs as a result of increased U.S. Inflation Rates.

FEMA *Federal Emergency Management Agency*
K *Thousand ($)*
Kts. *Knots*
M *Million ($)*
mph *Miles per hour*
NCDC *National Climatic Data Center*
NOAA *National Oceanic Atmospheric Administration*
PEMA *Pennsylvania Emergency Management Agency*
Tstm *Thunderstorm*

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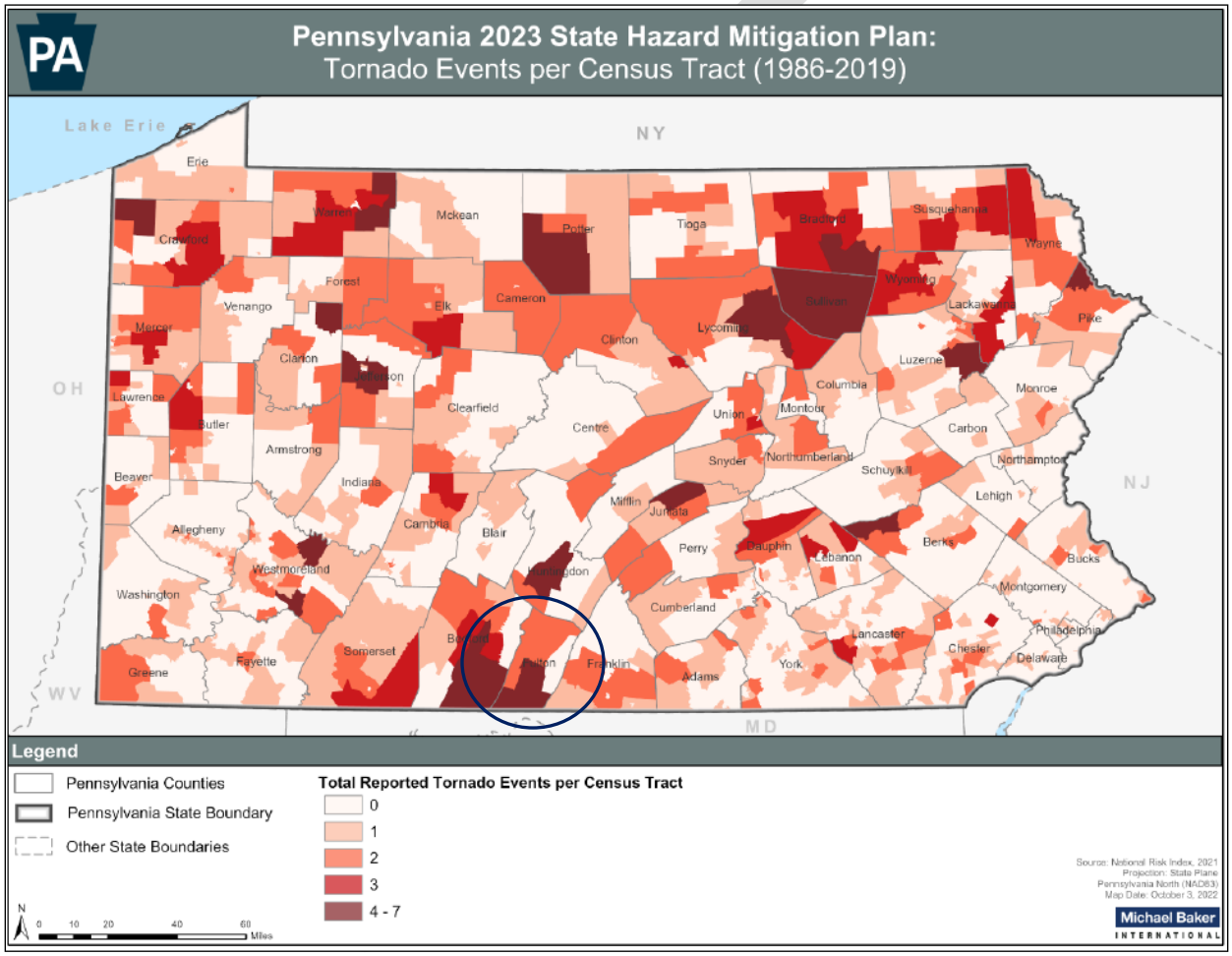
4.3.12.5 Probability of Future Occurrence

According to the National Weather Service, the Commonwealth of Pennsylvania has an annual average of 10 tornadoes with two related deaths. While the chance of being hit by a tornado is small, the damage that results when the tornado arrives is devastating. An EF4 tornado can carry wind velocities of 200 mph, resulting in a force of more than 100 pounds per square foot of surface area. This is a "wind load" that exceeds the design limits of most buildings.

Using data collected on events between 1986 and 2019, Figure 4.3.12-3 shows the number of total tornado events per census tract across Pennsylvania. The figure shows that a majority of Fulton County experienced a higher frequency of tornado events than the eastern and northern portions of the Commonwealth.

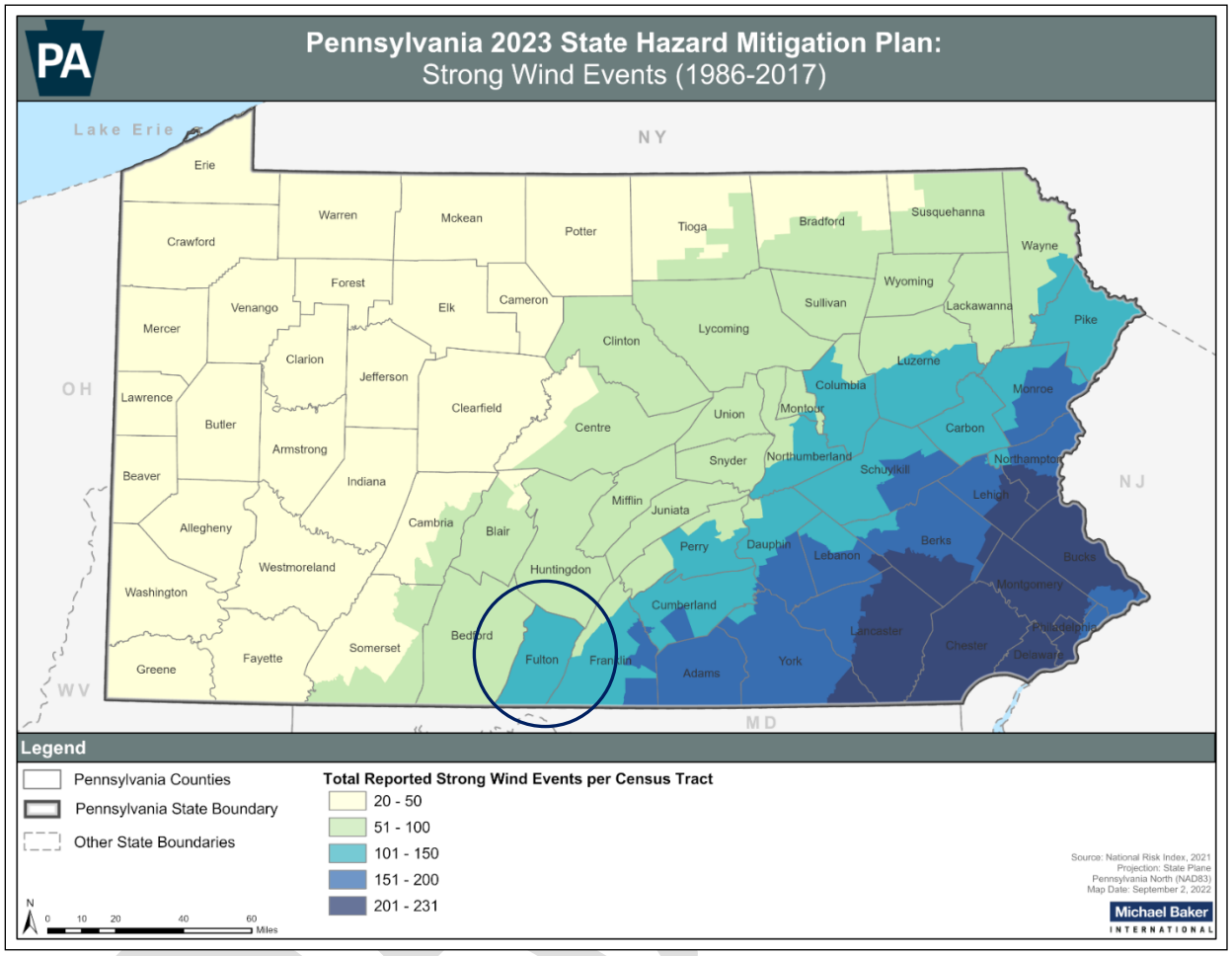
Figure 4.3.12-3. Total Tornado Events Per Square Mile in Pennsylvania



Source: PEMA 2023
Note: The blue circle indicates the approximate location of Fulton County.

The figure below provides a map of the maximum number of tornado touchdowns per census tract across the state from 1986 to 2017 The figure shows that Fulton County experienced a higher frequency of events than the northwestern parts of the State.

Figure 4.3.12-4. Maximum number of strong wind events per census tract in Pennsylvania from 1986-2017



Source: PEMA 2023
Note: The blue circle indicates the approximate location of Fulton County.

For the 2025 HMP update, the most up-to-date historic data was collected to calculate the probability of future occurrence of tornado and windstorm events for Fulton County. Information and data from NOAA-NCEI Storm Events database was used to identify the number of tornado and wind events that occurred between 1950 and 2024. Table 4.3.12-5 presents the probability of future occurrence of tornado events in Fulton County. Based on these statistics, there is an estimated nearly 100-percent chance of a windstorm event occurring in any given year in Fulton County.

Table 4.3.12-5. Probability of Future Tornado and Windstorm Events

Hazard Type	Number of Occurrences Between 1950 and 2024	Percent chance of occurrence in any given year
High Wind	13	17%
Strong Wind	1	1.3%
Thunderstorm Wind	74	98.7%
Funnel Cloud	5	6.7%
Tornado	6	8%
TOTAL	**100**	**100%**

Sources: (NOAA 2024)

In Section 4.4, the hazards of concern identified for Fulton County are ranked according to relative risk. The probability of occurrence, or likelihood of the event, is one parameter used for ranking hazards. The probability of occurrence for severe tornado and windstorm events in Fulton County is considered *highly likely* (greater than 90% annual probability) as defined by the Risk Factor Methodology probability criteria (Section 4.4).

4.3.12.6 Vulnerability Assessment

To understand risk, a community must evaluate assets exposed and vulnerable within the identified hazard area. The following section discusses potential impacts of the tornado hazard on Fulton County, including:

- Impacts on (1) life, health, and safety; (2) general building stock; (3) critical facilities; (4) the economy; and (5) the environment.
- Future growth and development.
- Expected Future Conditions.
- Additional data and next steps.

Impact on Life, Health, and Safety

Impacts of a tornado or windstorm on life, health, and safety depend on several factors, including severity of the event and whether adequate warning time was provided to residents. All residents in Fulton County are exposed to the tornado hazard.

Residents may be displaced or require temporary to long-term sheltering. In addition, downed trees, damaged buildings, and debris carried by high winds can lead to injury or loss of life. Similar to other natural hazards, socially vulnerable populations are most susceptible based on a number of factors, including their physical and financial ability to react or respond during a hazard, and locations and construction quality of their housing.

Economically disadvantaged populations are more vulnerable because they are likely to evaluate their risk and make decisions based on the major economic impact on their family and may not have funds to evacuate. The population over the age of 65 is also more vulnerable and, physically, they may have more difficulty evacuating. The elderly is considered most vulnerable because they may require extra time or outside assistance during evacuations and are more likely to seek or need medical attention that may not be available due to isolation during a storm event. Section 2 (County Profile) presents the statistical information regarding these populations in the County. First responders' safety is also at risk during on-scene operations and they may have limited access to roads to respond to incidents. First responders may experience a higher than normal call volume and demand and have additional duties such as traffic control.

Impact on General Building Stock and Critical Facilities

The entire County's building stock and critical facilities are exposed to the tornado hazard. Manufactured housing (i.e., mobiles homes) is particularly vulnerable to high winds and tornadoes. The U.S. Census Bureau defines manufactured homes as "movable dwellings, 8 feet or wider and 40 feet or more long, designed to be

towed on its own chassis, with transportation gear integral to the unit when it leaves the factory, and without need of a permanent foundation (US Census 2020)." They can include multi-wide types and expandable manufactured homes but exclude travel trailers, motor homes, and modular housing. Because of their lightweight and often unanchored design, manufactured housing is extremely vulnerable to high winds and will generally sustain the most damage.

Table 4.3.12-6 displays the number of manufactured housing units per municipality in Fulton County.

Table 4.3.12-6. Manufactured Housing Units per Municipality in Fulton County

Jurisdiction	Number of Manufactured Homes
Ayr Township	134
Belfast Township	107
Bethel Township	139
Brush Creek Township	91
Dublin Township	157
Licking Creek Township	120
McConnellsburg Borough	62
Taylor Township	94
Thompson Township	41
Todd Township	188
Union Township	37
Valley-Hi Borough	7
Wells Township	52
Fulton County	**1,229**

Source: Fulton County 2019 HMP

Impact on Economy

Tornadoes also impact the economy, including loss of business function (e.g., tourism, recreation), damage to inventory, relocation costs, and wage loss and rental loss due to repair/replacement of buildings. Impacts on transportation lifelines affect both short-term (e.g., evacuation activities) and long-term (e.g., day-to-day commuting and goods transport) transportation needs. Utility infrastructure (power lines, gas lines, electrical systems) could sustain damage and impacts could result in loss of power, which could also affect business operations and provision of heating or cooling to the population.

Impact on the Environment

Tornado events are typically localized; therefore, environmental impacts are rarely widespread. Impacts of windstorms on the environment usually occur over a larger area. Severe damage to plant species is likely from both tornado and windstorm events. This includes uprooting or total destruction of trees, and increased threat to wildfire in areas of tree debris.

Future Growth and Development

As discussed in Section 4.4 (Hazard Vulnerability Summary), areas targeted for future growth, development and re-development have been identified across Fulton County. Any areas of growth could be affected by the tornado and windstorm hazard because the entire County is exposed and potentially vulnerable to the wind hazard. Residential development, specifically manufactured homes, may be considered more vulnerable to the tornado hazard.

Expected Future Conditions

An increase in storms will produce more wind events and may increase tornado activity. Additionally, an increase in temperature may provide more energy to produce storms that generate tornadoes (PSU 2023). With an increased likelihood of strong winds and tornado events, all of the County's assets are at risk for losses as a result of extreme wind events.

4.3.12.7 Additional Data and Next Steps

In time, HAZUS versions will be released with modules that address straight-line wind and tornado events. As updated versions of are released, the County will be able to run analyses for an overall picture of the wind damages and debris generated from tornado events. Over time, Fulton County can obtain additional data to support the analysis of this hazard. This additional data would include details on past hazard events and impacts, and an updated building inventory that would provide specific building information, such as type of construction and details on protective features (for example, shutters and safe rooms).

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4.3.13 Transportation Accident

4.3.13.1 Hazard Description

For this plan update, transportation accidents are defined as transportation accidents are technological hazards involving the nation's system of land, sea, and air transportation infrastructure. A flaw or breakdown in any component of this system can and often does result in a major disaster involving loss of life, injuries, property and environmental damage, and economic consequences (PEMA 2023).

The Pennsylvania Emergency Management Agency (PEMA) states that transportation systems can present flaws or break down easily, which often results in a major disaster involving injuries, loss of property, environmental damage, economic consequences, and even loss of life (PEMA 2020). For the entire Commonwealth, transportation accidents are one of the costliest hazards in terms of the number of fatalities, injuries, economic loss, and environmental impacts.

Transportation systems available in Fulton County include roadways and airports. A major road accident in the county is probable; however, aviation accidents are unlikely. All county systems and supporting transportation resources provide services locally, regionally, and nationally. Transportation accidents involving road, air, and rail travel are defined below:

Vehicular Accidents: A vehicular accident is a road traffic incident that usually involves one vehicle colliding with another vehicle or other road user, such as an animal or a stationary roadside object. A vehicular accident may result in injury, property damage, or possible fatalities. Many factors contribute to vehicular accidents, including equipment failure, poor road conditions, weather, traffic volume, and driver behavior.

Aviation Accidents: According to the International Civil Aviation Organization, an aviation accident occurs during the operation of an aircraft between the time a person boards the aircraft with intent to fly to a destination, to the time the person has disembarked the aircraft. Three different situations qualify as an aviation accident: (1) a person is fatally or seriously injured; (2) the aircraft sustains damage or structural failure; or (3) the aircraft is missing or inaccessible. An aviation incident is an occurrence, other than an accident, associated with the operation of an aircraft that affects or could affect the safety of the operation (International Civic Aviation Organization 2015). Airport accidents and incidents have the potential to occur while the plane is over County airspace, not only directly on airport property.

This section provides a profile and vulnerability assessment of the transportation accident hazard for Fulton County.

4.3.13.2 Location and Extent

Vehicular Accidents

Major roadways in Fulton County include I-70, the Pennsylvania Turnpike – I-76, U.S.-522, and U.S.-30. Fulton County has more than 685 miles of roadways, divided as listed in Table 4.3.13-1.

Table 4.3.13-1. Fulton County Transportation Network

Category	Miles
Interstate Highway	39.6
Freeways/Expressways	0.0
Principal Arterials	24.2
Minor Arterials	48.7
Major Collectors	44.5
Minor Collectors	68.9

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Category	Miles
Local Roads	462.7
Total	**688.6**

Source: PennDOT 2020

Structurally deficient bridges pose a risk for transportation accidents. In response to the collapse of the I-35W Bridge in Minneapolis in August 2007, PennDOT assessed the structural integrity of all bridges in the Commonwealth. Table 4.3.13-2 lists the total number of bridges in Fulton County as well as the number of those that are structurally deficient (noted in parentheses).

Table 4.3.13-2. Bridges in Fulton County

On State Roads	On Local Roads
181 (17)	26 (4)

Source: PennDOT 2025

There is no warning time for vehicular accidents. Factors contributing to these accidents are typically associated with the driver, vehicle, and the environment. Factors associated with the driver include error, speeding, lack of experience, and blood-alcohol level. Factors associated with the vehicle include type, condition, and center of gravity. Environmental factors include quality of the infrastructure, weather, and obstacles. The majority of vehicular accidents are attributed to the driver. Vehicular accidents can severely affect those directly involved as well as others not directly involved. Other effects may include severe traffic delays, lost sales to businesses, delayed commodity shipments, and increased insurance costs (Cova and Conger 2004).

County and local officials identified the following areas as especially problematic for transportation accidents:

- PA-915 near Slabtown Drive.
- US-30 near South Valley Road.
- I-70 in Brush Creek Township.

The Harrisburg Area Transportation Study (HATS) made a GIS-based web application (app) available to the public to reduce vehicle crashes. The app uses five years of data from the Pennsylvania Department of Transportation's (PennDOT) Pennsylvania Crash Information Tool (PCIT) and puts it in a format that makes it easy to visualize and analyze. The app includes filters such as county, year, and accidents involving attributes such as aggressive driving, alcohol, bicycle and pedestrian, deer, heavy trucks, fatalities, serious injuries, and speeding. Figure 4.3.13-1 shows vehicular accidents from 2014 to 2023 in the County. Between this timeframe, a total of 2,509crashes occurred ranging in crash description and severity (PennDOT 2024).

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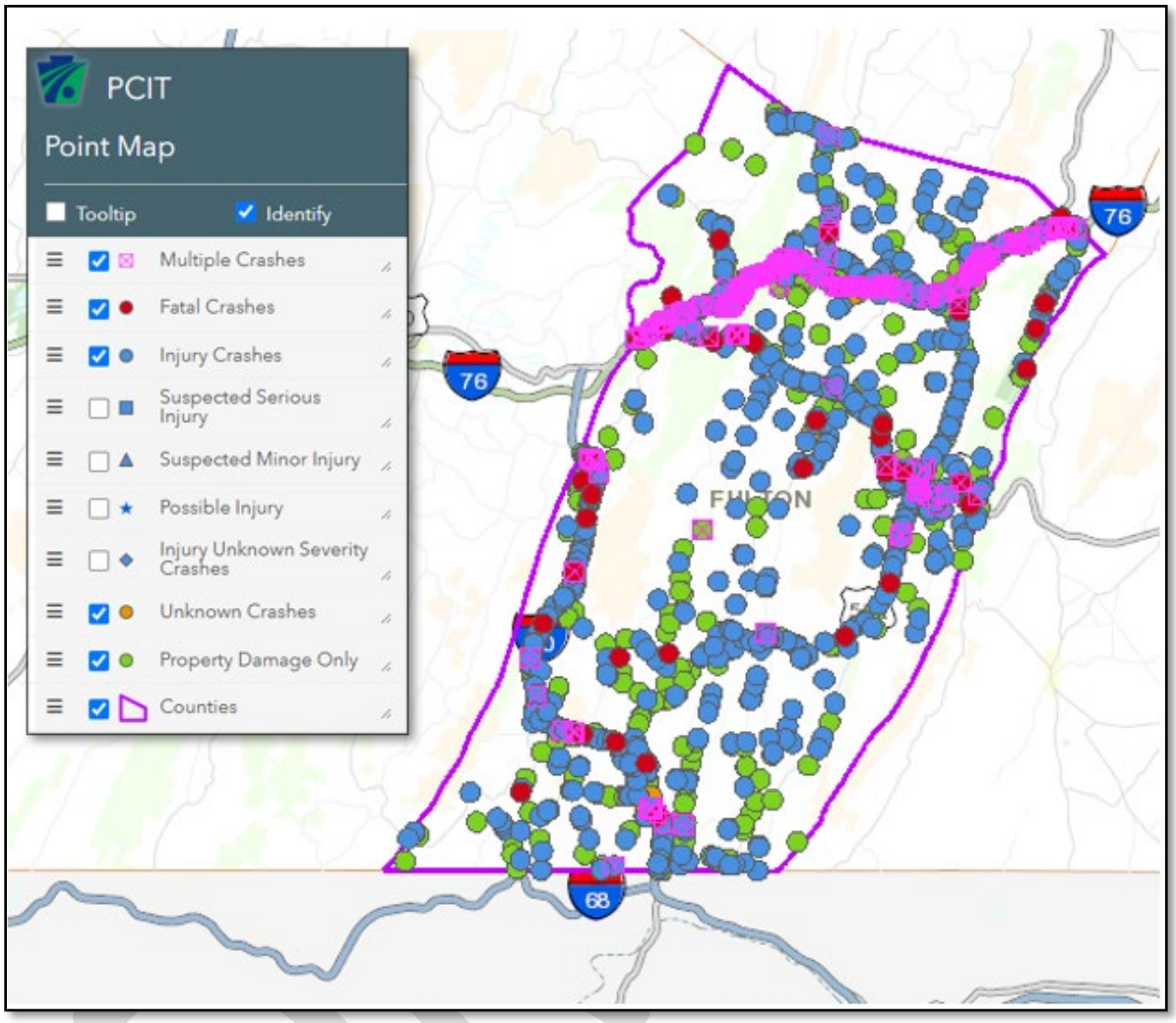
Figure 4.3.13-1. Vehicular Accidents in Fulton County, 2014 to 2023



Source: PennDOT 2024
Note: Date ranges cannot exceed 10 years. The most recent date range has been selected.

Aviation Accidents

Fulton County has only one airport within its limits, and this airport, Flying R Airport – PN35, is privately owned and operated. Although Fulton County does not maintain any public airports, several Pennsylvania counties near Fulton do. The most notable are the Franklin County Regional Airport and the Bedford County Airport. Farther away are the Gettysburg Airport, the Hanover Airport, the Mid-Atlantic Soaring Airport, and the Southern Adams County Heliport in Adams County; the Carlisle Airport and the Shippensburg Airport in Cumberland County; the Altoona-Blair County Airport, the Blue Knob Valley Airport, and the Cove Valley Airport in Blair County; and the Somerset County Airport in Somerset County. In addition, the Harrisburg International Airport is a little less than 70 miles from McConnellsburg, PA. This airport may have associated air traffic patterns in the skies above Fulton County that could lead to problems in flight and a crash within the County.

Approximately 80 percent of all aviation accidents occur shortly before or during take-off and landing. Reportedly, most of these accidents are caused by human error. Mid-flight accidents are rare but not unheard of. A survey of 1,843 plane crashes between 1950 and 2006 showed that 53 percent were the result of pilot (human) error, 21 percent were caused by mechanical failure, 11 percent were caused by weather, 8 percent were attributed to other human error (lack of communication or improper maintenance), 6 percent were caused by sabotage and terrorism, and 1 percent resulted from other causes (Krasner 2009).

Aviation accidents are often devastating incidents that may result in serious injuries or fatalities. The Federal Aviation Administration (FAA) and the National Transportation Safety Board (NTSB) are the agencies responsible for monitoring air travel and investigating accidents. Some of the most common causes of aviation accidents occur as a result of violations of FAA and NTSB regulations. Some other causes of accidents include those listed below (NCI 2021):

- **Pilot or flight crew errors** may include lack of experience, poor training, fatigue, or even intoxication. Pilot error is the number one cause of aviation accidents and accounts for the highest number of fatalities. Pilots have the responsibility to transport passengers safely from one place to another and follow the FAA and NTSB regulations to better ensure passenger safety. If a pilot or flight crew member makes an error, an accident may occur.
- **Faulty aircraft equipment** is another common cause of aviation accidents.
- **Aircraft design flaws** can lead to aviation accidents. The manufacturer of an aircraft is responsible for an aviation accident if the structural design is flawed and results in an accident.
- **Poor weather conditions**, such as snow, rain, wind, and fog, cause many of the accidents which occur during takeoff or landing. Adverse weather is generally considered when planning for departure and arrivals.
- **Safety standard violations**, such as failure to properly fuel or maintain the aircraft, can be very dangerous. If any regulations and safety standards set by the FAA or NTSB are violated, an accident may occur.
- **Failure of air traffic controllers to properly monitor the airways** is another cause of aviation accidents.

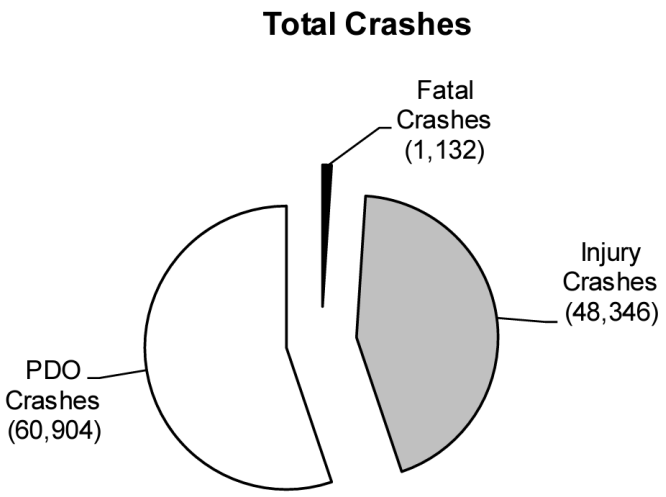
4.3.13.3 Range of Magnitude

Transportation accidents often result in injury, damages to property, environmental impacts, and in some cases, loss of life. Most air accidents that have been recorded in the Commonwealth have been non-fatal, causing minor injuries and property damages (PEMA 2023). Additionally, many highway/roadway accidents within the Commonwealth have also been non-fatal.

Roadway accidents in Fulton County range from minor crashes to more serious incidents that involve injuries or fatalities or result in a release of hazardous materials. Information for this plan regarding fatalities associated with automobile crashes (Table 4.3.13-3) and fatalities of pedestrians involved in transportation incidents (Table 4.3.13-4) was drawn from the Pennsylvania Department of Transportation Crash Facts and Statistics 2022 data (PennDOT 2022).

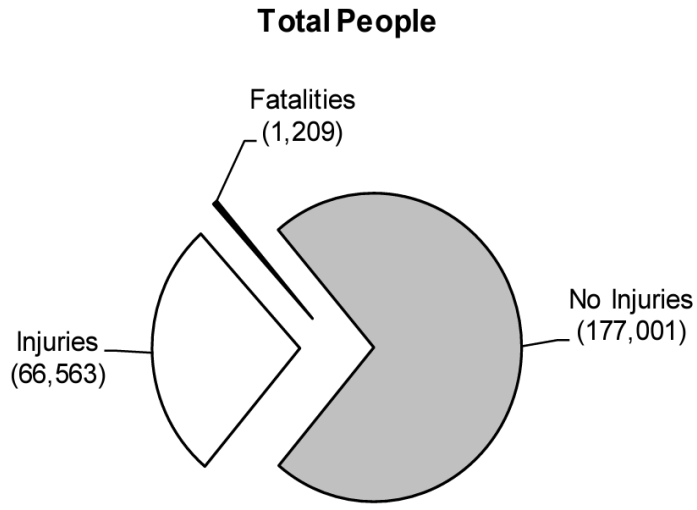
Figure 4.3.13-2 illustrates the total number of crashes in 2023 in the Commonwealth, based on PennDOT data. Over 1,100 crashes resulted in fatalities, which was the fourth lowest number of fatalities due to crashes in Pennsylvania to date (PennDOT 2024). In 2023 alone, there were 208 total crashes in Fulton County, with 8 of these resulting in fatalities (PennDOT 2024). Figure 4.3.13-3 illustrates the total number of people involved in crashes in 2023, based on data from PennDOT, and compared to the year before, 2023 saw an increase of 2.3 percent (PennDOT 2024).

Figure 4.3.13-2. Total Crashes in Pennsylvania, PennDOT 2023



Source: PennDOT 2024

Figure 4.3.13-3. Total People Involved in Crashes in Pennsylvania, PennDOT 2023



Source: PennDOT 2024

A worst-case transportation accident scenario within the county would be the overturn of a tractor-trailer carrying an extremely hazardous substance (described in Section 4.3.6) resulting in a massive release of its cargo on a major roadway. This incident would block traffic on Fulton County's major transportation routes and could threaten the health and safety of individuals on the roadways and in surrounding neighborhoods. In addition, a release could necessitate closure of county critical facilities near the accident. The most likely transportation accident in the county would involve a single vehicle hitting an object and sustaining minimal damage.

PennDOT restricts highway travel during certain events, such as winter storms, for commercial motor vehicles (CMV). PennDOT, the Pennsylvania State Police, and the Pennsylvania Emergency Management Agency assess each winter weather forecast to determine if CMV restrictions are warranted (PennDOT n.d.). Then, they review the restrictions hourly once they have been initiated to determine if the conditions warrant the restriction or can be lifted. In certain instances, passenger cars are also restricted (PennDOT n.d.).

Aircraft accidents can vary from a single-engine aircraft having a "hard landing" causing damage to the aircraft, to a crash of a small turboprop or jet aircraft, to a crash of a large jet (such as a Boeing 737). Other aircraft accidents could include helicopter or experimental aircraft crashes. Aviation accidents can also involve radio-controlled or drone aircraft devices, many of which are experimental and not subject to defined regulatory oversight, potentially complicating issues that could arise if one of these devices crashes.

4.3.13.4 Past Occurrence

Major roadway accidents (such as multi-vehicle accidents, those that close roads or bridges, or those involving school buses) are reported by Fulton County to PennDOT. Table 4.3.13-5 summarizes these accidents from 2005 to 2023. While this table lists accidents reported to the counties and Commonwealth, significantly more minor accidents are not reported. There have been no major aircraft accidents in Fulton County.

Table 4.3.13-3. Summary Roadway Accidents in Fulton County, 2005 to 2023

Year	Vehicle Accidents	Year	Vehicle Accidents
2005	322	2015	264
2006	314	2016	228
2007	338	2017	247
2008	320	2018	278
2009	330	2019	274
2010	267	2020	235
2011	279	2021	286
2012	282	2022	243
2013	286	2023	208
2014	246	**Total**	**5,247**

Source: PennDOT 2024

4.3.13.5 Future Occurrence

Considering the current transportation network within the County and the steady increase in traffic volume, it is safe to assume that the number of vehicle accidents will continue to increase. Incidents involving air or rail should remain low. The County's population has increased over the last decade, meaning it is likely that traffic volumes have also risen. New residents have limited knowledge of detour routes and alternate routes around accidents which contributes to the accident-related congestion experienced recently in the County. The trucking industry is expected to continue, maintaining and possibly increasing the number of tractor-trailers on the County's road system. Transportation accidents may increase slightly over the next five years without proper mitigation strategies in place.

For the 2025 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of transportation accident events for Fulton County. Information from PennDOT and NTSB were used to identify the number of transportation accident events that occurred between 2005 and 2023. Using these sources ensures the most accurate probability estimates possible. The table below shows these statistics, as well as the annual average number of events and the estimate percent chance of an incident occurring in a given year. Based on these statistics, there is an estimated 100-percent chance of a transportation accident (any type) occurring in any given year in Fulton County.

Based on the Risk Factor Methodology Probability Criteria, the probability of a transportation accident is considered to be *highly likely* (see Table 4.3.13-6). However, the low number of rail and air traffic accidents in the County indicates that the bulk of future transportation accidents will be roadway accidents.

Table 4.3.13-4. Probability of Future Transportation Accident Events

Hazard Type	Number of Occurrences Between 2005 and 2023	Percent Chance of Occurrence in any Given Year
Vehicular	5,247	100%
Aviation	0	0
TOTAL	**5,247**	**100%**

Sources: NTSB 2021; PennDOT 2024

4.3.13.6 Vulnerability Assessment

The entire county has been identified as the hazard area for transportation accidents. This section evaluates and estimates the potential impact of transportation hazards on Fulton County in the following sections:

- Impacts on (1) life, health, and safety; (2) general building stock; (3) critical facilities; (4) the economy; (5) the environment; and (6) future growth and development.
- Expected future conditions.
- Additional data and next steps.

A qualitative assessment on potential impacts to life, health, and safety; buildings and critical facilities; and the economy are summarized below.

Impact on Life, Health, and Safety

Transportation hazards could lead to potential losses in categories of human health and life, property, and natural resources. Vehicular accidents, flooded roadways, and other roadway impairments may result in injury or death to drivers and passengers on the road, the public in the immediate vicinity, and emergency services personnel. The number of people exposed to a hazard depends on population density, whether exposure occurs during day or night, and percentage of the population in the accident area located indoors and outdoors.

The county and its municipalities are prepared to manage and respond to transportation hazards. However, the risk to first responders increases when they respond to transportation accidents near trafficked areas. First responders may also have to take on the additional duty of controlling traffic and monitoring their surroundings for oncoming vehicles.

Impact on General Building Stock, Critical Facilities, and Economy

Because of insufficient data, a full loss estimate was not completed for the transportation hazard. Loss of roadway use, and public transportation services would affect thousands of commuters, employment, day-to-day operations within the county, and delivery of critical municipal and emergency services. Disruption of one or more of these modes of transportation can lead to congestion of another and affect both the county and the region as a whole.

Impact on the Environment

Like the range of magnitude, the environmental impacts of transportation accidents can vary greatly. In the case of a simple motor vehicle crash, train derailment, or aviation accident, the environmental impact is minimal. However, if the accident involves any type of vehicle moving chemicals or other hazardous materials, the impact will be considerably larger and may include an explosion or the release of potentially hazardous material (refer to Section 4.3.4 – Environmental Hazard – Hazardous Materials Releases).

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Future Growth and Development

As discussed in Section 2.4 of this HMP, areas targeted for future growth and development have been identified across Fulton County. Increased development in the county and region will lead to increased road traffic, which could lead to increased transportation accidents.

Expected Future Conditions

The 2018 Fourth National Climate Assessment notes that the national transportation system is vulnerable to changing conditions through infrastructure damage and electricity and communication outages (NCA 2018). Damaged infrastructure and ineffective safety systems may lead to an increased risk of transportation crashes. Continued use of transportation that uses fossil fuels also contributes to changing conditions through the release of greenhouse gas emissions. According to the U.S. Environmental Protection Agency, 28 percent of total U.S. greenhouse gas emissions in 2021 came from the transportation sector (US EPA 2023).

4.3.13.7 Additional Data and Next Steps

Based on limited data regarding the probability and potential impact of this hazard, a quantitative loss estimate was not completed for this HMP. Over time, the county can work with appropriate agencies to collect additional data to support mitigation planning, consideration of potential risks, and prioritization of mitigation measures for this hazard.

Fulton County recognizes it must compile and maintain data regarding specific concerns and past losses from this hazard. These data should include specific information regarding damage or loss of life, property, or infrastructure; and any reports pertaining to potential or actual cost and logistics of responding to an event caused by this hazard (locations of road closures, map detours, traffic counts, durations of closures and detours; and costs to respond). These data will be included in future revisions of the HMP and can be used to support future mitigation grant efforts (benefit-cost analysis).

Studying traffic and potential transportation incident patterns could provide information on the vulnerability of specific road segments and nearby populations. Predicting costs needed to respond to an incident or repair damaged infrastructure would be useful for developing mitigation options.

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4.3.14 Utility Interruption

4.3.14.1 Hazard Description

Utility interruption includes power failure, potable water service outage, telecommunications infrastructure failure, natural gas infrastructure failure, or sewer infrastructure failure. These interruptions or outages occur because of geomagnetic storms, fuel or resource shortages, electromagnetic pulses, information technology failures, transmission facility or linear utility accidents, and major energy, power, or utility failure (PEMA 2023).

For the purpose of this plan, utility interruption focuses on power failure, because it is the major cause of utility failure and has had widespread impacts on Fulton County. A power failure is defined as any interruption or loss of electrical service from disruption of power transmission caused by accident, sabotage, natural hazards, or equipment failure. A significant power failure is defined as any incident of a long duration that would require the involvement of local or state emergency management organizations to coordinate provision of food, water, heating, cooling, and shelter. Interruptions in other basic utilities (such as data/telecommunications, water, natural gas, or sewer) can have a detrimental impact on Fulton County. Utilities that employ aboveground wiring (power and data/telecommunications) are vulnerable to the effects of other hazards such as high wind, heavy snow, ice, rain, and vehicular accidents.

4.3.14.2 Location and Extent

Utility interruptions occur throughout Fulton County and are often a secondary impact of another hazard. Many natural hazards can produce utility outages, including dam failure, drought, earthquake, flood or flash flooding, hailstorms, landslides, levee failures, tornado/windstorms, wildfires, or winter storms. Above-ground power lines, water stations, wastewater stations, and others are all susceptible to the elements and threats posed by these natural hazards. Thus, the location of utility interruptions is the entire planning area in Fulton County.

4.3.14.3 Range of Magnitude

The most severe utility interruptions will be regional or widespread power and telecommunications outages. With the loss of power, electrically powered equipment and systems will not be operational. Regional loss of power affects lighting; heating, ventilation, and air conditioning (HVAC) and other support equipment; communications; fire and security systems; and refrigeration, which can in turn cause loss of water and sewer service, and food spoilage (PEMA 2023). At a minimum, utility interruptions can cause short term disruption in the orderly functioning of business, government, and private citizen functioning and activities like traffic signals, elevators, and retail sales.

However, loss of heating and cooling capability is more dangerous in the winter and summer months, when heat sensitive populations like the elderly count on utilities and fuel to maintain a safe temperature. A worst-case scenario for utility interruption in Fulton County would be a fuel shortage or power outage in the winter months, especially during a severe winter weather event, which may leave many homes without a source of heat.

4.3.14.4 Past Occurrence

Every year, Fulton County is susceptible to minor utility interruptions either through technological failure or as the result of inclement weather. Table 4.3.14-1 below shows major utility interruptions in the County since 1996. Additional utility interruptions could have occurred but have not been documented. In all, the County experienced around 17 incidents that included downed utility lines from July 2003 to December 2024.

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Table 4.3.14-1. Utility Interruptions from 1996 to 2024

Date(s) of Event	Event Type	Fatalities	Injuries	Property Damage	FEMA Disaster Declaration Number (if applicable)	Location	Description
7/6/2003	Thunderstorm WInd					Bethel Twp	Trees and power lines were reported down on Buck Valley Road in Bethel Township.
11/13/2003	High Wind					Fulton County	Across all of Pennsylvania, more than 80,000 persons were without power from the high winds.
9/8/2004	Thunderstorm Wind					McConnellsburg	Trees and wires were knocked down by thunderstorm winds near Crystal Spring.
6/8/2007	Thunderstorm Wind					McConnellsburg	An intense squall line produced widespread wind damage across Central Pennsylvania during the evening hours on June 8, 2007. Numerous trees and power lines were downed causing several power outages and other sporadic damage.
02/12/2009	High Wind			$25,000		Fulton County	Non-thunderstorm wind gusts between 50 and 60 mph toppled numerous trees and power lines across Fulton County. The high winds caused sporadic power outages to approximately less than 100 Allegheny Power customers.
5/26/2011	Thunderstorm Wind					Cove Mills	Thunderstorm winds estimated near 60 mph knocked down numerous trees and utility wires in several communities surrounding Cove Mills.
6/1/2012	Thunderstorm Wind					Needmore	Thunderstorm winds estimated near 60 mph knocked down trees and utility wires in Needmore.
10/29/2012 through 10/30/2012	High Winds					Fulton County	Hurricane Sandy caused significant damage throughout Pennsylvania. The impacts from the strong winds were widespread, with peak wind gusts were measured in the 50 to 60 mph range. High wind watches and warnings were issued well in advance of the storm. There were several reports of roof and other minor structural damage to homes and businesses. Widespread reports of trees down and power lines down were received. Wind damage caused significant power outages at the height of the storm.High winds knocked down several trees with widespread power outages reported county-wide.
11/1/2013	Tornado Winds					Thompson Twp	A line of heavy showers with estimated winds near 60 mph knocked down trees and wires in Thompson Township near Needmore.
5/31/2015	Tornado Winds					Needmore	Thunderstorm winds estimated near 60 mph knocked down trees and wires near the intersection of Great Cove and Timber Ridge Roads near Needmore.
8/4/2017	Thunderstorm Wind					Crystal Spring, McConnellsburg	A severe thunderstorm producing winds estimated near 60 mph knocked down trees and wires near the intersection of Route 915

Date(s) of Event	Event Type	Fatalities	Injuries	Property Damage	FEMA Disaster Declaration Number (if applicable)	Location	Description
							and Pleasant Valley Road near the Crystal Spring exit on I-70. A severe thunderstorm producing winds estimated near 60 mph knocked down trees and wires near McConnellsburg.
3/2/2018	High Winds					Fulton County	Non-thunderstorm wind gusts estimated near 60 mph knocked down trees and wires across Fulton County
2/24/2019	High Winds					Fulton County	Very gusty west-northwest winds developed across central Pennsylvania, as low pressure intensified over the Great Lakes and dragged a cold front across the area on Sunday, February 24 and continued into Monday, February 25, 2019. Gusts over 60 mph were observed across portions of central Pennsylvania, as were scattered power outages and downed trees. Non-thunderstorm wind gusts near 60 mph were observed across Fulton County from February 24-25, 2019.
6/4/2020	Tornado Winds					Needmore	A severe thunderstorm producing winds estimated near 60 mph knocked down trees and wires near Needmore.
7/21/2020	Tornado Winds					McConnellsburg	A severe thunderstorm producing winds estimated near 60 mph knocked down trees and wires across Route 522 near Back Run Road, closing the roadway to traffic.
6/30/2021	Tornado Winds					McConnellsburg, Knobsville	A severe thunderstorm producing winds estimated near 60 mph brought down trees and wires on W Wood Street and between Cowans Gap State Park and Turkey Road.
6/26/2023	Tornado Winds					Fulton County	A severe thunderstorm producing winds estimated near 60 mph knocked down trees and power lines in northern Fulton County.

Source: NOAA NCEI 2023

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4.3.14.5 Future Occurrence

Minor instances of power outages may occur several times a year for any given area in the County, while major events (long, widespread outage events) take place once every few years. Power failures often occur during severe weather; therefore, they should be expected during those events.

For the 2025 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of utility interruption events for Fulton County. Information from the 2020 Fulton County HMP, the NOAA NCEI Storm Events database, and input from Fulton County were used to identify the number of utility interruption events that occurred between 2009 and 2024. These sources were utilized to provide the most accurate probability estimates possible. The table below shows these statistics, as well as the annual average number of events and the estimate percent chance of an incident occurring in a given year. Based on these statistics, there is an estimated 100-percent chance of a utility interruption event occurring in any given year in Fulton County.

Table 4.3.14-2. Probability of Future Utility Interruption Events

Hazard Type	Number of Occurrences Between 1996 and 2024	Percent chance of occurrence in any given year
Utility Outage	17	59%

Sources: NOAA NCEI 2023;
Note: Information on events for 1996 to 2023 was limited and based on NOAA NCEI Storm Events and newspaper coverage. Therefore, it can be assumed that the number of events listed for that time period is conservative.

Based on available historical data, the future occurrence of utility interruption events can be considered *likely* as defined by the Risk Factor Methodology probability criteria (refer to Section 4.4) with minor events happening more frequently than major or long term interruptions in the future.

Effects of Future Conditions

Future conditions can significantly impact utility infrastructure, leading to increased risks of utility failures in Fulton County. More frequent and severe storms can damage power lines, transformers, and other utility infrastructure, resulting in more frequent power outages. Increased precipitation and flooding can damage underground utility lines and equipment, disrupt water supply systems, and overwhelm sewage and drainage systems. Higher temperatures and more frequent heat waves can strain the electrical grid due to increased demand for cooling, leading to power outages and reduced efficiency of power generation and transmission. Additionally, more frequent freeze-thaw cycles can damage infrastructure such as water pipes and roads, causing utility disruptions.

4.3.14.6 Vulnerability Assessment

To understand risk, a community must evaluate the assets that are exposed or vulnerable in the identified hazard area. This section discusses the potential impact of the utility interruption hazard on Fulton County in the following subsections:

- Impact on (1) life, health, and safety; (2) general building stock and critical facilities; (3) the economy; (4) the environment; and (5) future growth and development.
- Effect of climate change on vulnerability.
- Further data collections that will assist understanding of this hazard over time.

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Impact on Life, Health, and Safety

General Population

Utility interruptions most severely affect individuals with access and functional needs (such as children, the elderly, and individuals with special medical needs). Special medical equipment will not function without power. Likewise, a loss of air conditioning during periods of extreme heat or the loss of heating during extreme cold can be especially detrimental to those with medical needs, children, and the elderly. Table 4.3.14-3 shows the demographic change in the county for children and the elderly from 2020 through 2023. Data on individuals with special medical needs were not available. Additionally, first responders' safety may be at risk during on-scene operations, and they may not be able to respond in a timely manner due to electrical outages or water shortages. First responders may need to take on additional duties due to a higher-than-normal call volume and demand, traffic control, and responding to transportation incidents.

Table 4.3.14-3. Demographic Trends for Vulnerable Populations

Vulnerable Population	ACS 5-Year Pop Est. 2020	ACS 5-Year Pop Est. 2023	2020 to 2023 Change
Under 5 years	710	691	-19
65 years and over	3,086	3,228	+142

Source: 2020 – 2023 American Community Survey 5-Year Estimates

Socially Vulnerable Populations

Social vulnerability is defined as the susceptibility of social groups to the adverse impacts of non-natural hazards, including disproportionate death, injury, loss, or disruption of livelihood. Social vulnerability considers the social, economic, demographic, and housing characteristics of a community that influence its ability to prepare for, respond to, cope with, recover from, and adapt to environmental hazards.

Utility interruptions, particularly during winter, pose significant risks to vulnerable populations, such as the elderly and medically frail. For instance, individuals relying on medical equipment like oxygen concentrators are at risk during power outages. The elderly, who make up over 22 percent of Fulton County's population (US Census Bureau 2022), are especially vulnerable to extreme temperatures resulting from power failures.

Research indicates that while some populations may not face more hazard exposure, they can experience more severe impacts and prolonged recovery due to factors like physical and financial limitations. Economically disadvantaged individuals may struggle to evacuate due to financial constraints, and the elderly may require additional time or assistance during evacuations. They are also more likely to need medical attention, which may be unavailable during utility interruptions. Please refer to Section 2 (County Profile) for the statistics of these populations.

Impact on General Building Stock and Critical Facilities

All critical facilities are vulnerable to utility interruptions, especially the loss of power. The establishment of reliable backup power at these facilities is extremely important to continue to provide for the health, safety, and well-being of Fulton County's population.

Impact on the Economy

During a utility interruption event, the County may experience losses because of an interruption of critical services. Further, increased costs such as providing shelters, and costs related to cooling and heating centers may be incurred. Extended power outages will require officials to shelter victims who require heat and power for activities of daily living.

Power interruptions can cause economic impacts stemming from lost income, spoiled food and other goods, costs to the owners/operators of the utility facilities, and costs to government and community service groups. FEMA's benefit-cost analysis methodology measures the loss of electrical service on a per-person-per-day-of-lost-service basis for the service area affected.

Interruption of utility gas or potable water distribution could also cause significant economic impacts such as: additional costs for bringing in water tenders to maintain fire suppression capabilities; opening additional warming centers should electric and utility gas utility be interrupted to residential areas; and distribution of potable water for public consumption. There could be significant costs associated with reimbursing fire departments from other counties to travel, staff, and maintain water tenders within Fulton County during the duration of a water outage event.

Potential modeling of economic impacts from utility interruption would be calculating interruption of service costs which is derived from a standard value per person per day multiplied out by the number of customers served. This would help to provide an estimate of the impact of the interrupted utility service but may not be representative of the complete economic impact of a prolonged utility interruption.

The FEMA Benefit-Cost Analysis (BCA) Toolkit v.6.0 has standard values based on the daily cost per rate-paying connection (FEMA 2020). The daily cost-per-connection value is shown in Table 4.3.14-4.

Table 4.3.14-4. FEMA BCA Toolkit v6.0 Daily Standard Values of Utility Services

Utility	Daily Value (per connection/per day)
Electric	$174.00
Potable Water	$114.00
Wastewater	$58.00

Source: FEMA 2020

Impact on the Environment

The most significant impact associated with utility interruptions is when the interruption involves a release of hazardous materials. This hazardous material may be released in a pipeline accident or when a material is in transit. Section 4.3.5 and 6, Environmental Hazards, includes a complete discussion on the impacts of a hazardous materials release. Pipelines carrying flammable materials also have the possibility of exploding or starting a fire (PEMA 2023).

A number of secondary impacts are associated with utility interruptions. First, interruptions could affect the ability of the government to function, especially if backup power generators or supply is inadequate or unavailable. Utility interruptions also can reduce the efficient and effective communication that is essential to first responders. Heating loss and severe cold can also impact the health and safety of at-risk populations like young children, the elderly, and individuals with disabilities (PEMA 2023).

Future Changes That May Impact Vulnerability

Future Growth and Development

Areas targeted for potential future growth and development in the next 5 to 10 years have been identified across Fulton County (further discussed in Section 2.4 of this HMP). Any areas of growth could be potentially impacted by the utility interruption hazard because the entire county is exposed and potentially vulnerable. An increase in development and population will increase demand for power supply and has the ability to increase the likelihood of utility interruption incidents.

Future Conditions on Vulnerability

According to the Fourth National Climate Assessment, two future condition scenarios were modeled, and temperature change in the northeastern United States is estimated to increase between 3.98 - 5.09 degrees Fahrenheit (°F) by 2036-2065, and between 5.27 - 9.11°F by 2071-2100. The annual mean temperature change in Pennsylvania is projected to increase between 5.9 - 6.3°F by 2041 - 2070. Some areas of the world may experience greater temperature changes than others. It is important to note that frequency estimates may not be an accurate representation of future conditions due to the unknown impacts of climate change (PEMA 2023).

Increased average temperatures as a result of climate change make the occurrence of extreme heat more likely. While increased average temperatures would make the occurrence of extreme cold less likely, some climatologists have suggested that warming in the Arctic could impact the position of the jet stream, allowing for more extreme cold weather events to occur (Lindsey 2021). While some research supports this concept, others do not and the impact of climate change on cold weather events is not fully understood. Extreme heat and cold result in greater strain on utilities, increasing the likelihood of utility interruption.

Climatologists expect an increase in the number and intensity of severe weather events. This will include wind events such as hurricanes, tornadoes, and wind associated with thunderstorms, among other phenomena. More storms with higher winds will increase the chance that the utility infrastructure will be impacted by these storms. Additionally, climatologists expect an increase in precipitation, which could come in the form of heavy downpours or winter weather thus causing additional utility interruptions. Increased risk of drought may also threaten water utilities (NIDIS n.d.).

4.3.14.7 Additional Data and Next Steps

For future plan updates, Fulton County can track data on power outage events and obtain additional information on past and future events, particularly in terms of any injuries, deaths, shelter needs, pipe-freeze incidents, and other impacts. These data will help to identify any concerns or trends for which mitigation measures should be developed or refined. In time, quantitative modeling of estimated power outage events may be feasible as data are gathered and improved.

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4.3.15 Wildfire

4.3.15.1 Hazard Description

This section provides a profile of and vulnerability assessment for wildfire hazards. A wildfire is an unplanned fire that burns in a natural area. Wildfires can cause injuries or death and can ruin homes in their path. Wildfires can be caused by humans or lightning and can happen anytime, though the risk increases in periods of little rain. In Pennsylvania, 98 percent of wildfires are caused by people (PEMA 2020).

There are two distinct types of Wildland-Urban Interface (WUI) zones, categorized based on the amount of vegetation and housing density: interface and intermix (Frontline Wildfire Defense 2025).

- **Interface** areas are characterized by a high density of homes and businesses situated within proximity to undeveloped land, typically within 1.5 miles of developed areas and urban centers. This means that while the area is predominantly developed, it is still within reach of significant undeveloped acreage, creating a boundary where urban development meets wildland.
- **Intermix** areas, on the other hand, consist of houses and businesses that are dispersed within wildlands. In these zones, the density is greater than one home or business for every 40 acres of open land. This results in a more integrated mix of developed and undeveloped land, with structures scattered throughout the wildland environment.

4.3.15.2 Location and Extent

Wildfires take place in less developed or completely undeveloped areas, spreading rapidly through vegetative fuels. They can occur any time of the year, but mostly occur during long, dry, hot spells. Any small fire, if not quickly detected and suppressed, can get out of control. Most wildfires are caused by human carelessness, negligence, and ignorance. However, some are precipitated by lightning strikes, and in rare instances, spontaneous combustion. Wildfires in Pennsylvania can occur in open fields, grass, dense brush, and forests.

Wildfires can occur at any time of the year but are most likely in Fulton County during a drought, and can occur in fields, grass, and brush as well as in the forest itself. Under dry conditions or droughts, wildfires have the potential to burn forests as well as croplands.

The majority of Fulton County is forested (approximately 71.8 percent) and agricultural (approximately 22.6 percent) land. Historically, wildfires in Fulton County have been small in size, ranging from 0–200 acres. The greatest potential for wildfires is in the spring months of March, April, and May and the autumn months of October and November; 92 percent of all Pennsylvania wildfires occur in these two time periods. In the spring, bare trees allow sunlight to reach the forest floor, drying fallen leaves and other ground debris. In the fall, dried leaves are also fuel for fires (PEMA 2023).

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Figure 4.3.15-1. Land Cover in Fulton County

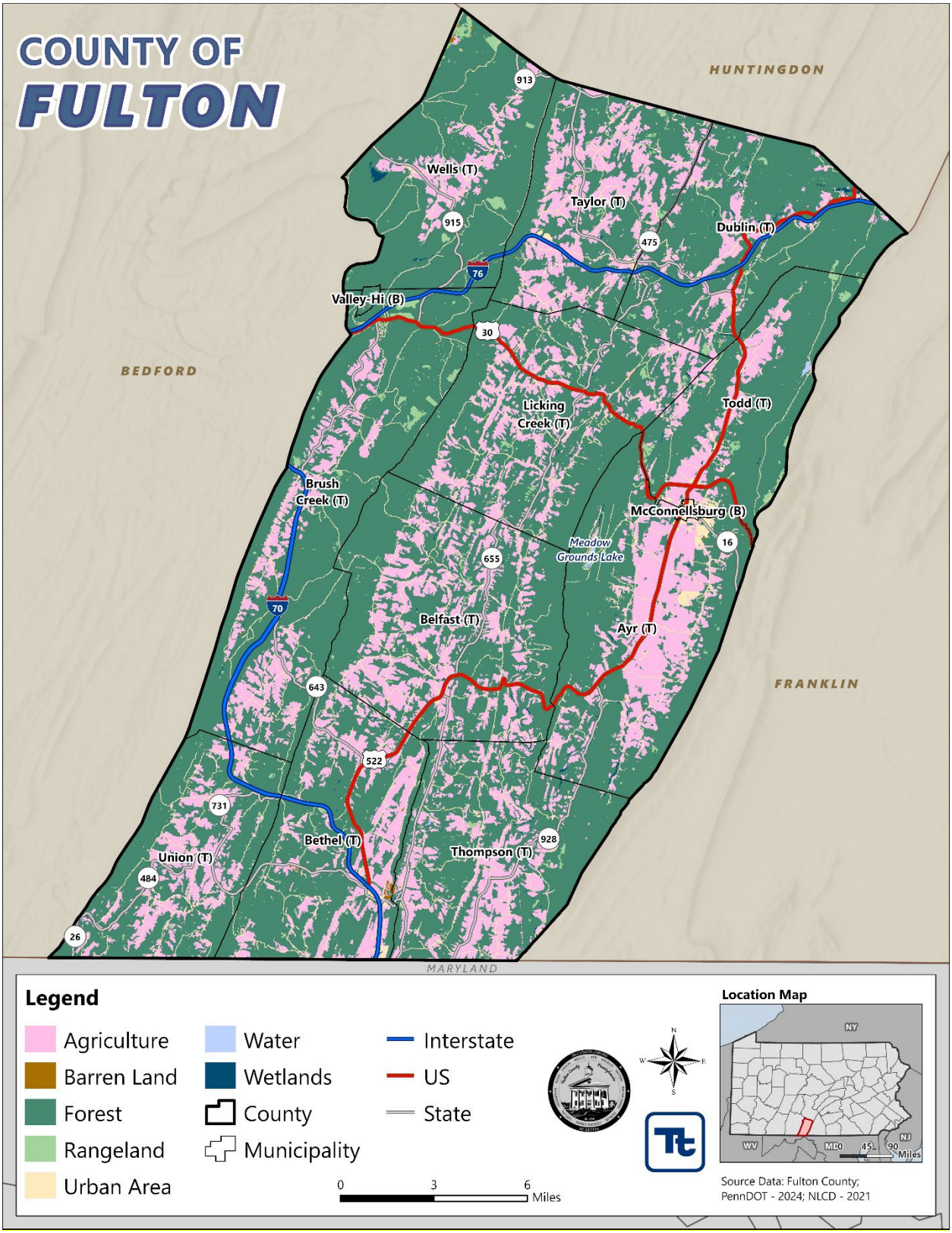
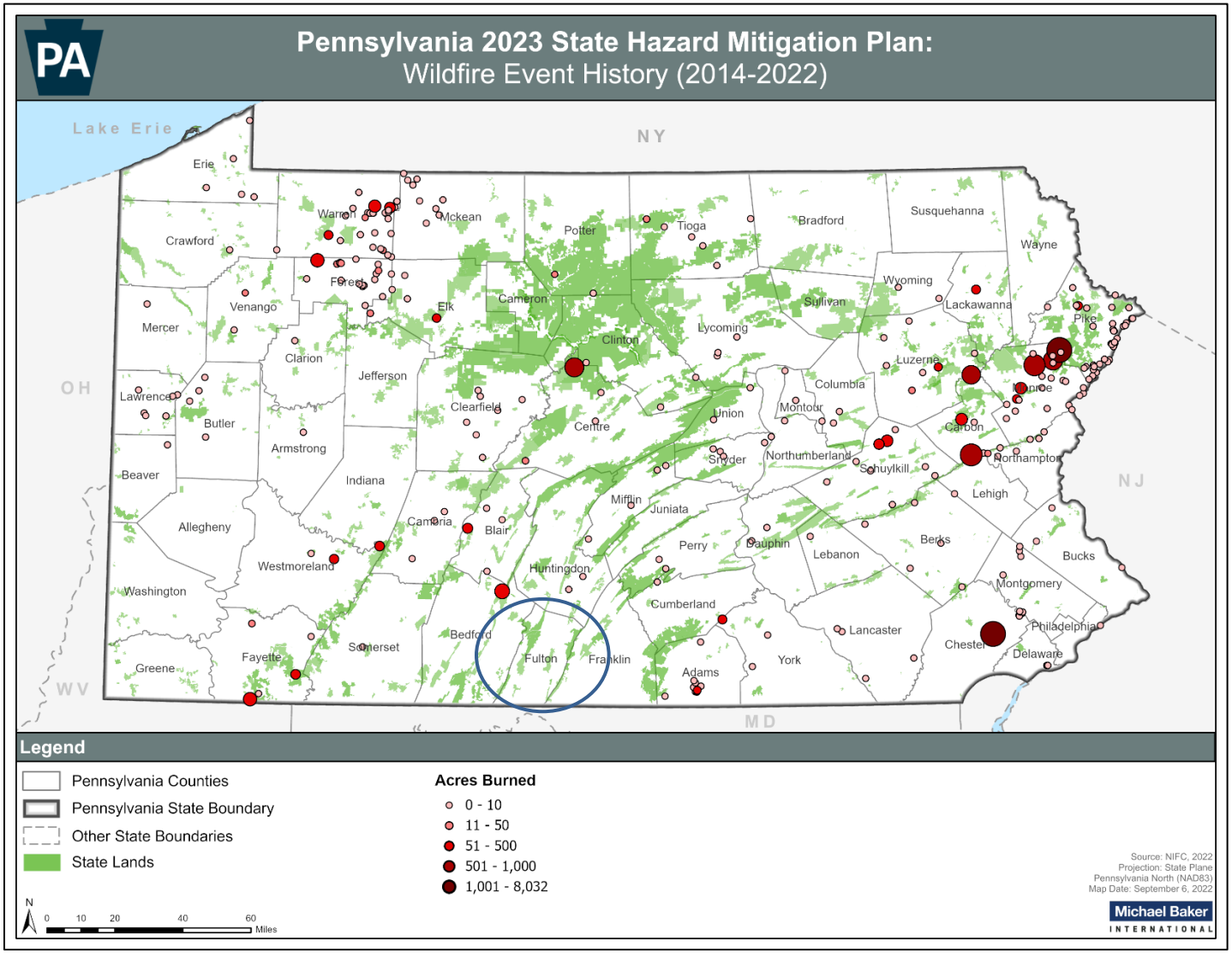


Figure 4.3.15-2. Location of Wildfire Events responded to by BOF from 1992–2015



Source: PEMA 2023
Note: Blue oval was added to highlight Fulton County's location within Pennsylvania.

According to the Pennsylvania 2023 State All-Hazard Mitigation Plan Update, areas of the Commonwealth that have large home developments built in volatile fuel types are at risk for catastrophic wildfires. Many areas of the state are at risk for large wildfires, but northeastern Pennsylvania is the most at risk for loss of life and/or property due to the number of homes at risk for wildfire (PEMA 2023).

Several tools are available to estimate fire potential location and extent, including but not limited to the WUI, Wildland Fire Assessment System, and PA DCNR Priority Landscape Analysis. These tools are discussed in further detail below.

Wildland/Urban Interface (WUI)

The WUI is considered to be the area where houses and wildland vegetation coincide. The WUI is divided into two categories: intermix and interface. Intermix WUI are areas where housing and vegetation "intermingle." Intermix areas have more than one house per 40 acres and have more than 50 percent vegetation. Interface WUI are areas with housing in the vicinity of contiguous wildland vegetation. Interface areas have more than one house per 40 acres, have less than 50 percent vegetation, and are within 1.5 miles of an area larger than 1,235 acres that is more than 75 percent vegetated (Stewart 2015).

The California Fire Alliance determined that areas within 1.5 miles of wildland vegetation are the approximate distance that firebrands can be carried from a wildland fire to the roof of a house. Therefore, even structures not located within the forest are at risk from wildfire. This buffer distance, along with housing density and vegetation type, were used to define the WUI (Stewart 2015).

Concentrations of WUI can be seen along the east coast of the United States, including the area around Pittsburgh, Pennsylvania, and the eastern half of Pennsylvania. Fulton County is identified as having many areas of very low-density housing or no housing due to the large amount of forested area. Areas where recreation and tourism dominate are also places where WUI is common (Stewart 2015). Figure 4.3.15-3 depicts the WUI for Pennsylvania as well as Fulton County, and Figure 4.3.15-4 illustrates the WUI for Fulton County. Concentrations of WUI areas greater than 50 percent are classified as WUI (intermix or interface) in the county.

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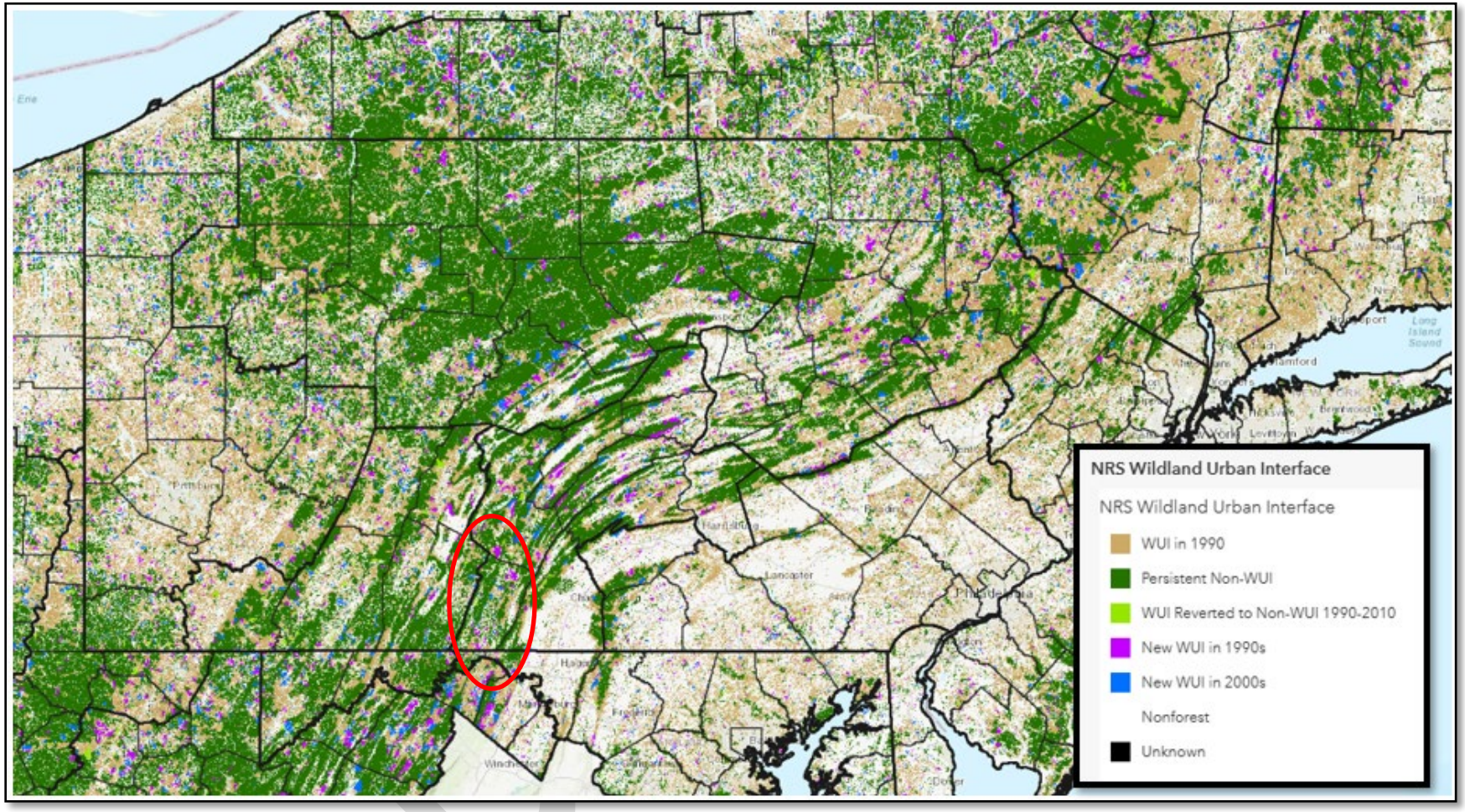
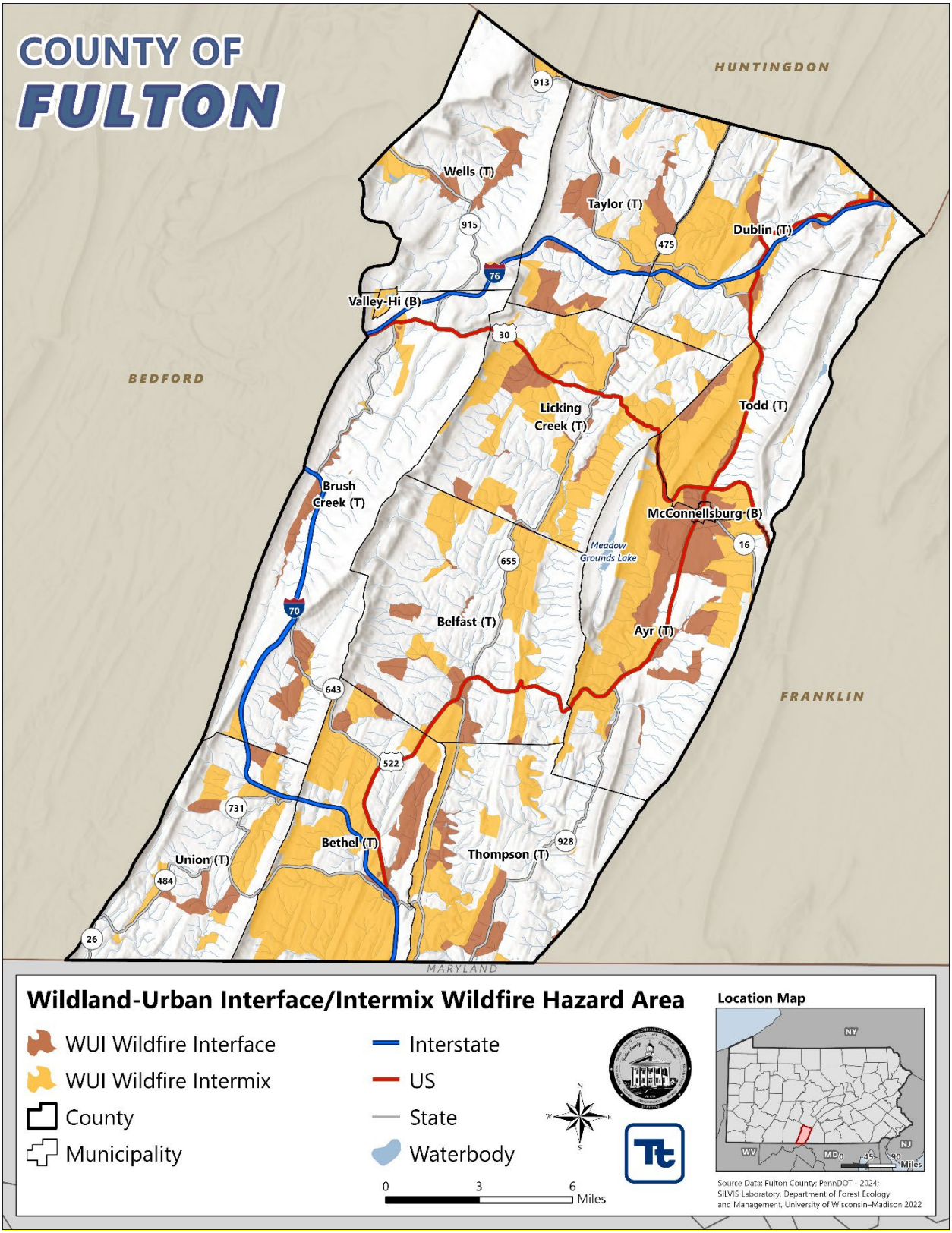
Figure 4.3.15-3. WUI for Pennsylvania



Source: (USFS 2021)
Note: Red oval highlights Fulton County's location within Pennsylvania.

Figure 4.3.15-4. Wildfire Urban Intermix/Interface for Fulton County



Wildland Fire Assessment System (WFAS)

The WFAS is an Internet-based information system maintained at the National Interagency Fire Center (NIFC) in Boise, Idaho, that provides a national view of weather and fire potential, including national fire danger, weather maps, and satellite-derived "Greenness" maps (USFS 1993). Each day during the fire season, national maps of selected fire weather and fire danger components of the National Fire Danger Rating System (NFDRS) are produced by the (USFS, Wildland Fire Assessment System 2022). The Fire Danger Rating level, described in Table 4.3.15-1 below, takes into account current and antecedent weather, fuel types, and both live and dead fuel moisture. The adjective class rating is a method of normalizing rating classes across different fuel models, indexes, and station locations. It is based primarily on a fuel model cataloged for the station, the fire danger index selected to reflect staffing levels, and climatological class breakpoints. Local station managers provide this information to USFS (USFS 2011).

Table 4.3.15-1. Fire Danger Rating and Color Code

Fire Danger Rating and Color Code	Description
Low (L) (Dark Green)	Fuels do not ignite readily from small firebrands, although a more intense heat source, such as lightning, may start fires in duff or punky wood. Fires in open cured grasslands may burn freely a few hours after rain, but woods fires spread slowly by creeping or smoldering and burning in irregular fingers. There is little danger of spotting.
Moderate (M) (Light Green or Blue)	Fires can start from most accidental causes, but with the exception of lightning fires in some areas, the number of starts is generally low. Fires in open cured grasslands will burn briskly and spread rapidly on windy days. Timber fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel, especially draped fuel, may burn hot. Short-distance spotting may occur but is not persistent. Fires are not likely to become serious and control is relatively easy.
High (H) (Yellow)	All fine dead fuels ignite readily, and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly, and short-distance spotting is common. High intensity burning may develop on slopes or in concentrations of fine fuels. Fires may become serious and their control difficult unless they are attacked successfully while they are small.
Very High (VH) (Orange)	Fires start easily from all causes and, immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high-intensity characteristics such as long-distance spotting and fire whirlwinds when they burn into heavier fuels.
Extreme (E) (Red)	Fires start quickly, spread furiously, and burn intensely. All fires are potentially serious. Development into high intensity burning will usually be faster and occur from smaller fires than in the very high fire danger class. Direct attack is rarely possible and may be dangerous except immediately after ignition. Fires that develop headway in heavy slash (trunks, branches, and treetops) or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions the only effective and safe control action is on the flanks until the weather changes or the fuel supply lessens.

Source: USFS 2012

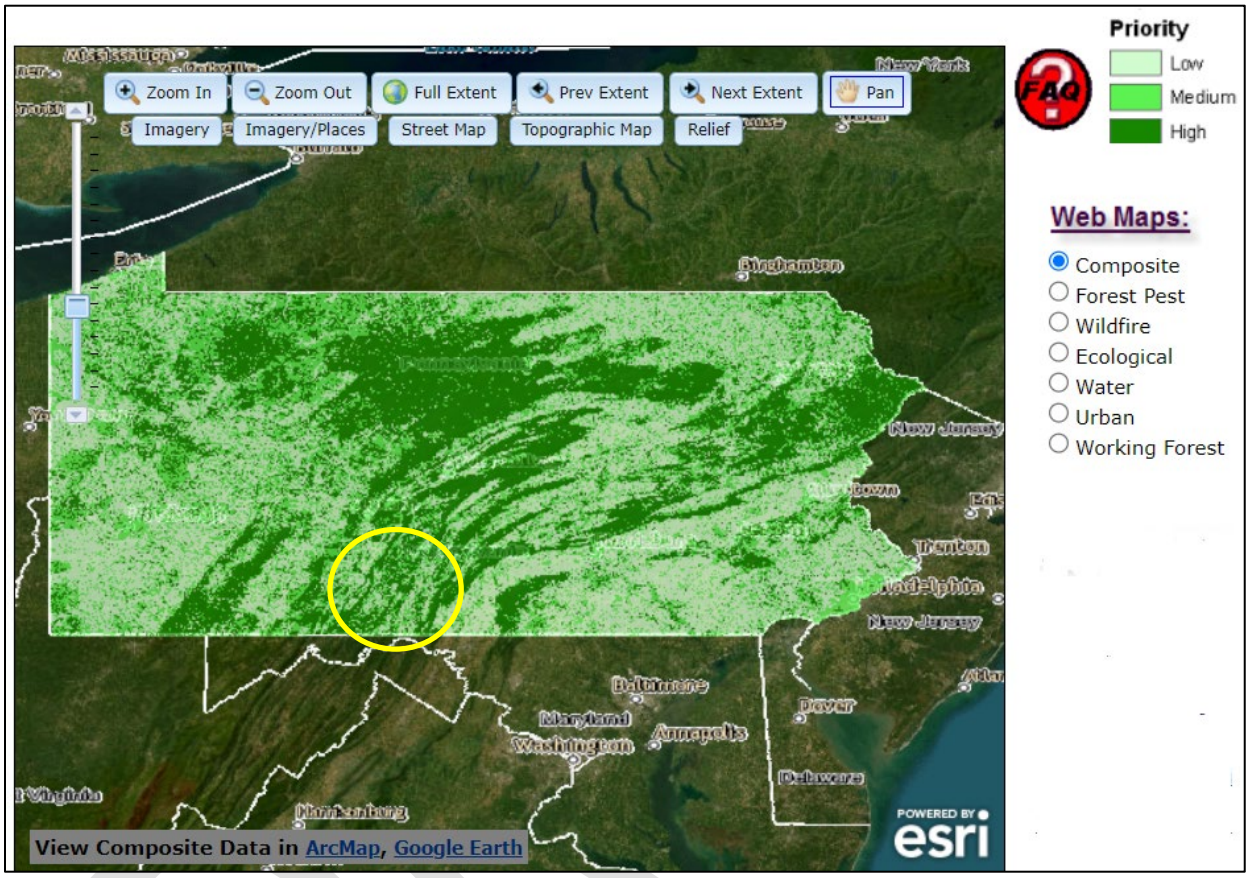
Pennsylvania Department of Conservation and Natural Resources (PA DCNR) Priority Landscape Analysis

The PA DCNR conducted a wildfire priority landscape analysis identifying areas where wildland fires are predicted to occur and become problematic. The areas are classified into high, medium, and low categories. The high classification is defined as an area prone to extreme fire behavior, with the potential to cause extensive property damage, or that could threaten the safety of the Commonwealth's citizens. Figure 4.3.15-5 illustrates the output for the wildfire priority landscapes model for Fulton County. The following five datasets were used for this analysis:

- 2002 WUI
- 2006 LANDFIRE.

- 2002–2008 Pennsylvania Wildfire Point Origin Occurrences.
- Percent Slope.
- 2009 Local Assessment of Values, Risks, Hazards.

Figure 4.3.15-5. Wildfire Priority Landscapes in Fulton County



Source: PA DCNR 2024
Notes: Low Priority = 0–0.21 (light green); Medium Priority = 0.21–0.35 (medium green); High Priority = 0.35–1 (dark green), Fulton County location within yellow oval

4.3.15.3 Range of Magnitude

Wildfire events in Fulton County can range from small fires that can be managed by local firefighters to large fires burning many acres of land. Large events may require evacuation from one or more communities and necessitate regional or national firefighting support. The impact of a severe wildfire can be devastating. A wildfire has the potential to kill people, livestock, fish, and wildlife. They often destroy property, valuable timber, forage, and recreational and scenic resources.

In addition to the risk wildfires pose to the general public and property owners, the safety of firefighters is also a concern. Although loss of life among firefighters does not occur often in Pennsylvania, it is always a risk. More common firefighting injuries include falls, sprains, abrasions, or heat-related injuries, such as dehydration. Response to wildfires also exposes emergency responders to the risk of motor vehicle accidents and can place them in remote areas away from the communities that they are chartered to protect.

While some fires are not human-caused and are part of natural succession processes, a wildfire can kill people, livestock, fish, and wildlife. They often destroy property, valuable timber, forage, and recreational and scenic values. The most significant environmental impact is the potential for severe erosion, silting of stream beds and

reservoirs, and flooding due to ground-cover loss following a fire event. Wildfire can also have a positive environmental impact in that they burn dead trees, leaves, and grasses to allow more open spaces for new vegetation to grow and receive sunlight. Another positive effect is that it stimulates the growth of new shoots on trees and shrubs and its heat can open pinecones and other seed pods.

4.3.15.4 Past Occurrence

Many sources provided wildfire information regarding previous occurrences and losses associated with wildfire throughout Pennsylvania and Fulton County. With so many sources reviewed for the purposes of this plan, loss and impact information for many events could vary depending on the source. Therefore, the accuracy of monetary figures discussed is based only on the available information identified during research for this HMP update.

Between 1954 and 2024, Pennsylvania was not included in any FEMA fire management assistance (FMA) declarations. Generally, these disasters cover a wide range of the State; therefore, the disaster may have impacted many counties (FEMA 2023).

For this 2025 HMP update, known wildfire events that have impacted Fulton County between 2011 and 2019 are identified in Table 4.3.15-2. This includes events presented in the 2019 Fulton County HMP and events listed in the NOAA-NCEI storm events database. With wildfire documentation being limited during the planning process, not all events have been identified for researched. Therefore, Table 4.3.15-2 may not include all events that have occurred in the County.

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Table 4.3.15-2. Wildfire Events in Fulton County, 2011 to 2019

Municipality	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Ayr Township	0	1	1	0	0	0	0	**0**	**0**	**2**
Belfast Township	0	0	0	0	0	0	0	**0**	**1**	**1**
Bethel Township	0	0	0	0	0	0	0	**0**	**0**	**0**
Brush Creek Township	1	7	0	2	0	0	0	**0**	**0**	**10**
Dublin Township	0	0	0	1	0	1	0	**0**	**0**	**2**
Licking Creek Township	1	0	0	1	0	2	0	**0**	**0**	**4**
McConnellsburg Borough	0	0	0	0	0	0	0	**0**	**0**	**0**
Taylor Township	0	0	0	0	0	0	0	**0**	**0**	**0**
Thompson Township	0	0	0	0	0	0	0	**0**	**0**	**0**
Todd Township	0	0	0	1	0	1	1	**1**	**0**	**4**
Union Township	0	0	0	0	0	0	0	**0**	**0**	**0**
Valley-Hi Borough	0	0	0	0	0	0	0	**0**	**0**	**0**
Wells Township	0	0	0	0	0	1	1	**0**	**0**	**2**
Fulton County	**2**	**8**	**1**	**5**	**0**	**5**	**2**	**1**	**1**	**25**

Source: PA DCNR 2019
Note: Numbers listed in 2011 to August 2019 were based on wildfires reported to PA DCNR.
PA DCNR BOF is not responsible for the accuracy of the data shown above, and these numbers should be used for planning purposes only.

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4.3.15.5 Future Occurrence

In Pennsylvania, wildfire events will continue to occur each year. However, the likelihood of one of those fires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring. Additionally, invasive forest insects can increase the likelihood of wildfires occurring; insects that attack and kill trees increase the total wildfire fuel available in wooded areas. Climate change is also likely to increase the probability of future wildfires. Prolonged periods of drought caused by climate change can potentially increase the length of the wildfire season and provide a more favorable climate for ignition (PEMA 2019).

For this 2024 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of wildfire events for Fulton County. Data collected from the PA DCNR BOF was used to identify the number of wildfire events that occurred between 2011 and 2019. Due to the fact that all brush or wildfires are likely not reported to Fulton County or the State, it is difficult to have a comprehensive record of wildfire incidents. The table below shows these statistics as well as the annual average number of events and the estimated percent chance of an incident occurring in a given year, using the PA DCNR BOF records from 2011 to 2019. Based on these statistics, there is an estimated 100-percent chance of a wildfire event occurring in any given year in Fulton County.

Table 4.3.15-3. Probability of Future Wildfire Events

Hazard Type	Number of Occurrences Between 2001 and 2016	Percent Chance of Occurrence in Any Given Year
Wildfires	25	100%

Sources: PA DCNR BOF 2019

Based on available historical data, the future occurrence of wildfires in Fulton County can be considered *highly likely* as defined by the Risk Factor Methodology probability criteria (refer to Section 4.4). However, the likelihood of one of those fires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions like drought and wind can increase the likelihood of wildfires occurring. Any fire, without the quick response or attention of firefighters, forestry personnel, or visitors to the forest, has the potential to become a wildfire.

4.3.15.6 Vulnerability Assessment

To understand risk, a community must evaluate what assets are exposed and vulnerable in the identified hazard area. The following text evaluates and estimates the potential impact of the wildfire hazard on the county, including:

- Impact on (1) life, health and safety; (2) general building stock; (3) critical facilities; (4) economy; (5) environment; and (6) future growth and development.
- Expected future conditions on vulnerability.
- Further data collections that will assist understanding this hazard over time.

Impact on Life, Health, and Safety

Wildfires have the potential to impact human health and life of residents and responders, structures, infrastructure, and natural resources. The most vulnerable populations include emergency responders and those within a short distance of the interface between the built environment and the wildland environment. First responders are exposed to the dangers from the initial incident and after-effects from smoke inhalation and heat stroke. Table 4.3.15-4 summarizes the estimated population exposed to the wildfire hazard by municipality.

Table 4.3.15-4. Estimated Population Located Within the Wildland-Urban Interface/Intermix (WUI) Wildfire Fuel Hazard Areas in Fulton County

Jurisdiction	American Community Survey 5-Year Population Estimates (2022)	Estimated Population Located Within the Wildland-Urban Interface/Intermix (WUI) Wildfire Hazard Areas			
		Number of People in the WUI Interface Wildfire Hazard Area	Percent of Total	Number of People in the WUI Intermix Wildfire Hazard Area	Percent of Total
Ayr (T)	1,969	629	31.9%	1,063	54.0%
Belfast (T)	1,401	285	20.3%	462	33.0%
Bethel (T)	1,443	145	10.0%	1,017	70.5%
Brush Creek (T)	587	125	21.3%	114	19.4%
Dublin (T)	1,175	253	21.5%	608	51.7%
Licking Creek (T)	1,575	255	16.2%	822	52.2%
McConnellsburg (B)	1,056	1,050	99.4%	0	0.0%
Taylor (T)	1,164	369	31.7%	242	20.8%
Thompson (T)	949	105	11.1%	368	38.8%
Todd (T)	1,797	792	44.1%	649	36.1%
Union (T)	991	139	14.0%	378	38.1%
Valley-Hi (B)	3	0	0.0%	3	100.0%
Wells (T)	435	146	33.6%	115	26.4%
Fulton County (Total)	**14,545**	**4,293**	**29.5%**	**5,841**	**40.2%**

Source: U.S. Census Bureau, American Community Survey 2022; SILVIS Laboratory, Department of Forest Ecology and Management, University of Wisconsin–Madison 2022

Impact on General Building Stock

The most vulnerable structures to wildfire events are those within the wildfire urban interface/intermix hazard area. Buildings constructed of wood or vinyl siding are generally more likely to be impacted by the fire hazard than buildings constructed of brick or concrete. To estimate the buildings exposed to the wildfire hazard, the WUI was overlaid upon the updated building inventory. The replacement cost value of the structures with their center in the WUI were totaled (refer to Table 4.3.15-5).

Out of the general building stock (8,394 buildings), 29.7 percent sit in the wildfire interface area and 37.9 percent sit in the wildfire intermix area. The Borough of McConnellsburg has the greatest number of buildings within in the wildfire interface area (536 buildings). The Township of Ayr has the greatest number of buildings in the wildfire intermix area (569 buildings).

Table 4.3.15-5. Estimated Building Stock Located Within the Wildland-Urban Interface/Intermix (WUI) Wildfire Fuel Hazard Areas in Fulton County

Jurisdiction	Total Number of Buildings (2020 Census Tract)	Estimated Building Stock Located Within the Wildland-Urban Interface/Intermix (WUI) Wildfire Fuel Hazard Areas			
		Number of Buildings in the WUI Interface Wildfire Hazard Area	Percent of Total	Number of Buildings in the WUI Intermix Wildfire Hazard Area	Percent of Total
Ayr (T)	1,164	418	35.9%	569	48.9%
Belfast (T)	751	148	19.7%	226	30.1%
Bethel (T)	877	118	13.5%	589	67.2%
Brush Creek (T)	530	116	21.9%	89	16.8%
Dublin (T)	696	152	21.8%	343	49.3%
Licking Creek (T)	901	157	17.4%	465	51.6%
McConnellsburg (B)	547	536	98.0%	0	0.0%
Taylor (T)	707	232	32.8%	140	19.8%
Thompson (T)	582	63	10.8%	218	37.5%
Todd (T)	874	382	43.7%	300	34.3%
Union (T)	437	68	15.6%	144	33.0%
Valley-Hi (B)	29	0	0.0%	29	100.0%
Wells (T)	299	100	33.4%	73	24.4%
Fulton County (Total)	**8,394**	**2,490**	**29.7%**	**3,185**	**37.9%**

Source: Fulton County 2024; RS Means 2024; SILVIS Laboratory, Department of Forest Ecology and Management, University of Wisconsin–Madison 2022
Note: B – Borough; C – City; T – Township; % - Percent

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Impact on Critical Facilities

It is recognized that a number of critical facilities are located in the wildfire hazard area. Facilities at risk of impact from a wildfire include locations for vulnerable populations (i.e., schools and senior facilities) and emergency response agencies (i.e., fire and police). Table 4.3.15-6 summarizes the distribution of the 228 critical facilities located within the wildfire hazard area by jurisdiction. The Borough of McConnellsburg has the greatest number of critical facilities built in the Wildland-Urban interface hazard areas (18) and both Dublin and Todd Townships have the greatest number of critical facilities built in the Wildland-Urban intermix hazard areas (11). The exposed lifelines are categorized into FEMA lifelines, as presented in Table 4.3.15-7.

Table 4.3.15-6. Number of Critical Facilities Exposed to the Wildfire Urban Interface/Intermix Hazard Area

Jurisdiction	Total Critical Facilities Located in Jurisdiction	Number of Critical Facilities and Lifeline Facilities Located in the Wildland-Urban Interface Wildfire Hazard Area		Number of Critical Facilities and Lifeline Facilities Located in the Wildland-Urban Intermix Wildfire Hazard Area	
		Critical Facilities	Percent of Total Critical Facilities	Critical Facilities	Percent of Total Critical Facilities
Ayr (T)	22	9	40.9%	9	40.9%
Belfast (T)	16	6	37.5%	5	31.3%
Bethel (T)	23	12	52.2%	8	34.8%
Brush Creek (T)	18	1	5.6%	2	11.1%
Dublin (T)	27	8	29.6%	11	40.7%
Licking Creek (T)	17	4	23.5%	7	41.2%
McConnellsburg (B)	25	18	72.0%	0	0.0%
Taylor (T)	29	15	51.7%	3	10.3%
Thompson (T)	7	0	0.0%	2	28.6%
Todd (T)	25	4	16.0%	11	44.0%
Union (T)	10	1	10.0%	1	10.0%
Valley-Hi (B)	2	0	0.0%	2	100.0%
Wells (T)	7	6	85.7%	1	14.3%
Fulton County (Total)	**228**	**84**	**36.8%**	**62**	**27.2%**

Source: Fulton County 2024; SILVIS Laboratory, Department of Forest Ecology and Management, University of Wisconsin–Madison 2022

Table 4.3.15-7. Number Lifelines Exposed to the Wildfire Urban Interface/Intermix Hazard Area

FEMA Lifeline Category	Number of Lifelines	Number of Lifelines Located in the Wildland-Urban Interface Wildfire Hazard Area	Number of Lifelines Located in the Wildland-Urban Intermix Wildfire Hazard Area
Communications	39	8	11
Energy	10	4	5
Food, Hydration, Shelter	79	29	22
Hazardous Materials	10	5	3
Health and Medical	1	1	0
Safety and Security	53	24	9
Transportation	0	0	0
Water Systems	12	4	7
Other Critical Facilities	24	9	5
Fulton County (Total)	228	**84**	62

Source: Fulton County 2024; SILVIS Laboratory, Department of Forest Ecology and Management, University of Wisconsin–Madison 2022

Impact on the Economy

Wildfire events can have major economic impacts on a community from the initial loss of structures and the subsequent loss of revenue from destroyed businesses and decreases in tourism. Wildfire can also severely damage roads and infrastructure. Portions of Interstate I-70, I-76, US Routes US-30, US-522, and multiple State Routes, including PA-475, PA-484, PA-655, PA-913, PA-915, and PA-928 run through WUI areas. This factor should be considered for determine evacuation routes for Fulton County residents.

Impact on the Environment

According to the USGS, post-fire runoff polluted with debris and contaminants can be extremely harmful to ecosystem and aquatic life (Neary 2015). Studies show that urban fires, in particular, are more harmful to the environment than forest fires (Volker C. Radeloff 2018) The age and density of infrastructure within Fulton County can exacerbate consequences of fires on the environment because of the increased amount of chemicals and contaminants that would be released from burning infrastructure. These chemicals, such as iron, lead, and zinc, may leach into the storm water, contaminate nearby streams, and impair aquatic life.

Vegetation loss is often a concern, but is not typically a serious impact since natural re-growth occurs with time. The most significant environmental impact is the potential for severe erosion, silting of stream beds and reservoirs, and flooding due to ground-cover loss following a fire event. Wildfires also have a positive environmental impact in that they burn dead trees, leaves, and grasses to allow more open spaces for new and different types of vegetation to grow and receive sunlight. Another positive effect of a wildfire is that it stimulates the growth of new shoots on trees and shrubs, and its heat can open pinecones and other seed pods (PEMA 2019).

Wildfires can increase the probability of other natural disasters, specifically floods and mudflows. Wildfires, particularly large-scale fires, can dramatically alter the terrain and ground conditions, making land already devastated by fire susceptible to floods. Lands impacted by wildfire increase the risk of flooding and mudflow in those areas. Normally, vegetation absorbs rainfall, reducing runoff. However, wildfires leave the ground charred, barren, and unable to absorb water, thus creating conditions perfect for flash flooding and mudflows.

Flood risk in these impacted areas remains significantly higher until vegetation is restored, which can take up to five years after a wildfire (FEMA 2021).

Future Growth and Development

It is anticipated that any new development and new residents in the Wildfire Urban Intermix/Interface will be exposed to the wildfire hazard. Areas targeted for potential future growth and development in the next 5 years have been identified across the County at the municipal level.

Fulton County has experienced a slight population decrease since 2010. According to the U.S. Census Bureau, the County's population has increased 1 percent between 2010 and 2020 (US Census Bureau 2022). If the population continues to decrease, it is likely that number of exposed persons would as well.

Expected Future Conditions

According to USFS, changing future conditions will likely alter the atmospheric patterns that affect fire weather. Changes in fire patterns will, in turn, affect carbon cycling, forest structure, and species composition. Future climate conditions associated with elevated greenhouse gas concentrations may create an atmospheric and fuel environment that is more conducive to large, severe fires (USFS 2011).

Fire interacts with climate and vegetation (fuel) in predictable ways. Understanding the interactions of climate, fire, and vegetation is essential for addressing issues associated with changing conditions that include:

- Effects on regional circulation and other atmospheric patterns that affect fire weather.
- Effects of changing fire regimes on the carbon cycle, forest structure, and species composition, and
- Complications from land use change, invasive species, and an increasing WUI (USFS 2011).

It is projected that higher summer temperatures will likely increase the fire risk by 10 to 30-percent. Fire occurrence and areas burned could increase across the United States as a result of the increase of lightning activity; the frequency of surface pressure and associated circulation patterns conducive to surface drying; and fire weather conditions, in general, which are conducive to severe wildfires. Warmer temperatures will also increase the effects of drought and increase the number of days each year with flammable fuels, extending fire seasons and areas burned (USFS 2011).

Pennsylvania's Department of Environmental Protection (PADEP) was directed by the Climate Change Act (Act 70 of 2008) to initiate a study of the potential impacts of global temperature change on the Commonwealth. The June 2021 Pennsylvania Climate Impact Assessment's main findings indicate Pennsylvania may be at increased risk for wildfires; however, the findings could not determine how large the increase in risk would be (Shortle and others 2009).

Future changes in fire frequency and severity are difficult to predict. Global and regional changing conditions associated with elevated greenhouse gas concentrations could alter large weather patterns, thereby affecting fire weather conditions that are conducive to extreme fire behavior (USFS 2011).

4.3.15.7 Additional Data and Next Steps

As the data and resources become available, a custom building inventory can be generated to capture the construction of structures (such as roofing material, fire detection equipment, and structure age) to further refine the vulnerability analysis. As detailed in previous sections, buildings constructed of wood or vinyl siding are generally more likely to be damaged by the fire hazard than buildings constructed of brick or concrete. The proximity of these building types to the WUI should be identified for further evaluation. Development and availability of these data would permit a more detailed estimate of potential vulnerabilities, including loss of life and potential structural damages.

In locations where homes are at risk for wildfires, the BOF's WUI Guidance Document is available to assist homeowners, community associations, local government, and developers to assess and mitigate the potential dangers of a wildfire. The guidance also provides information for developing an action plan in coordination with local emergency managers. Communities at risk for wildfires can adopt by local ordinance the "International Wildland-Urban Interface Code" of the Uniform Construction Code.

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4.3.16 Winter Storm

4.3.16.1 Hazard Description

Winter storms consist of cold temperatures, snow, and ice. They occur, on average, approximately 35 times each year in Pennsylvania from November through March, Pennsylvania is exposed to winter storms that move up the Atlantic coast or sweep in from the west. Every county in the commonwealth is vulnerable to severe winter storms; however, the northern tier, western counties, and mountainous regions tend to experience winter weather more frequently and with greater severity.

This section provides a profile and vulnerability assessment of the winter storm hazard for the Fulton County Hazard Mitigation Plan (HMP). A winter storm is a storm in which the main types of precipitation are snow, sleet, or freezing rain. A winter storm can range from a moderate snowfall or ice event over a period of a few hours to blizzard conditions with wind-driven snow that lasts for several days. Most deaths from winter storms are not directly related to the storm itself but result from traffic accidents on icy roads, medical emergencies while shoveling snow, or hypothermia from prolonged exposure to cold (PEMA 2020). Types of severe winter weather events or conditions are further defined as the following (NWS 2009):

- **Heavy Snow** is generally considered snowfall accumulating to a depth of 4 inches or more within 12 hours or snowfall accumulating to a depth of 6 inches or more within 24 hours.
- A **snow squall or snowstorm** is limited-duration period of moderate to heavy snowfall accompanied by strong, gusty surface winds and possibly lightning.
- **Blizzards** are characterized by low temperatures, wind gusts of 35 miles per hour (mph) or more and falling and/or blowing snow that reduces visibility to 0.25 mile or less for 3 hours or more. A severe blizzard is defined as having a wind velocity of 45 mph, temperatures of 10 °F or lower, and a high density of blowing snow with visibility frequently measured in feet over an extended period.
- **Sleet** is defined as pellets of frozen or mostly frozen raindrops or refrozen partially melted snowflakes. These ice pellets usually bounce after hitting the ground or other hard surfaces.
- **Freezing rain** is rain that falls as a liquid but freezes into a glaze upon contact with the ground.
- An **ice storm** is an occasion when damaging volumes of ice accumulate from freezing rain. Significant accumulations of ice pull down trees and utility lines, resulting in loss of power and means of communication. These accumulations of ice render walking and driving extremely dangerous and can create extreme hazards to motorists and pedestrians.

Due to their regular occurrence, these storms are considered hazards only when they result in damage to communications networks, impact vegetation, cause structural collapse, and/or cause very serious transportation problems and utility interruptions. Winter storms have also been known to contribute to severe flooding. A winter storm can adversely affect roadways, utilities, and business activities and can cause frostbite or loss of life. These storms may include one or more of the following weather events: heavy snowstorm, sleet storm, ice storm, or severe blizzard.

Any of the above events can result in the closing of major or secondary roads, particularly in rural locations, stranded motorists, transportation accidents, loss of utility services, and depletion of heating supplies. Environmental impacts often include damage to shrubbery and trees due to heavy snow loading, ice build-up and/or high winds which can break limbs or even bring down large trees. Gradual melting of snow and ice provides excellent groundwater recharge. However, high temperatures following a heavy snowfall can cause rapid surface water runoff and severe flooding.

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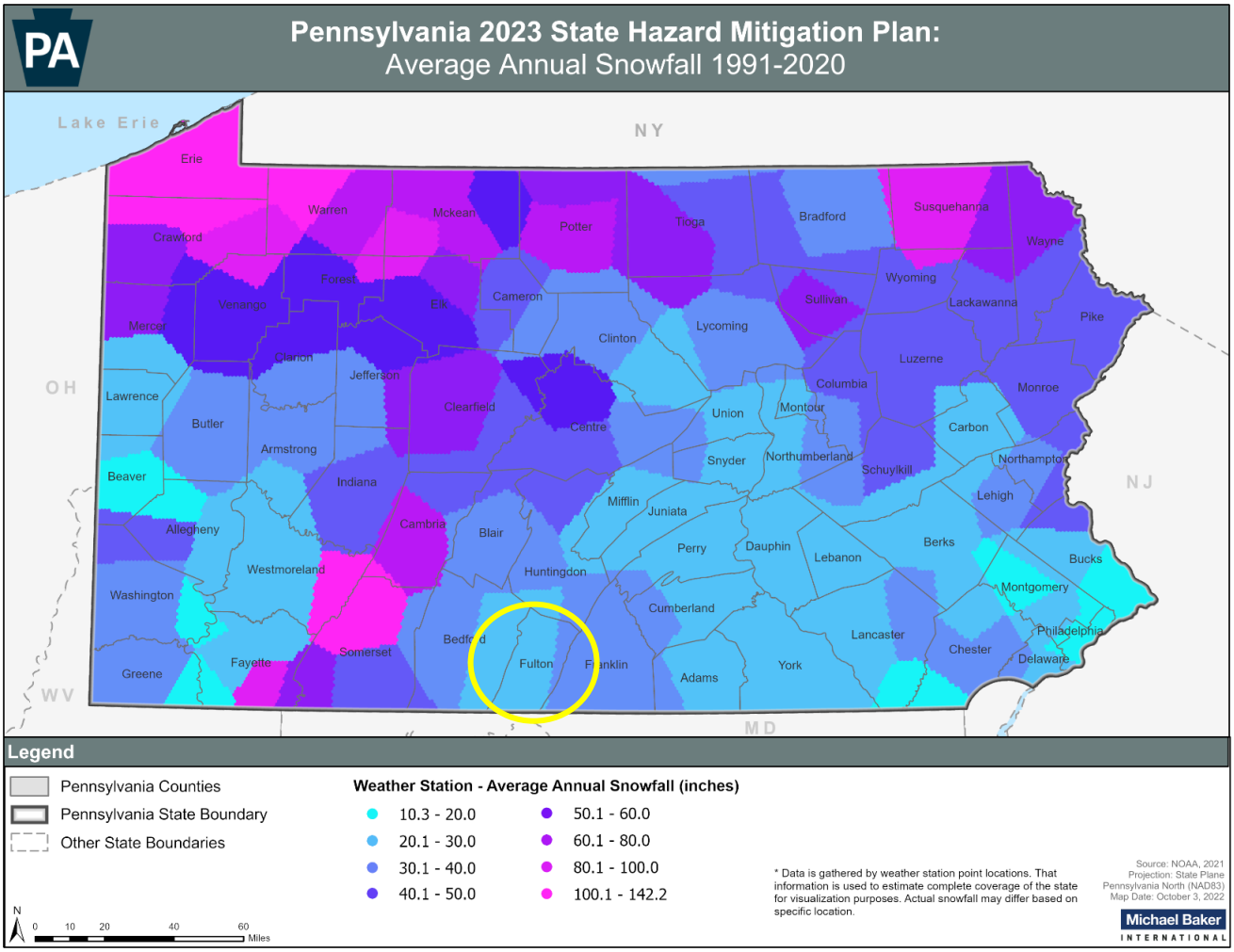
4.3.16.2 Location and Extent

Winter storms consist of cold temperatures, heavy snow or ice, and sometimes strong winds. They begin as low-pressure systems that move through Pennsylvania following the jet stream. Winter storms are regional events and every county in the commonwealth, including Fulton County, is subject to this hazard.

4.3.16.3 Range of Magnitude

Determining the extent of winter storms is measured in several different ways. Annual snowfall totals (as shown below) are one, while others, like the Regional Snowfall Index (RSI) or Winter Storm Severity Index (WSSI), categorize a range of winter storm magnitudes in several ways. According to Figure 4.3.16-1, between 1991 and 2020, Fulton County experiences between 20.1 and 40 inches of snow each year (PEMA 2023).

Table 4.3.16-1. Average Annual Snowfall (1991-2020) for Pennsylvania



Source: PEMA 2023
Note: Yellow circle indicates Fulton

The magnitude or severity of a severe winter storm depends on several factors including a region's climatological susceptibility to snowstorms, snowfall amounts, snowfall rates, wind speeds, temperatures, visibility, storm duration, topography, time of occurrence during the day (e.g., weekday versus weekend), and time of season.

Regional Snowfall Index (RSI)

The extent of a severe winter storm can be classified by meteorological measurements and by evaluating its societal impacts. National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information (NCEI) produces the Regional Snowfall Index (RSI) for significant snowstorms that affect the eastern two-thirds of the United States.

The RSI ranks snowstorm impacts on a scale from 1 to 5 as shown in Table 4.3.16-1. It is based on the spatial extent of the storm, the amount of snowfall, and the interaction of the extent and snowfall totals with population based on the 2010 Census. The NCEI has analyzed and assigned RSI values to over 500 storms since 1900 (EPA 2024), and Fulton County can expect a range of RSI values ranging from 1 to 5.

Table 4.3.16-2. RSI Ranking Categories

Category	Description	RSI Value
1	Notable	1-3
2	Significant	3-6
3	Major	6-10
4	Crippling	10-18
5	Extreme	18+

Source: NCEI 2023

Winter Storm Severity Index (WSSI)

Created through the use of Geographic Information Systems (GIS), this NWS tool screens official NWS forecasts for winter weather elements and combines those data with non-meteorological information datasets (e.g., climatology, land-use, urban areas). As shown in Table 4.3.16-2, WSSI provides a classification of the overall expected severity of winter weather using the following terminology: "Minor", "Moderate", "Major", and "Extreme". Components of the WSSI produce a 0 to 5 output scale value that equates to the potential severity based on the winter weather hazards (0=no winter weather, 1=winter weather area, 2=minor, 3=moderate, 4=major, and 5=extreme) (NOAA/WPC 2023). Fulton County, PA can expect a range of WSSI values between 1 and 5.

Table 4.3.16-3. WSSI Impact Definitions

Winter Weather Area	• Expect winter weather • Winter driving conditions • Drive carefully
Minor Impacts	• Expect a few inconveniences to daily life • Winter driving conditions • Use caution while driving
Moderate Impacts	• Expect disruptions to daily life • Hazardous driving conditions. • Use extra caution while driving • Closures and disruptions to infrastructure may occur
Major Impacts	• Expect considerable disruptions to daily life • Dangerous or impossible driving conditions • Avoid travel if possible • Widespread closures and disruptions to infrastructure may occur
Extreme Impacts	• Expect substantial disruptions to daily life • Extremely dangerous or impossible driving conditions • Travel is not advised • Extensive and widespread closures and disruptions to infrastructure may occur • Life-saving actions may be needed

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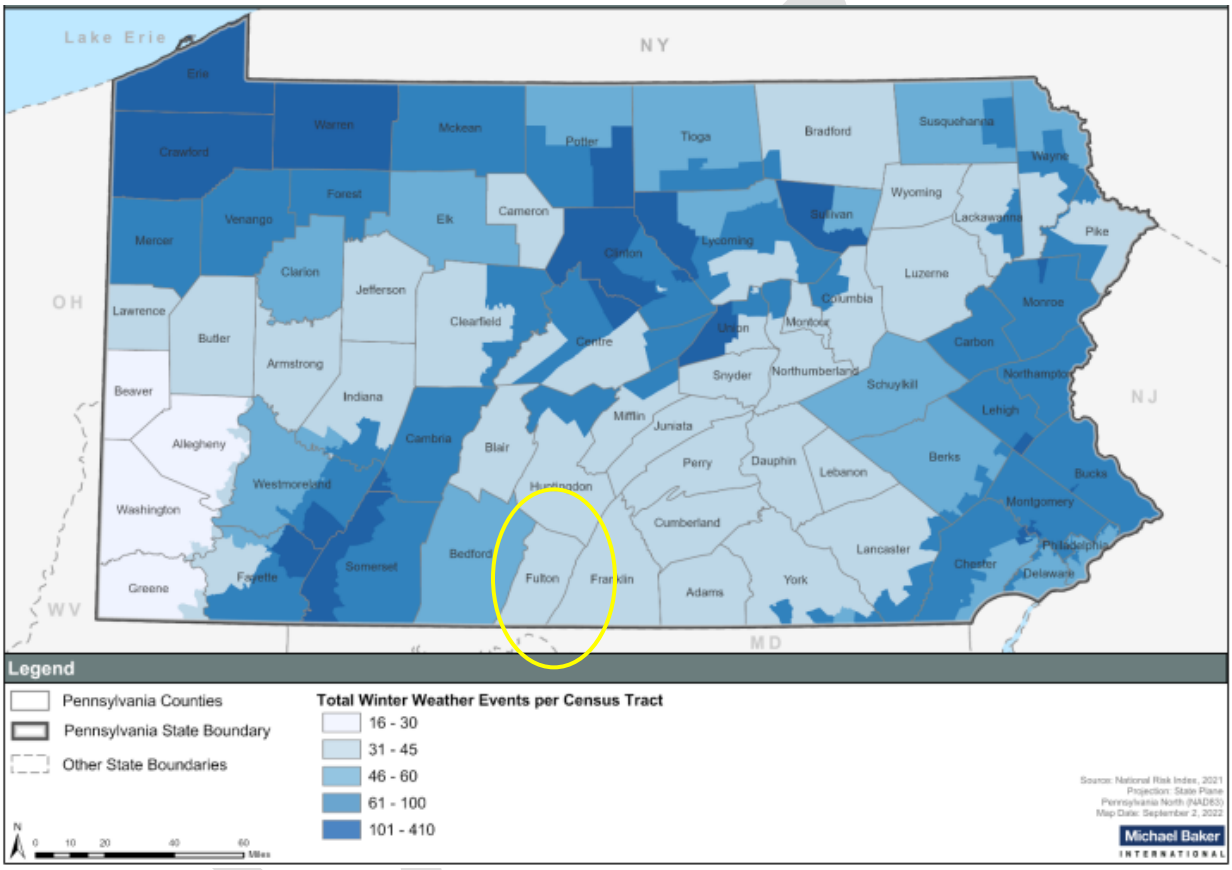
4.3.16.4 Past Occurrence

Many sources including the NOAA-NCEI storm events database and other local sources provided historical information regarding previous occurrences and losses associated with winter storm events throughout the Commonwealth of Pennsylvania and Fulton County. With so many sources reviewed for the purposes of this plan, loss and impact information for many events varied depending on the source. Therefore, accuracy of monetary figures discussed is based only on available information identified during research for this plan. Monetary figures may also have been calculated for the region, based on entire storm damage, and include damage from other counties. shows the number of winter weather events by census tract across Pennsylvania between 2005 and 2017, Fulton County ranges between 31 and 45 events (PEMA 2023).

Table 4.3.16-4. Pennsylvania Winter Weather Events, 2005-2017



Source: (PEMA 2023)
Note: Yellow oval indicates Fulton County.

Between 1954 and 2024, the Federal Emergency Management Agency (FEMA) declared that the Commonwealth of Pennsylvania experienced seven winter storm-related disasters (DR) or emergencies (EM) classified as one or a combination of the following disaster types: severe winter storms, snowstorms, blizzards, winter storms, severe storms, and snowfalls. Generally, these disasters covered a wide region of the Commonwealth, and therefore may have impacted many counties. However, not all counties were included in the disaster declarations. Fulton County has been declared a disaster area as a result of six winter storm events (FEMA 2022, NOAA 2017, Shreeves 2022).

Table 4.3.16-5. FEMA DR and EM Declarations for Winter Storm Events in Fulton County

FEMA Declaration Number	Date(s) of Event	Incident Type	Description
EM-3105	March 13-17, 1993	Snow	Severe winter storms and extreme snowfall impacted almost half of the U.S. population from the southern U.S. all the way up the East Coast. Later to be named the "Storm of the Century", approximately $5.5 billion in damage resulted from this storm due to coastal flooding, crippling snow, and extreme cold.
DR-1015	January 4-February 25, 1994	Severe Storm	The "Blizzard of 1994" caused arctic freeze conditions to impact Fulton County. 15 inches of snow were dropped across the State of Pennsylvania in this winter storm event.
DR-1085	January 6-12, 1996	Snow	The "Blizzard of '96" was a Category 5 snowstorm that brought an average of 30 inches of snowfall across the East Coast. After the blizzard, major flooding and extreme wind caused additional damage.
EM-3180	February 14-19, 2003	Severe Storm	The 2003 President's Day Storm brought heavy snowfall and freezing conditions to the East Coast, resulting in widespread business closures.
DR-1898	February 5-11, 2010	Snow	"Snowmageddon 2010" was a series of severe winter storms that brought an average of 20 inches of snow to the planning area.
EM-3367	January 4-20, 2014	Severe Ice Storm	A slow-moving arctic front brought snowfall and freezing temperatures to the region.
DR-4267	March 24, 2016	Severe Storm	Winter Storm Jonas brought over 30 inches of snow to Pennsylvania, causing severe blockages to transportation routes.

Source: FEMA 2024

For this 2025 HMP update, known severe winter weather events that have impacted Fulton County between 1993 and 2024 are identified in Table 4.3.16-4. This includes events presented in the 2020 Fulton County HMP and events listed in the NOAA-NCEI storm events database. Only events that resulted in a disaster declaration or caused injuries, fatalities, or over $10,000 in damage are included in the table. With winter weather documentation being so extensive for Pennsylvania and Fulton County, not all sources have been identified or researched. Therefore, the table below may not include all events that have occurred in the County.

Table 4.3.16-6. Major Winter Storm Events in Fulton County between 1993 and 2024

Dates of Event	Event Type	Fatalities	Injuries	Property Damage	FEMA Disaster Number	Description
March 13-17, 1993	Winter Storm	-	-	-	EM-3105	See Table 4.3.16-2 above.
January 4 – February 25, 1994	Winter Storms	-	-	-	DR-1015	See Table 4.3.16-2 above.
January 7, 1996	Blizzard	1	0	$1,450,000.00	DR-1085	See Table 4.3.16-2 above.
January 13, 1999	Winter Storm	0	12	$0.00	N/A	No description available.
February 16, 2003	Winter Storm	0	0	$1,000,000.00	EM-3180	See Table 4.3.16-2 above.
February 5-11, 2010	Winter Storm	0	0	$2,500,000.00	DR-1898	See Table 4.3.16-2 above
February 4-20, 2014	Winter Storms	0	0	$0.00	EM-3367	See Table 4.3.16-2 above
January 22-24, 2016	Winter Storm	0	5	N/A	DR-2467-PA	A major snowfall from an incoming low-pressure system resulted in downed trees, minor power outages, stranded vehicles, and cancelled schools. Pennsylvania Governor Tom Wolf declared a State of Emergency. A total of 22.4 inches of snow fell at the Philadelphia International Airport.
March 20, 2018	Winter Storm	0	1	$0	N/A	A heavy, wet snow accumulated to a depth of up to 10 inches under a deformation zone that established itself over the area during the storm. Strong northwest winds with gusts to 60 mph occurred, leading to widespread damage to trees and power lines, which induced extensive power outages throughout the region. There was one fatality in Montgomery County, when a tree fell on a vehicle. On March 2, Governor Tom Wolf activated the Pennsylvania National Guard to support local response to the storm.
November 15, 2018	Winter Storm	0	0	0	N/A	An early-season winter storm produced a wintry mix of precipitation across central Pennsylvania on November 15-16, 2018. Widespread snowfall of 9 to 13 inches was observed across north-central Pennsylvania, with lesser amounts to the south where a considerable amount of sleet (and some freezing rain) fell. A few spots across far southern Pennsylvania received 0.25 or greater ice accumulation. A winter storm produced 6 to

Dates of Event	Event Type	Fatalities	Injuries	Property Damage	FEMA Disaster Number	Description
						11 inches of snow and sleet across Fulton County on November 15-16, 2018.
February 11, 2019	Winter Storm	0	0	0	N/A	A Winter Storm produced 2 to 4 inches of snow and sleet, and greater than 0.25 of freezing rain across Fulton County from February 11-12, 2019.
February 20, 2019	Winter Storm	0	0	0	N/A	A Winter Storm produced 6 to 8 inches of snow and sleet followed by greater than 0.25 of freezing rain across Fulton County on February 20-21, 2019.
December 16, 2020	Winter Storm	0	0	0	N/A	An early-season Nor'Easter produced anywhere from 6 inches of snow and sleet in the Lower Susquehanna Valley up to 30 inches of snow in parts of Tioga County. Widespread travel impacts were observed, and it was the heaviest snowfall from a single event that many central Pennsylvania locations had seen in a few years. A winter storm produced 6 to 12 inches of snow across Fulton County from December 16-17, 2020.
January 31, 2021	Winter Storm	0	0	0	N/A	A winter storm produced 9 to 16 inches of snow across Fulton County from January 31 to February 2, 2021.
February 1, 2021	Winter Storm	0	0	0	N/A	A winter storm produced 9 to 16 inches of snow across Fulton County from January 31 to February 2, 2021.
December 15, 2022	Winter Storm	0	1	0	N/A	A winter storm produced around an inch of snow, half an inch of sleet, and 0.10 to 0.20 of freezing rain across Fulton County on December 15, 2022. As a result, a multi-vehicle accident occurred on the PA Turnpike westbound in Dublin Township. Some debris from that accident ended up in the eastbound lanes and caused another multi-vehicle accident there. There was one injury reported.

Source: NOAA-NCEI 2022; FEMA 2022

* *Many sources were consulted to provide an update of previous occurrences and losses; event details and loss/impact information may vary and has been summarized in the above table. No property damage or crop loss was reported by NOAA and USDA.*

DR *Major Disaster Declaration (FEMA)*
FEMA *Federal Emergency Management Agency*
Mph *Miles per Hour*
NCEI *National Centers for Environmental Information*
NOAA *National Oceanic and Atmospheric Administration*
N/A *Not Applicable*

4.3.16.5 Probability of Future Occurrence

Given the history of winter storm events that have impacted Fulton County, future winter storm events of varying degrees will occur every year, and thus many people and properties are at risk from the winter storm hazard in the future.

For the 2025 HMP update, update, the most up-to-date data was collected to calculate the probability of future occurrence of winter storm (heavy snow, blizzard, sleet/freezing rain, winter weather, and winter storm) events for Fulton County. Information from the NOAA-NCEI storm events database was used to identify the number of winter storm events that occurred between 1950 and 2024. Using these sources ensures the most accurate probability estimates possible. The table below shows these statistics, as well as the annual average number of events and the estimate percent chance of an incident occurring in a given year. Based on these statistics, there is an estimated 100-percent chance of a winter storm event occurring in any given year in Fulton County.

Table 4.3.16-7. Probability of Future Winter Storm Events

Hazard Type	Number of Occurrences Between 1950 and 2024	Percent Chance of Occurrence in Any Given Year
Blizzard	1	1.4%
Heavy Snow	30	40.5%
Ice Storm	2	2.7%
Winter Storm	45	60.8%
Winter Weather	120	100%
TOTAL:	**198**	**100%**

Sources: NOAA-NCEI 2022; FEMA 2022
Note: Disaster occurrences include federally declared disasters since the 1950 Federal Disaster Relief Act, and selected storm events since 1950. Due to limitations in data, not all severe winter weather events occurring between 1950 and 1996 are accounted for in the tally of occurrences. As a result, the number of hazard occurrences is underestimated.

Based on available historical data, future occurrences of winter storm events are considered *highly likely*, according to Risk Factor Methodology probability criteria further discussed in Section 4.4.

4.3.16.6 Vulnerability Assessment

To understand risk, a community must evaluate the assets that are exposed or vulnerable within the identified hazard area. Regarding winter storm events, all of Fulton County has been identified as the hazard area. Therefore, all assets (population, structures, critical facilities, and lifelines), as described in the Section 4.4, Hazard Vulnerability Summary, are potentially vulnerable. The following sections estimate the potential impacts of the winter storm hazard on the County, including:

- Impact on (1) life, health and safety; (2) general building stock; (3) critical facilities; (4) economy; (5) environment; and (6) future growth and development.
- Expected future conditions.
- Further data collections that will assist understanding this hazard over time.

Life, Health, and Safety

General Population

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

die in traffic accidents on icy roads, of heart attacks while shoveling snow, or of hypothermia from prolonged exposure to cold (NSSL n.d.).

For the purposes of this HMP, the entire population of Fulton County is considered exposed to winter storm events (US Census Bureau 2021). The elderly are considered most susceptible to this hazard because of their increased risk of injuries and death from falls and overexertion, and/or hypothermia from exposure while attempting to clear snow and ice. In addition, winter storm events can reduce ability of these populations to access emergency services. Residents with low incomes may not have access to housing, or their housing may be less able to withstand cold temperatures (e.g., homes with poor insulation and heating supply).

The homeless, elderly, and children are considered most susceptible to this hazard; the homeless due to their lack of shelter; the elderly and children due to their increased risk of injuries and death from falls and overexertion or hypothermia from attempts to clear snow and ice. Winter weather events can reduce the ability of these populations to access emergency services.

Impact on General Building Stock

The entire general building stock inventory in Fulton County is exposed and vulnerable to the winter storm hazard. In general, structural impacts include damage to roofs and building frames rather than building content. Current modeling tools are not available to estimate specific losses from this hazard.

Table 4.3.16-8 provides an overview of the estimated financial losses from winter storms for Fulton County and its jurisdictions. The Township of Ayr has the highest replacement cost value (RCV), estimated at $742.9 million. It also has the highest potential loss, with $74.3 million if 10 percent of its building stock is damaged. Total estimated losses for Fulton County range from approximately $49.7 million (1 percent damages) to nearly $497 million (10 percent damages).

An area especially vulnerable to the winter storm hazard is the floodplain. At-risk building stock and infrastructure in floodplains are presented in the flood hazard profile in Section 4.3.6. Generally, losses from flooding associated with winter storms should be less than those associated with a 1-percent or 0.2-percent flood. Snow and ice melt can cause both riverine and urban flooding. Estimated losses caused by riverine flooding in the County are discussed in Section 4.3.6.

Table 4.3.16-8. General Building Stock Estimated Losses from Winter Storm

Jurisdiction	General Building Stock Estimated Losses from Winter Storm			
	Total RCV *(Structure Only)*	1% Damages	5% Damages	10% Damages
Ayr (T)	$742,859,081	$7,428,591	$37,142,954	$74,285,908
Belfast (T)	$359,056,843	$3,590,568	$17,952,842	$35,905,684
Bethel (T)	$542,567,184	$5,425,672	$27,128,359	$54,256,718
Brush Creek (T)	$445,273,226	$4,452,732	$22,263,661	$44,527,323
Dublin (T)	$417,063,664	$4,170,637	$20,853,183	$41,706,366
Licking Creek (T)	$465,998,102	$4,659,981	$23,299,905	$46,599,810
McConnellsburg (B)	$430,777,436	$4,307,774	$21,538,872	$43,077,744
Taylor (T)	$524,724,711	$5,247,247	$26,236,236	$52,472,471
Thompson (T)	$239,062,372	$2,390,624	$11,953,119	$23,906,237
Todd (T)	$526,558,205	$5,265,582	$26,327,910	$52,655,820
Union (T)	$173,542,789	$1,735,428	$8,677,139	$17,354,279
Valley-Hi (B)	$6,636,466	$66,365	$331,823	$663,647

Jurisdiction	General Building Stock Estimated Losses from Winter Storm			
	Total RCV *(Structure Only)*	1% Damages	5% Damages	10% Damages
Wells (T)	$94,864,621	$948,646	$4,743,231	$9,486,462
Fulton County (Total)	**$4,968,984,701**	**$49,689,847**	**$248,449,235**	**$496,898,470**

Source: Fulton County 2024; RS Means 2024
Note: % = Percent

Impact on Critical Facilities

Full functionality of critical facilities such as police, fire and medical facilities is essential for response during and after a severe winter storm event. The structures that compose these critical facilities are largely constructed of concrete and masonry; therefore, they are not expected to suffer severe structural damage from severe winter storm events. Because power interruption can occur, backup power is recommended. Infrastructure at risk for this hazard includes roadways that could be damaged due to the application of salt and intermittent freezing and warming conditions that can damage roads over time. Severe snowfall requires the clearing roadways and alerting citizens to dangerous conditions; following the winter season, resources for road maintenance and repair are required (NSSL 2022).

> Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Communications and power can be disrupted for days while utility companies work to repair the extensive damage. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians. Bridges and overpasses are particularly dangerous because they freeze before other surfaces (NSSL 2022).

Impact on the Economy

Infrastructure at risk from the winter storm hazard includes roadways that could be damaged by application of salt and intermittent freezing and warming conditions that can damage roads over time. Costs of snow and ice removals, as well as repairs of roads undergoing freeze/thaw cycles, can drain local financial resources. Potential secondary effects of the winter storm hazard may include local economy impacts including loss of utilities, interruption of transportation corridors, and loss of business function.

Impact on the Environment

Environmental impacts often include damage to trees and shrubs caused by heavy snow loading, ice build-up, and/or high winds, which can break limbs and down large trees. Indirect effects of winter storms include possible damage to surfaces and contamination of groundwater adjacent to roadway surfaces treated with salt, chemicals, and other de-icing materials (PEMA 2023).

To an extent, winter storms present certain positive environmental impacts including the gradual melting of snow and ice which recharges the supply of groundwater. However, abrupt high temperatures following a heavy snowfall can accelerate snowmelt, leading to rapid surface water runoff and severe flooding (PEMA 2023).

Future Changes That May Impact Vulnerability

Future Growth and Development

Areas targeted for potential future growth and development within the next 5 to 10 years have been identified across the County at the municipal level and are further discussed in Section 4.4 of this HMP. Because Fulton County in its entirety has been identified as the hazard area vulnerable to the winter storm hazard, any new development will be exposed to associated risks.

As discussed in Section 2, County Profile, the Fulton County population has been increasing and is projected to continue to decrease in coming decades. In addition, the population is aging. As the aging population grows, so too will the number of persons vulnerable to severe winter weather and extreme cold temperatures.

The ability of new development to withstand winter storm impacts can be enhanced through land use practices and consistent enforcement of codes and regulations for new construction. New development will change the landscape where buildings, roads, and other infrastructure potentially replace open land and vegetation. Freezing temperatures during winter storm events can impact pipe and utility development and may discourage development due to high cost of repairs.

Expected Future Conditions

The climate of Pennsylvania has changed in several ways. Over the past 100 years, annual average temperatures have been rising across the commonwealth. Warmer winters have led to a decrease in snow cover and earlier arrival of spring. Recent analyses based on the IPCC models suggest a decrease in frequency and an increase in intensity of extra-tropical winter cyclones. However, based on the methodology applied, some models show no significant change in the storm track whereas others indicate a northward displacement of the storm track in the North Atlantic. For the mid-Atlantic region, there is little indication of a change in storm activity or track over Pennsylvania. An overall increase in winter precipitation is anticipated, with a decrease in snow and an increase in rain during the winter months. Projections regarding future occurrences of extra-tropical cyclones in Pennsylvania are substantially uncertain. Based on available information and projections, winter storms are anticipated to continue to affect Pennsylvania in the future. Future improvements in modeling smaller-scale climatic processes can be expected and will lead to improved understanding of ways in which changing weather patterns will alter temperature, precipitation, and storm events in Pennsylvania (NYSDEC n.d.).

4.3.16.7 Additional Data and Next Steps

The assessment above identifies vulnerable populations and economic losses associated with the winter storm hazard of concern. Historical data on structural losses to general building stock are not adequate to predict specific losses to this inventory; therefore, the percent of damage assumption methodology was applied. This methodology is based on FEMA How-to Series (FEMA 386-2), Understanding Your Risks, Identifying and Estimating Losses (FEMA 2001), and FEMA's Using HAZUS-MH for Risk Assessment (FEMA 433) (FEMA 2015a). Acquisition of additional and actual valuation data regarding general building stock and critical infrastructure losses would further support future estimates of potential exposure of and damage to the general building stock inventory.

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4.4 HAZARD VULNERABILITY SUMMARY

This section describes the methodology and tools used to support the risk assessment process.

4.4.1 Methodology

A risk assessment is a process that involves measuring the potential loss of life, personal injury, economic losses, and property damage resulting from identified hazards. It allows planning personnel to address and reduce hazard impacts and emergency management personnel to establish early response priorities by identifying potential hazards and vulnerable assets. Risk assessment results are used in subsequent mitigation planning processes, including determining and prioritizing mitigation actions that reduce each jurisdiction's risk to a specified hazard. Past, present, and future conditions must be evaluated to assess risk most accurately for the county and each jurisdiction. The process focuses on the following elements:

- **Hazard Identification** – Use all available information to determine what types of hazards might affect a jurisdiction
- **Profile Each Hazard** – Understand each hazard in terms of:
  - Location – the geographic area most affected by the hazard
  - Extent – the severity of each hazard
  - Range of magnitude
  - Previous occurrences and losses
  - Probability of future hazard events
- **Assess Vulnerability**
  - **Exposure identification** – Estimate the total number of assets in the jurisdiction likely to experience a hazard event by overlaying hazard maps with the asset inventories.
  - **Vulnerability identification and loss estimation** – Assess the impact of hazard events on the people, property, environment, economy, and lands of the region, including estimates of the cost of potential damage or costs that could be avoided by mitigation.

The following summarizes the asset inventories, methodology, and tools used to support the risk assessment process.

4.4.1.1 Asset Inventories

Fulton County identified county assets to assess potential exposure and loss associated with the hazards of concern. For the Hazard Mitigation Plan (HMP) update, Fulton County evaluated the vulnerability of the following types of assets: population, buildings critical facilities/infrastructure, and the environment. Some assets are more vulnerable because of their physical characteristics or socioeconomic uses. To protect individual privacy and the security of critical facilities, information on properties assessed is presented in aggregate without details about specific individual personal or public properties.

Population

Total population statistics from the 2022 American Community Survey (ACS) 5-year estimate were used to estimate the exposure and potential impacts to the county's population in place of the 2020 U.S. Census block estimates. Population statistics were extracted directly from the Census Bureau and ACS by their respective jurisdictions and were averaged among the total number of residential properties to estimate the population at the structure level. This estimate provides a more precise distribution of population across the county compared to only using the Census block or Census tract boundaries. Limitations of these analyses are recognized, and thus the results are used only to provide a general estimate for planning purposes.

As discussed in Section 2, County Profile, research has shown that some populations are at greater risk from hazard events because of decreased resources or physical abilities. Vulnerable populations in Fulton County

included in the risk assessment are children, elderly, population below the poverty level, non-English speaking individuals, and persons institutionalized with a disability.

Buildings

A custom general building stock was created countywide. The general building stock was updated countywide with a custom-building inventory using structure locations and 2024 parcel tax assessor information provided by the County. The 2022 Microsoft BING building footprints layer was utilized to generate other structure locations that were not available from the County. The building inventory attributes were updated using parcel tax assessor information provided by Fulton. Attributes provided in the associated files were used to further define each structure, such as year built, number of stories, occupancy class, and square footage. The centroid of each building footprint was used to estimate the building location. Structural and content replacement cost values (RCV) were calculated for each building using the available assessor data, the building footprint, and RS Means 2024 values.

A regional location factor for Fulton County was applied based on the individual building stock's zip code location:

RCV Regional Location Factor		
Zip Code	**Residential**	**Non-Residential**
155xx	0.86	0.93
166xx	0.90	0.95
172xx	0.83	0.89

RCV is the current cost of returning an asset to its pre-damaged condition using present-day cost of labor and materials. Total RCV consists of both the structural cost to replace a building and the estimate value of contents of a building. The occupancy classes available in Hazus were condensed into the categories of residential, commercial, industrial, agricultural, religious, governmental, and educational to facilitate analysis and presentation of results. Residential loss estimates addressed both multi-family and single-family dwellings.

Critical Facilities

The National Land Use and Land Cover data was derived from the Multi-Resolution Land Characteristics (MRLC) Consortium. The MRLC, a consortium of federal agencies who coordinates and generates consistent and relevant land cover information at the national scale for a wide variety of environmental, land management, and modeling applications.

This 2021 dataset was converted from a raster to a vector polygon, which informed spatial areas of built and natural land use areas. The built land use areas were defined as urban areas and include developed open space, low, medium, and high intensity locations. Non-urban areas were extracted into agricultural, barren land, forest, rangeland, water, and wetlands land use categories.

New Development

In addition to summarizing the current vulnerability, Fulton County examined recent and anticipated new development that can affect the County's vulnerability to hazards. Identifying these changes and integrating them into the risk assessment ensures they are considered when developing the mitigation strategy to reduce these vulnerabilities in the future. An exposure analysis was conducted using anticipated and recent new developments provided by each jurisdiction.

4.4.1.2 Methodology

To address the requirements of the DMA 2000 and to better understand potential vulnerability and losses associated with hazards of concern, Fulton County used standardized tools, combined with local, state, and federal data and expertise to conduct the risk assessment. Three different levels of analysis were used depending upon the data available for each hazard as described below. Table 4.4-1 summarizes the type of analysis conducted by hazard of concern.

1. Historic Occurrences and Qualitative Analysis – This analysis includes an examination of historic impacts to understand potential impacts of future events of similar size. In addition, potential impacts and losses are discussed qualitatively using best-available data and professional judgement.
2. Exposure Assessment – This analysis involves overlaying available spatial hazard layers, or hazards with defined extent and locations, with assets in GIS to determine which assets are in the impact area of the hazard. The analysis highlights which assets are in the hazard area and may incur future impacts.
3. Loss Estimation — The FEMA Hazus modeling software was used to estimate potential losses for the following hazards: flood, earthquake, and hurricane. In addition, an examination of historic impacts and an exposure assessment was conducted for these spatially delineated hazards.

Table 4.4-1. Summary of Risk Assessment Analyses

Hazard	Data Analyzed			
	Population	General Building Stock	Critical Facilities	Environment
Dam Failure	Q	Q	Q	Q
Drought	Q	Q	Q	Q
Earthquake	H	H	H	Q
Environmental Hazard- Hazardous Releases	E	E	E	Q
Environmental Hazard- Gas and Liquid Pipelines	E	E	E	Q
Flood, Flash Flood, Ice Jam	E, H	E, H	E, H	E
Hailstorm	Q	Q	Q	Q
Landslide	E	E	E	Q
Pandemic/Infectious Diseases	Q	Q	Q	Q
Radon Exposure	Q	Q	Q	Q
Subsidence/Sinkhole	E	E	E	Q
Tornado, Windstorm	H	H	H	Q
Transportation Accident	Q	Q	Q	Q
Utility Interruption	Q	Q	Q	Q
Wildfire	E	E	E	Q
Winter Storm	Q	Q	Q	Q

Note: E – Exposure analysis; H – Hazus analysis; Q – Qualitative analysis

Hazards U.S. – Multi-Hazard (Hazus)

In 1997, FEMA developed a standardized model for estimating losses caused by earthquakes, known as Hazards U.S. or Hazus. Hazus was developed in response to the need for more effective national-, state-, and community-level planning and the need to identify areas that face the highest risk and potential for loss. Hazus was expanded into a multi-hazard methodology, Hazus with new models for estimating potential losses from wind (hurricanes) and flood (riverine) hazards. Hazus is a GIS-based software tool that applies engineering and scientific risk calculations, which have been developed by hazard and information technology experts, to provide defensible damage and loss estimates. These methodologies are accepted by FEMA and provide a consistent framework for assessing risk across a variety of hazards. The GIS framework also supports the evaluation of hazards and assessment of inventory and loss estimates for these hazards.

Hazus uses GIS technology to produce detailed maps and analytical reports that estimate a community's direct physical damage to building stock, critical facilities, transportation systems and utility systems. To generate this information, Hazus uses default data for inventory, vulnerability, and hazards; this default data can be supplemented with local data to provide a more refined analysis. Damage reports can include induced damage (inundation, fire, threats posed by hazardous materials and debris) and direct economic and social losses (casualties, shelter requirements, and economic impact) depending on the hazard and available local data. Hazus' open data architecture can be used to manage community GIS data in a central location. The use of this software also promotes consistency of data output now and in the future and standardization of data collection and storage. More information on Hazus is available at http://www.fema.gov/hazus.

In general, modeled losses were estimated in the program using depth grids for the flood analysis and probabilistic analyses were performed to develop expected or estimated distribution of losses (mean return period losses) for hurricane wind and seismic hazards. The probabilistic model generates estimated damages and losses for specified return periods (e.g., 100- and 500-year). Table 4.4-2 displays the various levels of analyses that can be conducted using the Hazus software.

Table 4.4-2 Summary of Hazus Analysis Levels

Hazus Analysis Levels	
Level 1	*Hazus provides hazard and inventory data with minimal outside data collection or mapping.*
Level 2	*Analysis involves augmenting the Hazus provided hazard and inventory data with more recent or detailed data for the study region, referred to as "local data"*
Level 3	*Analysis involves adjusting the built-in loss estimation models used for the hazard loss analyses. This Level is typical done in conjunction with the use of local data.*

Dam Failure

Digital dam failure inundation area maps were not available for inclusion in the risk assessment. A qualitative analysis was conducted for the dam failure hazard based on best-available data and professional judgment.

Drought

To assess the vulnerability to drought and its associated impacts, a qualitative assessment was conducted. The U.S. Department of Agriculture (USDA) Census of Agriculture 2022 (USDA, 2022) was used to estimate economic impacts on the County. Information regarding the exposed farmland areas and total market value of livestock and poultry, and other agricultural products sold, etc., was extracted from the report and summarized in the vulnerability assessment.

Earthquake

A probabilistic assessment was conducted for Fulton County for the 500-year MRP through a Level 2 analysis in HAZUS-MH v6.1 to analyze the earthquake hazard and provide a range of loss estimates. The probabilistic method uses information from historical earthquakes and inferred faults, locations, and magnitudes and computes the probable ground shaking levels that might be experienced during a recurrence period by Census tract.

As noted in the HAZUS-MH Earthquake User Manual, *"Uncertainties are inherent in any loss estimation methodology. They arise in part from incomplete scientific knowledge concerning earthquakes and their effects upon buildings and facilities. They also result from the approximations and simplifications that are necessary for comprehensive analyses. Incomplete or inaccurate inventories of the built environment, demographics and economic parameters add to the uncertainty. These factors can result in a range of uncertainty in loss estimates produced by the HAZUS Earthquake Model, possibly at best by a factor of two or more"* (FEMA 2015). However, HAZUS' potential loss estimates are acceptable for the purposes of this HMP.

Ground shaking is the primary cause of earthquake damage to man-made structures, and soft soils amplify ground shaking. One contributor to the site amplification is the velocity at which the rock or soil transmits shear waves (S-waves). The National Earthquake Hazard Reductions Program (NEHRP) has developed five soil classifications defined by their shear-wave velocity that impact the severity of an earthquake. The soil classification system ranges from A to E, where A represents hard rock that reduces ground motions from an earthquake and E represents soft soils that amplify and magnify ground shaking and increase building damage and losses.

NEHRP soil classifications were not available for Fulton County at the time of this analysis. Soils were estimated as NEHRP soil Type D across Fulton County, as a conservative approach to this risk assessment. Groundwater was set at a depth of 5 feet (default setting). Damages and losses due to liquefaction, landslide, or surface fault rupture were not included in this analysis. Although damages are estimated at the Census tract level, results were presented at the municipal level. For Census tracts encompassing multiple municipalities, the default general building stock inventory was used to calculate the percent of the total Census tract replacement cost value in each municipality. This percentage was applied to the Census tract losses to estimate the municipal level losses. For example, the Census blocks from two municipalities are located within one Census tract. The total replacement cost value of Municipality A is 60 percent of the total Census tract replacement cost value, while Municipality B is 40 percent of the total value. Therefore, 60 percent of the losses for the Census tract will be applied to Municipality A, and 40 percent will be applied to Municipality B.

In addition to the probabilistic scenarios cited, an annualized loss run was conducted to estimate annualized general building stock dollar losses and the impact on critical facilities in the county for the 500-year MRP earthquake event.

Environmental Hazards

To determine potential impact on Fulton County, a 0.25-mile buffer was placed around the identified major roadways and the designated vulnerability radius of each of the county's 11 Superfund Amendments (The vulnerability radius for each hazard facility is determined by the Fulton County Local Emergency Planning Committee) and Reauthorization Act (SARA) Title III planning facilities was used to define the hazard area. The primary roadways in Fulton County are listed as follows:

- Pennsylvania Turnpike (I-76)
- Interstate 70 (I-70)
- U.S. Highway 522 (US-522)
- U.S. Highway 30 (US-30)
- PA State Highway 16 (PA-16)

Populations and features of the built environment within these areas might be directly or indirectly affected by a potential environmental hazard. The hazard area was overlaid upon the 2022 U.S. Census, American Community Survey population data in GIS (U.S. Census 2022).

Flood, Flash Flood, and Ice Jam

The 1- and 0.2-percent annual chance flood events were examined to evaluate Fulton County's flood risk. These flood events are generally those considered by planners and evaluated under federal programs such as the National Flood Insurance Program.

The effective Fulton County FEMA Digital Flood Insurance Rate Maps (DFIRM) dated February 18, 2011 were used to evaluate exposure. The FEMA Risk Map 1-percent annual chance flood depth grid, dated February 2011, was incorporated into HAZUS-MH v6.1 to estimate potential losses for the county. The depth grid developed was integrated into the Hazus riverine model to estimate potential losses for the 1 percent annual chance flood event.

DFIRM flood boundaries, custom-built general building stock inventory, updated critical facility inventories, and 2020 U.S. Census population data were used to estimate exposure to the 1-percent annual chance flood events. A HAZUS-MH v6.1 riverine flood analysis was performed. The updated critical facility inventories were incorporated into HAZUS-MH v6.1, replacing the default essential facility (police, fire, schools, etc.) and utility inventories. The HAZUS-MH v6.1 riverine flood model was run to estimate potential losses in Fulton County for the 1-percent. HAZUS-MH v6.1 calculated the estimated potential losses to the population (default 2020 U.S. Census data) and potential damages to the general building stock and critical facility inventories based on the depth grid generated and the default HAZUS-MH v6.1 damage functions in the flood model.

Hailstorm

A qualitative analysis was conducted for the hailstorm hazard based on best-available data and professional judgment.

Landslide

Unlike the flood, wind, and earthquake hazards, no standard loss estimation models or methodologies have been established for the landslide hazard.

Vulnerability to ground failure hazards is a function of location, soil type, geology, type of human activity, use, and frequency of events. Effects of landslides on people and structures can be reduced by total avoidance of hazard areas or by restricting, prohibiting, or imposing conditions on hazard-zone activity. Local governments can reduce effects of landslides through land-use policies and regulations. Individuals can reduce their exposure to hazards by educating themselves on the past hazard history of the site and by making inquiries to planning and engineering departments of local governments (National Atlas 2018).

To estimate Fulton County's vulnerability, a 2010 Steep Slope Landslide GIS layer from the National Land Trust was used to coarsely define the general landslide susceptible area. For the purposes of this assessment, steep slope areas with a slope angle greater than 25 percent are considered the hazard zone. The future occurrence of landslides can be considered unlikely as defined by the Risk Factor Methodology probability criteria.

Pandemic and Infectious Diseases

A qualitative analysis was conducted for the pandemic and infectious diseases hazard based on best-available data and professional judgment.

Radon Exposure

A qualitative analysis was conducted for the radon hazard based on best-available data and professional judgment.

Subsidence/Sinkholes

There is no standard loss estimation model available for the carbonate rock/mine subsidence hazard. To determine the assets that are exposed to the carbonate rock hazard, available and appropriate spatial data delineating the extent of Pennsylvanian rock and anthracite fields (Pennsylvania Bureau of Topographic and Geologic Survey 2015) were overlaid upon the asset data (population, buildings, critical facilities). To determine the assets that are exposed to the mine subsidence hazard, Abandoned Mined Land Inventory areas & Abandoned Mine Reclamation of the various coal seam areas (Pennsylvania Department of Environmental Protection 2024) were overlaid upon the asset data (population, buildings, critical facilities).

The assets with centers located in the hazard area are reported as exposed and potentially vulnerable to mine subsidence events. For the purposes of this planning effort, the area underlain by carbonate (limestone) bedrock is considered exposed to this hazard. Fulton County has a very low susceptibility to sinkholes and subsidence attributable to abandoned mines; however, this does not mean such an event cannot occur. The limitations of this analysis are recognized and are only used to provide a general estimate of exposure

Tornado/Windstorm

A Hazus probabilistic analysis was performed to analyze the wind hazard losses for Fulton County for the 500-year MRP event. The probabilistic Hazus hurricane model activates a database of thousands of potential storms that have tracks and intensities reflecting the full spectrum of Atlantic hurricanes observed since 1886 and identifies those with tracks associated with Fulton County. Hazus contains data on historic hurricane events and wind speeds. It also includes surface roughness and vegetation (tree coverage) maps for the area. Surface roughness and vegetation data support the modeling of wind force across various types of land surfaces. Default demographic and updated building and critical facility inventories in Hazus were used for the analysis. Although damages are estimated at the census tract level, results were presented at the municipal level. Because there are multiple census tracts that contain more than one jurisdiction, a density analysis was used to extract the percentage of building structures that fall within each tract and jurisdiction. The percentage was multiplied against the results calculated for each tract and summed for each jurisdiction.

Transportation Accident

A qualitative analysis was conducted for the transportation accident hazard based on best-available data and professional judgment.

Utility Failure

A qualitative analysis was conducted for the utility interruption hazard based on best-available data and professional judgment.

Wildfire

The Wildland-Urban Interface (WUI) obtained through the SILVIS Laboratory, Department of Forest Ecology and Management, University of Wisconsin—Madison, based on the 2020 Census and 2021 National Land Cover Dataset and the Protected Areas Database, was used to delineate the wildfire hazard areas. The WUI area is divided into two categories: intermix and interface. The California Fire Alliance determined that 1.5 miles is the approximate maximum distance that firebrands can be carried from a wildland fire to the roof of a house. Therefore, even structures not within the forest are at risk from wildfire. This buffer distance, along with housing density and vegetation type, were used to define the WUI.

For this risk assessment, the high-, medium-, and low-density interface areas were combined and used as the Interface hazard area, and the high-, medium-, and low-density intermix areas were combined and used as the Intermix hazard areas.

Asset data (population, building stock, critical facilities) were used to support an evaluation of asset exposed and potential impacts and losses associated with this hazard. To determine what assets are exposed to wildfire, available and appropriate GIS data were overlaid with the hazard area. Assets with their centroid located in the hazard area were totaled to estimate the number of assets and their replacement cost value exposed to a wildfire event.

Winter Storm

The entire general building stock inventory in Fulton County is exposed and vulnerable to the severe winter storm hazard. In general, structural impacts include damage to roofs and building frames, rather than building content. Current modeling tools are not available to estimate specific losses for the severe winter storm hazard.

Historic data on structural losses to general building stock are not adequate to predict specific losses to this inventory; therefore, a percentage of the custom-building stock structural replacement cost value was used to estimate damages that could result from winter storm conditions. This methodology is based on FEMA's How-to Series (FEMA 386-2), Understanding Your Risks, Identifying and Estimating Losses (FEMA 2001) and FEMA's Using HAZUS-MH for Risk Assessment (FEMA 433) (FEMA 2004).

Given professional knowledge and the currently available information, the potential losses for this hazard are considered to be overestimated; hence, providing a conservative estimate for losses associated with winter storm events.

Qualitative Analyses

For many of the hazards evaluated in this risk assessment, historical data are not adequate to model future losses at this time. Where GIS data are not available, Fulton County conducted a qualitative analysis for the following hazards using the best available data and professional judgment. Multiple federal, state, and academic sources were used to evaluate these hazards:

- Dam Failure
- Drought
- Hailstorm
- Pandemic and Infectious Diseases
- Radon
- Transportation Accidents
- Utility Interruption
- Winter Storm

Data Source Summary

Table 4.4-3 summarizes the sources of data used in the risk assessment.

Table 4.4-3. Data Source Summary

Data	Source	Date	Format
Population data	U.S. Census Bureau, American Community Survey 5-Year Estimates	2018-2022	CSV converted to Digital (GIS) format
Building Inventory	Fulton County; RS Means 2024	2024	Digital (GIS) Format
Critical Facilities	Fulton County	2024	Digital (GIS) Format
Land Use	National Land Use Cover Database	2021	Digital (GIS) Format
Digitized Preliminary FIRM maps	FEMA	2011	Digital (GIS) Format
FEMA Risk Map Depth Grid	FEMA	2011	TIFF
Environmental Hazard Roadways & SARA Vulnerability Areas	Fulton County	2024	Digital (GIS) Format
Wildland–Urban Interface (WUI) Wildfire Interface/Intermix	SILVIS Laboratory, Department of Forest Ecology and Management, University of Wisconsin–Madison	2022	Digital (GIS) Format
Landslide (Slopes >25%)	Natural Lands Trust	2010	Digital (GIS) Format
Subsidence - Carbonate Rock	Pennsylvania Bureau of Topographic and Geologic Survey	2015	Digital (GIS) Format
Subsidence - Abandoned Mined Areas & Mined Areas	Pennsylvania Department of Environmental Protection	2024	Digital (GIS) Format

Notes:
FEMA – Federal Emergency Management Agency
SILVIS – Spatial Analysis For Conservation and Sustainability

4.4.1.3 Limitations

Loss estimates, exposure assessments, and hazard-specific vulnerability evaluations rely on the best-available data and methodologies. Uncertainties are inherent in any loss estimation methodology and arise in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from the following:

1) Approximations and simplifications necessary to conduct such a study.

2) Incomplete or dated inventory, demographic, or economic parameter data.
3) The unique nature, geographic extent, and severity of each hazard.
4) Mitigation measures already employed by the participating municipalities.
5) The amount of advance notice residents have to prepare for a specific hazard event.

These factors can result in a range of uncertainty in loss estimates, possibly by a factor of two or more. Therefore, potential exposure and loss estimates are approximate. These results do not predict precise results and should be used to understand relative risk. Over the long term, Fulton County will collect additional data and update and refine existing inventories to assist in estimating potential losses.

Potential economic loss is based on the present value of the general building stock using best-available data. The county acknowledges significant impacts may occur to critical facilities and infrastructure as a result of these hazard events causing great economic loss. However, monetized damage estimates to critical facilities and infrastructure, and economic impacts were not quantified and require more detailed loss analyses. In addition, economic impacts to industry such as tourism and the real-estate market were not analyzed.

4.4.2 Ranking Results

As discussed in Section 4.2 (Hazard Identification), a comprehensive range of natural and non-natural hazards that pose significant risk to Fulton County was selected and considered in this plan. However, the communities in Fulton County have differing levels of exposure and vulnerability to each of these hazards. It is important for each community participating in this plan to recognize those hazards that pose the greatest risk to their community and direct their attention and resources accordingly to most effectively and efficiently manage risk.

To this end, a relative hazard risk ranking process was conducted for the County using the Risk Factor (RF) methodology identified in Section 4.3 and Appendix 8 of Pennsylvania Emergency Management Agency's (PEMA) All-Hazard Planning Standard Operating Guide (PEMA 2025. The guidance states:

> The RF approach produces numerical values that allow identified hazards to be ranked against one another (the higher the RF value, the greater the hazard risk). RF values are obtained by assigning varying degrees of risk to five categories for each hazard: *probability, impact, spatial extent, warning time,* and *duration*.
>
> To calculate the RF value for a given hazard, the assigned risk value for each category is multiplied by the weighting factor. The sum of all five categories equals the final RF value, as demonstrated in the example equation below:

Risk Factor Methodology Equation

RF Value = [(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x .10)]

> Hazards identified as high-risk have RFs greater than or equal to 2.5. RFs ranging from 2.0 to 2.4 are considered moderate-risk hazards. Hazards with RFs less than 2.0 are considered low-risk.

Table 4.4-4 identifies the five risk assessment categories, the criteria and associated risk level indices used to quantify their risk, and the suggested weighting factor (weight value) applied to each risk assessment category. Table 4.4-5 shows the five risk assessment categories' values for each of Fulton County's hazards and each hazard's RF.

Table 4.4-4. Summary of Risk Factor (RF) Approach

Summary of Risk Factor (RF) Methodology				
Risk Assessment Category	Degree of Risk			Weight Value
	Level	Criteria	Index	
PROBABILITY *What is the likelihood of a hazard event occurring in a given year?*	UNLIKELY	LESS THAN 1% ANNUAL PROBABILITY	1	30%
	POSSIBLE	BETWEEN 1% & 49.9% ANNUAL PROBABILITY	2	
	LIKELY	BETWEEN 50% & 90% ANNUAL PROBABILITY	3	
	HIGHLY LIKELY	GREATER THAN 90% ANNUAL PROBABILTY	4	
IMPACT *In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?*	MINOR	VERY FEW INJURIES, IF ANY. ONLY MINOR PROPERTY DAMAGE & MINIMAL DISRUPTION ON QUALITY OF LIFE. TEMPORARY SHUTDOWN OF CRITICAL FACILITIES.	1	30%
	LIMITED	MINOR INJURIES ONLY. MORE THAN 10% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE DAY.	2	
	CRITICAL	MULTIPLE DEATHS/INJURIES POSSIBLE. MORE THAN 25% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE WEEK.	3	
	CATASTROPHIC	HIGH NUMBER OF DEATHS/INJURIES POSSIBLE. MORE THAN 50% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR 30 DAYS OR MORE.	4	
SPATIAL EXTENT *How large of an area could be impacted by a hazard event? Are impacts localized or regional?*	NEGLIGIBLE	LESS THAN 1% OF AREA AFFECTED	1	20%
	SMALL	BETWEEN 1 & 10.9% OF AREA AFFECTED	2	
	MODERATE	BETWEEN 11 & 25% OF AREA AFFECTED	3	
	LARGE	GREATER THAN 25% OF AREA AFFECTED	4	
WARNING TIME *Is there usually some lead time associated with the hazard event? Have warning measures been implemented?*	MORE THAN 24 HRS	SELF-DEFINED	1	10%
	12 TO 24 HRS	SELF-DEFINED	2	
	6 TO 12 HRS	SELF-DEFINED	3	
	LESS THAN 6 HRS	SELF-DEFINED	4	
DURATION *How long does the hazard event usually last?*	LESS THAN 6 HRS	SELF-DEFINED	1	10%
	LESS THAN 24 HRS	SELF-DEFINED	2	
	LESS THAN 1 WEEK	SELF-DEFINED	3	
	MORE THAN 1 WEEK	SELF-DEFINED	4	

(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)

Source: PEMA 2025

Table 4.4-5. Risk Ranking for Fulton County

HAZARD RISK	HAZARDS	RISK ASSESSMENT CATEGORY					RISK FACTOR (RF)
		PROBABILITY	FACTOR	SPATIAL EXTENT	WARNING TIME	DURATION	
HIGH	Flood, Flash Flood, and Ice Jam	3	4	4	3	4	3.6
	Winter Storm	4	3	4	1	4	3.4
	Transportation Accidents	4	2	2	4	2	2.8
	Wildfire	3	3	2	4	2	2.8
	Utility Interruption	2	3	3	4	2	2.7
	Environmental Hazards (Hazmat Release)	3	2	2	4	3	2.6
	Drought	3	1	4	1	4	2.5
MODERATE	Pandemic and Infectious Diseases	2	2	3	1	4	2.3
	Dam Failure	1	3	2	4	3	2.3
	Earthquake	2	1	4	4	1	2.2
	Tornado Wind	4	1	1	4	1	2.2
	Environmental Hazards (Gas and Liquid Pipelines)	2	2	2	4	2	2.2
	Subsidence/Sinkhole	3	1	1	4	4	2.2
	Radon Exposure	4	1	1	3	1	2.1
LOW	Hailstorm	2	1	2	3	1	1.7
	Landslide	1	1	1	4	4	1.6

Note: Prob. = Probability

Based on these results, there are six high-risk hazards, nine moderate-risk hazards, and eight low-risk hazards in Fulton County. Mitigation actions were developed for all hazards (see Section 6.4). The threat posed to life and property for moderate-risk and high-risk hazards is considered significant enough to warrant the need for establishing hazard-specific mitigation actions.

A risk assessment result for the entire county does not mean that each municipality is at the same amount of risk to each hazard. Table 4.4-6 shows the different municipalities in Fulton County and indicates whether each municipality considers their risk is greater than (>), less than (<), or equal to (=) the RF assigned to the county as a whole.

Table 4.4-6. Jurisdictional Risk by Municipality

Municipality	Dam Failures	Drought	Earthquake	Environmental Hazards (Gas and Liquid Pipelines)	Environmental Hazards (Hazmat Release)	Flooding/Flash Flood/Ice Jam	Hailstorm	Landslide	Pandemic and Infectious Diseases	Radon Exposure	Subsidence/Sinkholes	Tornado/Windstorm	Transportation Accidents	Utility Interruption	Wildfire	Winter storm
	2.3	**2.5**	**2.2**	**2.2**	**2.6**	**3.6**	**1.7**	**1.6**	**2.3**	**2.1**	**2.2**	**2.2**	**2.8**	**2.7**	**2.8**	**3.4**
Ayr Township	>	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Belfast Township	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Bethel Township	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Brush Creek Township	<	>	=	=	>	=	=	=	=	=	=	=	>	=	=	=
Dublin Township	>	=	=	=	=	=	=	=	=	=	=	=	>	=	=	=
Licking Creek Township	=	=	=	=	=	<	=	<	=	=	=	=	=	=	=	=
McConnellsburg Borough	<	<	=	=	=	<	=	<	=	=	=	=	=	=	<	=
Taylor Township	<	=	=	=	>	=	=	<	=	=	>	=	<	=	>	=
Thompson Township	<	=	=	=	=	<	=	<	=	=	=	=	=	=	=	=
Todd Township	>	=	=	=	>	=	=	=	=	=	=	=	>	=	>	=
Union Township	<	=	=	=	>	=	=	>	=	=	=	=	>	=	>	=

Municipality	Dam Failures	Drought	Earthquake	Environmental Hazards (Gas and Liquid Pipelines)	Environmental Hazards (Hazmat Release)	Flooding/Flash Flood/Ice Jam	Hailstorm	Landslide	Pandemic and Infectious Diseases	Radon Exposure	Subsidence/Sinkholes	Tornado/Windstorm	Transportation Accidents	Utility Interruption	Wildfire	Winter storm
	2.3	**2.5**	**2.2**	**2.2**	**2.6**	**3.6**	**1.7**	**1.6**	**2.3**	**2.1**	**2.2**	**2.2**	**2.8**	**2.7**	**2.8**	**3.4**
Valley-Hi Borough	>	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Wells Township	=	=	=	=	=	<	=	=	=	=	=	=	>	=	>	=

Notes:
“>” indicates that the risk is greater than the RF assigned to the county
“<” indicates that the risk is lower than the RF assigned to the county
“=” indicates that the risk is equal to the RF assigned to the county

4.4.3 Potential Loss Estimates

Potential loss estimates for hazard events help a community understand the monetary value of what might be at stake during a hazard event. Estimates are considered *potential* in that they generally represent losses that could occur in a countywide hazard scenario. Localized events could yield lower losses, while regional events could yield higher losses.

The data utilized to conduct the vulnerability assessment came from a variety of sources, as noted throughout each hazard profile and Appendix A. As summarized in the Methodology subsection, the 2022 U.S. Census demographic data, Hazus v6.1 default building inventory and its associated replacement cost value of the structures and contents, and the comprehensive critical facility inventory update in HAZUS v5.1 were used for Fulton County.

Potential loss estimates provided in Section 4.3 (Hazard Profiles) were either based on historical losses, current-condition losses, and/or predictive losses by performing spatial analyses in GIS and hazard probabilistic modeling. In summary, HAZUS v6.1 was used to estimate potential losses for the flood, hurricane/tropical storm, and tornado/windstorm hazards. For many of the hazards evaluated, historical data are not adequate to model future losses at this time. For these hazards of concern, areas and inventory susceptible to specific hazards were mapped, and exposure was evaluated to help guide mitigation efforts (mitigation efforts are discussed further in Section 6). Spatial analyses were conducted to assess potential exposure for hazards of concern with delineated hazard areas: dam failure; environmental hazard hazardous materials release; flood, flash flood, and ice jam; landslide; subsidence and sinkhole; and wildfire. Where GIS data are not available for some hazards, a qualitative analysis was conducted using the best available data and professional judgment.

4.4.4 Future Development and Vulnerability

Risk and vulnerability to natural and human-caused hazard events are not static. Risk will increase or decrease as counties and municipalities see changes in land use and development, as well as changes in population. Population change (in terms of total and demographics) and the age of the housing stock continue to be the main indicators of vulnerability change in Fulton County.

Fulton County experienced a 4.10-percent increase in population from 2000 to 2020, as summarized in Section 2 of this HMP. However, according to the U.S. Census for Population Projections, the population in Fulton County is projected to have a slight decrease over the coming decades. The range of projected change in population varies from a 26.67 percent population decrease in Valley-Hi Borough to a 32.36 increase in population in Brush Creek Township (U.S. Census 2024).

Continued analysis of the age structure in Fulton County will provide deeper understanding of future vulnerability to at-risk populations. Approximately 21.8 percent of Fulton County's population is age 65 or older (ACS 2022). As these residents continue to age in the county, they might have increased access and functional needs. For example, many residents in this age bracket might be unable to drive; therefore, development of special evacuation plans for them will be necessary. They might also have hearing or vision impairments that could hinder their reception of emergency instructions. Both older and younger populations are at higher risks for contracting certain diseases. Fulton County's combined under-5-years-of-age and over-65 populations constitute approximately 26.6 percent of its population (ACS 2022).

Approximately 0.2 percent of Fulton County's population lives in group quarters, which are communal settings that can include inmates in a prison, students in a dorm, or elderly or mentally disabled in group-care homes. Many residents living in group quarters have special needs. It is important to ensure that each group-quarter facility has an emergency plan to account for the unique needs of its residents during a hazard event.

Less than 1 percent of Fulton County's population is not proficient in English. Future hazard mitigation strategies should consider addressing language barriers to ensure that all residents can receive emergency instructions.

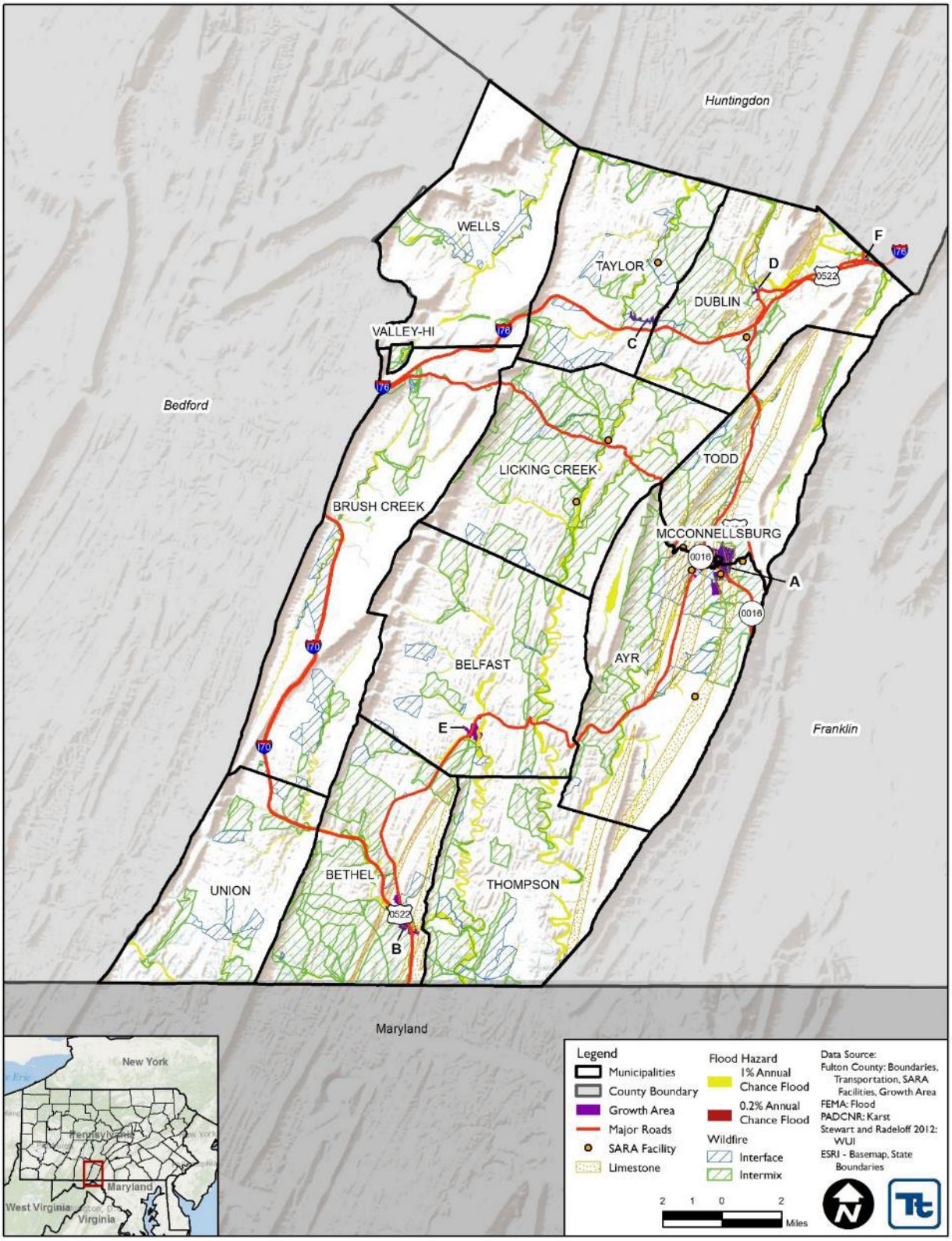
In addition, remote and sparsely-populated municipalities face higher vulnerability to hazards because they do not have as easy access to care facilities or response personnel. For instance, sparsely-populated municipalities such as Wells Township face increased vulnerability to tornadoes, windstorms, and winter storms due to isolation, access issues, and longer emergency response times.

The aging housing stock in Fulton County is another source of current and future vulnerability in many hazard events. According to the Alleghenies Ahead Joint Comprehensive Plan (Alleghenies 2018), 7,112 structures in Fulton County were built earlier than 1939 (19.8 percent of the building stock). As discussed throughout Section 4, Risk Assessment, Fulton County can experience strong gusts of wind during windstorms, tornadoes, hurricanes, tropical storms, or Nor'easters. The structure of these older houses can cause them to be at greater risk of destruction under these strong wind conditions. These structures might also be at risk during flooding and winter storm events if the materials are either not strong enough to withstand the pressure or weight of the precipitation or are liable to leak, causing further risk of destruction to the house.

While any development increases the risk of damage and loss to natural hazards, a number of factors indicate that this increase in risk is low and mitigated by existing federal, state, county, and local regulations, policies, and programs. A total of 11 municipalities in Fulton County have adopted subdivision regulations, and two municipalities have adopted local zoning regulations. The Fulton County Planning and Mapping Department reviews and reports on subdivisions, land developments, comprehensive plans, and municipal land use ordinance amendments. This broad range of planning review services is separated into two areas of activity: subdivision and land development reviews, and community planning reviews. Most types of reviews are presented to the commission for its consideration at a public meeting prior to them being forwarded on to the respective municipalities and/or applicants.

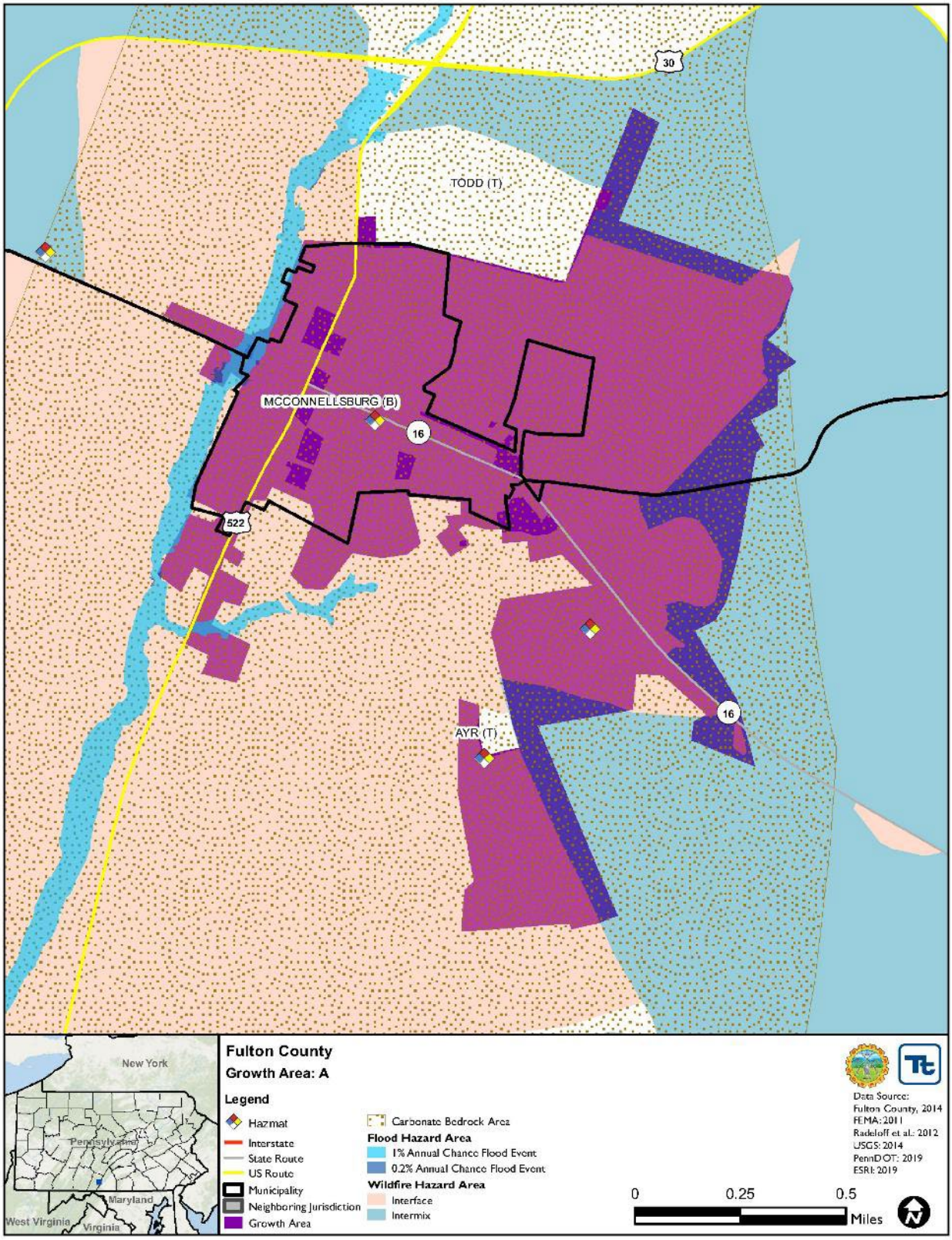
Fulton County and its municipalities identified areas of potential new urban growth. According the Alleghenies Ahead Joint Comprehensive Plan (Alleghenies 2018), Fulton County is in the process of working with landowners to leverage the Interstate 70 corridor and attract new business and development in Warfordsburg. Fulton County has also already initiated leveraging state grants for improvements and revitalization to downtown McConnellsburg. As urban growth is planned, it should be compared with identified hazard areas to determine hazard vulnerability. In Fulton County's 2015 HMP, six geographic hazards and growth areas were identified as A-F and are mapped below. All the growth areas, except Growth Area E, are in the interface and intermix wildfire hazard area. Growth Area A is the only area located within both the 0.25-mile buffer of a major road and 0.10-mile buffer of a SARA Title III Facility. Growth Areas A, B, and F are located above limestone formations in the subsidence and sinkhole hazard area. Figure 4.4-1 through Figure 4.4-7 show the Fulton County growth areas.

Figure 4.4-1. Fulton County Growth Areas and Hazards



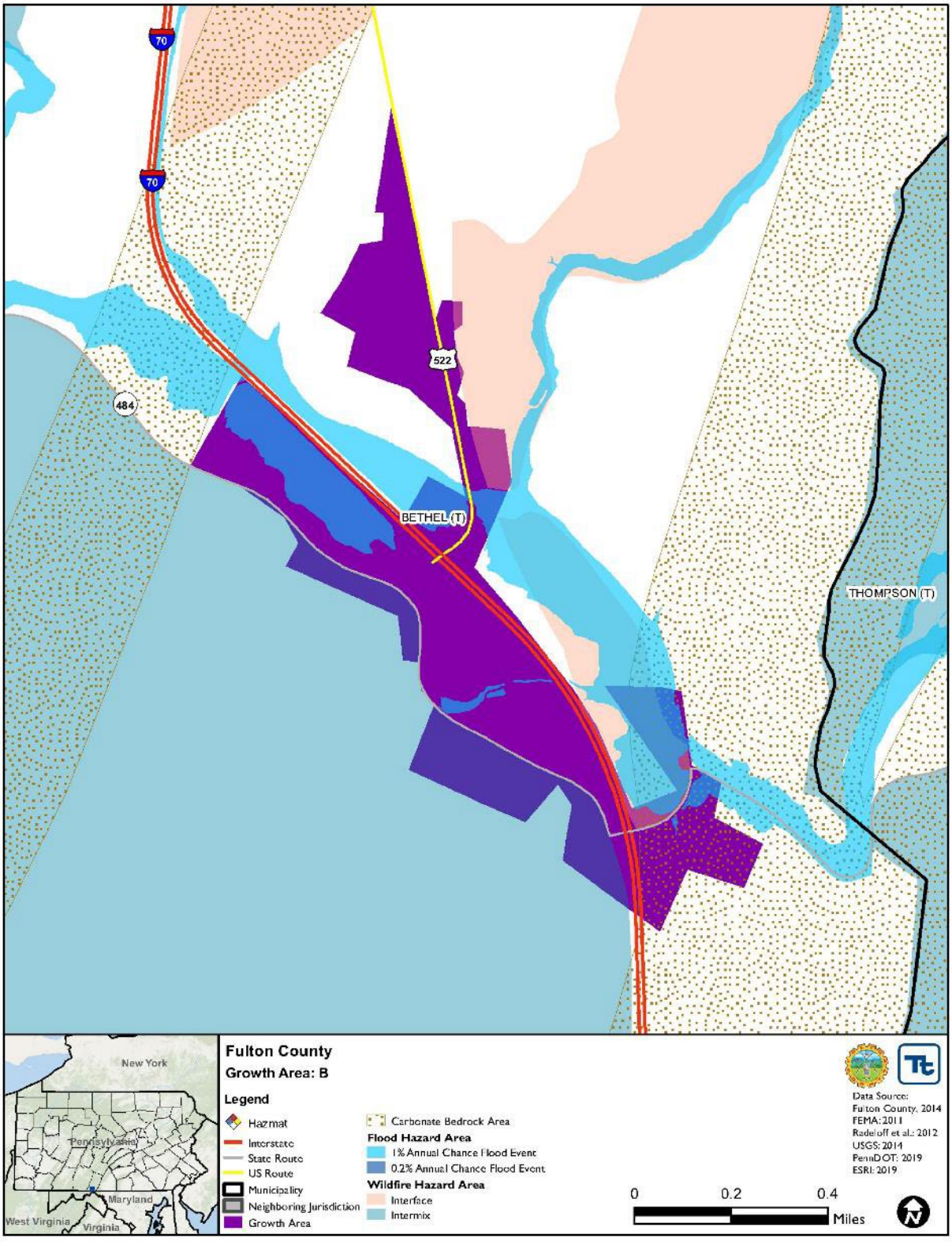
Source: Fulton County Planning Commission 2019

Figure 4.4-2. Fulton County Growth Area A and Hazards



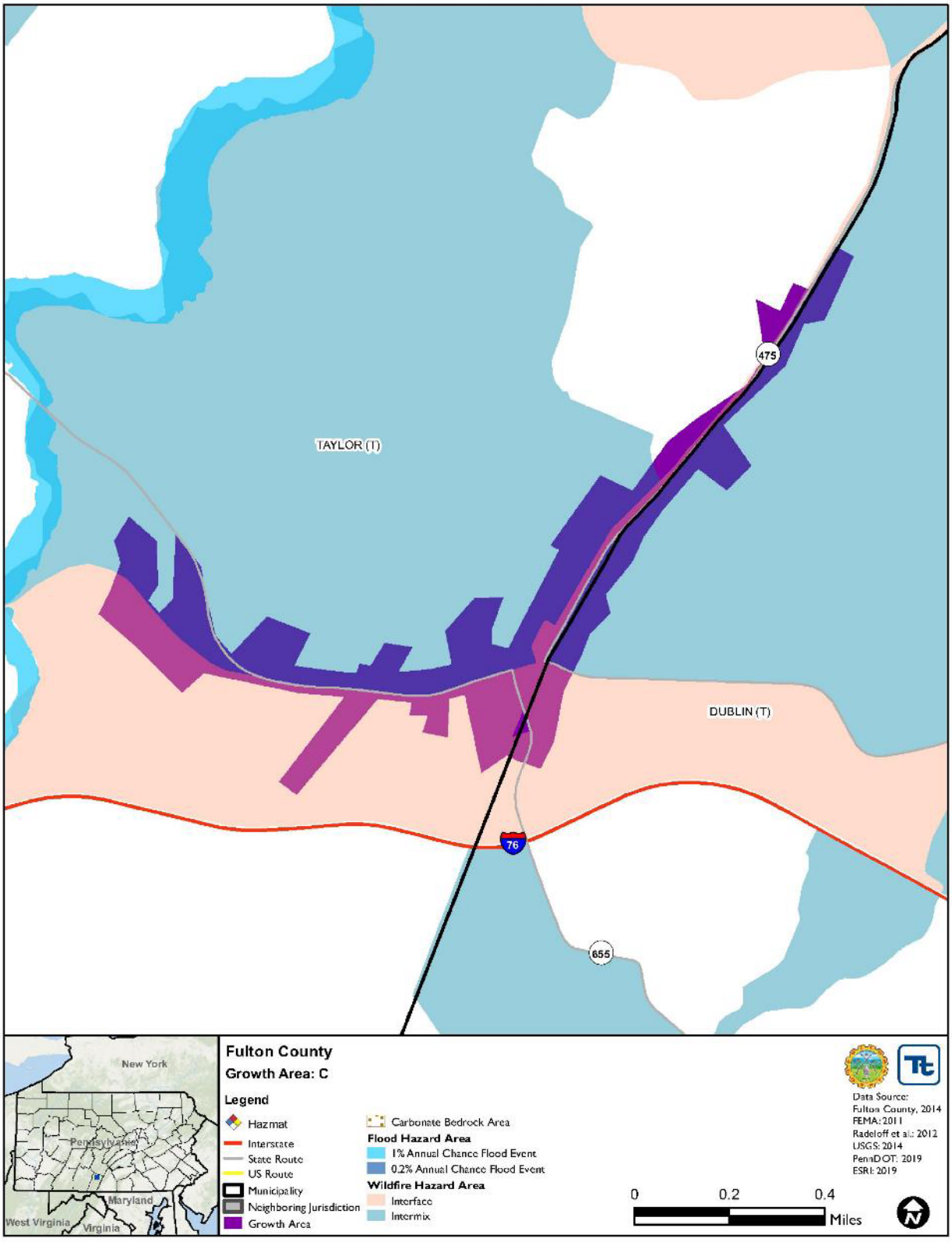
Source: Fulton County Planning Commission 2019

Figure 4.4-3. Fulton County Growth Area B and Hazards



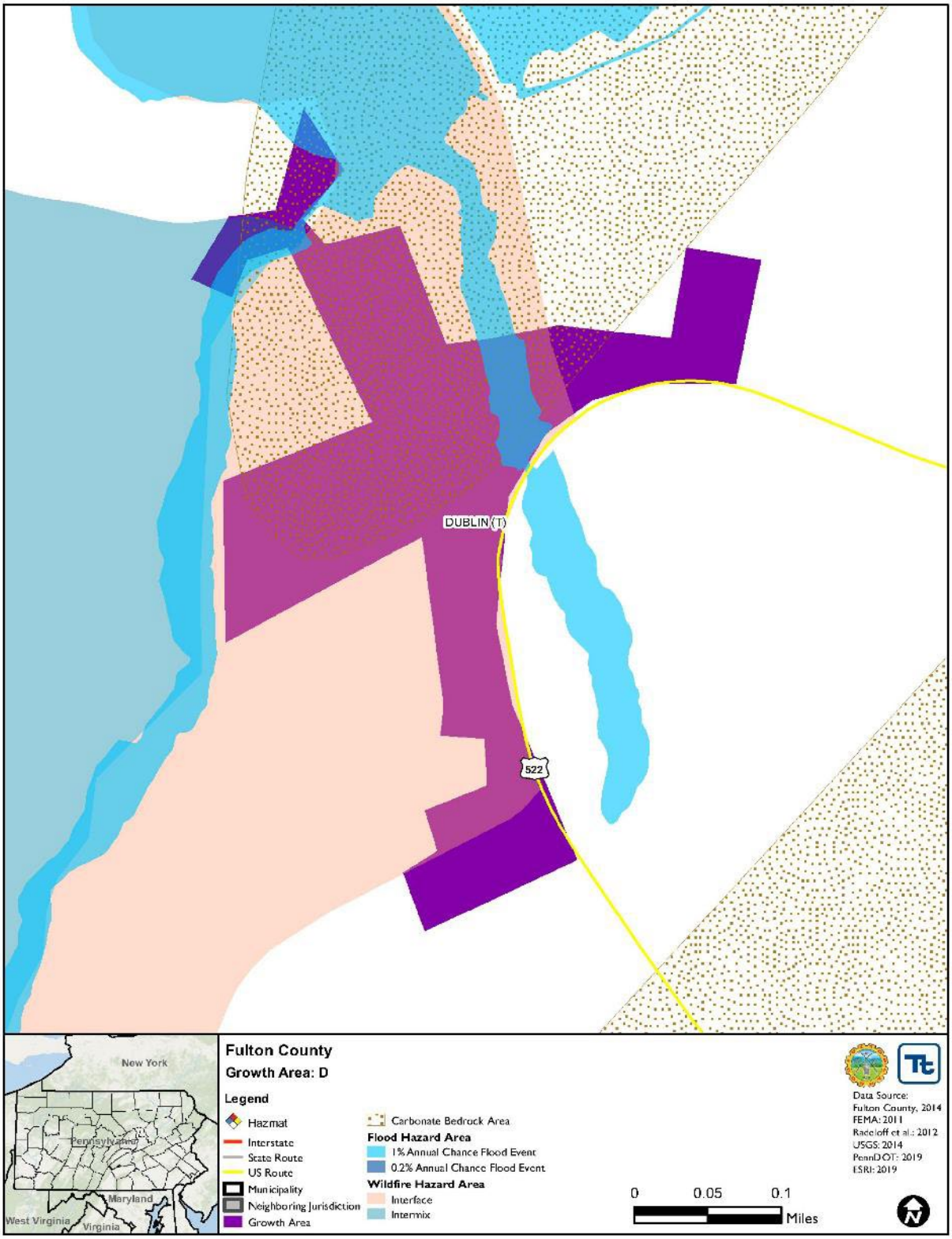
Source: Fulton County Planning Commission 2019

Figure 4.4-4. Fulton County Growth Area C and Hazards



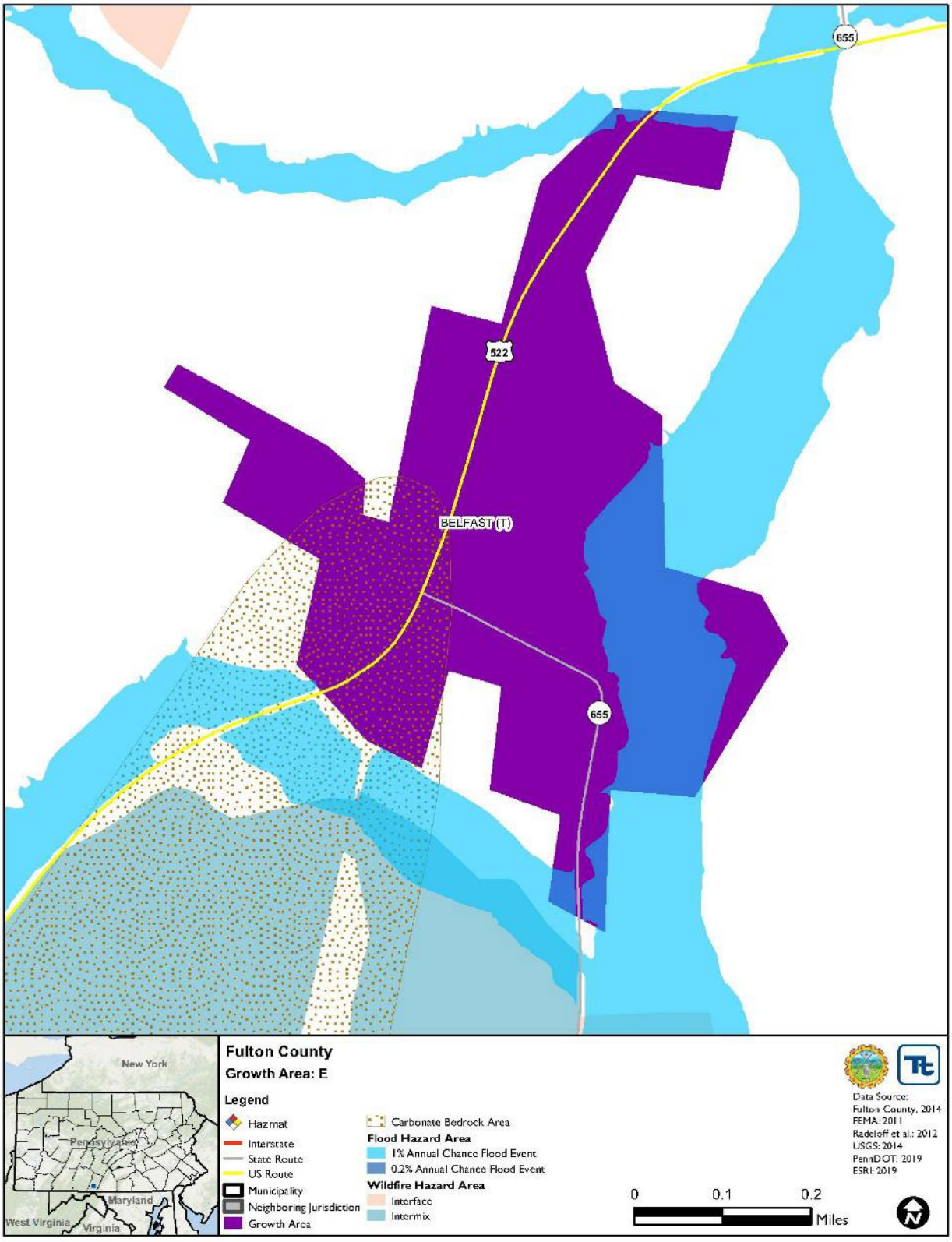
Source: Fulton County Planning Commission 2019

Figure 4.4-5. Fulton County Growth Area D and Hazards



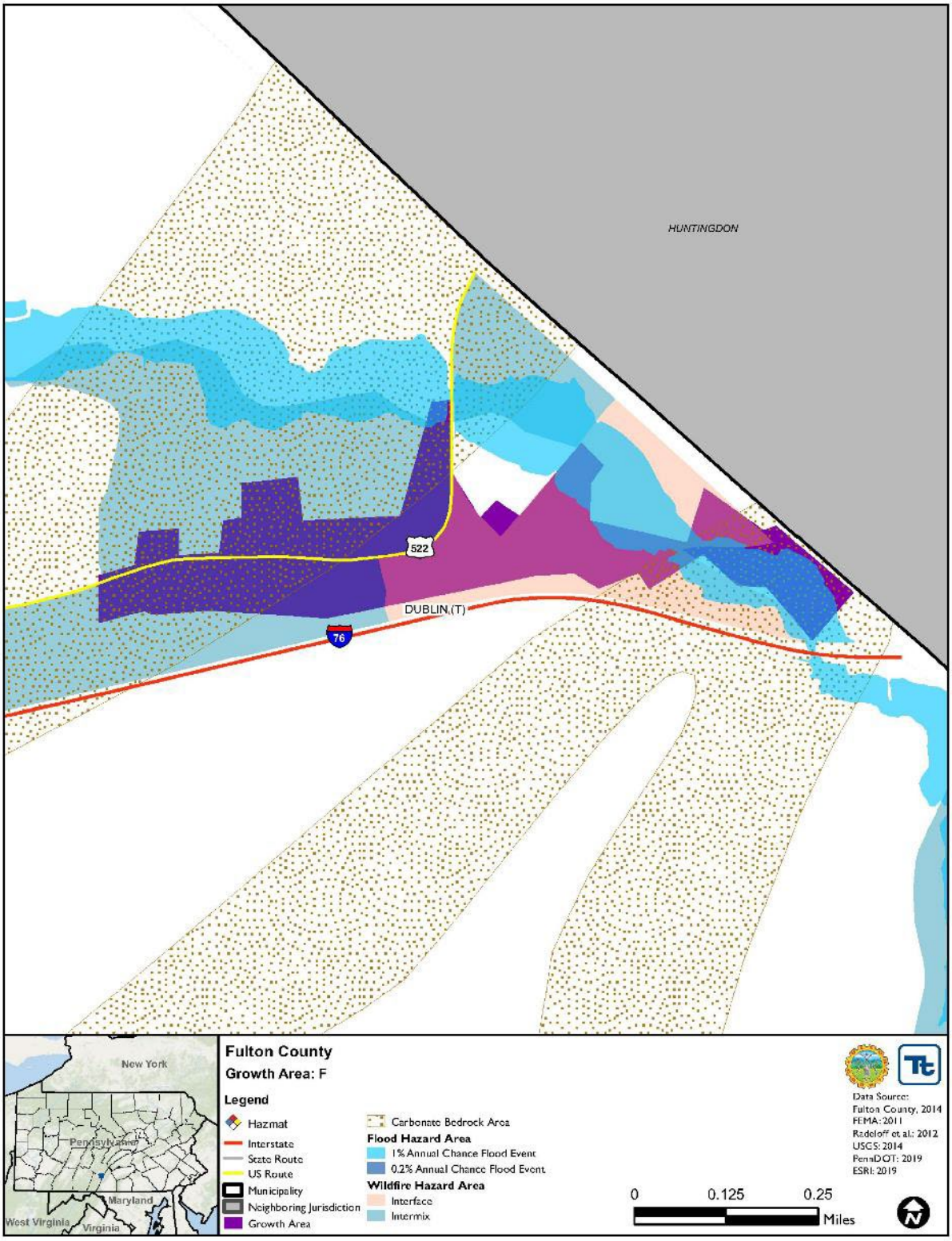
Source: Fulton County Planning Commission 2019

Figure 4.4-6. Fulton County Growth Area E and Hazards



Source: Fulton County Planning Commission 2019

Figure 4.4-7. Fulton County Growth Area F and Hazards



Source: Fulton County Planning Commission 2019

SECTION 5 CAPABILITY ASSESSMENT

The capability assessment evaluates the community's capabilities and resources already in place at the municipal, county, state, and federal levels to reduce hazard risks. The assessment also identifies where improvements can be made to increase disaster resistance in the community through future mitigation actions.

The first step in organizing hazard mitigation capabilities or resources is to describe the basic approaches available to reduce hazard risks. According to the 2020 Pennsylvania Emergency Management Agency (PEMA) All-Hazard Mitigation Planning Standard Operating Guide (SOG), the following four general mitigation actions may reduce hazard risks: (1) local plans and regulations, (2) structure and infrastructure, (3) natural systems protection, and (4) education and awareness. A brief description of each (according to the PEMA All-Hazard Mitigation Planning SOG) is provided below:

- **Local Plans and Regulations** – These actions include government authorities, policies, or codes that influence the ways land and buildings are developed and built.
- **Structure and Infrastructure** – These actions involve modifying existing structures and infrastructure or constructing new structures to reduce hazard vulnerability.
- **Natural Systems Protection** – These actions minimize damage and losses and preserve or restore the functions of natural systems.
- **Education and Awareness** – These actions inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate these hazards, including participation in national programs.

Capability assessments document the existing resources available to local communities to reduce hazard risks. Resources can be divided into five categories: human, physical, technical, informational, and financial. For each basic capability or approach, one or more of the five resources may be available. A brief description of each resource (PEMA 2020) is provided below:

- **Human resources** include local police, fire, ambulance, and emergency management and response personnel; local government services; and electric, gas, and other utility providers that are critical during disasters.
- **Physical resources** include the equipment and vehicles (such as emergency response and recovery equipment and vehicles), public lands, facilities, and buildings available to the community.
- **Technical/technological resources** include early warning systems, weather alert radios, stream-level monitoring gauges, and 9-1-1 communications systems. They also include technical requirements established by law, regulation, or ordinance.
- **Informational resources** include materials about disasters and hazard mitigation and planning; these resources are available from a wide variety of sources, such as applicable websites, libraries, and state and federal agencies.
- **Financial resources** identify the sources of funding available for hazard mitigation. Most state and federal grant programs require local communities to provide at least part of the necessary project funding in real dollars or through in-kind services. Local communities need to assess their financial capability and resources to implement hazard mitigation action plans.

This section describes and summarizes the federal, state, county, and local capabilities to address hazard risks in Fulton County.

5.1 UPDATE PROCESS SUMMARY

During the plan update process, Fulton County and all participating municipalities were asked to provide an updated assessment of their mitigation planning capabilities. Each municipality was provided with a Capability Assessment Survey based on Appendix 3 of the October 2020 edition of the PEMA All-Hazard Mitigation Planning SOG (PEMA 2020). The survey was provided to each of the municipal planning points of contact at the Planning Team kickoff meeting. Appendix D provides completed Capability Assessment Surveys, whether completed by hand, electronically, or filled in working alongside the Fulton County Emergency Services staff or planning consultant.

Fulton County has several resources available to implement hazard mitigation initiatives, including emergency response measures; local planning and regulatory tools; administrative assistance and technical expertise; fiscal capabilities; and participation in local, regional, state, and federal programs. These resources enable community resiliency through actions taken before, during, and after a hazard event. Emergency services, manpower, equipment, and fiscal resources are important tools in addressing hazard potential and mitigation in Fulton County communities.

This section describes and summarizes the federal, state, county, and local capabilities to address hazard risk in Fulton County.

5.2 CAPABILITY ASSESSMENT FINDINGS

A jurisdiction's ability to effectively manage natural hazard risk is directly related to its level of hazard mitigation capabilities. As such, mitigation strategies developed in coordination with Fulton County's municipalities have a direct effect on establishing new capability functions in the community or strengthening existing capabilities.

Fulton County and most of its municipalities updated and completed the Capability Assessment Survey (Appendix D: Municipal Participation Documentation). If municipalities did not update or only partially updated their capabilities information, the information provided for the 2020 Hazard Mitigation Plan (HMP) was carried forward into this plan update.

All municipalities in Fulton County, except for Borough of Valley-Hi, participate in the National Flood Insurance Program (NFIP); however, only one municipality, Union Township, participates in the Community Rating System (CRS). Participating in CRS can reduce insurance premiums for properties located outside of Special Flood Hazard Areas of up to 10 percent. Properties located in Special Flood Hazard Areas can reduce premiums up to 45 percent by participating in the CRS program. These discounts can be obtained by undertaking public information, mapping and regulations, flood damage reduction and flood preparedness activities (FEMA 2025).

Finally, limited funding is a critical barrier to the implementation of hazard mitigation activities in Fulton County. The county will need to rely on regional, state, and federal partnerships for financial assistance. Fulton County will continue to alert municipalities when FEMA grant funding is available to apply for to implement eligible projects in this HMP update.

The following sections further detail the capability assessment findings.

5.2.1 Planning and Regulatory Capability

While municipalities in Pennsylvania must comply with the minimum regulatory requirements established under the Pennsylvania Municipal Planning Code, they otherwise have considerable latitude in adopting ordinances, policies, and programs that can be used to manage natural and non-natural hazard risks. Specifically, municipalities can manage these risks through comprehensive land use planning, hazard-specific ordinances (for example, flood damage prevention, sinkholes, and steep slopes), zoning, site-plan approval, and building code enforcement. When effectively prepared and administered, these regulations can lead to hazard mitigation. Guiding documents, known as the "Planning Series" can assist municipalities develop regulations and best management practices. T These *Series* can be found in the Pennsylvania Department of Community and

Economic Development Library, https://dced.pa.gov/library/, under Local Government – Handbooks and Guides – Community Planning.

For example, the adoption of the NFIP and the Pennsylvania Flood Plain Management Act (Act 166 of 1978) established minimum floodplain management criteria. A municipality must adopt and enforce these minimum criteria to be eligible for participation in the NFIP. Municipalities have the option of adopting a single-purpose ordinance or incorporating these provisions into their zoning and/or subdivision and land development ordinances or building codes, thereby mitigating the potential impacts of local flooding.

Federal Planning Capabilities

Several national programs incentivize or support mitigation activities, including the NFIP and Community Rating System (CRS). These programs are a key component of hazard mitigation capabilities. The following summarizes the planning and regulatory capabilities available to Fulton County at the state level.

Biggert-Waters National Flood Insurance Reform Act of 2012

Under the Biggert-Waters National Flood Insurance Reform Act of 2012, long-term changes to the NFIP have been adopted that have increased rates overall to reflect the flood risk more accurately for buildings in flood hazard areas. This has significantly influenced construction and reconstruction within flood hazard areas.

Property owners are encouraged to consider long-term insurance costs when undertaking reconstruction or elevation of damaged buildings. An investment to reconstruct the lowest floor of a building an additional foot or two higher today may translate into significant future flood insurance savings.

Bunning-Bereuter-Blumenauer Flood Insurance Reform Act of 2004

The Flood Insurance Reform Act of 2004 amended the National Flood Insurance Reform Act of 1968 to reduce losses to properties for which repetitive flood insurance claim payments have been made. This Act established a program for the mitigation of severe repetitive loss (SRL) properties and gave FEMA the authority to fund mitigation activities for individual repetitive loss (RL) claims properties. The Act provides additional coverage for compliance with land-use and control measures.

PEMA is the lead coordinator of the Commonwealth's NFIP efforts. PEMA's Mitigation Insurance and Resilient Communities (MIRC) Office is the agency working with Commonwealth communities with SRL properties. This Statute helps Commonwealth residents with affordable flood insurance and gives additional tools to the states and communities to mitigate SRL properties.

Code of Federal Regulations, Standard State Mitigation Plans (44 CFR PART 201.4)

The Code of Federal Regulations, Standard State Mitigation Plans (44 CFR PART 201.4) provides actions based on risk assessments and capabilities of the State to achieve and fund mitigation activities based on those actions. Both the law and regulations have encouraged the counties to prepare plans. FEMA has prepared policies and procedures for FEMA's review and approval of state and local emergency all-hazard mitigation plans.

Disaster Mitigation Act of 2000

The Disaster Mitigation Act of 2000 (DMA) is the current federal legislation addressing hazard mitigation planning. It encourages states, tribes, and local governments to undertake mitigation planning. DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (the Stafford Act) with mitigation plan requirements that emphasize the need for state, tribal, and local entities to closely coordinate mitigation planning and implementation efforts. It emphasizes planning for disasters before they occur.

DMA 2000 requires plans to be in place before Hazard Mitigation Assistance (HMA) grant funds are available to communities. Applicants with an approved HMP are eligible to apply for federal funds for the mitigation of hazards. The rules provide detailed guidance on what applicants should include in a plan. The PEMA MIRC Office is the lead agency to promote mitigation planning in Pennsylvania.

Disaster Recovery Reform Act

This bill permits the use of technical and financial assistance to implement codes, specifications, and standards that incorporate the latest hazard-resistant designs; establishes a National Public Infrastructure Pre-disaster Mitigation Fund; and authorizes the president's contribution to the cost of hazard mitigation measures to be used to increase resilience in any area affected by a major disaster.

PEMA's MIRC Office is the lead agency that reviews, submits, and administers federal funding through this Act to programs that mitigate hazards in Pennsylvania. These programs help find cost-beneficial projects to help reduce damage from hazards.

Emergency Support Function #14 Long-Term Recovery Planning

Emergency Support Function (ESF) #14 Long-Term Recovery Planning coordinates federal support to state, tribal, regional, and local governments, nongovernmental organizations, and the private sector to enable community recovery from the long-term consequences of disasters. It identifies sources of recovery funding and provides technical assistance (such as impact analyses) for community recovery.

ESF #14 may be activated for incidents that require a coordinated federal response to foster sustainable recovery from significant long-term impacts (e.g., impacts on housing, government operations, agriculture, businesses, employment, community infrastructure, the environment, human health, and social services). Actions coordinated under ESF #14 include pre-incident planning and coordination, measures immediately prior to an incident, post-event planning, and operations.

Homeowner's Flood Insurance Affordability Act

This 2014 law repeals and modifies certain provisions of the Biggert-Waters Flood Insurance Reform Act, which was enacted in 2012, and makes additional program changes to other aspects of the program not covered by that Act. The new law lowers the recent rate increases on some policies, prevents some future rate increases, and implements a surcharge on all policyholders. The Act also repeals certain rate increases that have already gone into effect and provides for refunds to those policyholders. The Act also authorizes additional resources for the National Academy of Sciences (NAS) to complete the affordability study.

FEMA, Congress, the private Write-Your-Own insurance companies, and other stakeholders work together to implement these Congressionally mandated reforms and to work toward shared goals of helping families maintain affordable flood insurance, ensuring the financial stability of the NFIP, and reducing the risks and consequences of flooding nationwide.

National Flood Insurance Program

The U.S. Congress established the NFIP with the passage of the National Flood Insurance Act of 1968, enabling property owners in participating communities to purchase insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. The flood hazard profile provides further information on the NFIP as implemented in Fulton County.

There are three components to the NFIP: flood insurance, floodplain management, and flood hazard mapping. Communities participate in the NFIP by adopting and enforcing floodplain management ordinances to reduce future flood damage. In exchange, the NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in these communities. Community participation in the NFIP is voluntary. Flood insurance is designed to provide an alternative to disaster assistance to reduce the escalating costs of repairing damage to buildings and their contents caused by floods. Flood damage in the U.S. is reduced by nearly $1 billion each year through communities implementing sound floodplain management requirements and property owners purchasing flood insurance.

The state and municipalities within it may adopt higher regulatory standards when implementing the provisions of the NFIP. The following list summarizes elements of these standards that may be altered to strengthen floodplain regulations:

- **Base Flood Elevation (BFE)**: The elevation of surface water due to flooding that has a 1 percent chance of being equaled or exceeded in any given year.
- **Freeboard:** By law, Pennsylvania requires Base Flood Elevation plus 1.5 feet (BFE+1.5) for all construction. When there is a base flood elevation available, the lowest floor, including any basement, must be at or above the base flood elevation. Elevations may be using properly compacted fill, a solid slab foundation, or a "crawl space" foundation, which contains permanent openings to let flood waters in and out. Non-residential structures may be flood-proofed in lieu of elevation. Where a local floodplain administrator has information to estimate a base flood elevation, such as historical flood records or a hydraulic study, that elevation must be used. Communities may go beyond this requirement, providing for additional freeboard (Commonwealth of Pennsylvania 2016).
- **Cumulative Substantial Improvements/Damages:** The NFIP allows improvements valued at up to 50 percent of the building's pre-improvement value to be permitted without meeting the flood protection requirements. Over the years, a community may issue a succession of permits for different repairs or improvements to the same structures. This can greatly increase the overall flood damage potential for structures within a community. The community may wish to deem "substantial improvement" cumulatively so that once a threshold of improvement within a certain length of time is reached, the structure is considered to be substantially improved and must meet flood protection requirements.

Implementation in Pennsylvania

The Pennsylvania Department of Community and Economic Development (PA DCED) is the legislated Commonwealth coordinating agency for the NFIP, and PEMA is the Commonwealth agency that carries out floodplain coordination in practice. These agencies support municipalities by providing suggested text for floodplain management ordinances.

The Pennsylvania Floodplain Management Act (Act 166) mandates municipal participation in and compliance with the NFIP. It also prohibits new or substantially improved structures in the floodway that are used for the production or storage of dangerous materials. Act 166 requires a special permit for the construction or expansion of any manufactured home park, hospital, nursing home, jail, or prison within a special flood hazard area.

As new Digital Flood Insurance Rate Maps (DFIRMs) are published, the Pennsylvania State NFIP Coordinator, who sits in PA DCED, works with communities to ensure the timely and successful adoption

of an updated floodplain management ordinance by reviewing and providing feedback on existing and draft ordinances. In addition, DCED provides guidance and technical support through Community Assistance Contacts (CAC) and Community Assistance Visits (CAV) (FEMA 2011).

The DCED provides a suggested ordinance to assist municipalities in meeting the minimum requirements of the NFIP. It also presents provisions that are more restrictive than state and federal requirements. Suggested provisions include the following:

- Prohibiting manufactured homes in the floodway
- Prohibiting manufactured homes within the area 50 feet landward from the top of the bank of any watercourse in a special flood hazard area
- Prohibiting new construction and development within the area 50 feet landward from the top of the bank of any watercourse in a special flood hazard area
- Establishing special requirements for recreational vehicles within the special flood hazard area
- Establishing special requirements for accessory structures

Participation in the National Flood Insurance Program

Participation in the NFIP is based on an agreement between communities and the federal government. If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction and substantial improvements in floodplains, the federal government will make flood insurance available within the community as a financial protection against flood losses. This insurance is designed to provide an alternative to disaster assistance and reduce the escalating costs of repairing damage to buildings and their contents caused by floods (FEMA 2024).

NFIP-participating communities in Fulton County are required to adopt a flood damage prevention ordinance (also sometimes called a "floodplain" or "floodplain management ordinance") and update this ordinance when the regulatory NFIP Flood Insurance Rate Maps (FIRMs) are officially updated. The Pennsylvania Department of Community and Economic Development (PA DCED) (the legislated Commonwealth coordinating agency for the NFIP) and PEMA (the Commonwealth agency that carries out floodplain coordination in practice) provide support to municipalities by providing suggested text for floodplain management ordinances.

All the County's municipalities, except Valley-Hi Borough, participate in the NFIP. Berrysburg Borough has no delineated special flood hazard area (SFHA). Fulton County's municipalities' FIRMs were made effective in February 2011. All participating municipalities have adopted a floodplain ordinance, and many have adopted a stormwater management ordinance.

The floodplain administrators of individual municipalities are often either the code enforcement officer or zoning officer for the municipality, and they enforce the floodplain ordinances locally. Throughout Fulton County, all municipalities enforce the Uniform Construction Code, and only McConnellsburg Borough and Thompson Township enforce zoning regulations. Rather than using a specific Floodplain Development Permit, the County's municipalities include a space for applicants to state whether the proposed development is located in the floodplain on zoning and/or building permit applications. The permit application reviewer confirms whether the property in question is in the floodplain. If it is, the municipal floodplain administrator reviews the proposed development against the municipality's floodplain management ordinance. The floodplain administrator conducts similar reviews of any revisions to the permit application until all requirements are met. As the proposed activity is conducted, the floodplain administrator works with the code enforcement officer and/or zoning officer to conduct inspections and ensure that the proposed activity is carried out as it was permitted.

NFIP-participating communities in Fulton County are required to make current NFIP FIRMs available to their residents for review, and mapping assistance may be provided through their floodplain administrators. Typically, this mapping is available at the municipal offices in each community. Floodplain administrators provide information about mapping to their residents using established outreach methods such as municipal websites, newsletters, and mailings. At the time of this plan update, the Fulton County FEMA Digitized Flood Insurance Rate Maps (DFIRMs) (dated February 2011) were used to evaluate exposure and determine potential future losses.

Floodplain administrators also use established outreach methods to provide information about flood insurance to residents and business owners. They can provide information on the availability of flood insurance, how to get a flood insurance policy, and how to determine the appropriate level of coverage.

Municipal participation in and compliance with the NFIP is supported at the federal level by FEMA Region III and the Insurance Services Office, Inc. (ISO) and at the commonwealth level by the PA DEP, PA DCED, and PEMA. The County's Planning Commission supports flood mitigation efforts, associated training, and public education and awareness programs.

Flood hazard risk management in Fulton County is further supported by the Act 167 County-Wide Stormwater Management Plan (see above). Ideally, this plan will continue to reduce the effects of flooding in certain areas of the County.

Additional information on the NFIP program and its implementation within the County can be found in the flood hazard profile in Section 4.3.5.

NFIP Floodplain Administrators

Each community participating in the NFIP has a designated floodplain administrator identified in its floodplain ordinance. Fulton County used the collection of updated planning and regulatory capabilities for the 2025 HMP update as an opportunity to educate municipal officials on NFIP participation, the HMP, and the role and responsibilities of the NFIP floodplain administrator.

The role of the NFIP floodplain administrator differs among Fulton County, and the 13 municipalities. The NFIP floodplain administrators are listed below in Table 5-1, and on their Capability Assessment Survey worksheet listed in Appendix D.

Table 5-1. NFIP Floodplain Administrators for Fulton County Municipalities

Municipality	NFIP Floodplain Administrator	Responsible Agency/Designee
Fulton County	-	-
Ayr Township	No	-
Belfast Township	-	-
Bethel Township	Yes	Ray E. Powell
Brush Creek Township	-	-
Dublin Township	No	-
Licking Creek Township	Yes	Licking Creek Township
McConnellsburg Borough	No	-
Taylor Township	No	-
Thompson Township	Yes	Fulton County
Todd Township	No	-
Union Township	Yes	Justine Murray, Township Secretary
Valley-Hi Borough	-	-
Wells Township	No	-

Notes: "-"indicates no information provided by municipality.

Community Rating System

In the 1990s, the Flood Insurance Administration (FIA) established the CRS to encourage local governments to increase their standards for floodplain development. The goal of the program is to encourage communities, through flood insurance rate adjustments, to implement standards beyond the minimum required to:

- Reduce losses from floods.
- Facilitate accurate insurance ratings.
- Promote public awareness of the availability of flood insurance.

CRS is a voluntary program designed to reward participating jurisdictions for their efforts to create more disaster-resistant communities using the principles of sustainable development and management. By enrolling in CRS, municipalities can leverage greater flood protection while receiving flood insurance discounts.

10 CRS classes determine the amount of reduction in insurance premiums. Class 1 requires the most credit points and gives the largest premium reduction; Class 10 receives no premium reduction. CRS premium discounts on flood insurance range from 5 percent for Class 9 communities up to 45 percent for Class 1 communities. The CRS recognizes 18 creditable activities that are organized under four categories: Public Information, Mapping and Regulations, Flood Damage Reduction, and Flood Preparedness. Currently, one jurisdiction participates in the CRS Program in Fulton County.

Currently, the Township of Union is the only Fulton County municipality that participates in the CRS Program. The County, municipalities, and PEMA's NFIP Program Manager continue to coordinate with FEMA Region III on additional municipality participation.

Presidential Policy Directive 8

Presidential Policy Directive 8 (PPD-8) requires states to develop a threat hazard identification and risk assessment (THIRA) to remain eligible for the Homeland Security Grant Program (HSGP) and Emergency Management Program Grant (EMPG) funding. PEMA is the lead agency in preparing Pennsylvania's THIRA.

Risk Mapping, Assessment, and Planning

FEMA works with federal, state, tribal, and local partners across the nation to identify flood risk and promote informed planning and development practices to help reduce that risk through the Risk Mapping, Assessment, and Planning (Risk MAP) program. Risk MAP provides high-quality flood maps and information, tools to better assess the risk from flooding, and planning and outreach support to communities to help them take action to

reduce (or mitigate) flood risk. Each Risk MAP flood risk project is tailored to the needs of each community and may involve different products and services.

Risk Rating 2.0: Equity in Action

FEMA introduced Risk Rating 2.0: Equity in Action to consider specific characteristics of a building to provide more modern, individualized, and equitable flood insurance rates. The new rating methodology considers the frequency of flooding, multiple flood types, proximity to flood sources, and building characteristics such as first-floor heights and costs to rebuild. Homeowners who elect to drop NFIP insurance policies will no longer have access to FMA funding for future mitigation efforts.

Robert T. Stafford Disaster Relief and Emergency Assistance Act

The Stafford Act provides an orderly and continuing means of assistance by the federal government to state and local governments in carrying out their responsibilities to alleviate the suffering and damage that results from disasters. The provisions of the Act include the following objectives:

- Revising and broadening the scope of existing disaster relief programs
- Encouraging the development of comprehensive disaster preparedness and assistance plans, programs, capabilities, and organizations by state and local governments
- Achieving greater coordination and responsiveness of disaster preparedness and relief programs
- Encouraging individuals and state and local governments to protect themselves by obtaining insurance coverage to supplement or replace governmental assistance
- Encouraging hazard mitigation measures to reduce losses from disasters, including the development of land-use and construction regulations
- Providing federal assistance programs for both public and private losses sustained in disasters

From a mitigation perspective of the Stafford Act, the PEMA MIRC Office is the lead agency that reviews, submits, and administers federal funding to programs that mitigate hazards. These programs help find cost-beneficial projects to help reduce damage from hazards.

Clean Water Act Section 404(e)

Under Section 404(e) of the Clean Water Act, the U.S. Army Corps of Engineers (USACE) can issue general permits to authorize activities that have only minimal individual and cumulative adverse environmental effects. There are three types of USACE permits: standard, nationwide, and regional. Standard permits are individual permits that involve a full public interest review of an individual permit application and include the issuance of a public notice for any project that does not meet the terms and conditions of a Nationwide Permit (NWP) or a Letter of Permission (LOP). Regional general permits are for small, specialized projects.

An NWP is a general permit that authorizes activities across the country unless a district or division commander revokes the nationwide permit in a state or other geographic region. There are 54 nationwide permits, and they authorize a wide variety of activities, including linear transportation projects, bank stabilization activities, residential development, commercial and industrial developments, aids to navigation, and certain maintenance activities. (USACE 2017).

Commonwealth Planning Capabilities

The following summarizes the planning and regulatory capabilities available to Fulton County at the commonwealth level.

Counterterrorism Planning, Preparedness, and Response Act

Act 227 (i.e. the Counterterrorism Planning, Preparedness and Response Act of December 16, 2002, P.L. 1967, No. 227 35) provides for counterterrorism planning, preparedness, and response; imposing powers and duties on PEMA, Department of Health (DOH), counties, and municipalities; and providing for the organization of various

response teams. Act 227 states the responsibilities of regional counter-terrorism task force groups, the urban search and rescue task force, and specialized response teams, and provides immunity from liability.

Marcellus Shale Drilling Regulations

Oil and gas exploration in Pennsylvania is regulated through the Oil and Gas Act, the Coal and Gas Resource Coordination Act, the Oil and Gas Conservation Law, the Clean Streams Law, the Dam Safety and Encroachments Act, the Solid Waste Management Act, and the Water Resources Planning Act. The Oil and Gas Act (Act 13 of 2012) presented major changes to the oil and gas industry in Pennsylvania, including the authorization for local governments to adopt an impact fee and the provision of stronger environmental protections.

The Bureau of Oil and Gas Management in the Pennsylvania Department of Environmental Protection (PADEP) along with county conservation districts and the Susquehanna River Basin Commission or the Delaware River Basin Commission, if applicable geographically, have the authority to regulate the oil and gas industry in Pennsylvania to protect the environment and citizens of the Commonwealth.

Nutrient Management Law

Act 38 was signed into law on July 6, 2005, replacing Act 6, which was Pennsylvania's first nutrient management law. This act deals with local regulation of agricultural operations. It requires concentrated animal operations to develop and maintain a nutrient management plan, which includes best management practices to minimize the environmental impact of nutrients on a farm. Act 38 Nutrient Management Plans are required to receive permits for concentrated animal feeding operations that can be populated with livestock.

Pennsylvania Construction Code Act

The Pennsylvania Construction Code Act (Act 45) of 1999 (as amended) establishes the basic requirements for the Uniform Construction Code (UCC), which applies to the construction, alteration, repair, demolition, or change of occupancy of buildings. Enforcement of the UCC began in April 2004. Utilization of the UCC provides for the protection of life, health, property, and the environment daily as well as during disasters by establishing construction standards. Pennsylvania is protected by the guidelines outlined in the UCC, with over 90 percent of Pennsylvania's 2,562 municipalities administering compliance locally either through their staff or third-party agencies (PA General Assembly n.d.). The Department of Labor & Industry has limited code enforcement authority, primarily ensuring municipalities have a certified "Accessibility Inspector/Plans Examiner."

Recent changes to the act include Acts 35 and 36 of 2017. Act 35 provided exclusions for certain agricultural buildings. Act 36 resulted in a lot of changes, including requiring a re-review of the 2015 International Code Council, changing the makeup of the UCC Review and Advisory Council, permitting Philadelphia to pass an ordinance adopting the 2018 commercial ICC codes, changes to permitting fees, creating a local board of appeals, and establishing a six-month statute of limitations for permit submissions after updated building codes go into effect (PA General Assembly n.d.). On October 26, 2022, the Commonwealth Court ruled that all enforcement of the 2021 accessibility standards must cease and revert to 2018 requirements.

Pennsylvania Emergency Management Service Code, Title 35

Pennsylvania's Emergency Management Service Code, Title 35, covers PEMA's overall legal responsibilities for emergency management. PA CS Title 35 Section 7102 defines emergency management as "the judicious planning, assignment, and coordination of all available resources in an integrated program of prevention, mitigation, preparedness, response and recovery for emergencies of any kind, whether from attack, Human-caused or natural sources." Section 7311 establishes that PEMA was created "to assure prompt, proper and effective discharge of basic Commonwealth responsibilities relating to civil defense and disaster preparedness, operations and recovery." Title 35 addresses PEMA's responsibilities before, during, and after a disaster.

Pennsylvania Flood Plain Management Act

The Pennsylvania Flood Plain Management Act (Act 166) encourages sound land use practices within the floodplain. The Act requires municipalities with Special Flood Hazard Areas (SFHA) to participate in the NFIP and meet the minimum standards. The Act establishes higher regulatory standards for hazardous materials and high-risk land uses and designates the state agency responsible for NFIP coordination and oversight. Previously held by the Department of Community and Economic Development (DCED), the Flood Plain Management Act was amended in July 2022 to designate PEMA as the State NFIP Coordinator.

In addition to the work PEMA does, there are local floodplain managers who have the training and authority to help enforce regulations. Managers are encouraged to enroll in FEMA training courses and even obtain their Certified Floodplain Manager (CFM) certification. PEMA's Orientation Guide describes the job as having four main roles: Coordinator, Regulator, Educator, and Planner. They work continuously with federal, state, and local stakeholders to ensure development in the floodplain is done properly.

Pennsylvania Hazardous Material Emergency Planning and Response Act

The federal requirements associated with the Superfund Amendments and Reauthorization Act 165 are implemented at the state level through Act 165 (i.e., Pennsylvania Hazardous Material Emergency Planning and Response Act, 1990-165). Act 165 creates a strong working relationship between business and industry, the Commonwealth, counties, and local municipalities to protect citizens from the dangers of hazardous materials.

The Superfund Amendments and Reauthorization Act 165 (SARA) has several provisions, including requirements for reporting releases of chemicals and requirements for the protection of responders. However, SARA Title III (i.e., the Federal Emergency Planning and Community Right-to-Know Act), relating to emergency planning and community right-to-know, has the greatest impact on local governments.

Pennsylvania Municipalities Planning Code Act

Per the Pennsylvania Municipalities Planning Code Act, P.L. 805, No. 247 (Act 247) of 1968, boroughs, townships, and counties have the authority to prepare zoning, subdivision, land development, floodplain management, and other ordinances, as well as official zoning maps, all of which can be used individually or jointly as tools to guide growth and minimize development in hazard-prone areas. Act 247 also requires counties to create and adopt a comprehensive plan and encourages municipalities to adopt municipal or joint municipal comprehensive plans generally consistent with the county's comprehensive plan.

Pennsylvania Radiation Protection Act

Act 147 (i.e., Pennsylvania Radiation Protection Act, 1984-147) deals specifically with radiation, control of radioactive sources, and accidental releases of radiation from any of the nuclear-powered electric generating facilities in Pennsylvania. The act was most recently amended in 2007 with Act 31. This law empowers the PADEP to implement a comprehensive statewide radiation protection program and enables PEMA to develop a radiological emergency response program with plans for each fixed nuclear power generating facility. In implementing the radiological emergency response program, PEMA has planned for the evacuation or protection of persons in the area immediately surrounding a given facility within a 10-mile radius. Each of the affected municipalities has a plan that addresses accidental releases of radiation at the facility. The law requires periodic exercise of these plans; every 2 years, there is a full-scale exercise involving several hundred people to test the plan and response capabilities.

Act 147 also created a Radiation Emergency Response Fund and a Radiation Transportation Emergency Response Fund, which receive money from nuclear facility operators, spent fuel storage facilities, and spent nuclear fuel shippers. PEMA then distributes this money to affected counties, where it is then distributed to municipalities. Funds are distributed based on grant applications submitted by counties to reimburse expenses involved in preparing plans, providing equipment, and involved in training and exercising the radiological emergency response program.

Public Safety Emergency Telephone Act

Act 78 (i.e., the Public Safety Emergency Telephone Act, 1990-78), as amended, is designed to provide a toll-free standard number (911) accessible from both land and cellular phones for any individual in the Commonwealth to gain rapid, direct access to emergency services. The act was amended in 1998 with Act 17. The act places responsibility for developing a 911 system on county government. The act also allows for end-user contributions based on the number of lines of telephone service. Act 78 establishes technical, training, and certification guidelines and minimum standards to be met in developing the county's 911 system. Additionally, the act encourages the development of enhanced 911 systems and the constant improvement of existing systems.

County and Municipal Planning Capabilities

Fulton County Comprehensive Plan

A comprehensive plan is a policy document that states objectives and guides the future growth and physical development of a municipality. The comprehensive plan is a blueprint for housing, transportation, community facilities, utilities, and land use. It examines how the past led to the present and charts the community's future path. The Pennsylvania Municipalities Planning Code (MPC) Act 247 of 1968, as reauthorized and amended, requires counties to prepare and maintain a comprehensive plan. In addition, the MPC requires counties to update the comprehensive plan every 10 years.

Section 301a.(2) of the MPC requires comprehensive plans to include a plan for land use, which among other provisions suggests that the plan should give consideration to floodplains and other areas of special hazards and other similar uses. The MPC also requires comprehensive plans to include a plan for community facilities and services and recommends giving consideration to storm drainage and floodplain management.

Fulton County and all of its municipalities participated in a six-county comprehensive plan, "Alleghenies Ahead - Joint Comprehensive Plan" which is slated to guide Fulton County until 2028. The comprehensive plan was adopted in 2018 and the Fulton County Action Plan specifically addresses the following plan elements:

- Broadband and Cellular Service
- Collaboration and Coordination
- Business and Workforce Development
- Agriculture
- Recreational Amenities and Natural Assets

Each plan element includes a profile, trends, inputs, and outputs and action items.

- Action items for broadband and cellular service include establishing a regional broadband and cell service task force, performing an inventory of all infrastructure inventory, implementing a customer survey and identifying anchor customers, hiring a telecommunications project manager at SAPDC, and conducting broadband outreach and aggregation.
- Action items for collaboration and coordination include conducting outreach and education about local and regional best practices in problem solving and service delivery, identifying and approaching potential candidates for merger or consolidation, ascertaining legal and financial guidance for collaboration, and creating a satellite office for SAPDC in Fulton County.
- Action items for business and workforce development include reconstructing/revamping the Fulton County economic development organization responsible for countywide business development, working with land owners to leverage the Interstate 70 corridor and attract new business/development in Warfordsburg, leveraging state grants for improvements to downtown McConnellsburg, and developing "Main Street," and a downtown revitalization initiative.
- Action items for agriculture include ensuring agriculture is represented in the county economic development agency, actively recruiting new processing facilities to locate in Fulton County, developing a public campaign to educate and raise public awareness and appreciation of county farmers, and collaborating with agricultural lenders to provide low interest loans to farmers.

- Action items for recreational amenities and natural assets include conducting a trail feasibility study for a county-wide north-south trail, coordinating and cooperating with other Southern Alleghenies counties and chamber of commerce and tourism agencies to market both private and public recreational and cultural destinations, and coordinating with Bedford County on The Old Pennsylvania Pike.

Stormwater Management Planning

In 1978, the Pennsylvania General Assembly passed the Stormwater Management Act (Act 167) of 1978 (Pennsylvania State Data Center 1978). Act 167 requires counties to prepare stormwater management plans on a watershed-by-watershed basis. The plans must be developed in consultation with the affected municipalities. Each new plan is required to provide standards for control of runoff from new development, based on a detailed hydrologic assessment. A key objective of each plan is to coordinate the stormwater management decisions of the watershed municipalities. Implementation of each plan is through mandatory municipal adoption of ordinance provisions consistent with the plan.

Plans prepared under Act 167 will not resolve all drainage issues. A key goal of the planning process is to maintain existing peak runoff rates throughout a watershed as land development continues to take place. While the planning process does not solve existing flooding problems, it aims to prevent these problems from getting worse. Each municipality is responsible for correcting existing flooding problems.

In June 2010, Fulton County developed the Act 167 Scope of Study for Fulton County Stormwater Management Plan (Fulton County Planning Commission 2017). This Plan is the result of Phase II of the Act 167 Plan and includes:

- A summary of county watershed characteristics
- An inventory of relevant problems and recommendations
- A proposed scope of study, schedule, and budget for completion of the Phase 2 Plan project

The plan is designed to provide consistency in stormwater management planning, regulation, and implementation; provide an integrated stormwater management plan; provide useable technical information in a geographic information system (GIS) format; and provide technical information for future hydrologic and hydraulic analysis and regulatory activities.

An Act 167 Stormwater Management Plan for the Cove Creek Watershed was previously completed in 1993.

According to Section 11(b) of Act 167, municipalities subject to the Stormwater Management Plan must enact or amend and implement such ordinances as necessary to regulate development in a manner consistent with the Stormwater Management Plan. Municipalities are encouraged to use the model ordinance included in the plan.

Southern Alleghenies Greenways and Open Space Network Plan

The Southern Alleghenies Greenways and Open Space Network Plan outlines a comprehensive strategy for linking natural and man-made resources across the region's six counties, to include Fulton County. By creating an interconnected greenway network, the plan aims to enhance the value of these resources for various purposes, including recreation, conservation, and economic development. The plan not only identifies the key elements that constitute the greenway network but also provides a strategic framework for its implementation and management. This framework includes prioritizing greenways or project corridors, offering a range of potential implementation tools, and summarizing available support and funding sources. By leveraging the region's natural assets, the plan seeks to promote sustainable development and strengthen the resilience of the community against potential hazards.

Transportation Planning

Fulton County participates in the Southern Alleghenies Planning and Development Commission (SAPDC). The SAPDC serves as the state-designed Rural Planning Organization (RPO) for six member counties. The RPO is responsible for developing a long-range transportation plan, the transportation improvement program (TIP) and other transportation-related documents and reports.

Informational Resources

Fulton County has a variety of informational resources available, including websites, brochures, pamphlets, workshops, and public service announcements (PSAs).

- The Planning & Mapping Department has an informational website located at https://www.co.fulton.pa.us/planning-commission.php
- The County's website is located at https://www.co.fulton.pa.us/
- Information on hazard mitigation and preparedness was referenced at the websites for Federal Emergency Management Agency (FEMA) (www.fema.gov) and PEMA (https://www.pema.pa.gov/).
- Fulton County Emergency Management Agency website is located at https://www.co.fulton.pa.us/ema.php

Fulton County Emergency Management

The Fulton County Emergency Management Agency (EMA) maintains a strong emergency management capability that supports Fulton County. The County operates an emergency 9-1-1 call center and activates its own emergency operations center (EOC) during emergencies. In addition, the County provides or supports emergency service programs and measures, including emergency response, public alert and warning systems, emergency communications systems, hazard event monitoring systems, and public information and outreach programs. Capabilities include the 9-1-1 center, EOC, emergency service measures, emergency response planning, public information programs, and geographic information system, which are described in the sections below.

9-1-1 Center

9-1-1 is the telephone number used to report emergencies. Citizens use the service in the event of the presence or potential for an immediate threat to life or property and to request response from police, fire, or emergency medical services (EMS) agencies. Examples include reporting a crime that has just occurred or is in progress; describing an odor such as gas or reporting a fire; or calling for assistance with a sick or injured person who requires treatment and possibly transportation to a hospital emergency department. The 9-1-1 system is capable of accepting calls from hearing or speech-impaired callers using a Telecommunications Device for the Deaf (TDD), and text messages. Each county in Pennsylvania operates a 9-1-1 Public Safety Answering Point (PSAP). Personnel at these PSAPs would need to coordinate their efforts during a regional hazard event. Computerized mapping of streets with address information is critical for emergency response purposes. The 9-1-1 center is also used to alert citizens during an emergency.

Emergency Operations Center

In the event of an impending emergency or disaster, Fulton County would activate its EOC. When activated, the EOC is in constant communication with the 9-1-1 center to ensure coordination of activities. The EOC is located within the EMA in McConnellsburg Borough.

The EMA capabilities fall under two categories: emergency service measures and emergency response planning. These capabilities are described below.

Emergency Planning

Emergency Operations Plan

The Pennsylvania Emergency Management Services Code, Title 35, requires all political jurisdictions in the Commonwealth to have an Emergency Operations Plan (EOP), an Emergency Management Coordinator (EMC), and an EOC.

The Fulton County EOP documents the County's emergency preparedness planning. The EOP includes County-specific emergency response procedures during significant emergency events. Fulton County's EOP complies with the National Incident Management System (NIMS) and is updated every 2 years. The updated risk assessment information from this HMP will be incorporated into subsequent updates to the EOP.

Mutual Aid Agreements

Fulton County has mutual aid agreements (formal agreements) with the contiguous Pennsylvania counties as a result of the Pennsylvania Intrastate Mutual Assistance Program. Every county participates in this program. Fulton County is also part of a larger county consortium, the South-Central Mountains Regional Task Force (SCMRTF), which works together and shares resources during times of emergency. Originally formed in response to the increasing threat of weapons of mass destruction (WMD) and other terroristic activity, the SCMRTF also provides all-hazards preparedness, mitigation, prevention, response, and recovery services to citizens in its purview. This intergovernmental agreement is between the following counties:

- Bedford
- Blair
- Centre
- Fulton
- Huntingdon
- Juniata
- Mifflin
- Snyder

Regional Planning Initiatives

Fulton County also assists in County or regional planning and preparation for the following:

- Local (Municipal) EOPs
- Medical facilities
- Dams
- Airports
- Pandemic
- Mass casualty/fatality incidents
- Counterterrorism preparedness
- Special events, such as concerts, parades, etc.
- School emergency planning
- Day care, group home, and special needs facilities
- Superfund Amendments and Reauthorization Act of 1986 (SARA) – The Local Emergency Planning Committee program is based on the SARA of 1986, Title III. This legislation requires local planning by businesses and response agencies (such as fire departments and hazardous materials teams) whenever hazardous materials are involved. SARA also requires the establishment of a system in each community that informs the citizens of chemicals used, manufactured, and stored locally.
- In cooperation with the American Red Cross, the County has designated shelters that may be used during emergencies and disasters.

Local Emergency Management Capabilities

According to Pennsylvania Title 35 (Emergency Management Services Code), Chapter 7500, the following stipulations apply:

- Each political subdivision of this Commonwealth is directed and authorized to establish a local emergency management organization in accordance with the plan and program of PEMA. Each local organization shall have responsibility for emergency response and recovery within the territorial limits of the political subdivision within which it is organized and, in addition, shall conduct such services outside of its jurisdictional limits as may be required under this part.
- The governing body of a political subdivision may declare a local disaster emergency upon finding a disaster has occurred or is imminent. The effect of a declaration of a local disaster emergency is to

activate the response and recovery aspects of any and all applicable local emergency management plans and to authorize aid and assistance.

- Each local organization of emergency management shall have a coordinator responsible for the planning, administration, and operation of the local organization.
- Each political subdivision shall adopt an Intergovernmental Cooperation agreement with other political subdivisions to accomplish the following:
    - Prepare, maintain, and keep current a disaster emergency management plan for (1) the prevention and minimization of injury and damage caused by a disaster, (2) prompt and effective response to disaster, and (3) disaster emergency relief and recovery consistent with the Pennsylvania Emergency Management Plan.
    - Establish, equip, and staff an EOC (integrated with warning and communication systems) to support government operations in emergencies and provide other essential facilities and equipment for agencies and activities assigned emergency functions.
    - Provide individual and organizational training programs to ensure prompt, efficient, and effective disaster emergency services.
    - Organize, prepare, and coordinate all locally available manpower, materials, supplies, equipment, facilities, and services necessary for disaster emergency readiness, response, and recovery.
    - Adopt and implement precautionary measures to mitigate the anticipated effects of a disaster. Execute and enforce such rules and orders as the agency shall adopt and promulgate under the authority of this part.
    - Cooperate and coordinate with any public and private agency or entity in achieving any purpose of this part.
    - Have available for inspection at its EOC all emergency management plans, rules, and orders of the Governor and PEMA.
    - Provide prompt and accurate information regarding local disaster emergencies to appropriate Commonwealth and local officials and agencies and the general public.
    - Participate in all tests, drills, and exercises—including remedial drills and exercises—scheduled by the agency or by the federal government.
    - Participate in the program of integrated flood warning systems under Section 7313 (6) (relating to powers and duties).
- Direction of disaster emergency management services is first the responsibility of the lowest level of government affected. When two or more political subdivisions within a county are affected, the county organization shall exercise responsibility for coordination and support to the area of operations. When two or more counties are involved, coordination shall be provided by PEMA or by area organizations established by PEMA.
- When all appropriate locally available forces and resources are fully committed by the affected political subdivision, assistance from a higher level of government shall be provided.
- Local coordinators of emergency management shall develop mutual aid agreements with adjacent political subdivisions for reciprocal emergency assistance. The agreements shall be consistent with the plans and programs of PEMA.

Mutual Aid Agreements

Fulton County has formal mutual aid agreements in place with its municipalities.

Emergency Operations Centers

In the event of an impending emergency or disaster, the local EOC may be activated. The purpose of the EOC is to manage the emergency response and coordinate distribution of resources to a disaster incident at the local level.

Emergency Response

Each municipality is responsible for providing emergency response to their municipality consisting of EMS, fire, and police. If a municipality does not have one of these providers in their community, they should have mutual aid agreements with an adjacent political subdivision or the Commonwealth (e.g., law enforcement coverage by the Pennsylvania State Police [PSP]) to respond.

Monitoring Systems

The municipalities may also be equipped with several systems to monitor emergency information and warnings, including the Radio Amateur Civil Emergency Service (RACES) and the National Weather Service (NWS).

Emergency Response Planning

The municipalities may also assist with planning for:

1. Municipal EOPs
2. Medical facilities
3. Dams
4. Counterterrorism preparedness
5. Special events
6. School emergency planning
7. Day care, group homes, and special needs facilities
8. Evacuation

A summary of existing federal, state, regional, and county programs (regulatory and otherwise) to manage specific hazard risks is provided in the hazard profiles in Section 4 of this plan update. While the risk of certain hazards can be addressed at least partially through mitigation, the risks of other hazards (particularly certain non-natural hazards) are primarily managed through the preparedness and response elements of emergency management or through other regulatory programs at the federal and state levels.

Municipal Capabilities Summary

Participating municipalities in this planning effort were provided a Capability Assessment Survey. Table 5-2 summarizes the responses of the municipalities based on planning and regulatory capability, supplemented by information received from the County regarding municipal capabilities. Detailed information regarding Fulton County municipalities' planning and regulatory capabilities can be found in the municipal survey responses provided in Appendix D.

The municipalities within Fulton County have varying levels of planning and regulatory capabilities. Majority of the municipalities have comprehensive plans and regulations in place, including Hazard Mitigation, Stormwater Management Plans, and Subdivision regulations. These municipalities are well-positioned to enhance their capabilities further through community-based training programs and advanced technologies for better hazard mapping and response. Additionally, all municipalities, with the except of the Town of Thompson, could focus on expanding their natural resource protection, capital improvement, and economic development planning to ensure sustainable development.

All municipalities lack certain critical components like Disaster Recovery and Evacuation Plans. The municipalities could benefit from developing these plans to ensure comprehensive preparedness. Targeted support and partnerships with regional agencies could help these municipalities build their capabilities and better serve their residents.

Table 5-2. Planning and Regulatory Capability

Municipality	Hazard Mitigation Plan	EOP	Disaster Recovery Plan	Evacuation Plan	COOP Plan	NFIP	NFIP – CRS	Floodplain Regulations	Floodplain Mgmt. Plan	Zoning Regulations	Subdivision Regulations	Comprehensive Land Use Plan (or General, Master, or Growth Mgmt. Plan)	Open Space Mgmt. Plan	Stormwater Mgmt. Plan/Ordinance	Natural Resource Protection Plan	Capital Improvements Plan	Economic Dev. Plan	Historic Preservation Plan	Farmland Preservation	Building Code	Fire Code	Other
Fulton County	X	X	-	-	X	X	N/A	N/A	-	-	-	X	X	X	-	-	-	-	-	-	-	-
Ayr Township	X	-	-	-	-	-	-	X	X	-	X	-	-	X	-	-	-	-	-	X	-	X*
Belfast Township																						
Bethel Township	X	X	-	-	-	X	-	X	X	-	X	X	X	X	-	-	-	-	-	X	-	-
Brush Creek Township	X	X	-	-	-	X	-	-	-	-	X	X	-	X	-	-	-	-	X	X	-	X*
Dublin Township	X	-	-	-	-	-	-	X	-	-	X	-	-	X	-	-	-	-	-	X	-	-
Licking Creek Township	X	X	-	-	X	X	-	X	-	-	X	X	X	X	-	-	-	-	-	X	-	X*
McConnellsburg Borough	X	X	-	-	-	X	-	-	X	X	X	X	X	X	-	-	-	-	-	X	-	-
Taylor Township	X	X	-	-	-	X	-	-	-	-	X	-	-	X	-	-	-	-	-	-	-	-
Thompson Township	X	-	-	-	-	-	-	-	-	X	-	X	X	X	X	X	X	X	X	X	X	X
Todd Township	X	X	-	-	-	-	-	X	-	-	X	X	-	X	-	-	-	-	-	X	-	-
Union Township	X	X	-	-	-	X	-	-	-	-	X	X	X	X	-	-	-	-	X	X	-	-
Valley-Hi Borough																						
Wells Township	X	X	-	-	-	X	-	-	-	-	X	X	X	X	-	-	-	-	-	X	-	-

Notes:
"X" indicates that the municipality currently has this capability in place.
"-" indicates no capability is currently in place.
"" indicates that the "Other" capability is Agricultural Security Areas.*
COOP: Continuity of Operations
"N/A" indicates not applicable
Blank space indicates no response was received from the municipality.

5.2.2 Administrative and Technical Capability

Administrative capability is described as the adequacy of departmental and personnel resources for the implementation of mitigation-related activities. Technical capability relates to an adequacy of knowledge and technical expertise of local government employees or the ability to contract outside resources for this expertise to effectively execute mitigation activities. Common examples of skillsets and technical personnel needed for hazard mitigation include: planners with knowledge of land development/management practices, engineers or professionals trained in construction practices related to buildings and/or infrastructure (e.g., building inspectors), planners or engineers with an understanding of natural and/or human-caused hazards, emergency managers, floodplain managers, land surveyors, scientists familiar with hazards in the community, staff with the education or expertise to assess community vulnerability to hazards, personnel skilled in geographic information systems, resource development staff or grant writers, and fiscal staff to handle complex grant application processes.

Municipalities are further supported by county, regional, state, and federal administrative and technical capabilities. For this HMP, most support agencies and resources have been identified and referenced throughout this plan update.

It is noted that the county and many of its municipalities have identified specific mitigation initiatives described in this plan update, which will help build and enhance mitigation-related administrative and technical capabilities in Fulton County.

Federal and Commonwealth Capabilities

Federal agencies that can provide technical assistance for mitigation activities include, but are not limited to:

- U.S. Army Corp of Engineers
- Department of Housing and Urban Development
- Department of Agriculture
- Economic Development Administration
- Emergency Management Institute
- Environmental Protection Agency
- FEMA
- Small Business Administration

Commonwealth agencies that can provide technical assistance for mitigation activities include, but are not limited to:

- Pennsylvania Department of Community and Economic Development
- Pennsylvania Department of Conservation and Natural Resources
- Pennsylvania Emergency Management Agency
- Pennsylvania Department of Environmental Protection
- Pennsylvania Silver Jackets

Municipal Capabilities Summary

Participating municipalities in this planning effort were provided with a capabilities survey. Table 5-3 summarizes the responses of the municipalities based on administrative and technical capability. Appendix D includes copies of the individual municipal responses.

Several municipalities, such as Thompson Township and Bethel Township, demonstrate strong administrative and technical capabilities with expertise spanning planners, engineers, emergency managers, floodplain administrators, and grant writers. This range of skills supports effective hazard management and planning. However, many municipalities, including Dublin Township and Valley-Hi Borough, show limited or no specialized staff in these areas, indicating a need to invest in building technical expertise, particularly in GIS, hazard knowledge, and grant management, to improve overall community resilience.

Table 5-3. Administrative and Technical Capability

Municipality	Planners (with land use/land development knowledge)	Planners or Engineers (with natural and/or human-caused hazards knowledge)	Engineers or Professionals trained in building and/or infrastructure construction practices	Emergency Managers	NFIP Floodplain Administrator	Land Surveyors	Scientists or Staff familiar with the hazards of the community	Personnel skilled in GIS and/or the FEMA HAZUS program	Grant Writers or Fiscal Staff to handle large/complex grants	Staff with expertise or training in Benefit-Cost Analysis	Other
Fulton County	X	-	-	X	N/A	-	X	X	-	-	-
Ayr Township	-	-	X	-	-	-	-	-	-	-	-
Belfast Township	-	-	X	-	-	-	-	-	-	-	-
Bethel Township	-	X	X	X	X	X	-	-	-	-	-
Brush Creek Township	-	-	X	X	X	-	-	-	-	-	-
Dublin Township	-	-	-	-	-	-	-	-	-	-	-
Licking Creek Township	X	X	X	X	X	X	X	X	X	X	-
McConnellsburg Borough	-	X	X	X	-	-	-	-	-	-	-
Taylor Township	-	-	X	X	-	-	-	-	-	-	-
Thompson Township	X	X	X	X	X	X	X	X	X	X	-
Todd Township	-	-	-	-	-	-	-	-	-	-	-
Union Township	X	-	-	X	X	-	-	-	-	-	-
Valley-Hi Borough	-	-	-	-	-	-	-	-	-	-	-
Wells Township	-	-	-	X	-	-	-	-	-	-	-

Notes:
"X" indicates that the municipality currently has this capability in place.
"-" indicates no capability is currently in place.
Blank space indicates no response was received from the municipality.

5.2.3 Financial Capability

Mitigation projects and initiatives are largely or entirely dependent on available funding. As such, it is critical to identify all available sources of funding at the local, county, regional, state, and federal level to support implementation of the mitigation strategies identified in this plan update.

Jurisdictions fund mitigation projects though existing local budgets, local appropriations (including referendums and bonding), and through myriad federal and state loan and grant programs.

Federal mitigation grant funding (Stafford Act 404 and 406) (FEMA 2000) is available to all communities with a current HMP (this plan); however, most of these grants require a "local share" in the range of 10 to 25 percent of the total grant amount.

Federal Hazard Mitigation Funding Opportunities

The Hazard Mitigation Grant Program

The Hazard Mitigation Grant Program (HMGP) (Stafford Act 404 and 406) is a post-disaster mitigation program made available to states by FEMA after each federal disaster declaration. The HMGP can provide up to 75 percent funding for hazard mitigation measures and can be used to fund cost-effective projects to protect public or private property in an area covered by a federal disaster declaration or projects to reduce the likely damage from future disasters. Examples of projects include the acquisition and demolition of structures in hazard-prone

areas, floodproofing, or elevation to reduce future damage, minor structural improvements, and development of state or local standards.

Projects must fit into an overall mitigation strategy for the area identified as part of a local planning effort. All applicants must have a FEMA-approved HMP. Applicants who are eligible for the HMGP include state and local governments, certain nonprofit organizations or institutions that perform essential government services, and Indian tribes and authorized tribal organizations. Individuals or homeowners cannot apply directly for the HMGP; a local government must apply on their behalf. Applications are submitted to PEMA and ranked order for available funding and submitted to FEMA for final approval. Eligible projects not selected for funding are placed in an inactive status and may be considered as additional HMGP funding becomes available.

Sections 404 and 406 hazard mitigation funding are two distinct criteria associated with mitigation funding. Participation in FEMA 404 HMGP may cover mitigation activities including raising, removing, relocating, or replacing structures within flood hazard areas. FEMA 406 HMGP is applied to parts of a facility that were damaged by a disaster, and the mitigation measures that protect from subsequent events.

Flood Mitigation Assistance Program

Flood Mitigation Assistance (FMA) provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP. FMA is funded annually; no federal disaster declaration is required. Only NFIP-insured homes and businesses are eligible for mitigation in this program. Funding for FMA is limited, and, as with the HMGP, individuals cannot apply directly. Applications must come from local governments or other eligible organizations.

The federal government cost share for an FMA project is 75 percent. At least 25 percent of the total eligible costs must be provided by a non-federal source, and of this 25 percent, no more than half can be provided as in-kind contributions from third parties. At a minimum, a FEMA-approved local HMP is required before a project can be approved. FMA funds are distributed from FEMA to the Commonwealth. PEMA serves as the grantee and program administrator for FMA.

As of fiscal year 2013, the Severe Repetitive Loss and Repetitive Flood Claims Programs were dismantled and incorporated into the FMA Program. As a result, residential and non-residential properties currently insured with NFIP are eligible to receive FMA funds as long as they meet either the Repetitive Loss Properties (RLP) or Severe Repetitive Loss (SRL) property definitions as described in Section 4.3.6 of this plan.

Pre-Disaster Mitigation Program

Until 2020, the Pre-Disaster Mitigation (PDM) Program was an annually funded, nationwide, competitive grant program. No disaster declaration was required. Federal funds cover 75 percent of a project's cost of up to $3 million. As with the HMGP and FMA, a FEMA-approved local HMP was required to be approved for funding under the PDM program.

Federal Disaster Assistance Programs

Following a disaster, various types of assistance may be made available by local, state, and federal governments. The types and levels of disaster assistance depend on the severity of the damage and the declarations that result from the disaster event. General types of assistance that may be provided, should the President of the United States declare the event a major disaster, include the following:

- Individual Assistance – Provides help for homeowners, renters, businesses, and some nonprofit entities after disasters occur. This program is largely funded by the U.S. Small Business Administration. For homeowners and renters, those who suffered uninsured or underinsured losses may be eligible for a Home Disaster Loan to repair or replace damaged real estate or personal property. Renters are eligible for loans to cover personal property losses. Individuals may borrow up to $200,000 to repair or replace real estate, $40,000 to cover losses to personal property, and an additional 20 percent for mitigation. For businesses, loans may be made to repair or replace disaster damages to property owned by the business,

including real estate, machinery and equipment, inventory, and supplies. Businesses of any size are eligible. Nonprofit organizations such as charities, churches, private universities, etc., are also eligible. An Economic Injury Disaster Loan provides necessary working capital until normal operations resume after a physical disaster. These loans are restricted, by law, to small businesses only.

- Public Assistance – Provides cost reimbursement aid to local governments (state, county, local, municipal authorities, and school districts) and certain nonprofit agencies that were involved in disaster response and recovery programs or that suffered loss or damage to facilities or property used to deliver government-like services.

U.S. Department of Housing and Urban Development Community Development Block Grants

The U.S. Department of Housing and Urban Development (HUD) Community Development Block Grants (CDBG) are federal funds intended to provide low- and moderate-income citizens with decent housing, a suitable living environment, and expanded economic opportunities. Eligible activities include community facilities and improvements, roads and infrastructure, housing rehabilitation and preservation, development activities, public services, economic development, planning, and administration. Public improvements may include flood and drainage improvements. In limited instances, and during times of "urgent need" (for example, post-disaster) as defined by the CDBG National Objectives, CDBG funding may be used to acquire a property located in a floodplain that was severely damaged by a recent flood, demolish a structure severely damaged by an earthquake, or repair a public facility severely damaged by a hazard event. All municipalities in the county are eligible for CDBG funds through the county, except for the City of Harrisburg, which receives CDBG funding directly from U.S. HUD.

High Hazard Potential Dam (HHPD) Program

To reduce high hazard dam vulnerability within Fulton County, the County could apply for the FEMA Rehabilitation of HHPD grant program. "The main objective of the HHPD grant program is to provide technical, planning, design, and construction assistance in the form of grants to non-federal sponsors for rehabilitation of eligible high-hazard potential dams." (FEMA 2024). New guidance for the HHPD grant program was provided in July 2020.

To receive the HHPD funding, the following are basic outline program eligibility requirements:

1. The applicant must be a non-federal government entity or a nonprofit and work with the State Administrative Agency (SSA) designee which will serve as the applicant and/or pass-through entity for a subrecipient.
    a. It is recommended that applicants pursue this grant in coordination with the State Dam Safety Officer and the State Hazard Mitigation Officer (SHMO). For Pennsylvania, Roger Adams is the PA DEP Dam Safety Division Chief, and Tom Hughes is the PA SHMO.
2. The subrecipient must:
    a. Act in accordance with the state dam safety program, and the project must be regulated by the same program.
    b. Must be a full participant in the NFIP and not suspended.
    c. Must commit to operation and maintenance (O&M) for 50 years in addition to providing an O&M plan and assure that the plan will be carried out.
    d. Must have a floodplain management plan in place.
    e. Must comply with the Stafford Act, Davis-Bacon Act, Copeland Anti-Kickback Act, and the Brook Architect-Engineers Act.
3. Eligibility Requirements as identified on pages 2-7 of the HHPD guidance document:
    a. Be located in a state with a state dam safety program.
    b. Be classified as "high hazard potential" by the state dam safety program.
    c. Have an emergency action plan (EAP) approved by the state dam safety program/
    d. Fail to meet minimum state dam safety standards and pose an unacceptable risk to the public/

e. Eligible project must meet non-federal cost-share requirements of 35% of entire project costs.
f. Phased projects are allowable in the program/

4. Grant Fund Requirements:
    a. Environmental and Historic Preservation Compliance
    b. Non-Discrimination compliance
    c. Conflicts of Interest compliance
    d. Procurement compliance
    e. Duplication of Programs
    f. Duplication of Benefits

Additional Federal Resources

Weatherization Assistance Program: Minimizes the adverse effects of high-energy costs on low-income, elderly, and handicapped citizens through client education activities and weatherization services like heating system modifications and insulation (US DOE 2011).

Section 108 Loan Guarantee Programs: Provides loan guarantees as security for federal loans for acquisition, rehabilitation, relocation, clearance, site preparation, special economic development activities, and construction of certain public facilities and housing (HUD 2011).

U.S. Department of Agriculture: Provides disaster assistance through the following:

- The Emergency Conservation Program provides emergency funding for farmers to rehabilitate farmland damaged by natural disasters and for carrying out emergency water conservation measures during periods of severe drought.
- The Non-Insured Crop Disaster Assistance Program provides financial assistance for non-insurable crop losses and planting prevented by disasters.

Emergency Watershed Protection Program: Undertakes emergency measures including the purchase of floodplain easements for runoff retardation and soil erosion prevention to safeguard lives and property from floods, drought, and the products of erosion on any watershed whenever fire, flood, or any other natural occurrence is causing or has caused a sudden impairment of the watershed (NRCS 2011). An emergency doesn't need to be declared by the President for an area to be eligible for assistance. The program objective is to assist sponsors and individuals in implementing emergency measures to relieve imminent hazards to life and property created by a natural disaster. Activities include providing financial and technical assistance to remove debris from streams, protecting destabilized stream banks, establishing cover on critically eroding lands, repairing conservation practices, and purchasing floodplain easements. The program is designed for the installation of recovery measures.

Commonwealth Hazard Mitigation Funding Opportunities

Marcellus Shale Legacy Fund - Act 13 of 2012

Watershed Restoration and Protection Program (WRPP): Act 13 of 2012 establishes the Marcellus Legacy Fund and allocates funds to the Commonwealth Financing Authority for watershed restoration and protection projects. The overall goal of this program is to restore and maintain restored stream reaches impaired by the uncontrolled discharge of non-point source polluted runoff, and ultimately to remove these streams from the PA DEP's Impaired Waters list.

Greenways, Trails and Recreation Program (GTRP): In addition, Act 13 of 2012 allocates funds to the Commonwealth Financing Authority (the "Authority") for planning, acquisition, development, rehabilitation, and repair of greenways, recreational trails, open space, parks, and beautification projects. Projects can involve the development, rehabilitation, and improvements of public parks, recreation areas, greenways, trails, and river conservation.

Flood Mitigation Projects: Finally, Act 13 of 2012 allocates funds to the Commonwealth Financing Authority (the "Authority") for funding statewide initiatives to assist with flood mitigation projects.

While most of the identified fiscal capabilities are available to all of the municipalities in Fulton County, the extent to which communities have leveraged these funding sources varies widely. It is expected that communities familiar with accessing grant programs will continue to pursue those grant sources, as appropriate.

Other Commonwealth Hazard Mitigation Funding Opportunities

Commonwealth programs that may provide financial support for mitigation activities include, but are not limited to:

- Community Conservation Partnerships Program
- Community Revitalization Program
- Floodplain Land Use Assistance Program
- Growing Greener Program
- Keystone Grant Program
- Local Government Capital Projects Loan Program
- Land Use Planning and Technical Assistance Program
- Pennsylvania Heritage Areas Program
- Pennsylvania Recreational Trails Program
- Shared Municipal Services
- Technical Assistance Program

Municipal Capabilities

The implementation of mitigation actions requires time and fiscal resources. While some mitigation actions are less costly than others, it is important that funds are available locally to implement policies and projects. Financial resources are particularly important if jurisdictions try to take advantage of Commonwealth or federal mitigation grant funding opportunities that require local-match contributions.

Capital Improvement Planning

Capital improvement plans are often recommended by counties to their municipalities because these plans help identify specific capital projects to be funded and completed according to a defined schedule. Some of these projects involve improvements to facilities and infrastructure that provide hazard mitigation benefits. As such, during this update process, the County and its municipalities have been encouraged to consider the mitigation benefits associated with their known or anticipated capital projects as a way to help prioritize their execution and to develop awareness that mitigation grants may be available to help fund such projects.

Special Purpose Taxes

Communities may exercise their taxing authority to raise funds for any project they see fit. This includes special taxes to fund mitigation measures. Spreading the cost of a community project among the community's taxpayers helps provide the greatest public good for relatively low individual cost.

Gas/Electric Utility Fees

In the same way that special taxes can be levied to fund mitigation projects, a community can also finance a project by dedicating a portion of homeowner gas and electric utility fees to upgrade and maintain the related infrastructure. Burying transmission lines to protect them from the effects of winds and ice storms is expensive. These fees help to offset that cost.

Water/Sewer Fees

Water Authorities and Fees

Water authorities are multipurpose authorities with water projects, many of which operate both water and sewer systems. The financing of water systems for lease back to the municipality is among the principal activities of the local government facilities' financing authorities. An operating water authority issues bonds to purchase existing facilities or to construct, extend, or improve a system. The primary source of revenue is user fees based on metered usage.

The cost of constructing or extending water supply lines can be funded by special assessments against abutting property owners. Tapping fees also help fund water system capital costs. Water utilities are directly operated by municipal governments and by privately owned public utilities regulated by the Pennsylvania Public Utility Commission. The PA DEP has a program to assist with consolidation of small individual water systems to make system upgrades more cost effective.

Sewer Authorities and Fees

Sewer authorities include multipurpose authorities with sewer projects. The authorities issue bonds to finance acquisition of existing systems or to finance construction, extension, and improvements. Sewer authority operating revenues originate from user fees. The fee frequently is based on the amount of water consumed, and payment is enforced by the ability to terminate service or the imposition of liens against real estate. In areas with no public water supply, flat rate charges are calculated on average use per dwelling unit.

Stormwater Utility Fees

Stormwater utility fees are assessed and collected to offset the cost of maintaining and upgrading stormwater management structures such as drains, retention ponds, and culverts.

Development Impact Fees

Development impact fees are one-time fees assessed to offset the cost of providing public services to a new development. They may be dedicated to providing new water or sewer infrastructure, roads, parks and recreational areas, libraries, schools, etc. The new infrastructure may be less vulnerable to hazard impacts.

General Obligation, Revenue, and/or Special Tax Bonds

Jurisdictions may simply decide to dedicate general fund or similar financing to implement hazard mitigation projects.

Partnering Arrangements or Intergovernmental Agreements

Intergovernmental cooperation is one manner of accomplishing common goals, solving mutual problems, and reducing expenditures. Fulton County contains 13 municipalities. Each of these municipalities conducts its daily operations and provides various community services according to local needs and limitations. Each municipality varies in staff size, resource availability, fiscal status, service provision, constituent population, overall size, and vulnerability to the identified hazards.

Municipal Capabilities Summary

Municipalities participating in this planning effort were provided with a capabilities survey. Table 5-4 summarizes the responses of the municipalities based on financial capabilities. Copies of the individual municipal responses are found in Appendix D.

Thompson Township stands out with a comprehensive range of fiscal tools, including a capital improvements program, community development block grants, special purpose taxes, utility fees, development impact fees, bonds, and intergovernmental agreements, demonstrating strong financial capacity to support community projects. In contrast, many municipalities, such as Ayr Township, Brush Creek Township, and Wells Township,

lack these fiscal mechanisms, indicating an opportunity to explore and develop diverse funding sources to enhance their financial resilience and ability to fund infrastructure and hazard mitigation initiatives.

Table 5-4. Fiscal Capability

Municipality	Capital Improvements Program	Community Development Block Grants (CDBG)	Special Purpose Taxes	Gas/Electric Utility Fees	Water/Sewer Fees	Stormwater Utility Fees	Development Impact Fees	General Obligation, Revenue, and/or Special Tax Bonds	Partnering Arrangements or Intergovernmental Agreements	Other
Fulton County	-	-	-	-	-	-	-	-	-	-
Ayr Township	-	-	-	-	-	-	-	-	-	-
Belfast Township	-	-	-	-	X	-	-	-	-	X
Bethel Township	-	X	-	-	X	-	-	-	-	-
Brush Creek Township	-	-	-	-	-	-	-	-	-	-
Dublin Township	-	-	-	-	-	-	-	-	-	-
Licking Creek Township	-	X	-	-	-	-	-	-	-	X
McConnellsburg Borough	-	X	-	-	-	-	-	-	-	-
Taylor Township	-	-	-	-	-	-	-	-	-	-
Thompson Township	X	X	X	X	X	X	X	X	X	-
Todd Township	-	X	-	-	X	-	-	-	-	-
Union Township	-	X	-	-	-	-	-	-	-	-
Valley-Hi Borough										
Wells Township	-	-	-	-	-	-	-	-	-	-

Notes:
"X" indicates that the municipality currently has this capability in place.
"-" indicates no capability is currently in place.
Blank space indicates no response was received from the municipality.

5.2.4 Education and Outreach

Education and outreach programs and methods are used to implement mitigation activities and communicate hazard-related information. Examples include obtaining certification in programs, such as Firewise and StormReady, and developing and communicating hazard awareness and safety information to residents.

At the municipal level, education and outreach capabilities vary. Some municipalities have the capability to handle outreach initiatives while others rely on county resources. Several municipal websites post local plans and ordinances, and many municipalities post information regarding hazard-related topics. The local fire departments and emergency managers are active in the schools participating in programs, such as fire safety in the fall and attending other community activities to conduct outreach. Appendix D details the outreach and education conducted at the municipal level.

Public Information Programs

Flood Maps

Flood maps and flood data, including new digital maps for Fulton County, are available at the municipal offices for municipalities participating in the NFIP. County and municipality maps, tax maps, and property assessment

records are available at the Planning Department and Fulton County's Board of Assessments, and deeds are available at the Recorder of Deeds Office.

Library Education Tools

Libraries have educational materials, available upon request, which are used at public speaking events or county meetings, when appropriate. The following educational materials are available, but are not limited to:

- Various types of training videos
- Pennsylvania emergency preparedness guides
- American Red Cross packets for flash flooding, hurricane, thunder and lightning, tornado, and winter storms
- Family disaster planning guides
- Homeland security information for businesses, family, individuals, neighborhoods, and schools
- Pandemic brochures

Outreach Projects

Several organizations (both public and private sector) have developed outreach projects, educational tools, and training programs. The County promotes both online and traditional in-person programs to appeal to as wide an audience as possible.

- *ReadyPA Campaign*: Established by the Commonwealth of Pennsylvania, www.readypa.org is a website that aims to prepare the public for times of disaster by providing education on the risks within Pennsylvania, template emergency plans and kits, and information on ways to get involved with community organizations to help others.
- Emergency management courses are provided through the County EMA to local coordinators and elected officials; these courses include Basic Orientation, Duties and Responsibilities of the Local Emergency Management Coordinator (LEMC), and Damage Assessment.

Local Emergency Planning Committee

The Local Emergency Planning Committee (LEPC) works closely with the business industry community to form a safety net around the chemical industry to protect the general population from the possible outcome of hazardous material incidents. The following features of the LEPC demonstrate the capability of the LEPC to support County emergency management and preparedness initiatives.

- The LEPC shall have a minimum of seven members, with at least one representative from each of the following groups:
  - Group 1 – Elected official representing local government within the County
  - Group 2 – Local law enforcement, first aid, health, environmental, hospital, and transportation personnel
  - Group 3 – Firefighting personnel
  - Group 4 – Civil defense and emergency management personnel
  - Group 5 – Broadcast and print media personnel
  - Group 6 – Community groups not affiliated with emergency service groups
  - Group 7 – Owners and operators of facilities subject to the requirements of SARA Title III
- *Reporting Facilities:* The minimum reporting threshold for which facilities are required to have or prepared a Material Safety Data Sheet is 10,000 pounds of hazardous chemicals. This document provides workers and emergency personnel with procedures for handling or working with hazardous materials in a safe manner. It includes information on the chemicals' physical properties, toxicity, health effects, first aid, reactivity, storage, disposal, protective equipment, and spill-handling procedures.

- *Planning Facilities:* The reporting threshold for Extremely Hazardous Substances (as designated under Section 302 of Title III) is 500 pounds or the threshold planning quantity, whichever is lower. Qualifying facilities are subject to additional reports and accident prevention regulations.

Technical Assistance

The County EMA can support local, public, and private entities as needed through coordination and provision of information and equipment resources. These include both existing County capabilities and predetermined private and public resources.

Municipal Capabilities Summary

Municipalities participating in this planning effort were provided with a Capability Assessment Survey. Table 5-5 summarizes the responses of the municipalities based on education and outreach capabilities. Appendix D includes copies of the individual municipal responses.

Thompson Township demonstrates strong education and outreach capabilities, holding Firewise and StormReady certifications and actively engaging in natural disaster school programs, ongoing public education, public-private partnerships, and local citizen groups. This comprehensive approach supports community preparedness and resilience. On the other hand, several municipalities, such as Todd Township and Belfast Township, show little to no participation in these programs, indicating an opportunity to enhance community engagement through certification pursuits, educational initiatives, and partnerships to improve overall disaster readiness.

Table 5-5. Education and Outreach Capability

Municipality	Firewise Communities Certification	StormReady Certification	Natural Disaster or Safety-Related School Programs	Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	Public-private partnership initiatives addressing disaster-related issues	Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Other
Fulton County	-	X	X	-	-	-	-
Ayr Township	-	X	-	-	-	-	-
Belfast Township	-	X	-	-	-	-	-
Bethel Township	-	X	X	-	-	-	-
Brush Creek Township	-	X	-	-	-	-	-
Dublin Township	-	X	-	-	-	-	-
Licking Creek Township	-	X	X	-	-	-	-
McConnellsburg Borough	X	X	-	-	-	-	-
Taylor Township	-	X	-	-	-	-	-
Thompson Township	X	X	X	X	X	X	X
Todd Township	-	-	-	-	-	-	-
Union Township	-	X	-	-	-	-	-
Valley-Hi Borough							
Wells Township	-	X	-	-	-	-	-

Notes:

"X" indicates that the municipality currently has this capability in place.
"-" indicates no capability is currently in place.
Blank space indicates no response was received from the municipality.

5.2.5 Self-Assessment

The municipalities within Fulton County have varying levels of capabilities to implement hazard mitigation strategies effectively, as shown in Table 5-6. Most municipalities in the area demonstrate moderate (M) capabilities across planning and regulatory, administrative and technical, financial, and education and outreach categories. Brush Creek Township and Thompson Township stand out with a high (H) administrative and technical capabilities. Belfast, Todd, and Union Townships consistently rate low (L) across all categories, indicating areas needing significant improvement. Overall, financial capability tends to be the weakest category for many municipalities, highlighting an opportunity for focused capacity building.

Table 5-6. Self-Assessment

Municipality	Capability Category			
	Planning and Regulatory Capability	Administrative and Technical Capability	Financial Capability	Education and Outreach Capability
Fulton County	M	M	L	M
Ayr Township	M	M	M	M
Belfast Township	L	L	L	L
Bethel Township	M	M	M	M
Brush Creek Township	M	H	M	M
Dublin Township	M	M	M	L
Licking Creek Township	M	M	L	L
McConnellsburg Borough	M	M	L	L
Taylor Township	-	-	L	-
Thompson Township	M	H	M	M
Todd Township	L	L	L	L
Union Township	L	L	L	L
Valley-Hi Borough				
Wells Township	M	M	L	M

Note: Blank = No worksheet from municipality; "-"no response on worksheet from municipality

5.2.6 Plan Integration

According to FEMA, plan integration is a process where communities look critically at their existing planning framework and align their efforts. Integration of hazard mitigation principles into other local planning mechanisms (comprehensive plans, transportation plans, floodplain ordinances, etc.) and vice versa is vital to build a safer, more resilient community. This two-way exchange of information supports community-wide risk reduction, both before and after disasters occur. Not only will the community's planning efforts be better integrated, but by going through this process, there is a higher level of interagency coordination, which is just as important as the planning mechanisms themselves.

Within Fulton County, many existing plans and programs support hazard risk management; thus, it is critical that this HMP integrate and coordinate with, and complement, those mechanisms.

The intention of the Steering Committee and participating jurisdictions is to incorporate mitigation planning as an integral component of daily government operations. Steering Committee members will work with local

government officials to integrate the newly adopted hazard mitigation goals and actions into the general operations of government and partner organizations. Further, the sample adoption resolution (located in Section 8 of this HMP) includes a resolution item stating the intent of the local governing body to incorporate mitigation planning as an integral component of government and partner operations. By doing so, the Steering Committee anticipates the following:

1) Hazard mitigation planning will be formally recognized as an integral part of overall emergency management efforts.
2) Hazard mitigation planning will be formally recognized as an integral part of land use policies and mechanisms.
3) The HMP, the County comprehensive plans, and the County and municipal EOPs will become mutually supportive documents that work in concert to meet the goals and needs of County residents.
4) Duplication of effort can be minimized.

As noted in Section 6 of this plan, Fulton County has made a concerted effort to reduce its vulnerability to natural and non-natural hazards in its planning and in its daily operations since the Fulton County HMP was last updated in 2015. The County and its jurisdictions have implemented various programs and projects to reduce the impacts of hazards. These projects, programs, and regulations have reduced risk caused by natural and non-natural hazards and support the goals and objectives of this HMP. It is the intent of the County and its participating municipalities to strengthen this focus on mitigation by continuing existing policies and by further implementing the mitigation policies contained in this HMP.

Implementation actions will include incorporating the goals of the HMP into ongoing planning, zoning, building, and engineering activities. Specifically, the County will urge municipalities to take the following actions:

- Fund hazard mitigation projects or actions in operating budgets to the extent possible.
- Notify other municipalities about grant and other funding opportunities as they arise.
- Use data and maps from this HMP as supporting documentation in grant applications.
- Review mitigation actions when allocating funding for the municipal budgets.
- Include hazard mitigation when updating municipal ordinances.
- Identify hazard areas in updates of the comprehensive plan to identify land use issues.
- Review the HMP prior to land use or zoning changes and permitting or development decisions.

The information on hazards, risk, vulnerability, and mitigation contained in this HMP is based on the best science and technology available at the time of the plan's preparation. Additionally, certain plans (including blueprints) were incorporated directly into this HMP update. All participating jurisdictions recognize that this information can be invaluable in making decisions under other planning programs, such as comprehensive, capital improvement, and emergency management plans. Figure 5-1 illustrates the interrelationships between the HMP, the Alleghenies Ahead Joint Comprehensive Plan, the County EOP, and other community planning mechanisms. Existing processes and programs through which the HMP should be implemented are described below.

Plan participants will make every effort to implement the relevant sections and/or data contained in the HMP and will use administrative, budgetary, and regulatory processes as well as partnerships to the maximum extent, as described below.

Administrative

Administrative processes include departmental or organizational work plans, policies, or procedural changes that can be addressed by the following departments:

- Fulton County Children and Youth Services
- Emergency Management Agency
- Planning and Mapping
- Sheriff's Office

Additional administrative measures may include the creation of paid or unpaid internships to assist in HMP maintenance.

The Fulton County EMA is responsible for preparing and maintaining the County EOP, including a minimum biennial review. Whenever portions of the plan are implemented in an emergency event or training exercise, a review is performed, and changes are made where necessary. The risk assessment information presented in the 2015 HMP was used to update the Hazard Vulnerability Assessment section of the County EOP. The updated risk assessment information will affect subsequent updates to the EOP. Recommended changes to the HMP, based on changes to the EOP, will then be coordinated with the Steering Committee.

The Fulton County Board of Commissioners and each municipality's planning commission is responsible for maintaining and updating Fulton County's Joint Comprehensive Plan, which covers all 13 municipalities.

The administrative practices described above will continue through the development of subsequent Fulton County updates to the regional comprehensive plan using the information in this updated HMP. In return, the Fulton County sections of the regional comprehensive plan, located on the Fulton County Planning Commission's website, was incorporated into multiple aspects of this HMP. Information from the comprehensive plan and other documents was used to formulate the County profile, identify the history of individual hazards, and detail the population projections in Fulton County.

Budgetary Process

In terms of budgetary processes, the County will review capital budgets and, if funding is available, include a line item for mitigation actions. In addition, the County will maximize mitigation aspects of proposed projects and will encourage municipalities to do likewise.

Regulatory Measures

Regulatory measures—such as the creation of executive orders, ordinances, and other directives—will be considered to support hazard mitigation in the following areas:

- Comprehensive Planning – Institutionalize hazard mitigation for new construction and land use.
- Zoning and Ordinances – Enforce higher standards or restrictions in hazard areas. Restrict allowable development in hazard areas.
- Building Codes – Enforce codes or higher standards in hazard areas.
- Capital Improvements Plan – Ensure that the person responsible for projects under this plan evaluates whether new construction is in a high-hazard area (such as a flood plain) so the construction is designed to mitigate the risk. Revise requirements for this plan to include hazard mitigation in the design of new construction.
- NFIP – Continue to participate in this program and explore participation in CRS Program.
- Stormwater Management – Continue to implement stormwater management plans and ordinances. Stormwater management plans/ordinances are developed for nine municipalities with another currently under development.
- HMP Plan Coordination – Review all above-mentioned plans to ensure they are consistent with the HMP before making any formal changes (amendments) to master plans, zoning, ordinances, capital improvement plans, or other mechanisms that control development.

Funding

The County and its jurisdictions will consider multiple grant sources to fund eligible projects. These opportunities may include, but are not limited to:

- Federal
  - Federal Emergency Management Agency (FEMA) Pre-Disaster Mitigation Program (PDM)
  - FEMA Flood Mitigation Assistance Program (FMA)

  - FEMA Hazard Mitigation Grant Program (HMGP) – Stafford Act, Section 404
  - U.S. Department of Housing and Urban Development (HUD) – Community Development Block Grant (CDBG)
  - U.S. Department of Agriculture (USDA) – USDA Community Facilities
  - U.S. Economic Development Administration (EDA) Public Works Program
- Commonwealth
  - Pennsylvania Department of Transportation (PennDOT) Pennsylvania Infrastructure Bank
  - Act 13 Marcellus Shale Legacy Funds – Flood Mitigation Program
  - Growing Greener
- Regional
  - Appalachian Regional Commission
  - Southern Alleghenies Planning and Development Commission
- Nonprofit organizations, foundations, and private sources

Other potential federal funding sources include:

- Stafford Act, Section 406 – Public Assistance Program Mitigation Grants
- Federal Highway Administration
- Catalog of Federal Domestic Assistance
- U.S. Fire Administration – Assistance to Firefighter Grants
- U.S. Small Business Administration Pre- and Post-Disaster Mitigation Loans
- U.S. Department of Economic Development Administration Grants
- U.S. Army Corps of Engineers
- U.S. Department of Interior, Bureau of Land Management
- Other sources as yet to be defined

Partnerships

To provide broader support and understanding of hazard mitigation, opportunities for partnerships will be encouraged, as listed below.

Existing Committees and Councils

- Local Government Committees:
  - Fulton County Agricultural Land Preservation Board (https://conservationtools.org/)
  - Fulton County Conservation District (https://www.fultoncountyconservationdistrict.org/)
  - Fulton Industrial Development Association (http://www.fultonida.com/)
  - Fulton County Housing Authority (https://www.lowincomehousing.us/cty/pa-fulton)
  - Fulton County Local Emergency Planning Committee (https://www.co.fulton.pa.us/lepc.php)

Creative Partnerships for Funding and Incentives

- Public-private partnerships, including utilities and businesses
- State cooperation
- In-kind resources

Working with other Federal and Commonwealth Agencies

- U.S. Army Corps of Engineers (USACE)
- U.S. Department of Agriculture (USDA)

- U.S. Department of Transportation (USDOT)
- U.S. Geological Service (USGS)
- U.S. Department of Homeland Security (DHS)
- Federal Emergency Management Agency (FEMA)
- National Oceanic and Atmosphere Administration (NOAA)
- National Weather Service (NWS)
- Pennsylvania Department of Transportation (PennDOT)
- Pennsylvania Department of Environmental Protection (PA DEP)
- PEMA
- Pennsylvania State Police (PSP)

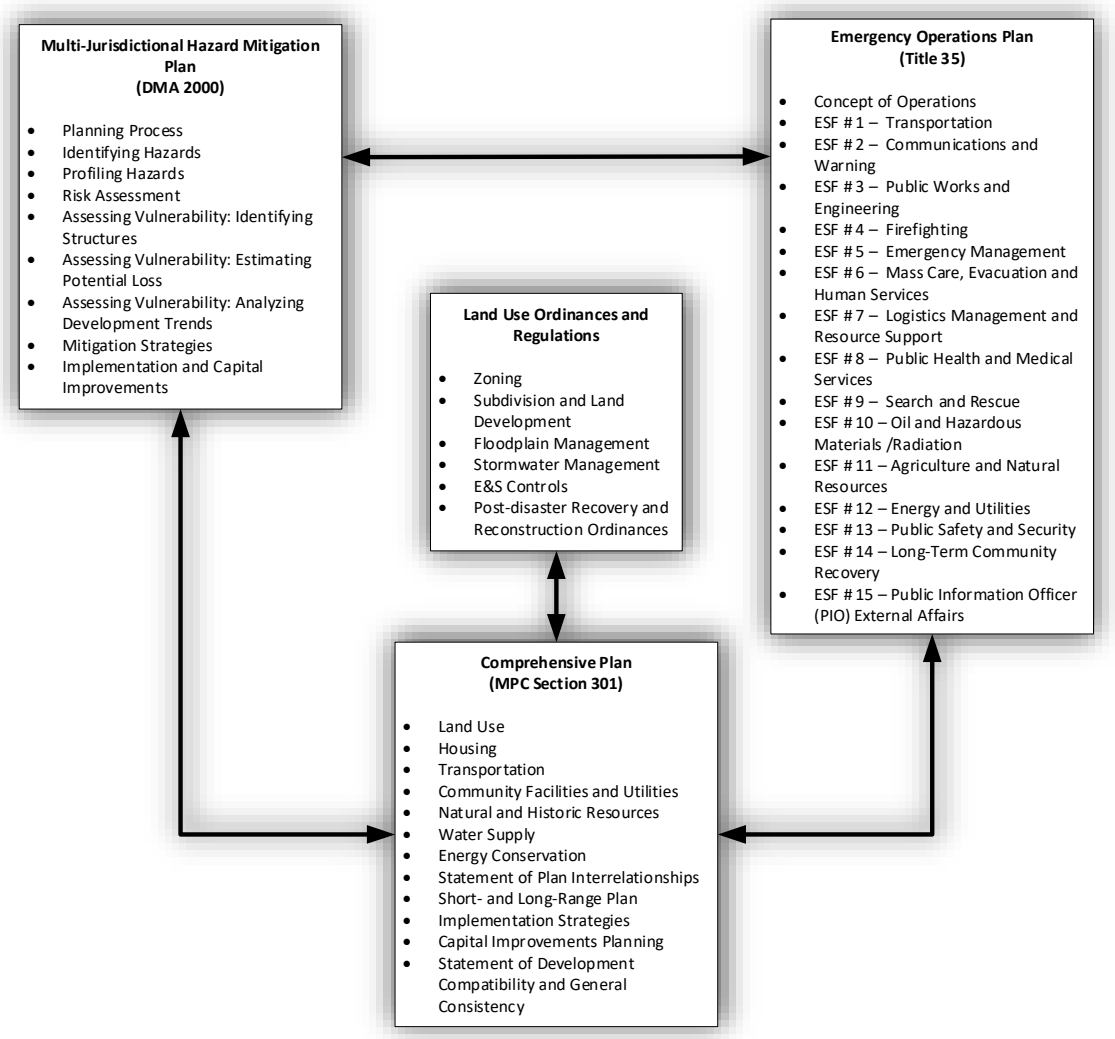
American Red Cross

Watershed Associations

- Chesapeake Bay Foundation (https://www.cbf.org/)
- Susquehanna River Basin Commission (https://www.srbc.net/)
- Potomac Conservancy (https://potomac.org/)

During the plan evaluation process, the Steering Committee will identify additional policies, programs, practices, and procedures that could be modified to accommodate hazard mitigation actions and will include these findings and recommendations in the HMP Progress Report.

Figure 5-1. Plan Interrelationships



Notes:

E&S *Erosion and Sedimentation*

ESF *Emergency support function*

MPC *Municipal Planning Code*

SECTION 6 MITIGATION STRATEGY

This section describes the process by which the Fulton County Planning Team will reduce or eliminate potential losses from the natural and non-natural hazards identified in Section 4.2 of this Hazard Mitigation Plan (HMP). The mitigation strategy focuses on existing and potential future mitigation actions to alleviate the effects of hazards on Fulton County's population, economy, and general building stock.

This section provides a summary of the 2025 HMP update process, outlines the mitigation goals and objectives set forth in the 2025 HMP update, describes the process for identifying and analyzing mitigation techniques, and provides the mitigation action plan.

6.1 UPDATE PROCESS SUMMARY

The goals and objectives listed in the Fulton County HMP were first examined through the dispersal of the Mitigation Strategy 5-Year Plan Review Worksheet (Mitigation Review Worksheet). During the 5-year review, the Planning Team members were afforded the opportunity to comment on the goals, objectives, and actions that were listed in the existing HMP.

The general mitigation planning approach used to develop this plan is based on (1) the Federal Emergency Management Agency (FEMA) publication, "Local Mitigation Planning Handbook" (FEMA 2023), and (2) the Pennsylvania All-Hazard Mitigation Planning Standard Operating Guide (SOG) (PEMA 2020):

1. **Review of Existing Mitigation Plan Goals, Objectives, and Mitigation Action Plan:** Existing mitigation goals and objectives, and the 2020 HMP mitigation actions were first examined at the Planning Team Kick-Off Meeting and revisited during the Mitigation Strategy Workshop. Both of these meetings were open to members of the Planning Team and stakeholders. The Steering Committee thoroughly reviewed and updated the mitigation goals and objectives utilizing the latest information gathered through the hazard profiles, vulnerability assessments, and the risk assessment; the mitigation goals and objectives were also compared to the State HMP goals and objectives. The updated goals and objectives were then presented at the Mitigation Solutions Workshop for final review and approval. Plan participants continued to review and provide progress on the 2020 mitigation actions throughout the planning process.
2. **Develop and Update Mitigation Strategies:** Mitigation actions were identified based on the risk assessment, mitigation goals and objectives, existing policies, and input from the Planning Team and planning partners.
3. **Mitigation Strategy Prioritization and Implementation:** The potential mitigation actions were qualitatively evaluated and are described in more detail in Section 6.4 of this HMP. Mitigation actions were prioritized into three categories: high, medium, and low. High priority and medium priority mitigation actions are recommended for implementation before low priority actions; however, based on county and municipal-specific needs, cost estimation, and available funding, some low priority mitigation actions may be addressed first.
4. **Document the Mitigation Planning Process:** The entire mitigation planning process is documented throughout this HMP, particularly in Section 3.

This section summarizes past mitigation goals and past mitigation action status and provides an update of mitigation strategies and additional past mitigation accomplishments.

6.1.1 Review of the Past Mitigation Goals

The mitigation goals identified in the 2020 version of the HMP are listed below:

- **Goal 1:** Protect the people, property, and environment in hazard areas.

- **Goal 2:** Prevent hazards from impacting the community.
- **Goal 3:** Enhance awareness, understanding, and preparedness among local, county, state, and federal emergency management personnel to protect public health and safety.
- **Goal 4:** Ensure that stakeholder groups have necessary information to mitigate against hazard impacts.

Table 6-1 shows the results of the Steering Committee and Planning Team review of the 2020 goals and objectives. The Steering Committee chose to reorganize the goals and objectives by moving away from organizing them by hazard, to reduce redundancy and overlap. Additional information on the Steering Committee's evaluation of each goal and objective is provided in the table.

Table 6-1. Steering and Planning Team Evaluation of 2020 Goals and Objectives

2020 Fulton County Hazard Mitigation Plan Goals and Objectives		Evaluation
Goal 1	**Protect the people, property, and environment in hazard areas.**	• Carried over into 2025 plan update.
Objective 1.A	Examine property protection measures and their applicability to the community.	• Carried over into 2025 plan update.
Objective 1.B	Protect critical facilities in hazard areas.	• Carried over into 2025 plan update.
Objective 1.C	Acquire, relocate, elevate, and/or retrofit existing structures, including repetitive loss properties, located in hazard areas.	• Carried over into 2025 plan update.
Objective 1.D	Encourage homeowners, renters, and businesses to insure their properties against all hazards, including flood coverage under the National Flood Insurance Program (NFIP).	• Carried over into 2025 plan update.
Objective 1.E	Protect the county's natural resources.	• Carried over into 2025 plan update.
Goal 2	**Prevent hazards from impacting the community.**	• Carried over into 2025 plan update.
Objective 2.A	Work with the municipalities to create and/or update land use regulations (e.g., zoning, subdivision, and land development).	• Carried over into 2025 plan update.
Objective 2.B	Address areas of roadways that are vulnerable to hazard impacts.	• Carried over into 2025 plan update.
Goal 3	**Enhance awareness, understanding, and preparedness among local, county, state, and federal emergency management personnel to protect public health and safety.**	• Carried over into 2025 plan update.
Objective 3.A	Ensure adequate communications capabilities among emergency response organizations.	• Carried over into 2025 plan update.
Objective 3.B	Continue to train municipal Emergency Management Coordinators, relevant personnel, and interested members of the community on hazard protection, preparedness, and response.	• Carried over into 2025 plan update.
Objective 3.C	Ensure adequate water supply to fight urban and wildland fires.	• Carried over into 2025 plan update.
Goal 4	**Ensure that stakeholder groups have necessary information to mitigate against hazard impacts.**	• Carried over into 2025 plan update.
Objective 4.A	Develop public education and outreach programs on hazards and hazard mitigation.	• Carried over into 2025 plan update.

2020 Fulton County Hazard Mitigation Plan Goals and Objectives		Evaluation
Objective 4.B	Educate property owners in hazard-risk areas regarding their risks and the precautions they can take.	• Carried over into 2025 plan update.
Objective 4.C	Encourage residents to implement hazard mitigation and preparedness measures on their properties.	• Carried over into 2025 plan update.

6.1.2 Past Mitigation Action Status and Update of Mitigation Strategies

In the 2020 HMP, Fulton County identified 64 actions and initiatives to support an improved understanding of hazard risk and vulnerability, to enhance mitigation capabilities, and/or to reduce vulnerability of infrastructure. Progress on the 2020 mitigation actions was evaluated during the 2025 update process.

Fulton County, via various representatives on the Steering Committee and Planning Team, was provided with a Mitigation Review Worksheet identifying all of the county and municipal actions and initiatives from the 2020 HMP. The respondents were asked to indicate the status of each action ("No Progress/Unknown," "In Progress/Not Yet Complete," "Continuous," "Completed," or "Discontinued") and provide review comments on each.

The completed Mitigation Action Plan Review Worksheet is provided in Table 6-2. Projects and initiatives identified as "Complete" and "Discontinued" have been removed from this plan update. The actions that the county has identified as "No Progress/Unknown" or "In Progress/Not Yet Complete" have been carried forward in the updated mitigation strategies identified in Table 6-4 (unless otherwise determined by the county to be a discontinued project). Actions from the 2020 HMP that reflect continuously maintaining capabilities have also been removed. The language in some actions being carried over has been adjusted to reflect changes to county needs and capabilities. Some actions were also merged to reduce redundant efforts on behalf of the county and its municipalities.

Table 6-2. Past Mitigation Action Status

Designator	Action	Status	Review Comments
FultonC-1	Acquire vacant, abandoned, or unsafe structures, especially those in hazard areas, and turn into open space.	No status update provided.	
FultonC-2	Educate the designated NFIP Floodplain Administrator and pursue relevant continuing education training such as FEMA Benefit-Cost Analysis.	No status update provided.	
FultonC-3	Work with hazmat facilities to inform them of the hazards they face and ensure emergency plans are current.	No status update provided.	
FultonC-4	Work with police departments in each municipality to ensure their emergency plans are updated, and inform them of the hazard areas in which they are located.	Continuous	
FultonC-5	Work with daycare owners/operators in each municipality to ensure their emergency plans are updated, and inform them of the hazard areas in which they are located.	Continuous	
FultonC-6	Work with schools and school districts to inform them of the hazards they face and ensure emergency plans are current.	Continuous	
FultonC-7	Develop and distribute educational information on hazards and emergency preparedness.	Continuous	
FultonC-8	Partner with community groups and local organizations, including civic, business, town watch, faith-based, senior, special needs and tenant associations, to promote emergency preparedness and mitigation efforts.	Continuous	
FultonC-9	Procure and maintain redundant power sources (portable generators).	Continuous	
FultonC-10	Purchase or relocate structures located in hazard-prone areas to protect structures from future damage, with repetitive loss properties as a priority.	No status update provided.	
FultonC-11	Encourage homeowners to install appropriate devices to alleviate radon concentrations within homes.	No status update provided.	

Designator	Action	Status	Review Comments
FultonC-12	Work with facility operators to protect critical facilities in the wildland-urban interface from wildfires.	No status update provided.	
FultonC-13	Work with facility operators to protect critical facilities in areas prone to sinkholes.	No status update provided.	
FultonC-14	Establish a Firewise Program, especially around the Meadow Grounds Lake, Cowans Gap State Park, and Breezewood Park. Part of this initiative could include visual development of impacted areas, public service announcements, and educational outreach to farmers, hunters, campers, hikers, school children, and homeowners in the Wildland-Urban Interface.	Continuous	
FultonC-15	Evaluate the need for a voluntary animal waste/manure/fertilizer self-reporting program for farmers, CAFO facilities, and other relevant organizations to utilize so that the County can more accurately estimate the amount of hazardous biological waste transported through the County and so that additional mitigation/safety measures may be implemented, if necessary.	No status update provided.	
FultonC-16	Create and maintain a web-based inventory of the County's special needs population to strengthen emergency response and evacuation operations.	No status update provided.	
FultonC-17	Ensure all applicable private industrial, commercial, and public utility service providers have a current Environmental Emergency Response Plan per the Federal Clean Water Act the Pennsylvania Clean Streams Law (35 P.S. §§691.1-691.1001), the Pennsylvania Solid Waste Management Act, the Pennsylvania Storage Tank Act, the Oil Pollution Act, and regulations promulgated thereunder.	No status update provided.	
FultonC-18	Strengthen the County's domestic animal health surveillance by familiarizing the Fulton County agricultural community with the list of reportable diseases and conditions related to animal health per the OIE and the Pennsylvania Domestic Animal Act (Act 100 of 1996).	In Progress	

Designator	Action	Status	Review Comments
FultonC-19	Work with the County's agricultural community to develop and implement the CART to strengthen the County's comprehensive emergency management program	No status update provided.	
FultonC-20	Consider promoting or adopting higher regulatory and zoning standards to manage flood hazard risk	No status update provided.	
FultonC-21	Work with dam owners and the population located downstream about dam failure, particularly for the Meadow Grounds Dam, Cowan's Gap Dam, and Valley-Hi Eagle Lake Dam.	Continuous	
FultonC-22	Educate the public on the hazards they face.	Continuous	
AyrT-1	Identify and implement response to manage stormwater runoff along Route 16, from True Value to Citgo Station.	Completed	PA DOT completed project
AyrT-2	Work with the owner and population downstream of the Meadow Grounds Dam about dam failure.	Completed	Dam has been rebuilt.
BelfastT-1	Assess and determine best action to reduce vulnerability to Hazmat incidents at the Horse Shoe turn on Rt 522.	Continuous	Anti-skid surface on curve.
BelfastT-2	Install a backup generator at the Water Supply Facility.	Completed	Generator installed.
BelfastT-3	Protect Needmore Water Supply to the 0.2% annual chance flood level.	In Progress	Planning for water tank.
BethelT-1	Increase visibility at the intersection of Buck Valley Road and Mays Chapel Road.	No Progress	
BethelT-2	Increase visibility at the intersection of SR-643 and Spring Road.	In Progress	
BethelT-3	Increase visibility at the intersection of Great Cove Road (US-522) and Alpine Road.	In Progress	
BethelT-4	Increase visibility at the intersection of Great Cove Road (US-522) and Bethel Church Road.	Completed	This project was finished in 2024.
BethelT-5	Increase visibility at the intersection of Stoney Break Road and Black Oak Road.	In Progress	
BethelT-6	Protect AT&T Wireless Cell Tower to the 0.2% annual chance flood level.	No Progress	

Designator	Action	Status	Review Comments
BethelT-7	Protect Bethel Township Sewer Authority to the 0.2% annual chance flood level.	No Progress	
BethelT-8	Work with Global Tower Partners to protect the tower in Bethel Township from landslides.	No Progress	
DublinT-1	Research corrective actions needed to improve the condition of Tannery Road Bridge in Dublin Township, and implement appropriate weight limit controls and other follow-up actions.	No status update provided.	
DublinT-2	Conduct intersection improvements at Waterfall Road (S.R. 475) and Battle Ridge Road (T-426).	No status update provided.	
DublinT-3	Install generator and circuit for Township Building.	No status update provided.	
DublinT-4	Obtain an engineering study to redesign the intersection at Taylor Road and Waterfall Road in Dublin Township.	No status update provided.	
LickingcreekT-1	Construct a bridge on Creek Road (T-388) in Licking Creek Township over the Creek fording.	No status update provided.	
LickingcreekT-2	Protect Valley Rural Electric - Route30 Subst to the 0.2% annual chance flood level.	No status update provided.	
LickingcreekT-3	Protect Valley Rural Electric located at 11563 Pleasant Ridge Rd to the 0.2% annual chance flood level.	No status update provided.	
LickingcreekT-4	Reconstruct Mill Road Bridge.	No status update provided.	
TaylorT-1	Conduct intersection improvements and cut the bank back at Frick Road and Waterfall Road.	No status update provided.	
TaylorT-2	Identify and coordinate with PennDOT to implement infrastructure improvements to the two state bridges along 655 between Waterfall Road and Hustontown.	No status update provided.	
TaylorT-3	Protect the Hustontown Pos Office facility to the 0.2% annual chance flood level.	No status update provided.	
TaylorT-4	Protect Valley Rural Electric Clear Ridge Substation to the 0.2% chance annual flood level.	No status update provided.	

Designator	Action	Status	Review Comments
TaylorT-5	Protect the Waterfall Post Office facility to the 0.2% annual chance flood level.	No status update provided.	
ThompsonT-1	Replace the corrugated metal culvert carrying West Orchard Road (T-305) over Ditch Run.	No status update provided.	
ThompsonT-2	Upgrade and realign the intersection of Dent Road (T-343) and Timber Ridge Road (S.R. 2005) to allow for the passage of emergency vehicles.	No status update provided.	
ToddT-1	Assess and determine best action to mitigate flooding and address deficiencies of Narrows Rd Bridge.	Continuous	
ToddT-2	Improve drainage in Coldspring development.	Continuous	
ToddT-3	Improve drainage along Lion's Park Drive.	Continuous	
ToddT-4	Improve drainage along Cloverleaf Court.	No Progress	
ToddT-5	Improve drainage in the Fairgrounds.	No Progress	
ToddT-6	Improve drainage along Lincoln Way West.	No Progress	
ToddT-7	Work with the owner and population downstream of the Cowan's Gap Dam about dam failure.	Continuous	
UnionT-1	Continue to pursue political channels and collaboration with state agencies (e.g., PennDOT) to study and maintain the slide area on T-366 (Old 126).	No status update provided.	
UnionT-2	Maintain and upgrade Bridge No. 3 on Zach's Ridge Road (T-330), as needed.	In Progress	Repairs have begun. Cottles Asphalt Maintenance completed underpinning and scour protection.
UnionT-3	Obtain an engineering study and geological study for repair of Old Rt 126	No status update provided.	
UnionT-4	Replace culvert over Indian Grave Creek.	No status update provided.	
UnionT-5	Conduct intersection improvements at Harmonia Road (S.R. 3002) and Lehman Road (T-308).	No status update provided.	
UnionT-6	Conduct intersection improvements at Harmonia Road (S.R. 3002) and Stahle Road (T-314).	No status update provided.	

Designator	Action	Status	Review Comments
FultonC-23	Work with PennDOT to develop solutions for safety issues caused by the proliferation of driveways on major highways.	No status update provided.	

6.2 MITIGATION GOALS AND OBJECTIVES

This section describes the mitigation goals and objectives set forth in the 2025 HMP update.

6.2.1 2025 Mitigation Goals

The Steering Committee reviewed the 2020 HMP goals to determine their continuing applicability to county mitigation needs and decided to update them. The updated goals and objectives were distributed to the Planning Team at the Mitigation Solutions Workshop. The Planning Team reviewed and approved the updated goals for the 2025 HMP. The 2025 Fulton County HMP goals are in line with the State HMP mitigation goals, embody the overarching needs and concerns of the county and participating municipalities, and address both natural and non-natural hazard risk reduction.

The 2025 Fulton County HMP goals are listed below:

1. **Goal 1:** Protect life, property, the environment, and critical infrastructure from hazard impacts.
2. **Goal 2**: Prevent hazards from impacting the community.
3. **Goal 3**: Maintain and enhance emergency services capabilities in the community**.**
4. **Goal 4**: Ensure that stakeholder groups have necessary information to mitigate against hazard impacts.
5. **Goal 5**: Protect critical infrastructure in hazard areas.
6. **Goal 6:** Reduce the risk of natural hazards for socially vulnerable populations and underserved communities.
7. **Goal 7:** Address long-term vulnerabilities from High Hazard Dams.

6.2.2 2025 Mitigation Objectives

The goals listed above were used to develop relevant objectives. The objectives address the results of the vulnerability assessment in more specific terms and reflect the possible effects that can be mitigated for the identified hazards, as well as existing limitations in available data and information. The objectives that were originally identified during the 2020 HMP update process were reviewed by the Steering Committee and updated to reflect changes in county priorities and capabilities since the HMP was written in 2020. Objectives related to each of the goals are listed below, and Table 6-1 summarizes the evaluation of all goals and objectives from the 2020 HMP.

Goal 1: Protect the people, property, and environment in hazard areas.

Objective 1.A: Examine property protection measures and their applicability to the community.

Objective 1.B: Protect critical facilities in hazard areas.

Objective 1.C: Acquire, relocate, elevate, and/or retrofit existing structures, including repetitive loss properties, located in hazard areas.

Objective 1.D: Encourage homeowners, renters, and businesses to insure their properties against all hazards, including flood coverage under the National Flood Insurance Program (NFIP).

Objective 1.E: Protect the county's natural resources.

Goal 2: Prevent hazards from impacting the community.

Objective 2. A: Work with the municipalities to create and/or update land use regulations (e.g., zoning, subdivision, and land development).

Objective 2. B: Address areas of roadways that are vulnerable to hazard impacts.

Goal 3: Enhance awareness, understanding, and preparedness among local, county, state, and federal emergency management personnel to protect public health and safety.

Objective 3.A: Ensure adequate communications capabilities among emergency response organizations.

Objective 3.B: Continue to train municipal Emergency Management Coordinators, relevant personnel, and interested members of the community on hazard protection, preparedness, and response.

Objective 3.C: Ensure adequate water supply to fight urban and wildland fires.

Goal 4: Ensure that stakeholder groups have necessary information to mitigate against hazard impacts.

Objective 4.A: Develop public education and outreach programs on hazards and hazard mitigation.

Objective 4.B: Educate property owners in hazard-risk areas regarding their risks and the precautions they can take.

Objective 4.C: Encourage residents to implement hazard mitigation and preparedness measures on their properties.

Goal 5: Protect critical infrastructure in hazard areas.

Objective 5.A: Identify the most vulnerable and critical structures and infrastructure due to the effects of natural and human-caused hazards.

Objective 5.B: Protect utilities from natural and human-caused hazards.

Objective 5.C: Enhance planning and mitigation strategy development for high-hazard dams and levees.

Goal 6: **Reduce the risk of natural hazards for socially vulnerable populations and underserved communities**

Objective 6.A: Encourage the establishment of policies to help ensure the prioritization and implementation of mitigation actions and/or projects designed to benefit socially vulnerable populations and underserved communities.

Objective 6.B: Promote sustainable and equitable land development practices that direct future development away from vulnerable areas and, when that is not possible, encourage the use of more resilient design, construction, and materials.

Objective 6.C: Encourage and support multi-jurisdictional mitigation projects that leverage funding and support from multiple levels of government and community organizations.

Goal 7: Address long-term vulnerabilities from High Hazard Dams.

Objective 7.A: Ensure the dam infrastructure is maintained.

Objective 7.B: Support the identification and access to funding to repair/rehabilitate/replace dams.

Objective 7.C: Ensure emergency action plans are developed and updated.

6.3 IDENTIFICATION AND ANALYSIS OF MITIGATION TECHNIQUES

Concerted efforts were made to ensure that the county and its municipalities developed updated mitigation strategies. Updated strategies included activities and initiatives covering the range of mitigation action types described in recent FEMA planning guidance, "Local Mitigation Planning Handbook" (FEMA 2023). Mitigation action types listed in the FEMA guidance include the following:

1. **Local Plans and Regulations:** These actions include government authorities, policies, or codes that influence the way land and buildings are being developed and built.
2. **Structure and Infrastructure Projects:** These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. These project types could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.
3. **Natural Systems Protection:** These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.
4. **Education and Awareness Programs:** These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as NFIP and CRS, StormReady (NOAA), and Firewise (National Fire Protection Association [NFPA]) Communities (FEMA 2013).

The participants of the Mitigation Strategy Workshop and the Planning Team identified actions that relate to the techniques listed above. Table 6-3 identifies which mitigation techniques are applicable for the hazards included in the 2025 HMP. In some cases, the mitigation techniques identified for a particular hazard reflect ongoing mitigation capabilities, not specific projects included in the updated HMP.

Table 6-3. Mitigation Technique Matrix

Hazard	Local Plans and Regulations	Structure and Infrastructure Projects	Natural Systems Protection	Education and Awareness Programs
Dam Failure	X	X	X	X
Drought and Water Supply Deficiencies	X	X		X
Earthquake	X	X		X
Environmental Hazards – Hazardous Materials Releases	X	X	X	X
Environmental Hazards – Oil and Natural Gas Pipelines	X	X	X	X
Flood, Flash Flood, Ice Jam	X	X	X	X
Hailstorm	X	X		X
Landslide	X	X	X	X
Pandemic and Infectious Disease	X	X		X
Radon Exposure	X	X		X
Subsidence, Sinkhole	X	X	X	X
Tornado, Windstorm	X	X		X
Transportation Accident	X	X		X
Utility Interruption	X	X		X
Wildfire	X	X	X	X

Hazard	Local Plans and Regulations	Structure and Infrastructure Projects	Natural Systems Protection	Education and Awareness Programs
Winter Storm	X	X		X

6.4 MITIGATION ACTION PLAN

Representatives from the county and all participating municipalities selected mitigation strategies and initiatives to pursue until the next plan update. These actions also include some actions identified during the 2020 update that are still relevant or in progress. This section describes 2025 mitigation initiatives, mitigation strategy prioritization and implementation, and prioritization of mitigation actions.

6.4.1 2025 Mitigation Initiatives

Table 6-4 summarizes the updated mitigation strategies identified by the county and all municipalities, including the following information:

- Mitigation actions for individual and multiple hazards
- Mitigation action type
- Department or agency primarily responsible for project initiation and/or implementation
- Estimated cost for the mitigation action and identification of known or potential sources of funding
- Implementation schedule
- Implementation priority

The updated mitigation actions were documented using the Mitigation Action Worksheet distributed at the Mitigation Solution Workshop. Refer to Appendix G for a blank version of the Mitigation Action Worksheet. Specific mitigation actions were identified to prevent future losses; however, current funding is not identified for all of these actions at present, but potential funding sources (see Section 5) are indicated to support future implementation.

Likewise, limited information was available for addressing the long-term vulnerability of Fulton County's residents to pandemic and infectious disease. Though many preparedness actions can be identified for addressing that hazard, Fulton County's mitigation strategy includes few actions that specifically address pandemics and infectious disease. The county will continue to research long-term solutions to the risk from pandemic and infectious disease as part of the annual review process.

The county and municipalities have limited resources to take on new responsibilities or projects. The implementation of these mitigation actions is dependent on the approval of the local elected governing body and the ability of the jurisdiction to obtain funding from local or outside sources.

The Planning Team prioritized proposed mitigation actions during the Mitigation Action Worksheet documentation process. In general, mitigation actions ranked as highest priorities should be addressed first within each jurisdiction, depending upon funding. However, medium- or low priority mitigation actions will be considered for implementation as funding becomes available. Therefore, the ranking levels should be considered as a preliminary ranking, which will evolve based on prevailing priorities and discretion of local governments, the public, the Pennsylvania Emergency Management Agency (PEMA), and FEMA as the plan update is implemented.

Table 6-4. Hazard Mitigation Strategy

Note: Some of the identified mitigation initiatives in Table 6-4 are dependent upon available funding (grants and local match availability) and may be modified or omitted at any time based on the occurrence of new hazard events and changes in county or municipal priorities. Actions that have been carried over from the 2017 version of the HMP may have been reworded and given a new initiative designation to conform to current needs and procedures. The countywide actions apply to the county as an entity and participating municipalities. For most countywide actions, the action applies to all participating municipalities.

Designator	Action	Municipality	New or Existing	Hazards	Goals	Lead	Support	Benefits (H, M, L)	Cost (H, M, L or number)	Funding Stream	Timeline	Priority	Mit Cat.
FultonC-1	Acquire vacant, abandoned, or unsafe structures, especially those in hazard areas, and turn into open space.	Fulton County; Ayr Township, Belfast Township, Bethel Township, Brush Creek Township, Dublin Township, Licking Creek Township, McConnellsburg Borough, Taylor Township, Thompson Township, Todd Township, Union Township Valley-Hi Borough, Wells Township	Existing	Flood, Flash Flood, and Ice Jams; Landslide; Subsidence and Sinkholes; Wildfire; Dam Failure; Environmental Hazards	2	EMA	Municipal EMCs	High	High	FEMA HMGP, PDM, FMA; PA DCED FMP	Long	Medium	NSP
FultonC-2	Educate the designated NFIP Floodplain Administrator and pursue relevant continuing education training such as FEMA Benefit-Cost Analysis.	Fulton County; Ayr Township, Belfast Township, Bethel Township, Brush Creek Township, Dublin Township, Taylor Township	N/A	Flood, Flash Flood, and Ice Jams	2	Municipal FPA		Medium	Low	Operating Budget	Short	Low	LPR
FultonC-3	Work with hazmat facilities to inform them of the hazards they face and ensure emergency plans are current.	Fulton County; Ayr Township, Brush Creek Township, Dublin Township, Licking Creek Township, McConnellsburg Borough, Taylor Township, Todd Township	N/A	All hazards	2	LEPC	County DPS and Municipal EMCs	High	Medium	Act 165 Funds	Short	High	LPR
FultonC-4	Work with police departments in each municipality to ensure their emergency plans are updated, and inform them of the hazard areas in which they are located.	Fulton County; Ayr Township, Belfast Township, Bethel Township, Brush Creek Township, Dublin Township, Licking Creek Township, McConnellsburg Borough, Taylor Township, Thompson Township, Todd Township, Union Township, Wells Township	N/A	All hazards	2	EMA		High	Medium	Operating Budget	Short	Low	LPR
FultonC-5	Work with daycare owners/operators in each municipality to ensure their emergency plans are updated, and inform them of the hazard areas in which they are located.	Fulton County; Todd Township	N/A	All hazards	2,5,6	Municipal EMCs		High	Medium	Operating Budget	Short	Low	LPR
FultonC-6	Work with schools and school districts to inform them of the hazards they face and ensure emergency plans are current.	Fulton County; Belfast Township, Bethel Township, McConnellsburg Borough, Taylor Township	N/A	All hazards	2	EMA	Municipal EMCs	High	Medium	Operating Budget	Short	High	LPR
FultonC-7	Develop and distribute educational information on hazards and emergency preparedness.	Fulton County; Ayr Township, Belfast Township, Bethel Township, Brush Creek Township, Dublin Township, Licking Creek Township, McConnellsburg Borough, Taylor Township, Thompson Township, Todd Township, Union Township, Valley-Hi Borough, Wells Township	N/A	All hazards	2	Municipality		Medium	Low	Operating Budget	Short	Medium	LPR
FultonC-8	Partner with community groups and local organizations, including civic, business, town watch, faith-based, senior, special needs and tenant associations, to promote emergency preparedness and mitigation efforts.	Fulton County; Ayr Township, Belfast Township, Bethel Township, Brush Creek Township, Dublin Township, Licking Creek Township, McConnellsburg Borough, Taylor Township,	New	All hazards	2,4,6	County EMA	Municipal EMCs	Medium	Low	Operating Budget	Short	Medium	EAP

Designator	Action	Municipality	New or Existing	Hazards	Goals	Lead	Support	Benefits (H, M, L)	Cost (H, M, L or number)	Funding Stream	Timeline	Priority	Mit Cat.
		Thompson Township, Todd Township, Union Township, Valley-Hi Borough, Wells Township											
FultonC-9	Procure and maintain redundant power sources (portable generators).	Fulton County; Ayr Township, Belfast Township, Bethel Township, Brush Creek Township, Dublin Township, Licking Creek Township, McConnellsburg Borough, Taylor Township, Thompson Township, Todd Township, Union Township, Valley-Hi Borough, Wells Township	New	Tornado, Windsorm, Winter Storm	2	DPW	Municipal EMC	High	Medium	FEMA HMGP, PDM; RACP	Short	Medium	SIP
FultonC-10	Purchase or relocate structures located in hazard-prone areas to protect structures from future damage, with repetitive loss properties as a priority.	Fulton County; Ayr Township, Belfast Township, Bethel Township, Brush Creek Township, Dublin Township, Licking Creek Township, McConnellsburg Borough, Taylor Township, Thompson Township, Todd Township, Union Township, Valley-Hi Borough, Wells Township	Existing	All hazards	2	Municipal CEO	Municipal FPAs	High	High	FEMA HMGP, PDM; RACP	Long	High	SIP
FultonC-11	Encourage homeowners to install appropriate devices to alleviate radon concentrations within homes.	Fulton County; Ayr Township, Belfast Township, Bethel Township, Brush Creek Township, Dublin Township, Licking Creek Township, McConnellsburg Borough, Taylor Township, Thompson Township, Todd Township, Union Township, Valley-Hi Borough, Wells Township	N/A	Radon Exposure	3,4	EMA	Municipal CEOs, EMCs	Medium	Low	Operating Budget	Short	Low	EAP
FultonC-12	Work with facility operators to protect critical facilities in the wildland-urban interface from wildfires.	Fulton County; Ayr Township, Belfast Township, Bethel Township, Brush Creek Township, Dublin Township, Licking Creek Township, McConnellsburg Borough, Taylor Township, Thompson Township, Todd Township, Union Township, Valley-Hi Borough, Wells Township	Existing	Wildfires	3,5	Municipality EMCs		High	Medium	Operating Budget	Short	High	NSP
FultonC-13	Work with facility operators to protect critical facilities in areas prone to sinkholes.	Fulton County; Ayr Township, Belfast Township, Bethel Township, Brush Creek Township, Dublin Township, McConnellsburg Borough, Todd Township, Valley-Hi Borough, Wells Township	Existing	Sinkholes	3,5	Municipality EMCs		High	Medium	Operating Budget	Short	High	SIP
FultonC-14	Establish a Firewise Program, especially around the Meadow Grounds Lake, Cowans Gap State Park, and Breezewood Park. Part of this initiative could include visual development of impacted areas, public service announcements, and educational outreach to farmers, hunters, campers, hikers, school children, and homeowners in the Wildland-Urban Interface.	Fulton County; Ayr Township, Belfast Township, Bethel Township, Brush Creek Township, Dublin Township, Licking Creek Township, McConnellsburg Borough, Taylor Township, Thompson Township, Todd	New	All hazards	3,4	County EMA	PA DCNR	Medium	Low	Operating Budget	Short	Medium	EAP

Designator	Action	Municipality	New or Existing	Hazards	Goals	Lead	Support	Benefits (H, M, L)	Cost (H, M, L or number)	Funding Stream	Timeline	Priority	Mit Cat.
		Township, Union Township Valley-Hi Borough, Wells Township											
FultonC-15	Evaluate the need for a voluntary animal waste/manure/fertilizer self-reporting program for farmers, CAFO facilities, and other relevant organizations to utilize so that the County can more accurately estimate the amount of hazardous biological waste transported through the County and so that additional mitigation/safety measures may be implemented, if necessary.	Fulton County; Ayr Township, Belfast Township, Bethel Township, Brush Creek Township, Dublin Township, Licking Creek Township, McConnellsburg Borough, Taylor Township, Thompson Township, Todd Township, Union Township Valley-Hi Borough, Wells Township	N/A	All hazards	3	Planning and Mapping	The PSU Cooperative Extension	Medium	Low	Operating Budget	Short	Medium	EAP
FultonC-16	Create and maintain a web-based inventory of the County's special needs population to strengthen emergency response and evacuation operations.	Fulton County; Ayr Township, Belfast Township, Bethel Township, Brush Creek Township, Dublin Township, Licking Creek Township, McConnellsburg Borough, Taylor Township, Thompson Township, Todd Township, Union Township Valley-Hi Borough, Wells Township	N/A	All hazards	3	EMA		Medium	Low	Operating Budget	Short	Medium	LPR
FultonC-17	Ensure all applicable private industrial, commercial, and public utility service providers have a current Environmental Emergency Response Plan per the Federal Clean Water Act the Pennsylvania Clean Streams Law (35 P.S. §§691.1-691.1001), the Pennsylvania Solid Waste Management Act, the Pennsylvania Storage Tank Act, the Oil Pollution Act, and regulations promulgated thereunder.	Fulton County; Ayr Township, Belfast Township, Bethel Township, Brush Creek Township, Dublin Township, Licking Creek Township, McConnellsburg Borough, Taylor Township, Thompson Township, Todd Township, Union Township Valley-Hi Borough, Wells Township	N/A	All hazards	3	LEPC	EMA; Fire Departments	Low	Low	Act 165 Funds; Operating Budget	Short	Low	LPR
FultonC-18	Strengthen the County's domestic animal health surveillance by familiarizing the Fulton County agricultural community with the list of reportable diseases and conditions related to animal health per the OIE and the Pennsylvania Domestic Animal Act (Act 100 of 1996).	Fulton County; Ayr Township, Belfast Township, Bethel Township, Brush Creek Township, Dublin Township, Licking Creek Township, McConnellsburg Borough, Taylor Township, Thompson Township, Todd Township, Union Township Valley-Hi Borough, Wells Township	Existing	Environmental Hazards	3,4	Planning and Mapping	The PSU Cooperative Extension	Medium	Low	Operating Budge;USDA grants	Short	Low	EAP
FultonC-19	Work with the County's agricultural community to develop and implement the CART to strengthen the County's comprehensive emergency management program	Fulton County; Ayr Township, Belfast Township, Bethel Township, Brush Creek Township, Dublin Township, Licking Creek Township, McConnellsburg Borough, Taylor Township, Thompson Township, Todd Township, Union Township Valley-Hi Borough, Wells Township	N/A	All hazards	3	Planning and Mapping	The PSU Cooperative Extension	Medium	Low	Operating Budget	Short	Low	LPR
FultonC-20	Consider promoting or adopting higher regulatory and zoning standards to manage flood hazard risk	Fulton County; Ayr Township, Belfast Township, Bethel Township, Brush Creek Township, Dublin Township, Licking Creek Township, McConnellsburg	N/A	Flood, Flash Flood, and Ice Jams	3	Municipal FPA's	Municipal CEOs	Medium	Low	Operaing Budget	Short	Low	LPR

Designator	Action	Municipality	New or Existing	Hazards	Goals	Lead	Support	Benefits (H, M, L)	Cost (H, M, L or number)	Funding Stream	Timeline	Priority	Mit Cat.
		Borough, Taylor Township, Thompson Township, Todd Township, Union Township Valley-Hi Borough, Wells Township											
FultonC-21	Work with dam owners and the population located downstream about dam failure, particularly for the Meadow Grounds Dam, Cowan's Gap Dam, and Valley-Hi Eagle Lake Dam.	Fulton County; Ayr Township, Bethel Township, Dublin Township, Todd Township, Valley-Hi Borough	Existing	Flood, Flash Flood, and Ice Jams; Dam Failure	3,4,7	EMA	Dam facility owners	Medium	Low	Operating Budget	Short	Low	EAP
FultonC-22	Educate the public on the hazards they face.	Fulton County; Ayr Township, Belfast Township, Bethel Township, Brush Creek Township, Dublin Township, Licking Creek Township, McConnellsburg Borough, Taylor Township, Thompson Township, Todd Township, Union Township Valley-Hi Borough, Wells Township	Existing	All hazards	3	Municipal EMCs		Low	Low	Operating Budget	short	Low	EAP
FultonC-23	Work with PennDOT to develop solutions for safety issues caused by the proliferation of driveways on major highways.	Fulton County; Ayr Township; Belfast Township; Bethel Township; Brush Creek Township; Dublin Township; Licking Creek Township; McConnellsburg Borough; Todd Township	Existing	Transportation Accident	3	EMA	Municipal DPW; PENNDOT	Medium	Low	Operating Budget; PENNDOT	Short	High	LPR
FultonC-24	In order to mitigate the risk of flooding in inundation zones, especially in the event of a dam failure, it is crucial to implement comprehensive flood protection measures. These measures include the construction of berms, floodwalls, and floodproofing of buildings and infrastructure. These flood protection measures are essential to safeguard lives and property, enhance community resilience, and reduce vulnerability to flooding. This is particularly important in case of dam failure, which can lead to catastrophic flooding in downstream areas.	Fulton County; Ayr Township, Bethel Township, Dublin Township, Todd Township, Valley-Hi Borough	Existing	Flood, Flash Flood, and Ice Jams; Dam Failure	3	EMA	Dam facility owners	Medium	Low	Operating Budget	Short	Low	SIP
BelfastT-1	Assess and determine best action to reduce vulnerability to Hazmat incidents at the Horse Shoe turn on Rt 522.	Belfast Township	Existing	Transportation Accident	3	Planning and Mapping	PENNDOT; LEPC	Medium	Low	Hazard Mitigation grants	Short	Medium	SIP
BelfastT-2	Protect Needmore Water Supply to the 0.2% annual chance flood level.	Belfast Township	Existing	Flood, Flash Flood, and Ice Jams	3	DPW	FPA, Municipal EMC	High	High	FEMA HMGP, PDM, FMA; PA DCED FMP	Short	High	SIP
BethelT-1	Increase visibility at the intersection of Buck Valley Road and Mays Chapel Road.	Bethel Township	Existing	Transportation Accident	3	DPW	PENNDOT	High	High	TIP; PENNDOT	Long	Medium	SIP
BethelT-2	Increase visibility at the intersection of SR-643 and Spring Road.	Bethel Township	Existing	Transportation Accident	3	DPW	PENNDOT	High	High	TIP; PENNDOT	Long	Medium	SIP
BethelT-3	Increase visibility at the intersection of Great Cove Road (US-522) and Alpine Road.	Bethel Township	Existing	Transportation Accident	3	DPW	PENNDOT	High	High	TIP; PENNDOT	Long	Medium	SIP
BethelT-4	Increase visibility at the intersection of Stoney Break Road and Black Oak Road.	Bethel Township	Existing	Transportation Accident	3	DPW	PENNDOT	High	High	TIP; PENNDOT	Long	Medium	SIP
BethelT-5	Protect AT&T Wireless Cell Tower to the 0.2% annual chance flood level.	Bethel Township	Existing	Flood, Flash Flood, and Ice Jams	3	Manor Borough PD		High	High	FEMA HMGP, PDM, FMA; PA DCED FMP, Sewer Grant; Sewer Fees	Short	Medium	SIP

Designator	Action	Municipality	New or Existing	Hazards	Goals	Lead	Support	Benefits (H, M, L)	Cost (H, M, L or number)	Funding Stream	Timeline	Priority	Mit Cat.
BethelT-6	Protect Bethel Township Sewer Authority to the 0.2% annual chance flood level.	Bethel Township	Existing	Flood, Flash Flood, and Ice Jams	3	DPW	Municipal FPA	High	Medium	FEMA HMGP, PDM; Operating Budget	Short	High	SIP
BethelT-7	Work with Global Tower Partners to protect the tower in Bethel Township from landslides.	Bethel Township	Existing	Landslides	3	DPW	FPA, Municipal EMC	High	High	FEMA HMGP, PDM, FMA; PA DCED FMP; Sewer Fees	Short	High	SIP
DublinT-1	Research corrective actions needed to improve the condition of Tannery Road Bridge in Dublin Township, and implement appropriate weight limit controls and other follow-up actions.	Dublin Township	Existing	Transportation Accident	3	DPW	Municipal EMC	Medium	Medium	FEMA HMGP, PDM, FMA; PA DCED FMP; Operating Budget	Short	Medium	SIP
DublinT-2	Conduct intersection improvements at Waterfall Road (S.R. 475) and Battle Ridge Road (T-426).	Dublin Township	Existing	Transportation Accident	3	DPW	PENNDOT	High	High	TIP; PENNDOT	Long	Medium	SIP
DublinT-3	Install generator and circuit for Township Building.	Dublin Township	New	Tornado, Windstorm, Winter Storm	3	DPW		Medium	Medium	Hazard Mitigation grants	Short	High	SIP
DublinT-4	Obtain an engineering study to redesign the intersection at Taylor Road and Waterfall Road in Dublin Township.	Dublin Township	Existing	Transportation Accident	3	DPW	PENNDOT	Medium	Medium	TIP; PENNDOT	Short	Medium	SIP
LickingcreekT-1	Construct a bridge on Creek Road (T-388) in Licking Creek Township over the Creek fording.	Licking Creek Township	Existing	Flood, Flash Flood, and Ice Jams	3	DPW		High	High	FEMA HMGP, PDM, FMA; PA DCED FMP; Operating Budget	Long	Low	SIP
LickingcreekT-2	Protect Valley Rural Electric - Route30 Subst to the 0.2% annual chance flood level.	Licking Creek Township	Existing	Flood, Flash Flood, and Ice Jams	3,5	DPW	FPA, Municipal EMC	High	High	FEMA HMGP, PDM; Operating Budget	Long	High	SIP
LickingcreekT-3	Protect Valley Rural Electric located at 11563 Pleasant Ridge Rd to the 0.2% annual chance flood level.	Licking Creek Township	Existing	Flood, Flash Flood, and Ice Jams	3,5	DPW	FPA, Municipal EMC	High	High	FEMA HMGP, PDM, FMA; PA DCED FMP, Sewer Grant; Sewer Fees	Short	High	SIP
LickingcreekT-4	Reconstruct Mill Road Bridge.	Licking Creek Township	Existing	Flood, Flash Flood, and Ice Jams	3	DPW		High	High	FEMA HMGP, PDM, FMA; PA DCED FMP; Operating Budget	Long	Low	SIP
TaylorT-1	Conduct intersection improvements and cut the bank back at Frick Road and Waterfall Road.	Taylor Township	Existing	Transportation Accident	3	DPW	PENNDOT	High	High	TIP; PENNDOT	Long	Medium	SIP
TaylorT-2	Identify and coordinate with PennDOT to implement infrastructure improvements to the two state bridges along 655 between Waterfall Road and Hustontown.	Taylor Township	Existing	Flood, Flash Flood, and Ice Jams	3	DPW		High	High	FEMA HMGP, PDM, FMA; PA DCED FMP; Operating Budget	Long	Low	SIP
TaylorT-3	Protect the Hustontown Pos Office facility to the 0.2% annual chance flood level.	Taylor Township	Existing	Flood, Flash Flood, and Ice Jams	3	DPW	USPS; FPA, Municipal EMC	High	High	FEMA HMGP, PDM, FMA, PA DCED	Short	High	SIP
TaylorT-4	Protect Valley Rural Electric Clear Ridge Substation to the 0.2% chance annual flood level.	Taylor Township	Existing	Flood, Flash Flood, and Ice Jams	3	Municipal FPA	Municipal EMC	High	High	FEMA HMGP, PDM, FMA;	Short	High	SIP

Designator	Action	Municipality	New or Existing	Hazards	Goals	Lead	Support	Benefits (H, M, L)	Cost (H, M, L or number)	Funding Stream	Timeline	Priority	Mit Cat.
										PA DCED FMP			
TaylorT-5	Protect the Waterfall Post Office facility to the 0.2% annual chance flood level.	Taylor Township	Existing	Flood, Flash Flood, and Ice Jams	3	DPW	USPS; FPA, Municipal EMC	High	High	FEMA HMGP, PDM, FMA; PA DCED FMP	Short	High	SIP
TaylorT-6	Improve drainage and pipes on Iron Bridge Road	Taylor Township	Existing	Flood, Flash Flood, and Ice Jams	3	DPW		Medium	Medium	FEMA HMGP, PDM, FMA; PA DCED FMP	Short	Low	SIP
ThompsonT-1	Replace the corrugated metal culvert carrying West Orchard Road (T-305) over Ditch Run.	Thompson Township	Existing	Flood, Flash Flood, and Ice Jams	3	DPW		Medium	Medium	FEMA HMGP, PDM, PA DCED FMP; Capital Improvement Budget	Short	Low	SIP
ThompsonT-2	Upgrade and realign the intersection of Dent Road (T-343) and Timber Ridge Road (S.R. 2005) to allow for the passage of emergency vehicles.	Thompson Township	Existing	All hazards	3	DPW		Medium	Medium	FEMA HMGP, PDM, PA DCED FMP; Capital Improvement Budget	Short	Medium	SIP
ToddT-1	Assess and determine best action to mitigate flooding and address deficiencies of Narrows Rd Bridge.	Todd Township	Existing	Flood, Flash Flood, and Ice Jams; Transportation Accidents	3	DPW	Inspection Report	Medium	Medium	FEMA HMGP, PDM, FMA; PA DCED FMP; Capital Improvement Budget	Short	Low	SIP
ToddT-2	Improve drainage in Coldspring development.	Todd Township	Existing	Flood, Flash Flood, and Ice Jams	3	DPW		Medium	Medium	FEMA HMGP, PDM, FMA; PA DCED FMP; Capital Improvement Budget	Short	High	SIP
ToddT-3	Improve drainage along Lion's Park Drive.	Todd Township	Existing	Flood, Flash Flood, and Ice Jams	3	DPW		Medium	Medium	FEMA HMGP, PDM, FMA; PA DCED FMP; Capital Improvement Budget	Short	High	SIP
ToddT-4	Improve drainage along Cloverleaf Court.	Todd Township	Existing	Flood, Flash Flood, and Ice Jams	3	DPW		Medium	Medium	FEMA HMGP, PDM, FMA; PA DCED FMP; Capital Improvement Budget	Short	High	SIP
ToddT-5	Improve drainage in the Fairgrounds.	Todd Township	Existing	Flood, Flash Flood, and Ice Jams	3	DPW		Medium	Medium	FEMA HMGP, PDM, FMA; PA DCED FMP; Capital Improvement Budget	Short	High	SIP
ToddT-6	Improve drainage along Lincoln Way West.	Todd Township	Existing	Flood, Flash Flood, and Ice Jams	3	DPW		Medium	Medium	FEMA HMGP, PDM, FMA; PA DCED FMP; Capital	Short	High	SIP

Designator	Action	Municipality	New or Existing	Hazards	Goals	Lead	Support	Benefits (H, M, L)	Cost (H, M, L or number)	Funding Stream	Timeline	Priority	Mit Cat.
										Improvement Budget			
ToddT-7	Work with the owner and population downstream of the Cowan's Gap Dam about dam failure.	Todd Township	Existing	Flood, Flash Flood, and Ice Jams; Dam Failure	3,4,5,7	DPW	Dam facility owner	Medium	Low	Operating Budget	Short	Low	EAP
UnionT-1	Continue to pursue political channels and collaboration with state agencies (e.g., PennDOT) to study and maintain the slide area on T-366 (Old 126).	Union Township	Existing	Landslides	3,4	Municipal CEO	Penndot, PEMA	Medium	Low	Operating Budget	Short	Medium	EAP
UnionT-2	Maintain and upgrade Bridge No. 3 on Zach's Ridge Road (T-330), as needed.	Union Township	Existing	Flood, Flash Flood, and Ice Jams	3	DPW		High	High	FEMA HMGP, PDM, FMA; PA DCED FMP; Operating Budget	Long	Low	SIP
UnionT-3	Obtain an engineering study and geological study for repair of Old Rt 126	Union Township	Existing	Landslides	3	DPW	PENNDOT	High	High	PennDOT, mitigation grants	Medium	Medium	SIP
UnionT-4	Replace culvert over Indian Grave Creek.	Union Township	Existing	Flood, Flash Flood, and Ice Jams	3	DPW	Municipal FPA	Medium	High	FEMA HMGP, PDM, FMA; PA DCED FMP; Operating Budget	Short	Low	SIP
UnionT-5	Conduct intersection improvements at Harmonia Road (S.R. 3002) and Lehman Road (T-308).	Union Township	Existing	Transportation Accident	3	DPW	PENNDOT	High	High	TIP; PENNDOT	Long	Medium	SIP
UnionT-6	Conduct intersection improvements at Harmonia Road (S.R. 3002) and Stahle Road (T-314).	Union Township	Existing	Transportation Accident	3	DPW	PENNDOT	High	High	TIP; PENNDOT	Long	Medium	SIP

Notes:

** The letters associated with the initiative number indicate the lead agency (i.e., county or municipality)*
*** Does this mitigation initiative reduce the effects of hazards on new and/or existing buildings and/or infrastructure? Not applicable (N/A) is inserted if this does not apply.*

EMA = Emergency Management Agency
EMS = Emergency Medical Services
FEMA = Federal Emergency Management Agency
FPA = Floodplain Administrator
PA DEP = Pennsylvania Department of Environmental Protection
PDM = Pre-Disaster Mitigation Program
PEMA = Pennsylvania Emergency Management Agency
WWTP = Wastewater Treatment Plant

Costs:
These rough estimates should be used where actual project costs cannot reasonably be established at this time:
Low = < $10,000
Medium = $10,000 to $100,000
High = > $100,000

DOF = Depending on funding
HMGP = Hazard Mitigation Grant Program

Timeline:
Short Term = 1 to 5 years. Long Term = 5 years or greater.

Mitigation Category:

- Education and Awareness Programs (EAP) - Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady and Firewise Communities.
- Local Plans and Regulations (LPR) - Actions include government authorities, policies, or codes that influence the way land and buildings are being developed and built.
- Natural Systems Protection (NSP) - Actions that minimize damage and losses, and also preserve or restore the functions of natural systems.
- Structure and Infrastructure Project (SIP) - Actions that involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.

6.4.2 Mitigation Strategy Prioritization and Implementation

Section 201.6(c) (3) (iii) of Title 44 Code of Federal Regulations (44 CFR) requires the prioritization of the action plan to emphasize the extent to which benefits are maximized according to a cost-benefit review of the proposed projects and their associated costs. This allows the jurisdictions to select the most cost-effective actions for implementation first, not only to use resources efficiently, but also to make a realistic start toward mitigating risks.

Mitigation benefits are defined as future damages and losses that would be eliminated and/or reduced by implementing the proposed mitigation project, and include physical damage to structures and infrastructure, loss of service or function, and emergency management costs. Particularly for physical ("shovel-in-the-ground") mitigation projects, jurisdictions were encouraged to estimate project costs as well as to identify the anticipated benefits. Where exact project costs and potential benefits were not available, ranges were identified (high, medium, low) for each, allowing a qualitative evaluation of project cost-effectiveness.

PEMA has developed a mitigation actions evaluation and prioritization process to provide a consistent, uniform approach for counties and jurisdictions to use to consider, in a systematic way, the best mitigation strategies for their communities (PEMA 2020). Jurisdictions first evaluate feasibility of mitigation actions by using the following ten evaluation criteria:

- **Life Safety:** The Planning Team assesses to what extent a mitigation action will protect individuals from being injured or killed by a hazard.
- **Property Protection:** The Planning Team assesses to what extent the action will protect property, including homes, businesses, and critical infrastructure.
- **Technical:** It is important to determine whether the proposed action is technically feasible, will help to reduce losses in the long term, and has minimal secondary impacts. Here, the Planning Team determines whether the alternative action is a whole or partial solution, or not a solution at all.
- **Political:** Understanding current opinions of community and state political leadership regarding issues related to the environment, economic development, safety, and emergency management will provide valuable insight into the level of political support offered for mitigation activities and programs. Proposed mitigation objectives sometimes fail because of a lack of political acceptability.
- **Legal:** Without the appropriate legal authority, the action cannot lawfully be undertaken. When considering this criterion, the Planning Team determines whether a jurisdiction has the legal authority at the state, tribal, or local level to implement the action, or whether the jurisdiction must pass new laws or regulations. Each level of government operates under a specific source of delegated authority. As a general rule, most local governments operate under enabling legislation that gives them the power to engage in different activities. Jurisdictions should identify the unit of government undertaking the mitigation action and include an analysis of the inter-relationships between local, regional, state, and federal governments. Legal authority is likely to have a significant role later in the process when the state, tribe, or community determines the ways in which mitigation activities can best be carried out, and the extent to which mitigation policies and programs can be enforced.
- **Environmental:** Impact on the environment is an important consideration because of public desire for sustainable and environmentally healthy communities. In addition, many statutory considerations, such as the National Environmental Policy Act (NEPA), should be counted when using federal funds. Jurisdictions need to evaluate whether, when implementing mitigation actions, the potential negative consequences to environmental assets such as threatened and endangered species, wetlands, and other protected natural resources.
- **Social:** The public must support the overall implementation strategy and specific mitigation actions. Therefore, the projects have to be evaluated in terms of community acceptance. Likewise, the Planning Team should determine if implementing a mitigation action will have a beneficial or negative effect on a particular segment of the population.

- **Administrative:** Under this part of the evaluation criteria, the Planning Team examines the anticipated staffing, funding, and maintenance requirements for the mitigation action to determine whether the jurisdiction has the personnel and administrative capabilities necessary to implement the action or whether outside help will be necessary.
- **Local Champion:** Having an individual who will lead the implementation of a project, particularly a complex project, is essential for implementing it.
- **Other Community Objectives:** The Planning Team evaluates to what extent implementing the mitigation action supports other community objectives, such as increasing parks and recreation, quality of life, and economic development.

Table 6-5 shows the feasibility evaluation for each identified mitigation action. For each criterion, how feasible or effective the action is in the above criteria was indicated with a "+" (highly effective or feasible), "N" (neutral or not applicable), or a "-" (ineffective or not feasible). All actions were deemed feasible.

Table 6-5. Evaluation of Mitigation Actions

Designator	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
FultonC-1	Acquire vacant, abandoned, or unsafe structures, especially those in hazard areas, and turn into open space.	0	1	1	1	0	0	1	1	0	1	(6) + (4) N (0) -
FultonC-2	Educate the designated NFIP Floodplain Administrator and pursue relevant continuing education training such as FEMA Benefit-Cost Analysis.	0	0	1	1	1	0	1	1	0	0	(5) + (5) N (0) -
FultonC-3	Work with hazmat facilities to inform them of the hazards they face and ensure emergency plans are current.	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -
FultonC-4	Work with police departments in each municipality to ensure their emergency plans are updated, and inform them of the hazard areas in which they are located.	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -
FultonC-5	Work with daycare owners/operators in each municipality to ensure their emergency plans are updated, and inform them of the hazard areas in which they are located.	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -

Designator	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
FultonC-6	Work with schools and school districts to inform them of the hazards they face and ensure emergency plans are current.	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -
FultonC-7	Develop and distribute educational information on hazards and emergency preparedness.	0	1	1	1	1	0	1	1	0	0	(6) + (4) N (0) -
FultonC-8	Partner with community groups and local organizations, including civic, business, town watch, faith-based, senior, special needs and tenant associations, to promote emergency preparedness and mitigation efforts.	0	1	1	1	1	0	1	1	0	0	(6) + (4) N (0) -
FultonC-9	Procure and maintain redundant power sources (portable generators).	1	1	1	1	1	0	1	0	0	1	(7) + (3) N (0) -
FultonC-10	Purchase or relocate structures located in hazard-prone areas to protect structures from future damage, with repetitive loss properties as a priority.	1	1	1	1	1	0	-1	0	0	1	(6) + (3) N (1) -

Designator	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
FultonC-11	Encourage homeowners to install appropriate devices to alleviate radon concentrations within homes.	1	0	1	1	1	1	0	0	1	0	(5) + (4) N (0) -
FultonC-12	Work with facility operators to protect critical facilities in the wildland-urban interface from wildfires.	1	1	1	1	1	0	1	1	1	0	(8) + (2) N (0) -
FultonC-13	Work with facility operators to protect critical facilities in areas prone to sinkholes.	1	1	1	1	1	0	1	1	1	0	(8) + (2) N (0) -
FultonC-14	Establish a Firewise Program, especially around the Meadow Grounds Lake, Cowans Gap State Park, and Breezewood Park. Part of this initiative could include visual development of impacted areas, public service announcements, and educational outreach to farmers, hunters, campers, hikers, school children, and homeowners in the Wildland-Urban Interface.	0	1	1	1	1	0	1	1	0	0	(6) + (4) N (0) -
FultonC-15	Evaluate the need for a voluntary animal waste/manure/fertilizer self-	0	0	1	1	1	1	1	1	0	0	(6) + (3) N (0) -

Designator	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
	reporting program for farmers, CAFO facilities, and other relevant organizations to utilize so that the County can more accurately estimate the amount of hazardous biological waste transported through the County and so that additional mitigation/safety measures may be implemented, if necessary.											
FultonC-16	Create and maintain a web-based inventory of the County's special needs population to strengthen emergency response and evacuation operations.	1	0	1	1	1	0	1	1	0	0	(5) + (4) N (0) -
FultonC-17	Ensure all applicable private industrial, commercial, and public utility service providers have a current Environmental Emergency Response Plan per the Federal Clean Water Act the Pennsylvania Clean Streams Law (35 P.S. §§691.1-691.1001), the Pennsylvania Solid Waste Management Act,	0	0	1	1	1	1	1	1	0	0	(6) + (3) N (0) -

Designator	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
	the Pennsylvania Storage Tank Act, the Oil Pollution Act, and regulations promulgated thereunder.											
FultonC-18	Strengthen the County's domestic animal health surveillance by familiarizing the Fulton County agricultural community with the list of reportable diseases and conditions related to animal health per the OIE and the Pennsylvania Domestic Animal Act (Act 100 of 1996).	0	0	1	1	1	0	1	1	0	0	(5) + (4) N (0) -
FultonC-19	Work with the County's agricultural community to develop and implement the CART to strengthen the County's comprehensive emergency management program	0	0	1	1	1	0	1	1	0	0	(5) + (4) N (0) -
FultonC-20	Consider promoting or adopting higher regulatory and zoning standards to manage flood hazard risk	0	1	1	1	1	0	1	0	0	0	(5) + (5) N (0) -
FultonC-21	Work with dam owners and the population located downstream about dam	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -

Designator	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
	failure, particularly for the Meadow Grounds Dam, Cowan's Gap Dam, and Valley-Hi Eagle Lake Dam.											
FultonC-22	Educate the public on the hazards they face.	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -
FultonC-23	Work with PennDOT to develop solutions for safety issues caused by the proliferation of driveways on major highways.	1	0	1	1	1	0	1	1	0	0	(6) + (4) N (0) -
FultonC-24	In order to mitigate the risk of flooding in inundation zones, especially in the event of a dam failure, it is crucial to implement comprehensive flood protection measures. These measures include the construction of berms, floodwalls, and floodproofing of buildings and infrastructure. These flood protection measures are essential to safeguard lives and property, enhance community resilience, and reduce	1	1	1	1	1	0	1	1	0	0	()+ () N () -

Designator	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
	vulnerability to flooding. This is particularly important in case of dam failure, which can lead to catastrophic flooding in downstream areas.											
BelfastT-1	Assess and determine best action to reduce vulnerability to Hazmat incidents at the Horse Shoe turn on Rt 522.	1	1	1	1	1	0	1	0	0	0	(6) + (4) N (0) -
BelfastT-2	Protect Needmore Water Supply to the 0.2% annual chance flood level.	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -
BethelT-1	Increase visibility at the intersection of Buck Valley Road and Mays Chapel Road.	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -
BethelT-2	Increase visibility at the intersection of SR-643 and Spring Road.	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -
BethelT-3	Increase visibility at the intersection of Great Cove Road (US-522) and Alpine Road.	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -
BethelT-4	Increase visibility at the intersection of Stoney Break Road and Black Oak Road.	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -
BethelT-5	Protect AT&T Wireless Cell Tower to the 0.2% annual chance flood level.	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -

Designator	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
BethelT-6	Protect Bethel Township Sewer Authority to the 0.2% annual chance flood level.	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -
BethelT-7	Work with Global Tower Partners to protect the tower in Bethel Township from landslides.	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -
DublinT-1	Research corrective actions needed to improve the condition of Tannery Road Bridge in Dublin Township, and implement appropriate weight limit controls and other follow-up actions.	0	1	1	1	1	0	1	0	0	0	(5) + (5) N (0) -
DublinT-2	Conduct intersection improvements at Waterfall Road (S.R. 475) and Battle Ridge Road (T-426).	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -
DublinT-3	Install generator and circuit for Township Building.	1	1	1	1	1	0	1	0	1	0	(7) + (3) N (0) -
DublinT-4	Obtain an engineering study to redesign the intersection at Taylor Road and Waterfall Road in Dublin Township.	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -
LickingcreekT-1	Construct a bridge on Creek Road (T-388) in Licking Creek	0	1	1	1	1	0	1	0	0	0	(5) + (5) N (0) -

Designator	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
	Township over the Creek fording.											
LickingcreekT-2	Protect Valley Rural Electric - Route30 Subst to the 0.2% annual chance flood level.	0	1	1	1	1	0	1	1	0	1	(7) + (3) N (0) -
LickingcreekT-3	Protect Valley Rural Electric located at 11563 Pleasant Ridge Rd to the 0.2% annual chance flood level.	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -
LickingcreekT-4	Reconstruct Mill Road Bridge.	0	1	1	1	1	0	1	0	0	0	(5) + (5) N (0) -
TaylorT-1	Conduct intersection improvements and cut the bank back at Frick Road and Waterfall Road.	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -
TaylorT-2	Identify and coordinate with PennDOT to implement infrastructure improvements to the two state bridges along 655 between Waterfall Road and Hustontown.	0	1	1	1	1	0	1	0	0	0	(5) + (5) N (0) -
TaylorT-3	Protect the Hustontown Pos Office facility to the 0.2% annual chance flood level.	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -
TaylorT-4	Protect Valley Rural Electric Clear Ridge Substation to the	1	1	1	1	1	0	1	1	0	0	(6) + (3) N (0) -

Designator	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
	0.2% chance annual flood level.											
TaylorT-5	Protect the Waterfall Post Office facility to the 0.2% annual chance flood level.	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -
TaylorT-6	Improve drainage and pipes on Iron Bridge Road	0	1	1	1	1	0	1	1	1	0	(7) + (3) N (0) -
ThompsonT-1	Replace the corrugated metal culvert carrying West Orchard Road (T-305) over Ditch Run.	0	1	1	1	1	0	1	1	0	0	(6) + (3) N (0) -
ThompsonT-2	Upgrade and realign the intersection of Dent Road (T-343) and Timber Ridge Road (S.R. 2005) to allow for the passage of emergency vehicles.	0	1	1	1	1	0	1	1	0	0	(6) + (3) N (0) -
ToddT-1	Assess and determine best action to mitigate flooding and address deficiencies of Narrows Rd Bridge.	0	1	1	1	1	0	1	1	1	0	(7) + (2) N (0) -
ToddT-2	Improve drainage in Coldspring development.	0	1	1	1	1	0	1	1	1	0	(7) + (2) N (0) -
ToddT-3	Improve drainage along Lion's Park Drive.	0	1	1	1	1	0	1	1	1	0	(7) + (2) N (0) -

Designator	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
ToddT-4	Improve drainage along Cloverleaf Court.	0	1	1	1	1	0	1	1	1	0	(7) + (2) N (0) -
ToddT-5	Improve drainage in the Fairgrounds.	0	1	1	1	1	0	1	1	1	0	(7) + (2) N (0) -
ToddT-6	Improve drainage along Lincoln Way West.	0	1	1	1	1	0	1	1	1	0	(7) + (2) N (0) -
ToddT-7	Work with the owner and population downstream of the Cowan's Gap Dam about dam failure.	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -
UnionT-1	Continue to pursue political channels and collaboration with state agencies (e.g., PennDOT) to study and maintain the slide area on T-366 (Old 126).	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -
UnionT-2	Maintain and upgrade Bridge No. 3 on Zach's Ridge Road (T-330), as needed.	0	1	1	1	1	0	1	0	0	0	(5) + (5) N (0) -
UnionT-3	Obtain an engineering study and geological study for repair of Old Rt 126	1	1	1	1	1	0	1	1	1	0	(8) + (2) N (0) -
UnionT-4	Replace culvert over Indian Grave Creek.	0	1	1	1	1	0	1	1	0	0	(6) + (4) N (0) -

Designator	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
UnionT-5	Conduct intersection improvements at Harmonia Road (S.R. 3002) and Lehman Road (T-308).	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -
UnionT-6	Conduct intersection improvements at Harmonia Road (S.R. 3002) and Stahle Road (T-314).	1	1	1	1	1	0	1	1	0	0	(7) + (3) N (0) -

6.4.3 Prioritization of Mitigation Actions

Actions that are deemed feasible (i.e., receive a positive evaluation score) were then compared and prioritized using another set of criteria (PEMA 2020):

- Effectiveness (20% of score) – The extent to which an action reduces the vulnerability of people and property.
- Efficiency (30% of score) – The extent to which time, effort, and cost is well used as a means of reducing vulnerability. This criterion assesses the benefits of an action versus the cost of the action's implementation.
- Multi-Hazard Mitigation (20% of score) – The action reduces vulnerability for more than one hazard.
- Addresses High-Risk Hazard (15% of score) – The action reduces vulnerability for people and property from a hazard(s) identified as high-risk.
- Addresses Critical Communications/Critical Infrastructure (15% of score) – The action pertains to the maintenance of critical functions and structures such as transportation, supply chain management, data circuits, etc.

Scores in each criterion range from 0 to 3. The action's priority is determined by using a formula based on the criteria values and weights. Priority values range from 0 to 3 as well. An action's priority is then determined using the following scale (PEMA 2020):

- Low priority = 0 – 1.8
- Medium priority = 1.9 – 2.4
- High priority = 2.5 – 3

Table 6-6 shows the prioritization scores for the identified, feasible mitigation actions. Municipal officials reviewed and updated the prioritization values based on local needs.

Table 6-6. Prioritization Scoring of Mitigation Actions

Designator	Action	Effectiveness	Efficiency	Multi-Hazard	Address High Risk	Address Crit Communications/ Infrastructure	Priority
FultonC-1	Acquire vacant, abandoned, or unsafe structures, especially those in hazard areas, and turn into open space.	2	3	1	3	0	1.95
FultonC-2	Educate the designated NFIP Floodplain Administrator and pursue relevant continuing education training such as FEMA Benefit-Cost Analysis.	1	1	1	2	2	1.3
FultonC-3	Work with hazmat facilities to inform them of the hazards they face and ensure emergency plans are current.	2	2	1	2	0	1.5
FultonC-4	Work with police departments in each municipality to ensure their emergency plans are updated, and inform them of the hazard areas in which they are located.	2	2	1	2	0	1.5
FultonC-5	Work with daycare owners/operators in each municipality to ensure their emergency plans are updated, and inform them of the hazard areas in which they are located.	2	2	1	2	0	1.5
FultonC-6	Work with schools and school districts to inform them of the hazards they face and ensure emergency plans are current.	2	2	1	2	0	1.5
FultonC-7	Develop and distribute educational information on hazards and emergency preparedness.	1	1	1	1	1	1
FultonC-8	Partner with community groups and local organizations, including civic, business, town watch, faith-based, senior, special needs and tenant associations, to promote emergency preparedness and mitigation efforts.	1	1	1	1	1	1
FultonC-9	Procure and maintain redundant power sources (portable generators).	2	2	1	3	3	2.1
FultonC-10	Purchase or relocate structures located in hazard-prone areas to protect structures from future damage, with repetitive loss properties as a priority.	2	2	1	3	3	2.1

Designator	Action	Effectiveness	Efficiency	Multi-Hazard	Address High Risk	Address Crit Communications/ Infrastructure	Priority
FultonC-11	Encourage homeowners to install appropriate devices to alleviate radon concentrations within homes.	0	2	3	1	2	1.8
FultonC-12	Work with facility operators to protect critical facilities in the wildland-urban interface from wildfires.	2	2	1	2	3	1.95
FultonC-13	Work with facility operators to protect critical facilities in areas prone to sinkholes.	2	2	1	2	3	1.95
FultonC-14	Establish a Firewise Program, especially around the Meadow Grounds Lake, Cowans Gap State Park, and Breezewood Park. Part of this initiative could include visual development of impacted areas, public service announcements, and educational outreach to farmers, hunters, campers, hikers, school children, and homeowners in the Wildland-Urban Interface.	1	1	1	1	1	1
FultonC-15	Evaluate the need for a voluntary animal waste/manure/fertilizer self-reporting program for farmers, CAFO facilities, and other relevant organizations to utilize so that the County can more accurately estimate the amount of hazardous biological waste transported through the County and so that additional mitigation/safety measures may be implemented, if necessary.	2	2	1	1	0	1.35
FultonC-16	Create and maintain a web-based inventory of the County's special needs population to strengthen emergency response and evacuation operations.	2	2	1	1	0	1.35
FultonC-17	Ensure all applicable private industrial, commercial, and public utility service providers have a current Environmental Emergency Response Plan per the Federal Clean Water Act the Pennsylvania Clean Streams Law (35 P.S. §§691.1-691.1001), the Pennsylvania Solid Waste Management Act, the Pennsylvania Storage Tank Act, the Oil Pollution Act, and regulations promulgated thereunder.	2	2	1	1	0	1.35
FultonC-18	Strengthen the County's domestic animal health surveillance by familiarizing the Fulton County	2	2	1	1	0	1.35

Designator	Action	Effectiveness	Efficiency	Multi-Hazard	Address High Risk	Address Crit Communications/ Infrastructure	Priority
	agricultural community with the list of reportable diseases and conditions related to animal health per the OIE and the Pennsylvania Domestic Animal Act (Act 100 of 1996).						
FultonC-19	Work with the County's agricultural community to develop and implement the CART to strengthen the County's comprehensive emergency management program	2	2	1	1	0	1.35
FultonC-20	Consider promoting or adopting higher regulatory and zoning standards to manage flood hazard risk	2	2	1	3	1	1.8
FultonC-21	Work with dam owners and the population located downstream about dam failure, particularly for the Meadow Grounds Dam, Cowan's Gap Dam, and Valley-Hi Eagle Lake Dam.	3	3	3	3	3	3
FultonC-22	Educate the public on the hazards they face.	1	1	1	1	1	1
FultonC-23	Work with PennDOT to develop solutions for safety issues caused by the proliferation of driveways on major highways.	3	3	1	3	1	2.3
FultonC-24	In order to mitigate the risk of flooding in inundation zones, especially in the event of a dam failure, it is crucial to implement comprehensive flood protection measures. These measures include the construction of berms, floodwalls, and floodproofing of buildings and infrastructure. These flood protection measures are essential to safeguard lives and property, enhance community resilience, and reduce vulnerability to flooding. This is particularly important in case of dam failure, which can lead to catastrophic flooding in downstream areas.	3	3	3	3	3	3
BelfastT-1	Assess and determine best action to reduce vulnerability to Hazmat incidents at the Horse Shoe turn on Rt 522.	2	2	1	3	3	2.1
BelfastT-2	Protect Needmore Water Supply to the 0.2% annual chance flood level.	3	3	1	3	3	2.6

Designator	Action	Effectiveness	Efficiency	Multi-Hazard	Address High Risk	Address Crit Communications/ Infrastructure	Priority
BethelT-1	Increase visibility at the intersection of Buck Valley Road and Mays Chapel Road.	2	2	1	2	1	1.65
BethelT-2	Increase visibility at the intersection of SR-643 and Spring Road.	2	2	1	2	1	1.65
BethelT-3	Increase visibility at the intersection of Great Cove Road (US-522) and Alpine Road.	2	2	1	2	1	1.65
BethelT-4	Increase visibility at the intersection of Stoney Break Road and Black Oak Road.	2	2	1	2	1	1.65
BethelT-5	Protect AT&T Wireless Cell Tower to the 0.2% annual chance flood level.	3	3	1	3	3	2.6
BethelT-6	Protect Bethel Township Sewer Authority to the 0.2% annual chance flood level.	3	3	1	3	3	2.6
BethelT-7	Work with Global Tower Partners to protect the tower in Bethel Township from landslides.	3	3	1	3	3	2.6
DublinT-1	Research corrective actions needed to improve the condition of Tannery Road Bridge in Dublin Township, and implement appropriate weight limit controls and other follow-up actions.	2	2	1	3	1	1.8
DublinT-2	Conduct intersection improvements at Waterfall Road (S.R. 475) and Battle Ridge Road (T-426).	2	2	1	2	1	1.65
DublinT-3	Install generator and circuit for Township Building.	2	2	1	3	3	2.1
DublinT-4	Obtain an engineering study to redesign the intersection at Taylor Road and Waterfall Road in Dublin Township.	2	2	1	2	1	1.65
LickingcreekT-1	Construct a bridge on Creek Road (T-388) in Licking Creek Township over the Creek fording.	2	2	1	3	1	1.8
LickingcreekT-2	Protect Valley Rural Electric - Route30 Subst to the 0.2% annual chance flood level.	3	3	1	3	3	2.6
LickingcreekT-3	Protect Valley Rural Electric located at 11563 Pleasant Ridge Rd to the 0.2% annual chance flood level.	3	3	1	3	3	2.6
LickingcreekT-4	Reconstruct Mill Road Bridge.	2	2	1	3	1	1.8
TaylorT-1	Conduct intersection improvements and cut the bank back at Frick Road and Waterfall Road.	2	2	1	2	1	1.65

Designator	Action	Effectiveness	Efficiency	Multi-Hazard	Address High Risk	Address Crit Communications/ Infrastructure	Priority
TaylorT-2	Identify and coordinate with PennDOT to implement infrastructure improvements to the two state bridges along 655 between Waterfall Road and Hustontown.	2	2	1	3	1	1.8
TaylorT-3	Protect the Hustontown Pos Office facility to the 0.2% annual chance flood level.	3	3	1	3	3	2.6
TaylorT-4	Protect Valley Rural Electric Clear Ridge Substation to the 0.2% chance annual flood level.	3	3	1	3	3	2.6
TaylorT-5	Protect the Waterfall Post Office facility to the 0.2% annual chance flood level.	3	3	1	3	3	2.6
TaylorT-6	Improve drainage and pipes on Iron Bridge Road	2	2	1	3	1	1.8
ThompsonT-1	Replace the corrugated metal culvert carrying West Orchard Road (T-305) over Ditch Run.	2	2	1	3	1	1.8
ThompsonT-2	Upgrade and realign the intersection of Dent Road (T-343) and Timber Ridge Road (S.R. 2005) to allow for the passage of emergency vehicles.	2	2	1	3	1	1.8
ToddT-1	Assess and determine best action to mitigate flooding and address deficiencies of Narrows Rd Bridge.	2	2	1	3	1	1.8
ToddT-2	Improve drainage in Coldspring development.	2	2	1	3	1	1.8
ToddT-3	Improve drainage along Lion's Park Drive.	2	2	1	3	1	1.8
ToddT-4	Improve drainage along Cloverleaf Court.	2	2	1	3	1	1.8
ToddT-5	Improve drainage in the Fairgrounds.	2	2	1	3	1	1.8
ToddT-6	Improve drainage along Lincoln Way West.	2	2	1	3	1	1.8
ToddT-7	Work with the owner and population downstream of the Cowan's Gap Dam about dam failure.	3	3	3	3	3	3
UnionT-1	Continue to pursue political channels and collaboration with state agencies (e.g., PennDOT) to study and maintain the slide area on T-366 (Old 126).	2	2	1	1	1	1.5
UnionT-2	Maintain and upgrade Bridge No. 3 on Zach's Ridge Road (T-330), as needed.	2	2	1	3	1	1.8
UnionT-3	Obtain an engineering study and geological study for repair of Old Rt 126	2	2	1	2	1	1.65

Designator	Action	Effectiveness	Efficiency	Multi-Hazard	Address High Risk	Address Crit Communications/ Infrastructure	Priority
UnionT-4	Replace culvert over Indian Grave Creek.	2	2	1	3	1	1.8
UnionT-5	Conduct intersection improvements at Harmonia Road (S.R. 3002) and Lehman Road (T-308).	2	2	1	2	1	1.65
UnionT-6	Conduct intersection improvements at Harmonia Road (S.R. 3002) and Stahle Road (T-314).	2	2	1	2	1	1.65

The actions in Table 6-7 are listed in order of priority, with the high priority actions first. This list of actions is the result of the planning effort led by the Planning Team and represents what the county and municipalities consider most important. Any actions, including projects, to be implemented will have benefits outweighing their associated costs (i.e., the benefit-cost ratio would be greater than 1).

A blank Mitigation Action Worksheet template is included in Appendix G.

Table 6-7. Prioritized Mitigation Actions

Designator	Action	Priority
High Hazard		
FultonC-21	Work with dam owners and the population located downstream about dam failure, particularly for the Meadow Grounds Dam, Cowan's Gap Dam, and Valley-Hi Eagle Lake Dam.	3
FultonC-24	In order to mitigate the risk of flooding in inundation zones, especially in the event of a dam failure, it is crucial to implement comprehensive flood protection measures. These measures include the construction of berms, floodwalls, and floodproofing of buildings and infrastructure. These flood protection measures are essential to safeguard lives and property, enhance community resilience, and reduce vulnerability to flooding. This is particularly important in case of dam failure, which can lead to catastrophic flooding in downstream areas.	3
ToddT-7	Work with the owner and population downstream of the Cowan's Gap Dam about dam failure.	3
BelfastT-2	Protect Needmore Water Supply to the 0.2% annual chance flood level.	2.6
BethelT-5	Protect AT&T Wireless Cell Tower to the 0.2% annual chance flood level.	2.6
BethelT-6	Protect Bethel Township Sewer Authority to the 0.2% annual chance flood level.	2.6
BethelT-7	Work with Global Tower Partners to protect the tower in Bethel Township from landslides.	2.6
LickingcreekT-2	Protect Valley Rural Electric - Route30 Subst to the 0.2% annual chance flood level.	2.6
LickingcreekT-3	Protect Valley Rural Electric located at 11563 Pleasant Ridge Rd to the 0.2% annual chance flood level.	2.6
TaylorT-3	Protect the Hustontown Pos Office facility to the 0.2% annual chance flood level.	2.6
TaylorT-4	Protect Valley Rural Electric Clear Ridge Substation to the 0.2% chance annual flood level.	2.6
TaylorT-5	Protect the Waterfall Post Office facility to the 0.2% annual chance flood level.	2.6
Medium Priority		
FultonC-23	Work with PennDOT to develop solutions for safety issues caused by the proliferation of driveways on major highways.	2.3
FultonC-9	Procure and maintain redundant power sources (portable generators).	2.1

Designator	Action	Priority
FultonC-10	Purchase or relocate structures located in hazard-prone areas to protect structures from future damage, with repetitive loss properties as a priority.	2.1
BelfastT-1	Assess and determine best action to reduce vulnerability to Hazmat incidents at the Horse Shoe turn on Rt 522.	2.1
DublinT-3	Install generator and circuit for Township Building.	2.1
Low Priority		
FultonC-12	Work with facility operators to protect critical facilities in the wildland-urban interface from wildfires.	1.95
FultonC-13	Work with facility operators to protect critical facilities in areas prone to sinkholes.	1.95
FultonC-1	Acquire vacant, abandoned, or unsafe structures, especially those in hazard areas, and turn into open space.	1.95
FultonC-11	Encourage homeowners to install appropriate devices to alleviate radon concentrations within homes.	1.8
FultonC-20	Consider promoting or adopting higher regulatory and zoning standards to manage flood hazard risk	1.8
DublinT-1	Research corrective actions needed to improve the condition of Tannery Road Bridge in Dublin Township, and implement appropriate weight limit controls and other follow-up actions.	1.8
LickingcreekT-1	Construct a bridge on Creek Road (T-388) in Licking Creek Township over the Creek fording.	1.8
LickingcreekT-4	Reconstruct Mill Road Bridge.	1.8
TaylorT-2	Identify and coordinate with PennDOT to implement infrastructure improvements to the two state bridges along 655 between Waterfall Road and Hustontown.	1.8
TaylorT-6	Improve drainage and pipes on Iron Bridge Road	1.8
ThompsonT-1	Replace the corrugated metal culvert carrying West Orchard Road (T-305) over Ditch Run.	1.8
ThompsonT-2	Upgrade and realign the intersection of Dent Road (T-343) and Timber Ridge Road (S.R. 2005) to allow for the passage of emergency vehicles.	1.8
ToddT-1	Assess and determine best action to mitigate flooding and address deficiencies of Narrows Rd Bridge.	1.8
ToddT-2	Improve drainage in Coldspring development.	1.8
ToddT-3	Improve drainage along Lion's Park Drive.	1.8
ToddT-4	Improve drainage along Cloverleaf Court.	1.8
ToddT-5	Improve drainage in the Fairgrounds.	1.8
ToddT-6	Improve drainage along Lincoln Way West.	1.8
UnionT-2	Maintain and upgrade Bridge No. 3 on Zach's Ridge Road (T-330), as needed.	1.8
UnionT-4	Replace culvert over Indian Grave Creek.	1.8
BethelT-1	Increase visibility at the intersection of Buck Valley Road and Mays Chapel Road.	1.65
BethelT-2	Increase visibility at the intersection of SR-643 and Spring Road.	1.65

Designator	Action	Priority
BethelT-3	Increase visibility at the intersection of Great Cove Road (US-522) and Alpine Road.	1.65
BethelT-4	Increase visibility at the intersection of Stoney Break Road and Black Oak Road.	1.65
DublinT-2	Conduct intersection improvements at Waterfall Road (S.R. 475) and Battle Ridge Road (T-426).	1.65
DublinT-4	Obtain an engineering study to redesign the intersection at Taylor Road and Waterfall Road in Dublin Township.	1.65
TaylorT-1	Conduct intersection improvements and cut the bank back at Frick Road and Waterfall Road.	1.65
UnionT-3	Obtain an engineering study and geological study for repair of Old Rt 126	1.65
UnionT-5	Conduct intersection improvements at Harmonia Road (S.R. 3002) and Lehman Road (T-308).	1.65
UnionT-6	Conduct intersection improvements at Harmonia Road (S.R. 3002) and Stahle Road (T-314).	1.65
FultonC-3	Work with hazmat facilities to inform them of the hazards they face and ensure emergency plans are current.	1.5
FultonC-4	Work with police departments in each municipality to ensure their emergency plans are updated, and inform them of the hazard areas in which they are located.	1.5
FultonC-5	Work with daycare owners/operators in each municipality to ensure their emergency plans are updated, and inform them of the hazard areas in which they are located.	1.5
FultonC-6	Work with schools and school districts to inform them of the hazards they face and ensure emergency plans are current.	1.5
UnionT-1	Continue to pursue political channels and collaboration with state agencies (e.g., PennDOT) to study and maintain the slide area on T-366 (Old 126).	1.5
FultonC-15	Evaluate the need for a voluntary animal waste/manure/fertilizer self-reporting program for farmers, CAFO facilities, and other relevant organizations to utilize so that the County can more accurately estimate the amount of hazardous biological waste transported through the County and so that additional mitigation/safety measures may be implemented, if necessary.	1.35
FultonC-16	Create and maintain a web-based inventory of the County's special needs population to strengthen emergency response and evacuation operations.	1.35
FultonC-17	Ensure all applicable private industrial, commercial, and public utility service providers have a current Environmental Emergency Response Plan per the Federal Clean Water Act the Pennsylvania Clean Streams Law (35 P.S. §§691.1-691.1001), the Pennsylvania Solid Waste Management Act, the Pennsylvania Storage Tank Act, the Oil Pollution Act, and regulations promulgated thereunder.	1.35
FultonC-18	Strengthen the County's domestic animal health surveillance by familiarizing the Fulton County agricultural community with the list	1.35

Designator	Action	Priority
	of reportable diseases and conditions related to animal health per the OIE and the Pennsylvania Domestic Animal Act (Act 100 of 1996).	
FultonC-19	Work with the County's agricultural community to develop and implement the CART to strengthen the County's comprehensive emergency management program	1.35
FultonC-2	Educate the designated NFIP Floodplain Administrator and pursue relevant continuing education training such as FEMA Benefit-Cost Analysis.	1.3
FultonC-7	Develop and distribute educational information on hazards and emergency preparedness.	1
FultonC-8	Partner with community groups and local organizations, including civic, business, town watch, faith-based, senior, special needs and tenant associations, to promote emergency preparedness and mitigation efforts.	1
FultonC-14	Establish a Firewise Program, especially around the Meadow Grounds Lake, Cowans Gap State Park, and Breezewood Park. Part of this initiative could include visual development of impacted areas, public service announcements, and educational outreach to farmers, hunters, campers, hikers, school children, and homeowners in the Wildland-Urban Interface.	1
FultonC-22	Educate the public on the hazards they face.	1

SECTION 7 PLAN MAINTENANCE PROCEDURES

7.1 UPDATE PROCESS SUMMARY

The process of monitoring, evaluating, and updating the HMP is critical to maintaining its value and supporting the success of Fulton County's hazard mitigation efforts. Ensuring effective implementation of mitigation activities paves the way for continued momentum in the planning process and supports future resiliency.

The Steering Committee reviewed the 2020 plan maintenance procedures and carried them forward to the current HMP update, as described in the sections below. Going forward, the plan will be available on the Fulton County Emergency Services website. The 2025 plan maintenance procedures also describe the ways in which this plan may be integrated into other planning mechanisms in the county.

7.2 MONITORING, EVALUATING, AND UPDATING THE PLAN

The Fulton County HMP Planning Team intends to remain intact as the organization responsible for monitoring, evaluating, and updating this plan. The Planning & Mapping Director/Recycling Coordinator of the Fulton County Planning Commission will serve as HMP Coordinator for the Planning Team. Each participating jurisdiction is expected to retain a hazard mitigation representative to support the jurisdiction's input to monitor, evaluate, and update the responsibilities identified in this section. Section 3 lists the Planning Team members.

Individual commitments change over time; therefore, each jurisdiction and its representatives will be responsible for informing the Fulton County HMP Coordinator of any changes in representation by formal letter. The HMP Coordinator will strive to ensure the Planning Team represents planning partners and stakeholders within the county. The HMP Coordinator will maintain the membership of the Planning Team on the Fulton County Hazard Mitigation Plan website (https://www.co.fulton.pa.us/planning-hmp-update.php) or in publicly accessible county records.

The following sections describe the monitoring, evaluating, and updating processes and protocols for the Fulton County HMP.

7.2.1 Monitoring

The Planning Team will be responsible for monitoring implementation and evaluating the effectiveness of the HMP and documenting this information in a progress report. Prior to Planning Team progress meetings (detailed below), Planning Team representatives may collect information from departments, agencies, and organizations involved with the mitigation activities identified in Section 6 of this plan. The representatives will make phone calls and conduct meetings with persons responsible for initiating and/or overseeing the mitigation projects to obtain progress information. Copies of any grant applications filed on behalf of any of the participating jurisdictions will be provided to the Planning Team. The Fulton County HMP Coordinator will work with municipal representatives to provide additional opportunities for members of the public to learn about the hazards they face, and to provide information to be incorporated into the HMP. FEMA's National Flood Hazard Layer interactive tools can be used to facilitate this process. Further, the representatives will obtain from their municipal supervisor, mayor, or councilperson any public comments made on the plan, and provide them to the Planning Team for inclusion in the progress report.

The Planning Team representatives will be expected to document the following, as needed and as appropriate:

- Additional stakeholders (such as planning agencies and business representatives) who should be invited to participate in the planning process

- Additional local assets (such as major employers, local points of interest, residential areas, etc.) to consider in the risk assessment and mitigation strategy to ensure that items considered vital by each municipality can be included in the HMP
- Hazard events and losses occurring in their jurisdiction, including their nature and extent, and the effects that hazard mitigation actions have had on impacts and losses
- Progress on the implementation of mitigation actions, including efforts to obtain outside funding for mitigation actions
- Any obstacles or impediments to the implementation of actions
- Additional mitigation actions believed to be appropriate and feasible
- How floodplain management, in accordance with the National Flood Insurance Program (NFIP), is carried out in the municipality (through completion of the NFIP Survey worksheet)
- Public and stakeholder input and comments on the plan

Local Planning Team representatives may use the progress reporting forms (Worksheets #1 and #3 in the Federal Emergency Management Agency [FEMA] 386-4 guidance document) to facilitate collection of progress data and information on specific mitigation actions.

7.2.2 Evaluating

The evaluation of the HMP is an assessment of whether (1) the planning process and actions have been effective, (2) the plan's goals are being reached, and (3) changes are needed. The plan will be evaluated on an annual basis to determine the effectiveness of the programs, and to reflect changes that may affect mitigation priorities or available funding.

After information is gathered on the status of the HMP, as described in Section 7.2.1, the information will be discussed and documented at an annual plan review meeting of the Hazard Mitigation Planning Team. At least 1 month before the progress plan review meeting, the Fulton County HMP Coordinator will advise Planning Team members of the meeting date, agenda, and expectations of the members. The Fulton County HMP Coordinator may also distribute additional flood mitigation surveys and mitigation project opportunity forms for jurisdictions with new information or for those that did not participate in the update process.

The Fulton County HMP Coordinator will be responsible for calling and coordinating the progress plan review meeting and assessing progress toward achieving plan goals and objectives. These evaluations will assess whether:

- Goals and objectives address current and expected conditions
- The nature or magnitude of the risks has changed
- The HMP has been implemented into land-use processes on the county and municipal levels
- Current resources are appropriate for implementing the HMP and if different or additional resources are now available
- Actions are cost effective
- Schedules and budgets are feasible
- Implementation problems exist—such as technical, political, legal, or coordination issues with other agencies
- Outcomes have occurred as expected
- Changes in county or municipal resources have impacted plan implementation (for example, funding, personnel, and equipment)
- New agencies, departments, or staff should be included, including other local governments, as defined under 44 *Code of Federal Regulations* (CFR), Section 201.6
- Documentation has been completed for any hazards that occurred during the last year

Specifically, the Planning Team will review the mitigation goals, objectives, activities, and projects using the following performance-based indicators:

- New agencies or departments created that have authority to implement mitigation actions or are required to meet goals, objectives, and actions
- Project evaluation based on current needs of the mitigation plan
- Project completion regarding progress of proposed or ongoing actions
- Underspending or overspending regarding proposed mitigation action budgets
- Achievement of the goals and objectives
- Resource allocation records to note whether resources are required to implement mitigation activities
- Timeframe comments on whether proposed schedules are sufficient to address actions
- Budget notes (if budget basis should be changed or is sufficient)
- Lead or support agency commitment notes (if there is a lack of commitment on the part of lead or support agencies)
- Resource comments on whether resources are available to implement actions
- Feasibility comments to determine whether certain goals, objectives, or actions prove to be unfeasible

Finally, the Planning Team will evaluate the ways other programs and policies have conflicted or augmented planned or implemented measures, and will identify policies, programs, practices, and procedures that could be modified to accommodate hazard mitigation actions (described further in Section 5.2.5). These other programs and policies can include those that address the following:

- Economic development
- Environmental preservation and permitting
- Historic preservation
- Redevelopment
- Health and/or safety
- Recreation
- Land use and zoning
- Public education and outreach
- Transportation

The Planning Team may refer to the evaluation forms (Worksheets #2 and #4 in the FEMA 386-4 guidance document) to assist in the evaluation process.

The Fulton County HMP Coordinator will be responsible for preparing an annual HMP progress report based on the annual local progress reports provided by each jurisdiction, information presented at the Planning Team meeting, and other information as appropriate and relevant. These HMP annual county progress reports will provide data for the 5-year update of this HMP and will assist in pinpointing implementation challenges. By monitoring the implementation of the plan, the Planning Team will assess which projects are completed, are no longer feasible, or may require additional funding.

The annual HMP progress report will apply to all planning partners who have provided input, and as such, will be developed according to an agreed-upon format and with adequate allowance for input and comment of each planning partner prior to completion and submission to the State Hazard Mitigation Officer. Each planning partner will be responsible for providing this report to its governing body for their review.

During the Planning Team meeting, the planning partners will establish a schedule for the development, review, comment, amendment, and submittal of the annual HMP progress report to the State Hazard Mitigation Officer. The HMP Coordinator will ensure that the reports are submitted to the State Hazard Mitigation Officer and FEMA Region III.

The plan will also be evaluated and revised following any major disasters to determine whether the recommended actions remain relevant and appropriate. The risk assessment will also be revisited to determine whether any changes are necessary based on the pattern of disaster damage or if data listed in Section 4.3 (Hazard Profiles) have been collected to facilitate the risk assessment. Revisiting the risk assessment is an opportunity to increase the community's disaster resistance and build a better and stronger community.

7.2.3 Updating

Section 44 CFR 201.6.d.3 requires that local hazard mitigation plans be reviewed, revised (as appropriate), and resubmitted for approval to remain eligible for benefits awarded under the Disaster Mitigation Act of 2000 (DMA 2000). The Fulton County Hazard Mitigation Planning Team will update this plan on a 5-year cycle from the date of plan adoption.

To facilitate the update process, the Fulton County HMP Coordinator (with support from the Planning Team) will hold a meeting 3 years from the date of plan approval to develop and commence with the implementation of a detailed plan update program. The Fulton County HMP Coordinator will invite representatives from the Pennsylvania Emergency Management Agency (PEMA) to this meeting to provide guidance on plan update procedures. This program will, at a minimum, establish (1) the parties responsible for managing and completing the plan update effort, (2) features needed to be included in the updated plan, and (3) a detailed timeline with milestones to ensure that the update is completed according to regulatory requirements.

At this meeting, the Planning Team will determine the resources needed to complete the update. The Fulton County HMP Coordinator will be responsible for ensuring that needed resources are secured.

The Fulton County HMP Coordinator will also be responsible for coordinating the plan evaluation portion of the meeting, soliciting feedback, collecting, and reviewing the comments, and ensuring their incorporation in the 5-year plan update, as appropriate. Additional meetings may also be held, as deemed necessary by the Planning Team. These meetings will provide an opportunity for the public to express concerns, opinions, and ideas about the HMP.

7.3 CONTINUED PUBLIC INVOLVEMENT

Fulton County and participating jurisdictions are committed to the continued involvement of the public in the hazard mitigation process. Therefore, the plan will be posted on the Fulton County HMP website https://www.fultoncountypahmp.com/draft-plans/, and copies of the plan will be made available for review during normal business hours at the main office in McConnellsburg (information provided below). Fulton County will make electronic copies of the plan available for local municipalies to provide to the public.

Following each 5-year update of the HMP, the updated plan will be distributed for public comment. After all comments are addressed, the HMP will be revised and distributed to all Planning Team members and the Pennsylvania State Hazard Mitigation Officer.

The Fulton County HMP Coordinator will be responsible for receiving, tracking, and filing public comments on the HMP. The public will have an opportunity to comment on the plan at the review meeting for the HMP and during the 5-year plan update. Fulton County will maintain an active link on the Emergency Services website to collect public comments.

The Planning Team representatives will be responsible for ensuring the following:

- Public comment and input on the HMP (and hazard mitigation in general) are recorded and addressed, as appropriate. An opportunity to comment on the plan will be provided directly on the Emergency Services website, and provisions will be made for public comments submitted in writing. All public comments should be addressed to:

  Brian J. Barton
  EMA/911 Director
  Fulton County Planning Commission
  Fulton County GIS Department
  Fulton County Recycling
  219 N. Second Street, Suite 102
  McConnellsburg, PA 17233

- Copies of the latest approved version of the plan will be available for review at the municipal buildings along with instructions to facilitate public input and comment on the plan.
- Appropriate links to the Fulton County website will be maintained. The website will be monitored throughout the course of the HMP update process, and a draft copy of the plan will be posted for public comment. Upon conclusion of the update, appropriate links to the County HMP will be maintained on the Fulton County HMP website https://www.fultoncountypahmp.com/.
- Public notices will be made, as appropriate, to inform the public of the availability of the plan, particularly during plan update cycles.

The Fulton County HMP Coordinator will ensure the following:

- Public comment and input on the HMP (and hazard mitigation in general) will be recorded and addressed, as appropriate.
- The Emergency Services website's HMP content will be maintained and updated, as appropriate.
- All public and stakeholder comments received will be documented and maintained.
- Copies of the latest approved plan will be available for review at the Fulton County Emergency Services office, along with instructions to facilitate public input and comment on the plan.
- Public notices, including media releases, will be developed (as appropriate) to inform the public of the availability of the plan, particularly during plan update cycles.

SECTION 8 PLAN ADOPTION

By adopting the Fulton County Hazard Mitigation Plan (HMP), local governing bodies demonstrate their commitment to fulfill the mitigation goals and objectives outlined in the plan. Adoption of the HMP by Fulton County and each participating jurisdiction legitimizes the HMP and authorizes responsible agencies to execute their responsibilities.

Each participating jurisdiction in Fulton County will continue with formal adoption proceedings upon conditional approval of this HMP from the Federal Emergency Management Agency (FEMA), known as "Approval Pending Adoption (APA)." Each participating jurisdiction understands that conditional approval of the HMP will be provided for those municipalities that meet the planning requirements with the exception of the adoption requirement, as stated above.

Following adoption or formal action on the HMP, each participating jurisdiction must submit a copy of the resolution or other legal instrument showing formal adoption (acceptance) of the HMP to the Fulton County Hazard Mitigation Coordinator. Fulton County will forward the executed resolutions to the Pennsylvania Emergency Management Agency (PEMA), which will subsequently forward the resolutions to FEMA. Each participating jurisdiction understands that FEMA will transmit acknowledgement of verification of formal HMP adoption and the official approval of the HMP to the Hazard Mitigation Coordinator. Resolutions reflecting the formal adoption of this HMP by the county and participating jurisdictions are included in Appendix E of this HMP. A sample resolution to be used by the county and its jurisdictions is provided on the following pages.

Fulton County Hazard Mitigation Plan

County Adoption Resolution

Resolution No. _____

Fulton County, Pennsylvania

WHEREAS, the municipalities of Fulton County, Pennsylvania, are most vulnerable to natural and human-made hazards, which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, Fulton County acknowledges the requirement of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Fulton County Hazard Mitigation Plan has been developed by Fulton County Emergency Services in cooperation with other county departments, local municipal officials, and the citizens of Fulton County, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Fulton County Hazard Mitigation Plan, and

WHEREAS, the Fulton County Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural and human-made hazards that face the county and its municipal governments.

NOW THEREFORE BE IT RESOLVED by the governing body for the County of Fulton that:

- The 2025 Fulton County Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the county, and
- The respective officials and agencies of Fulton County identified in the implementation strategy of the 2025 Fulton County Hazard Mitigation Plan are hereby directed to execute the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2025

ATTEST:

_____

FULTON COUNTY COMMISSIONERS

By _____

By _____

By _____

Fulton County Hazard Mitigation Plan

Municipal Adoption Resolution

Resolution No. _____

< *Municipality Name*>, Fulton County, Pennsylvania

WHEREAS, the <*Municipality Name*>, Fulton County, Pennsylvania, is most vulnerable to natural and human-made hazards, which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, the <*Municipality Name*> acknowledges the requirement of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Fulton County Hazard Mitigation Plan has been developed by Fulton County Emergency Services in cooperation with other county departments, and officials and citizens of <*Municipality Name*>, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Fulton County Hazard Mitigation Plan, and

WHEREAS, the Fulton County Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural and human-made hazards that face the county and its municipal governments.

NOW THEREFORE BE IT RESOLVED by the governing body for the <*Municipality Name*>:

- The 2025 Fulton County Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the <*Municipality Name*>, and
- The respective officials and agencies identified in the implementation strategy of the 2025 Fulton County Hazard Mitigation Plan are hereby directed to execute the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2025

ATTEST:

_____

< *MUNICIPALITY NAME*> REPRESENTATIVES

By _____

By _____

By _____