



Hazard Mitigation Plan Update Pike County, Pennsylvania



June
2022



TETRA TECH

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CERTIFICATION OF ANNUAL REVIEW MEETINGS

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

YEAR	DATE OF MEETING	PUBLIC OUTREACH ADDRESSED?*	SIGNATURE
2017			
2018			
2019			
2020			
2021	Pike County engaged in a full update of the HMP during 2021-2022.		
2022			
2023			
2024			
2025			
2026			



RECORD OF CHANGES

DATE	DESCRIPTION OF CHANGE MADE, MITIGATION ACTION COMPLETED, OR PUBLIC OUTREACH PERFORMED	CHANGE MADE BY (PRINT NAME)	CHANGE MADE BY (SIGNATURE)
TBD	Entire plan re-write and reformatting for the 2022 update	Brian Snyder	



SECTION 1. INTRODUCTION

This section presents background information, describes the purpose, and defines the scope of the 2022 update of the Pike 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 exhausts resources, diverting attention from important public programs and private agendas.

Pike County, Pennsylvania, has experienced a significant number of statewide or County-specific disaster declarations since 1954. The emergency management community, citizens, elected officials, and other stakeholders in Pike County recognize the impact of disasters on their community and concluded that proactive efforts need to be taken to reduce the impact of natural and human-caused hazards.

“Hazard mitigation” describes actions taken to prevent or reduce the long-term risks to life and property caused by a hazard event. Pre-disaster mitigation actions are taken in advance of a hazard event and are essential to breaking the typical disaster cycle of damage, reconstruction, and repeated damage. With careful selection, mitigation actions can be long-term, cost-effective means of reducing the risk of loss.

The Pike County Hazard Mitigation Steering Committee, composed of Pike County and municipal officials, and the Planning Team, composed of Pike County officials, municipal representatives, emergency responders, representatives from state and federal agencies and utility companies, has updated this HMP. Through an open-bid process, Pike County contracted Tetra Tech, Inc. (Tetra Tech), to update the 2017 HMP.

The HMP update is the result of nine months of collaboration between the citizens and officials of the County and representatives from Tetra Tech to develop a pre-disaster, multi-hazard mitigation plan that will guide the County toward greater disaster resistance, while respecting the character and needs of the community.

1.2 Purpose

The purpose of this HMP is to minimize the effects that natural, technological, and man-made hazards have on the people, property, environment, and business operations within Pike County. This document exists to provide the background information and rationale for the mitigation actions that the Steering Committee, Planning Team and municipal representatives have chosen to implement across the County.

The document is governed by the Disaster Mitigation Act of 2000 (DMA 2000) and its implementing regulations (Title 44 Code of Federal Regulations [CFR] §201.6, published February 26, 2002). Local jurisdictions must comply with the DMA 2000 and these regulations to remain eligible for funding and technical assistance from State and federal hazard mitigation programs.



1.3 Scope

The implementation actions within this HMP apply to Pike County and any municipalities within the County that adopt this HMP as their own. However, only those municipalities that have participated in the plan update process may adopt this plan and will remain eligible for State and federal hazard mitigation funding through the HMP. For the purpose of this plan, municipal participation was defined as completion and submission of an Evaluation of Identified Hazards Worksheet, Capability Assessment Survey, and Mitigation Strategy 5-Year Plan Review Worksheet and attendance by an official municipal representative at a planning or public meeting conducted as part of the planning process.

1.4 Authority and Reference

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

- FEMA “Local Mitigation Planning Handbook,” March 2013
- FEMA “Integrating Hazard Mitigation into Local Planning,” March 1, 2013
- FEMA “Plan Integration: Linking Local Planning Efforts,” July 2015
- Local Mitigation Plan Review Guide, October 1, 2011
- DMA 2000 (Public Law 106-390), October 30, 2000
- 44 CFR Parts 201 and 206 (including Feb. 26, 2002, Oct. 1, 2002; Oct. 28, 2003; and Sept. 13, 2004 Interim Final Rules)
- FEMA “How-To Guide for Using HAZUS-MH for Risk Assessment” (Document No. 433), February 2004
- FEMA Mitigation Planning How-To Series (FEMA 386-1 through 4), 2002
Available on-line at: <http://www.fema.gov/fima/planhowto.shtm>.
- FEMA “Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards,” January 2013
- Commonwealth of Pennsylvania’s All-Hazard Mitigation Planning Standard Operating Guide, 2020

Appendix A contains a full set of references used in updating this HMP.



SECTION 2. COMMUNITY PROFILE

This section discusses the geography and environment, community facts, population and demographics, land use and development, and critical facilities in Pike County.

2.1 Geography and Environment

Pike County is located in the far northeast corner of Pennsylvania (see Figure 2-1). The Delaware River serves as its entire border with New York State to the northeast and with New Jersey to the southeast. Lake Wallenpaupack and Wayne County make up the northwestern border, while Monroe County is at the southwestern border. With its 547 square miles, the county ranks forty-second out of the sixty-seven Commonwealth counties in terms of land mass.

Approximately 34.5 percent of Pike County is publicly owned. Included in this figure are close to 91,000 acres owned by the Commonwealth of Pennsylvania and over 17,000 acres owned by the Federal Government in the Delaware Water Gap National Recreation Area and a small amount (approximately 9 acres) in the Upper Delaware Scenic and Recreational River Corridor, all located within Pike County. **These Federal properties are located along the Delaware River and are managed by the U.S. Department of Interior's National Park Service.**

The County's location along the Upper Delaware River Corridor and the location of the Lackawaxen River, a major Delaware tributary which flows through the northern part of the County in Lackawaxen Township, both play a **significant role in the Pike County's Hazard Mitigation planning efforts.** Additionally, the County's strategic location near to the metropolitan centers in nearby New York and New Jersey also impact the human-made and societal hazards affecting the County.

All of Pike County's major watersheds are classified as "high quality" or "exceptional value." Pike County's watersheds are depicted in Figure 2-2.

2.2 Community Facts

Pike County formed in 1814 when it separated from Wayne County. The County was named for Zebulon Montgomery Pike, who discovered Pike's Peak. He also was a General killed in the war of 1812. By the Act of April 1, 1836, a portion of Pike County was cut off to form part of Monroe County; otherwise, its boundaries remain as they were established by the Act of 1814. At the time it was formed, it included 5 townships. Today it contains 13 municipalities: Blooming Grove Township, Delaware Township, Dingman Township, Greene Township, Lackawaxen Township, Lehman Township, Matamoras Borough, Milford Borough, Milford Township, Palmyra Township, Porter Township, Shohola Township, and Westfall Township. The County Seat is Milford Borough.

The County's proximity to New York City and location along the Delaware River historically made it an important area for transportation of commodities and resources, particularly timber and stone. Today, recreation is the main industry in the County. With its many lakes, rivers, streams, state game and forest lands and the Delaware Water Gap National



Recreation Area, it is estimated that the population of the county often doubles at times during the months from April to October. Hunting, fishing, biking, hiking, nature watching, and canoeing are the major recreational attractions to the area.

The largest recreation resource in Pike County is Lake Wallenpaupack which was created in 1926 when Pennsylvania Power and Light Company built a hydroelectric plant and dam on the Lackawaxen River. The Delaware River, Lackawaxen River and the large tracts of public land are also major eco-tourism attractions. Major employers in Pike County include school districts, government, and retailers.

Figure 2-1. Base Map of Pike County, PA

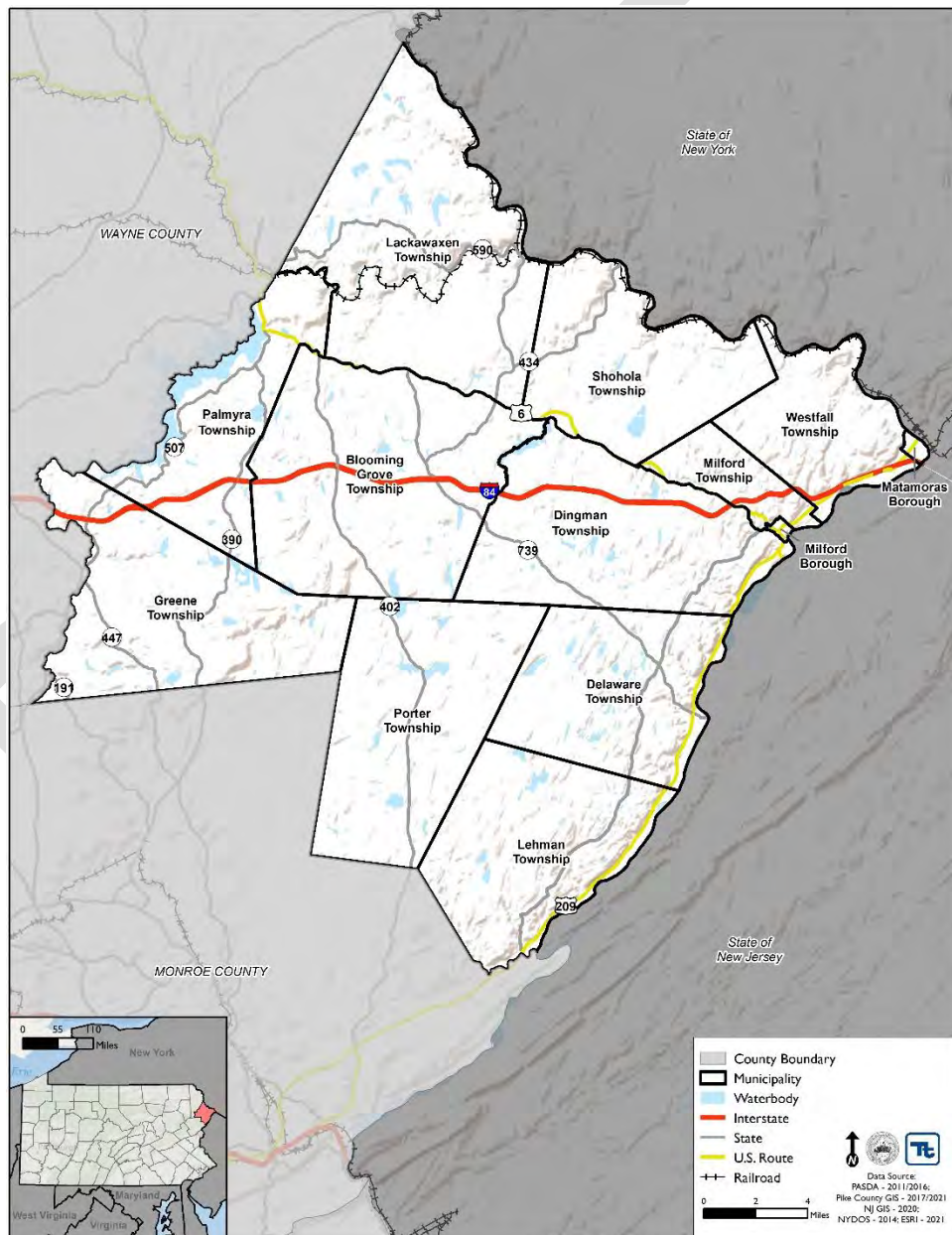
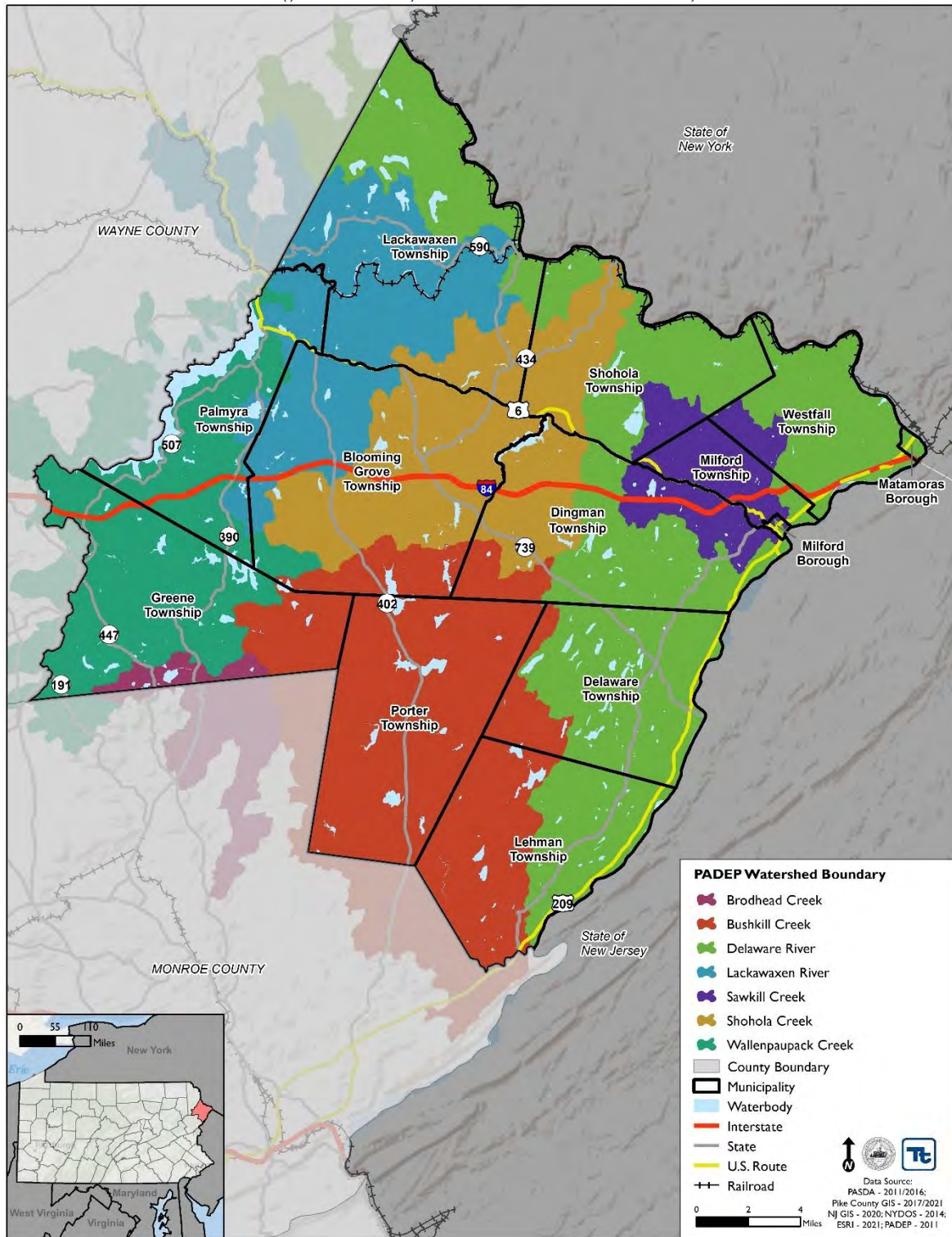




Figure 2-2. Major Watersheds in Pike County





2.3 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 Pike County to better assess magnitudes of hazards and develop more specific mitigation plans. According to the 2010 U.S. Census, Pike County had a population of 57,369, which represented a 23.9 percent increase from the 2000 U.S. Census population of 46,302. According to the 2015-2019 American Community Survey, Pike County had a population of 55,453 which represented a 3.3 percent decrease from the population in 2010. According to the 2020 U.S. Census population, Pike County had a total population of 58,535, a 2.0 percent increase from the 2010 Census. Table 2-1 presents the population statistics for Pike County based on the 2000 and 2010 U.S. Census, and 2015-2019 ACS estimates (the most current available) data. It should be noted that the 2020 U.S. Census data was not available at the time this section was developed. Therefore, the figures were created using the 2015-2019 ACS estimates. Table 2-2 provides details regarding demographics for Pike County.

Table 2-1. Pike County Population Statistics

Jurisdiction	2000 Census	2010 Census	2015-2019 ACS Estimates	2020 Census*	Population Change 2010-2020 (%)
Blooming Grove (Twp)	3,621	4,819	4,645	5,415	12.4%
Delaware (Twp)	6,319	7,396	7,063	7,453	0.8%
Dingman (Twp)	8,788	11,926	11,619	12,490	4.7%
Greene (Twp)	3,149	3,956	3,825	3,452	-12.7%
Lackawaxen (Twp)	4,154	4,994	5,020	5,072	1.6%
Lehman (Twp)	7,515	10,663	10,183	10,843	1.7%
Matamoras (Boro)	2,312	2,469	2,336	2,362	-4.3%
Milford (Boro)	1,104	1,021	1,172	1,103	8.0%
Milford (Twp)	1,292	1,530	1,329	1,523	-0.5%
Palmyra (Twp)	3,145	3,312	3,215	3,206	-3.2%
Porter (Twp)	385	485	400	550	13.4%
Shohola (Twp)	2,088	2,475	2,133	2,528	2.1%
Westfall (Twp)	2,430	2,323	2,513	2,537	9.2%
Pike County	46,302	57,369	55,453	58,535	2.0%

Source: (U.S. Census Bureau 2001), (U.S. Census Bureau 2003), U.S. Census Bureau 2020

*2020 U.S. Census was not available during the planning process.

Table 2-2. Demographics

Demographics	2000 Census	2010 Census	2015-2019 ACS Est.	2020 Census
Total Population	46,302	57,369	55,453	58,535
Male	23,197	28,686	28,148	N/A
Female	23,105	28,683	27,305	N/A
Median age (years)	35.7	43.7	48.2	N/A
Under 5 years	3,241	2,823	1,894	N/A
18 years and over	33,523	44,011	45,421	N/A
65 years and over	5,001	9,303	12,152	N/A
Household population	17,433	22,190	22,119	N/A
Group quarters population	392	478	493	N/A



Source: U.S. Census Bureau 2021, *General Population and Housing Characteristics, Pike County*

Note: The 2020 Census data was not available during the planning process; therefore, the table does not include all 2020 Census statistics.

As shown in the tables above, **Pike County's 2010 Census population was 57,369** and in 2019 was 55,453. Based on the 2010 data, the population density of Pike County is 105.3 persons per square mile, which is considerably lower than the Pennsylvania statewide average of 284 persons per square mile (U.S. Census 2010). Most of the municipalities in Pike County have population densities above the statewide average. However, many municipalities in the county have low population density. Dispersing information, instructions, and resources during a disaster response effort to residents in low-density areas is more difficult than in more densely populated areas because individuals are not centralized.

While low-density areas may 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.

The Disaster Mitigation Act of 2000 (DMA 2000) requires that HMPs consider socially vulnerable populations. These populations can be more susceptible to hazard events based on several factors, including their physical and financial ability to react to or respond during a hazard and the location and construction quality of their housing. For the purposes of this study, vulnerable populations shall include (1) the elderly and younger populations (persons aged 65 and over; persons aged 5 and younger) and (2) those living in low-income households.

Approximately 21.9 percent of the county's total population is aged 65 and older (U.S. Census, 2019). Older residents may have access and functional needs. For example, many may be unable to drive; therefore, special evacuation plans may be necessary. They may also have hearing or vision impairments that could make receiving emergency instructions difficult. Additionally, **3.4 percent of the county's total population is under the age of 5 years (U.S. Census 2019). Both older and younger populations have higher risks for contracting certain diseases. The county's combined population under 5 years of age and over 65 years represent approximately 25.3 percent of its total population.**

Figure 2-4 and Figure 2-5 illustrate the distribution of these populations for Pike County.



Figure 2-3. Pike County 2019 Population Distribution

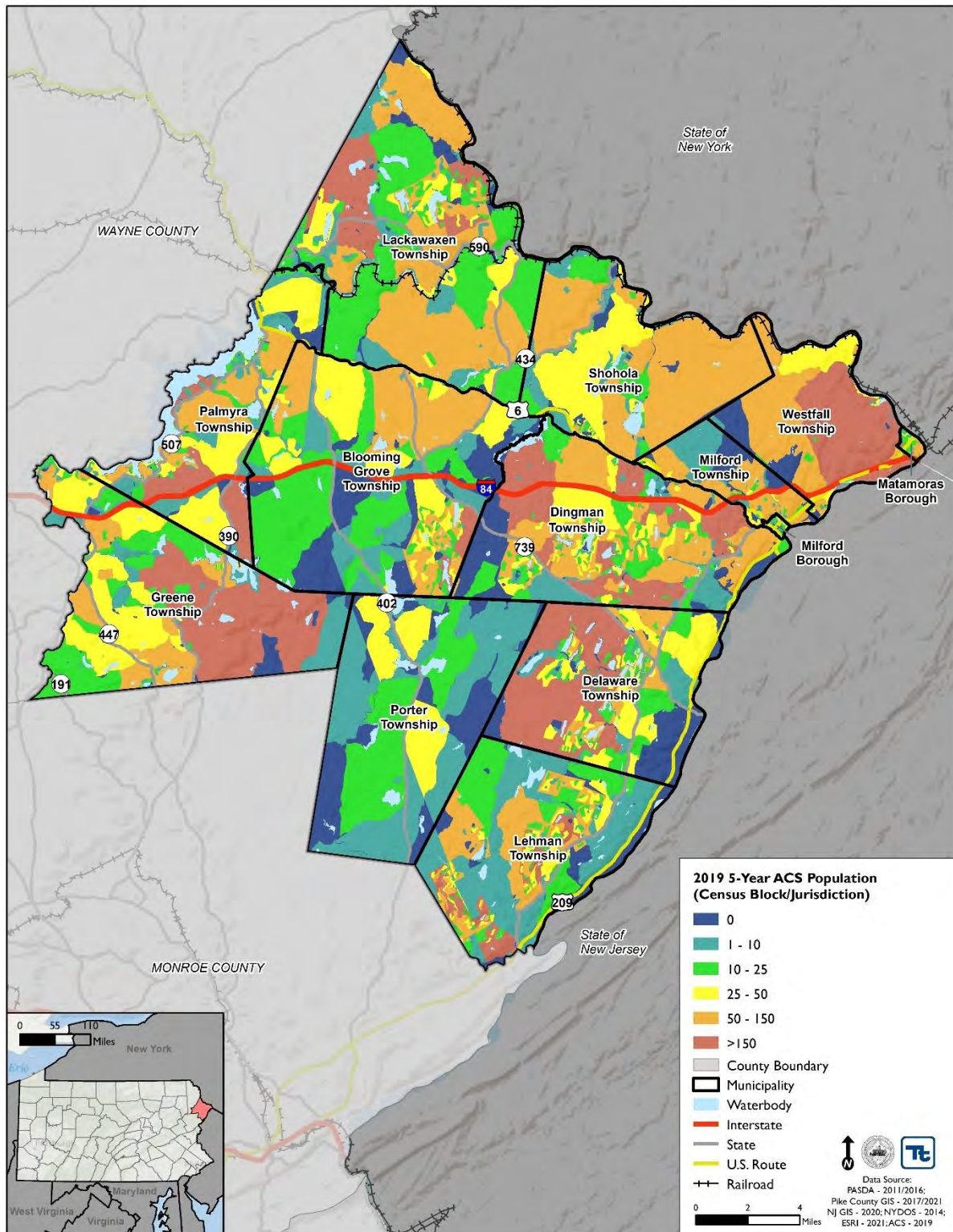




Figure 2-4. Pike County 2019 Population Over 65 Years

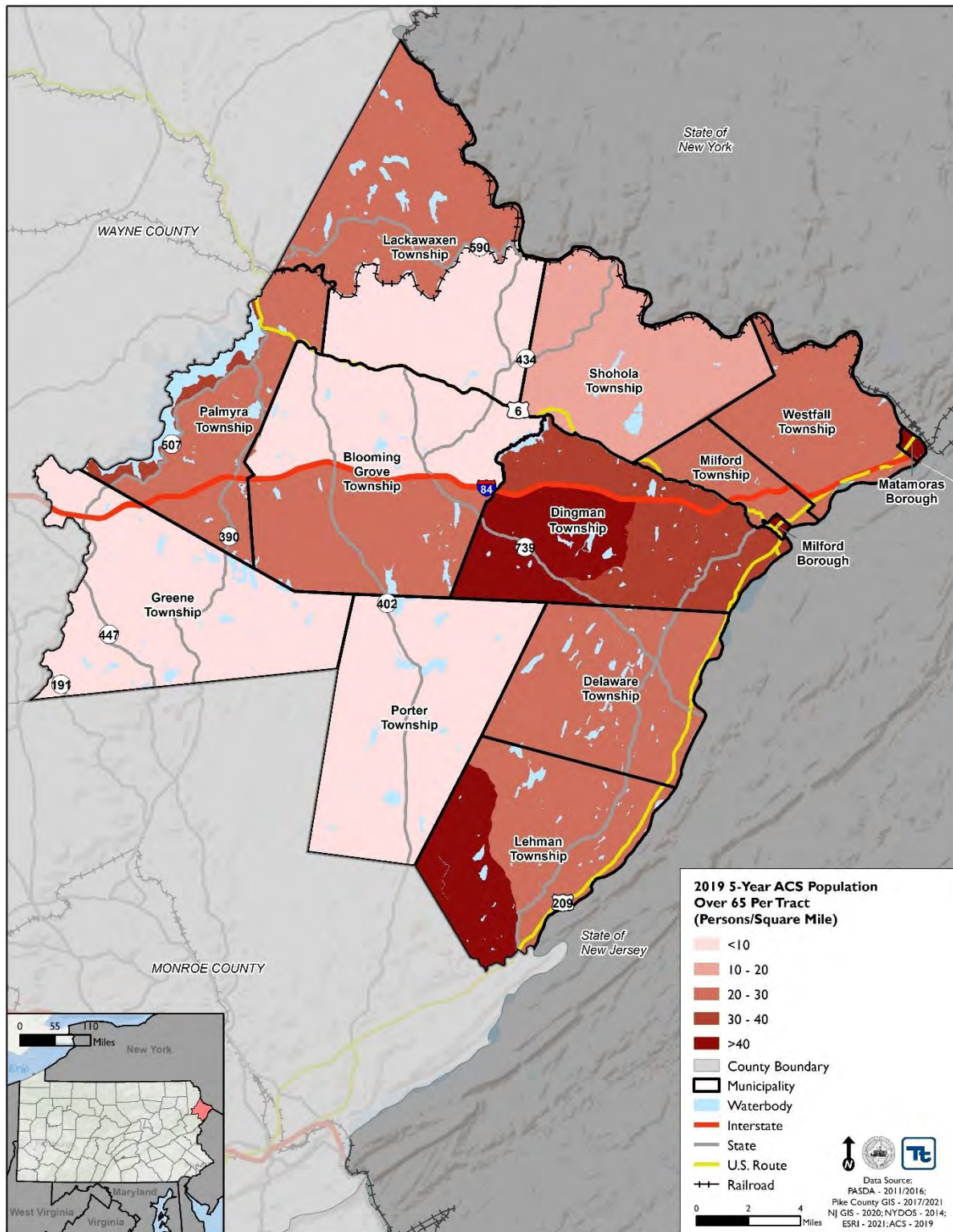
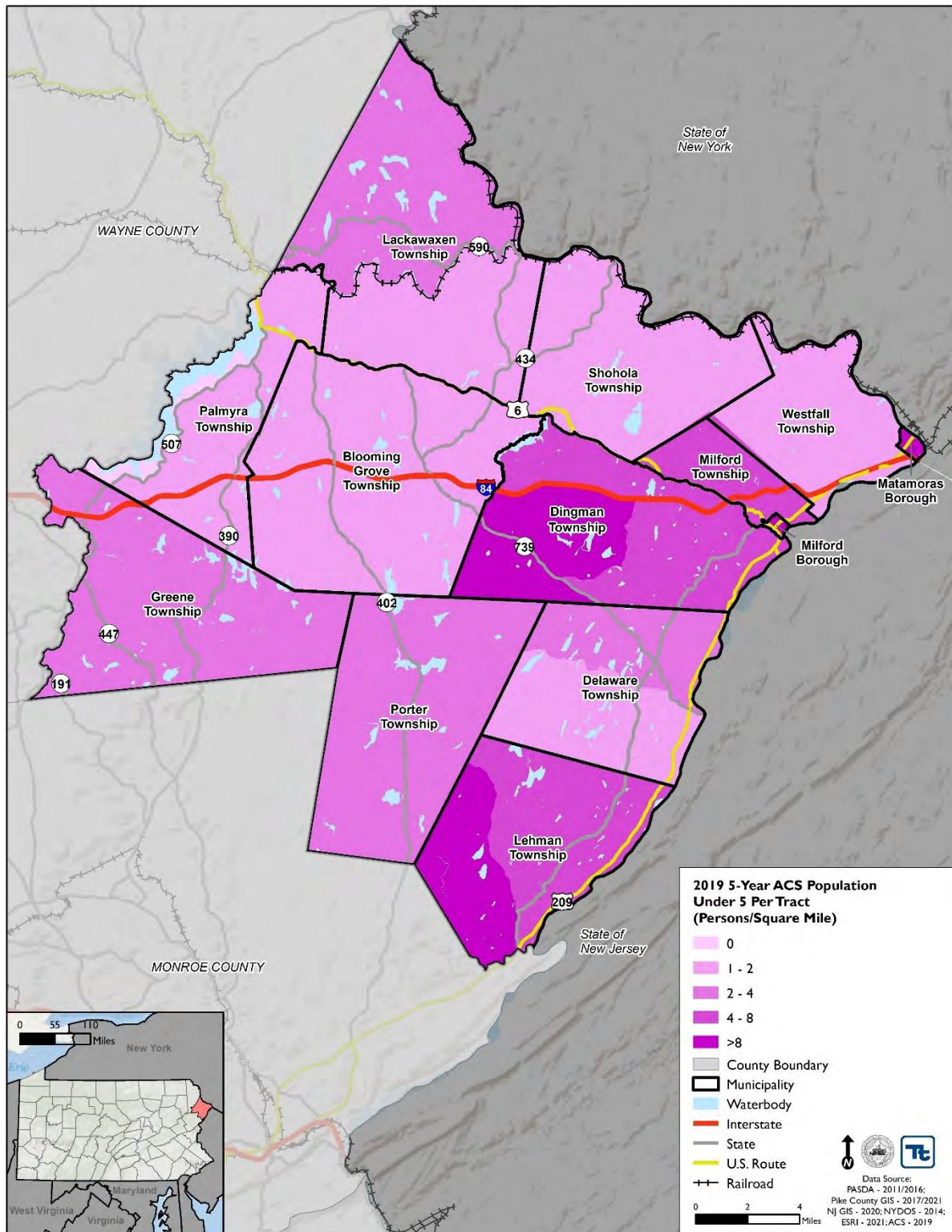




Figure 2-5. Pike County 2019 Population Under 5 Years





Only 493 people in Pike County live 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.

Table 2-3 provides population estimates and projections for each municipality in Pike County and for the county as a whole. The population of the entire county is estimated to be 54,257 by the year 2040, which represents a net population decrease of 3,112 people (5.4 percent) in a 30-year period. 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 Pike County to better assess magnitudes of hazards and develop more specific mitigation plans and strategies.

Table 2-3. Pike County Population Projections by Municipality

Jurisdiction	2010 Census	2015-2019 ACS Estimates	Population Change 2010-2019 (%)	2030 Projection	2040 Projection	Projected Population Change 2010-2040 (%)
Blooming Grove (Twp)	4,819	4,645	-3.6%	-	-	-
Delaware (Twp)	7,396	7,063	-4.5%	-	-	-
Dingman (Twp)	11,926	11,619	-2.6%	-	-	-
Greene (Twp)	3,956	3,825	-3.3%	-	-	-
Lackawaxen (Twp)	4,994	5,020	0.5%	-	-	-
Lehman (Twp)	10,663	10,183	-4.5%	-	-	-
Matamoras (Boro)	2,469	2,336	-5.4%	-	-	-
Milford (Boro)	1,021	1,172	1.5%	-	-	-
Milford (Twp)	1,530	1,329	-13.1%	-	-	-
Palmyra (Twp)	3,312	3,215	-2.9%	-	-	-
Porter (Twp)	485	400	-17.5%	-	-	-
Shohola (Twp)	2,475	2,133	-13.8%	-	-	-
Westfall (Twp)	2,323	2,513	8.2%	-	-	-
Pike County	57,369	55,453	-3.3%	55,783	54,257	-5.4%

Source: The Center for Rural Pennsylvania, 2014; U.S. Census 2019

Note: Population projections at the municipal level were not available for Pike County.

According to the 2015-2019 American Community Survey, 11.2 percent of the county’s population speaks a language other than English, with 2.2 percent of the population speaking English less than “very well.” While currently a low percentage, 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 for Pike County.



Table 2-4. Race and Ethnicity

Race and Ethnicity	2010	% of Population	2019 ACS	% of Population
One race	56,160	97.9%	54,123	97.6%
White	50,856	88.6%	49,074	88.5%
Black or African American	3,322	5.8%	3,526	6.4%
American Indian and Alaska Native	176	.31%	58	0.1%
Asian	597	1.0%	661	1.2%
Native Hawaiian and Other Pacific Islander	16	.03%	38	0.1%
Some other race	1,193	2.1%	766	1.4%
Two or more races	1,209	2.1%	1,330	2.4%
Foreign born	3,594	6.3%	4,549	8.2%
Speak a language other than English	5,392	9.4%	6,206	11.6%
Hispanic or Latino	5,173	9.0%	6,052	10.9%

Source: U.S. Census Bureau 2010, General Population and Housing Characteristics, Pike County; U.S. Census Bureau 2019; U.S. Census Bureau 2020

Pike County contains 38,940 housing units (U.S. Census 2019). 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 40.2 percent of the county's residential properties are vacant. Most vacancies are from units available for rent. 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 16.8 percent of the county's population live in rented homes. 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 2-5 summarizes characteristics of the residential properties in Pike County.

Table 2-5. Housing Characteristics

Housing Characteristics	2015-2019 ACS
Total housing units	38,940
Owner-occupied housing units	18,411
Renter-occupied housing units	3,708
Vacant housing units	16,821
Average household size	2.59
Housing units with a mortgage	11,777
Housing units (owned) without a mortgage	6,634

Source: U.S. Census Bureau 2019

In 2019 (the most current data available), the median household income in the County was \$65,928, which was higher than the Commonwealth of Pennsylvania's estimated median household income (\$61,744). The County's 2019



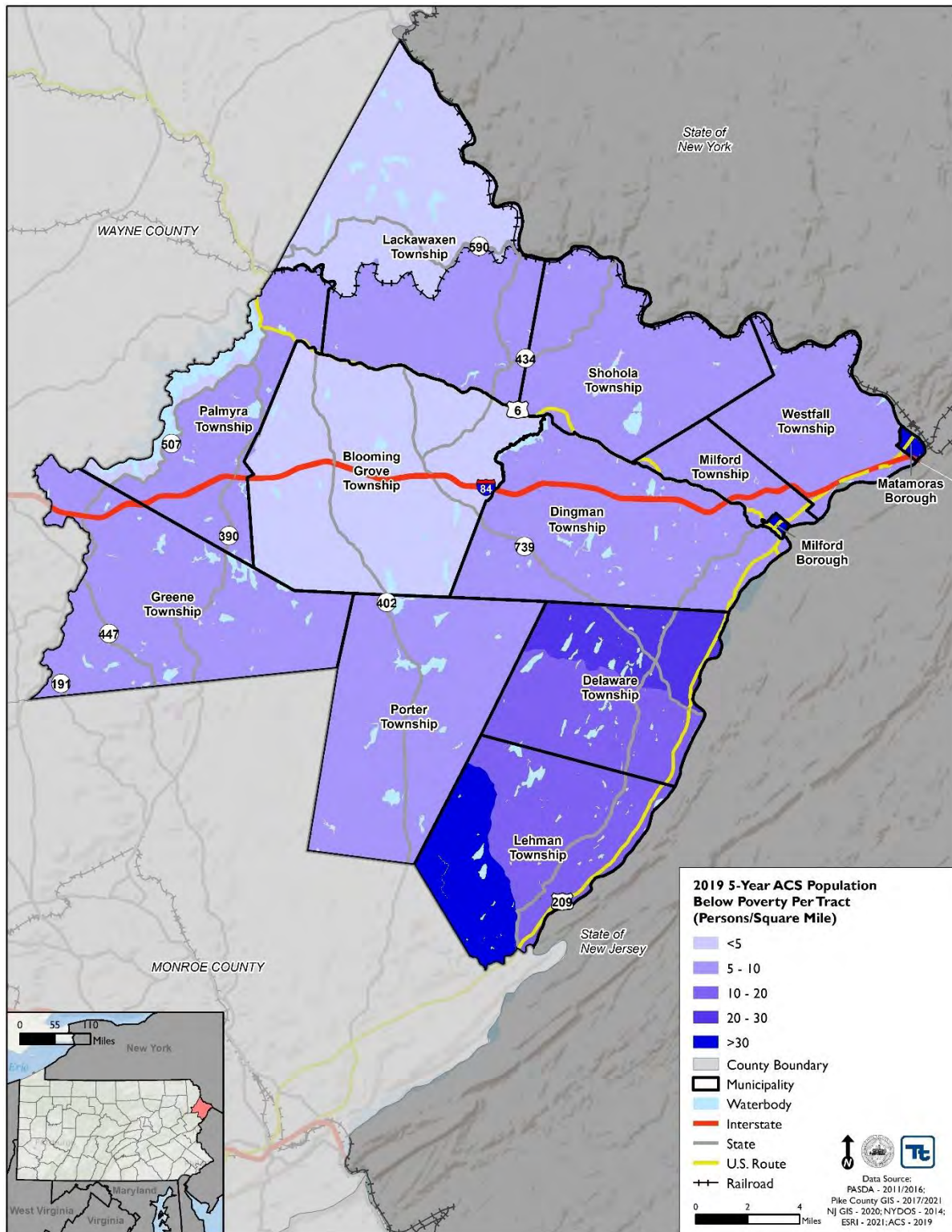
estimated per capita income of \$34,589 was higher than the Commonwealth's 2019 estimated per capita income of \$34,352. Approximately 9.5 percent of residents in Pike County were below poverty level in 2019. Emergency responders may have difficulty connecting with individuals within this economic bracket 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 a more vulnerable population during an evacuation. Table 2-6 summarizes economic characteristics of Pike County's population and population distribution of residents with incomes below the poverty level.

Table 2-6. Economic Characteristics

Economic Characteristics	2019 Data
Median household income in 2019	\$65,928
Median family income in 2019	\$80,167
Per capita income in 2019	\$34,589
Below poverty level	9.5%



Figure 2-6. Pike County Population Below the Poverty Level





2.4 Land Use and Development

Pike County's existing land use patterns are greatly influenced and shaped by surrounding natural features such as mountains, valleys, and waterways. These features have largely determined locations of transportation corridors and development activities.

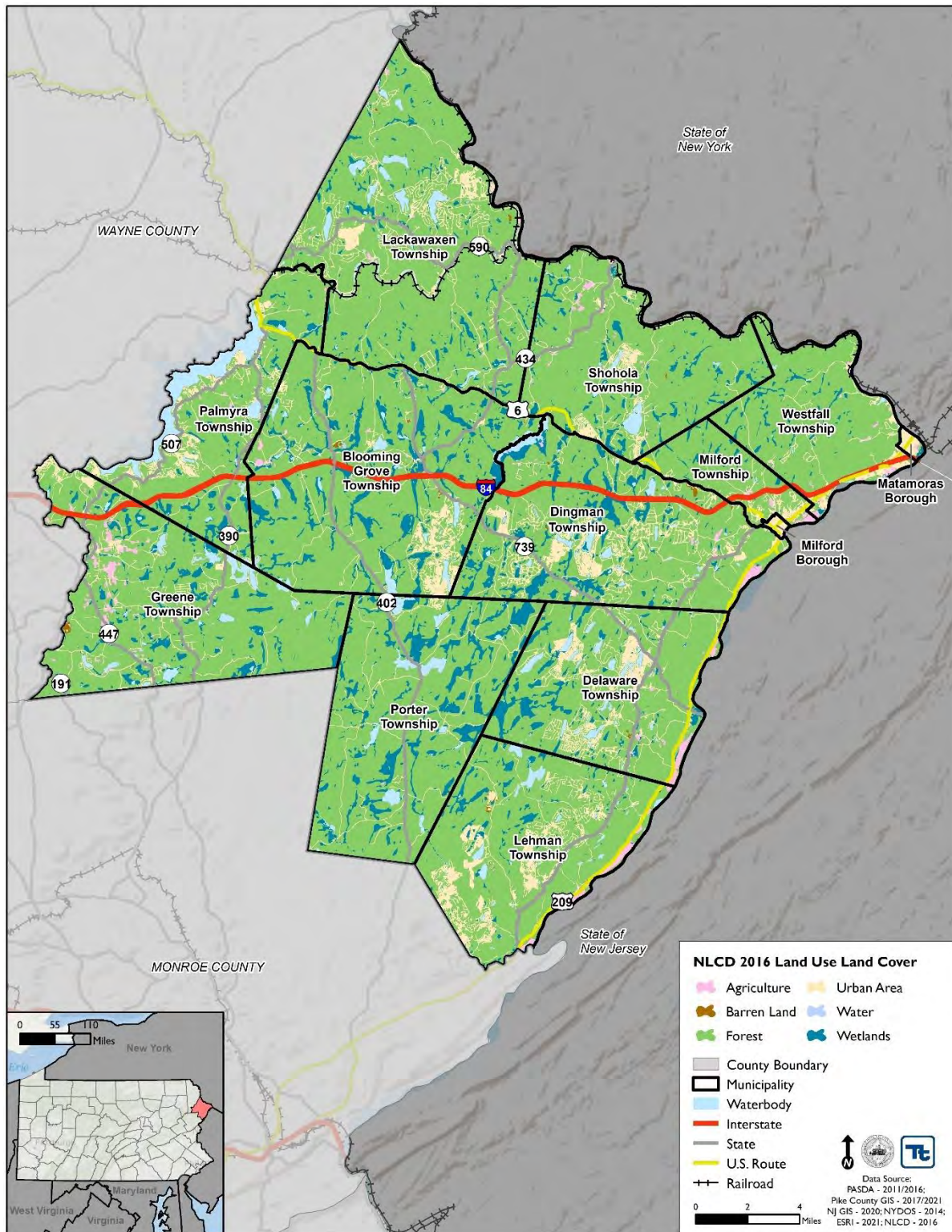
Over 95 percent of Pike County's land cover is undeveloped with almost 89 percent of this total devoted to forest and agricultural land uses (Figure 2-7). In addition, approximately 10 percent of the County is made up of water and wetlands.

Transportation systems within Pike County include highway and rail facilities. The County's highway system is formed around approximately 35 miles of Interstate Route 84. This road runs east to west across the center of the County. Access to I-84 is limited to six interchanges.

The County has become a commuter-shed for metropolitan New York and New Jersey via I-84, Routes 206 and 15, I-80, and mass transit which provide acceptable yet long commutes (Pike County Office of Community Planning, 2006). Most of the County's state routes are in need of repair and/or maintenance and were not designed to handle the increase in traffic volume being generated by the expanded population.



Figure 2-7. Pike County Land Use and Land Cover





2.5 Data Sources and Limitations

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

1. Pike County Comprehensive Plan (Pike County 2006)
2. Pennsylvania Department of Environmental Protection Population Projections Report (PA DEP n.d.)
3. U.S. Census Bureau. 2010
4. U.S. Census Bureau. 2019. 2015-2019 American Community Survey 5-Year Estimates Pike County.
5. U.S. Census Bureau. 2021. 2020 DEC Redistricting Data
6. Pike County Planning Division. 2021.
7. United States Department of Agriculture. 2020. 2017 Census of Agriculture: Pike County, Pennsylvania County Profile.

Data sources used to develop the HMP, in general, are listed in Section 1.4 and Appendix A. Data sources used to perform geographic information system (GIS) analysis for the risk assessment are listed in Section 4.1. These sources were key in understanding the current demographic makeup of the communities as well as in framing the foundation of the HMP. The sources listed provided the underlying context of the HMP and allowed the Planning Team to understand critical vulnerabilities in the county. Throughout the course of the planning process, the Steering Committee continually sought additional data sources to augment the information included in the HMP. The Steering Committee 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 Pike County HMP. This section describes the planning process used to update the HMP with participation from all 13 **of the county's municipalities**. This section also describes the Hazard Mitigation Steering Committee, Planning Team, meetings and documentation, public and stakeholder participation, multi-jurisdictional planning, and existing planning mechanisms implemented during the HMP update process. Additional details about the process of updating each section of this HMP appear at the beginning of those sections.

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 2020 PEMA Hazard Mitigation Plan Standard Operating Guide (2020 SOG) 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. Hazard vulnerabilities and the risk assessment are described in Section 4 (Risk Assessment), and the mitigation strategy is described in Section 5 (Mitigation Strategy) of 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 Pike 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 Pike County, its municipalities, and the Steering Committee. Through this planning process,



the county established a comprehensive approach to reduce the effects of hazards on the county and its municipalities.

3.2 The Planning Team

Recognizing the need to manage risk within the county, and to meet the requirements of the DMA 2000, the Pike County Community Planning Office led the update to the 2017 HMP. Mr. Brian Snyder, Community Planner, 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. Mr. Snyder served as chair of the Steering Committee and the lead planner and point of contact for the planning process. The Steering Committee was composed of the following individuals:

- Mike Mrozinski, Director, Pike County Community Planning Office
- Brian Snyder, Community Planner, Pike County Community Planning Office
- Tim Knapp, Director, Pike County Emergency Management Agency
- Michele Long, Executive Director, Pike County Conservation District
- Krista Gromalski, Director, Pike County Communications Office
- Fred Suljic, Pike County Planning Commission
- Kate Long, Hazard Mitigation Planner, Tetra Tech
- Heather Apgar, CFM, Project Manager, Tetra Tech

The Steering Committee was charged with the following tasks:

- Providing guidance and overseeing the planning process on behalf of the general planning partnership (Planning Team).
- Attending and participating in meetings.
- Assisting 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 the data and information used in the plan update process is best available
 - Reviewing and updating the hazard mitigation planning goals and objectives
 - Identifying and screening of appropriate mitigation strategies and activities
 - Reviewing and updating plan maintenance procedures
- Reviewing and commenting on plan documents prior to submission to PEMA and FEMA.

A Planning Team was assembled to represent each of the municipalities participating in the HMP update as well as invited stakeholders and members of the Steering Committee. The following organizations were invited to participate on the Planning Team:



Table 3-1. Pike County Planning Team

Pike County Jurisdictions				
Blooming Grove Township	Delaware Township	Dingman Township	Greene Township	Lackawaxen Township
Lehman Township	Matamoras Borough	Milford Borough	Milford Township	Palmyra Township
Porter Township	Shohola Township	Westfall Township		
Educational Institutions				
Delaware Valley School District	East Stroudsburg School District	Penn State Cooperative Extension	Pocono Environmental Education Center	Wallenpaupack Area School District
Hospitals and Health Care				
Carbon-Monroe-Pike Mental Health and Developmental Services	American Red Cross Northeastern PA Chapter			
Police Departments				
Pike County Sheriff's Office				
Utilities Agencies				
Brookfield Energy Partners	Orange & Rockland Utilities	Pennsylvania Power & Light	Pike Co Light & Power/Corning Gas	Lake Wallenpaupack Watershed District
Milford Water Authority	UGI	Westfall Sewer Authority		
Neighboring Jurisdictions				
Monroe County, PA	Orange County, NY	Sullivan County, NY	Sussex County, NJ	Warren County, NJ
Wayne County, PA				
Government Stakeholders				
National Park Service - Delaware Water Gap National Recreation Area	National Park Service - Upper Delaware Scenic & Recreational River	PA DCNR	PA DCNR Forestry - Delaware District Office	PA DEP Northeast Regional Office
PA Game Commission	PA House of Representatives 139th District	PA House of Representatives 189th District	PA Senate 20th District	PEMA Eastern Area Office
PEMA	PennDOT District 4-4	Pike County Economic Development Authority	Pike County Transportation	
Other Stakeholders				
Pocono Mountain Vacation Bureau	Twin and Walker Creeks Conservancy	Upper Delaware Council	Pike County Chamber of Commerce	

For a complete list of individual invitees, participants, attendance at meetings, completion of worksheets, or submission of comments, please refer to Appendices C through E.

The Planning Team acknowledged that important steps in developing a comprehensive HMP were identifying hazards that specifically affect Pike 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 narrow the focus to natural disasters only.

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, 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 strategy
- 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

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 3-2 lists dates and descriptions of meetings held by the Pike County Steering Committee and Planning Team as part of the process of updating the Pike County HMP.

Table 3-2. Public and Planning Meetings

Date	Description of Meeting
June 2, 2021	Kickoff meeting with Community Planning Office
June 24, 2021	Kickoff meeting with Steering Team member, including a 5-year plan review and plan update process, evaluation of identified hazards, capability assessment, and mitigation strategy review. The Steering Team members identified problem areas and issues throughout the county for each hazard.
July 1, 2021	Initial Planning Team Meeting to update the risk assessment, update the capabilities assessment, update the mitigation strategy, update other sections of the HMP
August 1, 2021	Bi-weekly check-in meeting. Discussion of municipal worksheet due dates; status of data collection; identification of hazards of concern; survey updates; and the current work plan.
September 8, 2021	Direct outreach discussions with municipalities to garner as much participation in the planning process as possible
October 1, 2021	Supervisors Meeting – Community Planning Office presented information about the HMP to the municipal supervisors in Pike County
November 10, 2021	Risk Assessment review meeting to present the risk assessments of hazards and hand out the mitigation actions, municipality risk factor analysis worksheets for the municipalities to complete
January 19, 2022	Mitigation Strategy Workshop to review mitigation goals, objectives, actions, and current plan status with the Planning Team.
June 1, 2022	Plan Draft Review Meeting to collect comments on the completed draft
	HMP adoption by County Commissioners

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. Documentation from all meetings is located in Appendix C.



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

The Risk Assessment Review Meeting and the Draft Review Meeting were advertised as public meetings. 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 the effectiveness of the HMP, the Steering Team fostered continual public and stakeholder engagement. Input was encouraged and collected through a variety of methods. Five worksheets/surveys—the Hazard/Risk Identification Survey, Risk Factor Analysis 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 Pike County. 14 jurisdictions (the county and 13 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 Planning Team or public meeting or by offering comments on the project website: local, state, and federal agencies; neighboring jurisdictions (Monroe and Wayne County, PA; Orange, Sullivan County, NY; Sussex and Warren County, NJ); community leaders; educators; healthcare facilities; and other relevant private and nonprofit groups. Invitations to participate in meetings were sent to those stakeholders. Appendix E includes a copy of the Planning Team meeting invitation list and sample copies of invitation letters sent. Meeting invitations were also sent to all municipalities, including elected officials and emergency management coordinators. Additionally, direct outreach by phone or one-on-one meetings 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. All 13 municipalities in Pike County had representatives attending at least one meeting.

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 Community Planning. Copies of the public notices and other forms of public and stakeholder outreach are presented in Appendix E.

Throughout the course of the entire planning process, the following stakeholder organizations participated:

- DCNR Bureau of Forestry - Delaware Forest District
- FEMA Region 3
- Lake Wallenpaupack Watershed Management District
- Monroe County, PA Office of Emergency Management
- Monroe County, PA Planning Department
- National Park Service
- Orange County, NY OEM
- Orange County, NY Department of Planning
- **PA State Senator Baker's Representative**
- PEMA
- Penn State Extension
- Pocono Mountains Visitors Bureau
- Sullivan County, NY Department of Planning



- Sussex County, NJ Division of Planning and Economic Development
- Upper Delaware Council
- Wayne County, PA EMA
- Wayne County, PA Planning Department

Table 3-3 in Section 3.5 of this HMP shows the overall municipal participation in the planning process.

3.5 Multi-Jurisdictional Planning

Pike County took a multi-jurisdictional approach to preparing the HMP so that the HMP would apply to the county and all participating municipalities. The county was able to provide resources (e.g., data, geographic information system [GIS], etc.) to which the municipalities might not have had access. However, Pike County depended on municipal buy-in because the municipalities have the legal authority to enforce compliance with land use planning and development directives. Pike County undertook an intensive effort to involve all 13 municipalities in the update process.

Each municipality was given the opportunity to participate in this process. Municipal officials and representatives were invited to attend Planning Team and public meetings; were provided worksheets to update the hazards of concern, capabilities, and mitigation strategy; and were asked to review and prioritize the mitigation actions. Municipal participation culminated in the formal adoption of the HMP; copies of municipal adoption resolutions are in Appendix F. Table 3-3 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 Pike County Steering Committee representatives to cover the meeting material and provide municipal support on the topics presented.



Table 3-3. Participation Matrix

Jurisdiction	Meetings					Indiv. Contact	Worksheets					2022 Plan Adoption Date
	Planning Team Kickoff Meeting (7/1/2021)	Municipal Support Meeting (9/8/2021)	Risk Assessment Meeting (11/10/2021)	Mitigation Strategy Workshop (1/19/22)	HMP Draft Review Meeting (6/1/22)		Hazard Evaluation Survey	Capability Assessment Survey	Municipal Mitigation Strategy Survey	NFIP Survey	RF*	
Pike County	X	X	X	X		X	X	X	X	-	X	TBD
Blooming Grove Township	-	-	X	X			X	X	X	X	X	TBD
Delaware Township	X	-	-	X		X	X	X	X	X	X	TBD
Dingman Township	-	-	-	X		X	X	X	X	X	X	TBD
Greene Township	-	-	-	-			X	X	-	-	X	TBD
Lackawaxen Township	X	X	-	-			X	X	X	X	X	TBD
Lehman Township	X	X	X	X			X	X	X	X	X	TBD
Matamoras Borough	-	-	-	-		X	X	X	X	X	X	TBD
Milford Borough	-	-	X	-		X	X	X	X	X	X	TBD
Milford Township	X	X	X	X			X	X	X	X	X	TBD
Palmyra Township	X	X	-	-		X	X	X	X	X	X	TBD
Porter Township	-	-	X	-		X	X	X	X	X	X	TBD
Shohola Township	-	X	-	-			X	X	X	X	-	TBD
Westfall Township	X	-	-	-			X	X	X	X	X	TBD

Notes:

Indiv. = Individual

RF = Municipal Risk Factor worksheet

TBD = To be **determined after plan is granted "approvable pending adoption" status by FEMA Region III.**



SECTION 4. RISK ASSESSMENT

4.1 Update Process Summary

In accordance with the Federal Emergency Management Agency (FEMA) Local Mitigation Planning Handbook, risk is the potential for damage, loss, or other impacts created by the interaction of natural hazards with community assets. Pike 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 2017 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 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 2017 HMP and requested that participants identify whether the frequency of occurrence, magnitude of impact, and/or geographic extent of each hazard increased, decreased, or did not change since the preparation of the 2017 HMP. The worksheet also provided the opportunity to assess hazards not profiled in the HMP to determine if those hazards should be included as part of the update. Responses from the worksheets were reviewed by the Steering Committee to identify a list of hazards to profile in the 2022 HMP, including three additional hazards of concern. The new hazards of concern are cyber terrorism, invasive species, and opioid addiction response. Each hazard profile also includes an additional subsection that discusses the effect of climate change on vulnerability. Refer to copies of the completed worksheets in Appendix H.



SECTION 4. RISK ASSESSMENT

4.2 Hazard Identification

4.2.1 Disaster Declarations

In reviewing and updating Pike County's hazards of concern, the Steering Committee and Planning Team reviewed additional information and historical records from a wide range of sources. The following section discusses the Presidential Disaster and Emergency Declarations, Gubernatorial Disaster Declarations or Proclamations, and Small Business Administration Disaster Declarations that have affected Pike County.

Presidential Disaster and Emergency Declarations are issued when it has been determined that state and local governments need assistance in responding to a disaster event. Since 1955, declarations have been issued for various hazard events, including hurricanes or tropical storms, severe winter storms, and flooding. A unique Presidential Emergency Declaration, Emergency Declaration 3235, was issued in September 2005. Through this declaration, President George W. Bush declared a state of emergency existed for the Commonwealth of Pennsylvania and ordered federal aid to supplement Commonwealth and local response efforts to help people evacuate from their homes due to Hurricane Katrina. A summary of declarations affecting the county is provided in the tables below.

Table 4.2-1 lists Presidential Disaster and Emergency Declarations issued between 1965 through 2021 that have affected Pike County. Additional declarations can be found on the Federal Emergency Management Agency (FEMA) website at: <https://www.fema.gov/disasters>.

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

Declaration Number	Date	Event
DR-4506	March 2020	Covid-19 Pandemic
EM-3441	March 2020	Covid-19
DR-4099	January 2013	Hurricane Sandy
EM-3356	October 2012	Hurricane Sandy
DR-4025	September 2011	Hurricane Irene
EM-3339	August 2011	Hurricane Irene
DR-1649	June 2006	Severe Storms, Flooding, and Mudslides
EM-3235	September 2005	Hurricane Katrina Evacuation
DR-1587	April 2005	Severe Storms and Flooding
DR-1557	September 2004	Tropical Depression Ivan
DR-1219	June 1998	Severe Storms, Tornadoes, and Flooding
DR-1093	January 1996	Flooding
DR-1085	January 1996	Blizzard
EM-3105	March 1993	Blizzard



Declaration Number	Date	Event
DR-340	June 1972	Tropical Storm Agnes
DR-273	August 1969	Severe Storms, Flooding
DR-206	August 1965	Water Shortage

Source: FEMA 2021

In addition to these Presidential Disaster and Emergency Declarations, 58 events warranted Gubernatorial Disaster Declarations or Proclamations. Table 4.2-2 lists Gubernatorial Disaster Declarations or Proclamations that have been issued for Pike County between 1958 and 2021, according to PEMA (PEMA 2021).

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

Date	Event
August 2021	Proclamation of Disaster Emergency – Hurricane Ida
August 2021	Amendment to Proclamation of Disaster Emergency – Opioid Crisis
May 2021	Amendment to Proclamation of Disaster Emergency – Coronavirus (COVID-19)
May 2021	Proclamation Terminating the Disaster Emergency – Civil Disturbance
May 2021	Amendment to Proclamation of Disaster Emergency – Opioid Crisis
April 2021	Proclamation of Disaster Emergency – Civil Disturbance
February 2021	Amendment to Proclamation of Disaster Emergency – Coronavirus (COVID-19)
February 2021	Amendment to Proclamation of Disaster Emergency – Opioid Crisis
February 2021	Proclamation of Disaster Emergency – Winter Weather
December 2020	Proclamation of Disaster Emergency – Winter Weather
November 2020	Amendment to Proclamation of Disaster Emergency – Coronavirus (COVID-19)
November 2020	Amendment to Proclamation of Disaster Emergency – Opioid Crisis
August 2020	Amendment to Proclamation of Disaster Emergency – Coronavirus (COVID-19)
August 2020	Amendment to Proclamation of Disaster Emergency – Opioid Crisis
June 2020	Amendment to Proclamation of Disaster Emergency – Coronavirus (COVID-19)
May 2020	Proclamation of Disaster Emergency
May 2020	Amendment to Proclamation of Disaster Emergency – Opioid Crisis
March 2020	Proclamation of Disaster Emergency – Coronavirus (COVID-19)
February 2020	Amendment to Proclamation of Disaster Emergency – Opioid Crisis
December 2019	Amendment to Opioid Crisis Emergency Proclamation
September 2019	Amendment to Opioid Crisis Emergency Proclamation
June 2019	Amendment to Opioid Crisis Emergency Proclamation
March 2019	Amendment to Opioid Crisis Emergency Proclamation
January 2019	Proclamation of Disaster Emergency for Severe Winter Event
December 2018	Amendment to Opioid Crisis Emergency Proclamation
September 2018	Amendment to the Opioid Crisis Emergency Proclamation
August 2018	Proclamation of Disaster Emergency for Severe Weather Event
June 2018	Amendment to Opioid Crisis Emergency Proclamation
April 2018	Amendment to Opioid Crisis Emergency Proclamation



Date	Event
January 2018	Opioid Crisis Emergency Proclamation
March 2017	Proclamation of Emergency – Severe Winter Storm
March 2017	Proclamation of Emergency – Severe Winter Storm
January 2016	Proclamation of Emergency – Severe Winter Storm
August 2015	Proclamation of Emergency – Severe Storms
January 2015	Proclamation of Disaster Emergency – Severe Winter Storms
February 2014	Proclamation of Disaster – 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
May 2013	Proclamation of Emergency – Dauphin Bridge Fire
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	Severe Storm
February 2007	Proclamation of Emergency - Severe Winter Storm
February 2007	Proclamation of Emergency - Regulations
April 2007	Proclamation of Emergency – Severe Winter Storm
September 2006	Proclamation of Emergency - Tropical Depression Ernesto
September 2005	Proclamation of Emergency - Hurricane Katrina
February 2002	Drought and Water Shortage
July 1999	Drought
February 1978	Blizzard
January 1978	Heavy Snow
February 1974	Truckers' Strike
February 1972	Heavy Snow
January 1966	Heavy Snow
February 1958	Heavy Snow

Source: Pike County HMP 2017, PEMA 2021

Pike County has also received Small Business Administration Disaster Assistance for a number of disaster events. A Small Business Administration Disaster Declaration qualifies communities for access to affordable, timely, and accessible financial assistance. Table 4.2-3 lists Small Business Administration Disaster Declarations issued for Pike County between 1981 and 2021 (SBA 2021).

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

Date	Event
September 2021	Remnants of Hurricane Ida
April, 2007	Severe Storms and Flooding



Date	Event
July, 1991	Drought
February, 1981	Flash Flood (Matamoras)

Source: Pike County HMP 2017, 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 2017 version of the plan as well as those identified in the State HMP. They also considered the history of hazard events occurring in Pike County as well as events occurring after the completion of the 2017 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 in which Pike County was designated for federal assistance.

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 Pike County, including any that may not have been considered in either the 2017 version of the plan or the State HMP. Completed worksheets submitted by the municipalities are included in Appendix G. Following review of the 2017 hazards list and completion of the *Hazard Identification/Evaluation of Risk* worksheet, additional hazards were considered in need of a risk assessment. The Steering Committee and Planning Team decided to keep all 2017 hazards of concern except Lightning, while adding a new chapter called Severe Weather.

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:

Natural Hazards

- Disease Outbreak
- Drought
- Earthquake
- Extreme Temperature
- Flood
- Geologic Hazards (landslide, sinkholes)
- **Hurricane, Tropical Storm, Nor'easter**
- Invasive Species
- Radon Exposure
- Severe Weather
- Tornado and Windstorm
- Wildfire
- Winter Storm

Non-Natural Hazards

- Dam Failure
- Drowning
- Environmental Hazards
- Nuclear Incidents
- Terrorism
- Transportation Accidents
- Structural Fire and Explosion
- Utility Interruption

These hazards have been profiled individually in Section 4.3 of this plan.



4.3.1 Disease Outbreak and Pandemic

4.3.1.1 Profile

Pandemics are large-scale disease outbreaks, defined by how the disease spreads, not by how many fatalities are associated with it. A pandemic outbreak has several recognizable characteristics, including rapid, large-scale (potentially global) spread; overloaded healthcare systems; inadequate medical supplies; medical supply shortages; and a disrupted economy and society (Flu.gov 2015). Pandemics typically result from infectious diseases. An infectious disease, as defined by the World Health Organization (WHO), is caused by pathogenic organisms (e.g., bacteria, viruses, fungus, or parasites) that spread from one person to another, whether through direct or indirect contact. Zoonotic disease, a type of infectious disease, occurs when animals transmit a disease to humans (WHO 2015). Although any infectious disease can reach pandemic levels, influenza (flu) has the greatest likelihood of causing the next pandemic.

Of particular concern to Pike County are arthropod-borne viruses (arboviruses), which are viruses that are maintained in nature through biological transmission between susceptible hosts (mammals) and blood-feeding arthropods (mosquitos and ticks). More than 100 arboviruses can cause disease in humans; over 30 have been identified as human pathogens in the western hemisphere (New Jersey Department of Health and Senior Services 2008). Pike County has been impacted by various past and present infestations including: high population of mosquitoes (mosquito-borne diseases), American Dog ticks and Blacklegged ticks (tick-borne diseases).

Mosquito-borne diseases are diseases that are spread through the bite of an infected female mosquito. Diseases of concern to Pike County include West Nile Virus. More recently, there has been an outbreak of Zika virus in the United States which is another mosquito-borne disease and a concern for the Commonwealth. Additionally, tick-borne diseases are bacterial or viral illnesses that spread to humans through infected ticks. Ticks become infected by microorganisms when feeding on small, infected mammals (mice and voles). People who spend a lot of time outdoors have a greater risk of being bitten by an infected tick and becoming infected themselves. It is possible to be infected with more than one tick-borne disease at a time. Tick-borne diseases, including Lyme disease, are a major concern to Pike County and the Commonwealth.

In addition to arboviruses, Pike County has been impacted by influenza outbreaks and the coronavirus pandemic in the past five years. Most recently, Pike County has been monitoring the Ebola virus, measles and Zika; however, there have been no cases in the County. For the purpose of this HMP update, the following diseases will be discussed in further detail: mosquito-borne (West Nile Virus), tick-borne (Lyme), influenza, coronavirus, measles, Ebola, and Zika.

West Nile Virus

West Nile Virus (WNV) encephalitis is a mosquito-borne viral disease, which can cause an inflammation of the brain. WNV is commonly found in Africa, West Asia, the Middle East and Europe. For the first time in North America, WNV was confirmed in New York City during the summer and fall of 1999. WNV was first found in Pennsylvania in 2000. Since 2004, a continent-wide WNV epidemic flare up in the summer and continues into the fall as infected mosquitoes spread the virus from birds to horses, humans and other animals (Health, West Nile Virus Fact Sheet 2022).



Tick-Borne Diseases

Ticks can be infected with bacteria, viruses, or parasites. Ticks can transmit numerous diseases, including Lyme disease, Anaplasmosis, Babesiosis, Ehrlichiosis, Spotted Fever Rickettsiosis, and Powassan Virus. One of the more common tick-borne diseases in the Northeast is Lyme disease. Lyme disease is an illness caused by infection with the bacterium *Borrelia burgdorferi*, which is carried by infected ticks. Symptoms include fever, fatigue, headache, **muscle aches, joint pain, a bull's eye rash may appear, and other symptoms that can be mistaken for viral infections**, such as influenza or infectious mononucleosis. Pennsylvania has led the nation in confirmed cases of Lyme disease for three straight years and for the first-time **deer ticks have been found in each of Pennsylvania's 67 counties**. In 2019, Pike County had the following recorded cases of tick-borne disease:

- Lyme disease – 89 cases
- Babesiosis – 6 cases
- Anaplasmosis – 17 cases
- Ehrlichiosis – less than 5 cases
- Spotted Fever Rickettsiosis – less than 5 cases (Health, 2019 Lyme and Other Tickborne Disease Surveillance Report 2021).

Influenza

The risk of a global influenza pandemic has increased over the last several years. This disease is capable of claiming thousands of lives and adversely affecting critical infrastructure and key resources. An influenza pandemic has the ability to reduce the health, safety, and welfare of the essential services workforce; immobilize core infrastructure; and induce fiscal instability.

An influenza pandemic is a global outbreak of a new influenza A virus. Pandemics happen when new (novel) influenza A viruses emerge which are able to infect people easily and spread from person to person in an efficient and sustained way (CDC, Influenza (Flu) 2017). The most recent pandemic occurred in 2009 and was caused by an influenza A (H1N1) virus. It is estimated to have caused between 100,000 and 400,000 deaths globally in the first year alone (Organization 2022).

At the national level, the CDC's Influenza Division has a long history of supporting the WHO and its global network of National Influenza Centers (NIC). With limited resources, most international assistance provided in the early years was through hands-on laboratory training of in-country staff, the annual provision of WHO reagent kits (produced and distributed by CDC), and technical consultations for vaccine strain selections. The Influenza Division also conducts epidemiologic research including vaccine studies and serologic assays and provides international outbreak investigation assistance (CDC, Influenza Division 2020).

Coronavirus

Coronaviruses are a large family of viruses, some causing illness in people and others circulating among animals, including camels, cats and bats. The 2019 novel coronavirus (COVID-19) is a new virus that causes respiratory illness in people and can spread from person-to-person. This virus was first identified during an investigation into an outbreak in Wuhan, China. Human coronaviruses spread through the air by coughing or sneezing, through close personal



contact, by touching an object or surface with the virus on it, and occasionally through fecal contamination (PADOH 2020).

COVID-19 rapidly spread into a global pandemic by spring of 2020. 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 2021). With the virus being relatively new, information regarding transmission and symptoms of the virus is still new. The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes. Reported illnesses have ranged from mild symptoms to severe illness and death. Reported symptoms include difficulty breathing and shortness of breath, fever or chills, cough, fatigue, muscle or body aches, loss of smell or taste, sore throat, congestion, and nausea or vomiting. Emergency symptoms that require immediate medical attention include trouble breathing, persistent pain or pressure in the chest, confusion or inability to wake or stay awake, and bluish lips or face. Symptoms may appear 2-14 days after exposure to the virus (based on the incubation period of MERS-CoV viruses) (CDC, COVID-19 2021). On December 11, 2020, the FDA issued the first emergency use authorization (EUA) for the Pfizer-BioNTech COVID-19 vaccine and on December 18, 2020 the FDA issued an EUA for the Moderna COVID-19 vaccine (HHS 2022).

The first two cases recorded in Pennsylvania occurred on March 6, 2020 and Governor Wolf signed a Disaster Declaration to ensure the state had the resources and authority to plan the process of containment and mitigation in Pennsylvania. On March 12, 2020, due to the rising cases across the State, closures in several counties began and continued throughout as cases grew. By March 19, 2020, Governor Wolf ordered all non-life-sustaining businesses to close across the commonwealth to help stop the spread of the virus and by April 1, 2020, stay-at-home orders were issued statewide (Pennsylvania 2020). As of March 2022, all COVID-19 restrictions in Pennsylvania have been suspended and over 22 million COVID-19 vaccine doses have been administered (CDC, COVID Data Tracker 2022).

Measles

Measles is caused by a virus and is normally passed through direct contact and through the air. The virus infects the mucous membranes and then spreads throughout the body. It is highly contagious and considered a very serious disease. In 1980, before widespread vaccination, measles caused an estimated 2.6 million deaths each year. It still remains as one of the leading causes of death among young children. In 2013, approximately 145,700 people died, worldwide, from measles, with a majority of deaths being children under age 5 (WHO 2015).

More recently, in 2015, 178 people from 24 states and Washington D.C. were reported to have measles, with one measles-related death. In recent years, the number of cases of measles has been on the rise as more parents elect not to vaccinate their children. Most of these cases were part of a large, ongoing outbreak linked to an amusement park in California.

Ebola

Ebola, previously known as Ebola hemorrhagic fever, is a rare and deadly disease caused by infection with one of the Ebola virus strains. According to the CDC, the 2014 Ebola epidemic is the largest in history affecting multiple countries in West Africa. Two imported cases, including one death, and two locally-acquired cases in healthcare workers have been reported in the United States. The CDC and partners are taking precautions to prevent the further spread of Ebola in the United States (CDC 2016).



Zika Virus

Zika virus is a generally mild illness that is spread primarily through the bite of an infected mosquito. Zika virus can spread through sexual contact from a partner who has been infected with Zika virus. Although less common, Zika virus can also be spread from a mother to baby during pregnancy or during the time of birth or through blood transfusion (Pennsylvania Department of Health 2016).

The current outbreak began in May 2015 in Brazil which led to reports of a neurological disease called Guillain-Barré syndrome and pregnant women giving birth to babies with birth defects such as microcephaly. The outbreak has spread to numerous countries and areas, prompting the Centers for Disease Control and Prevention (CDC) to issue travel notices to regions where the Zika virus transmission is ongoing. In response to the emerging disease, Pennsylvania has created a Zika Response Plan (Pennsylvania Department of Health 2016).

4.3.1.2 Location and Extent

Pandemic events cover a wide geographic area and can affect large populations; this can include multiple countries or continents. Size and extent of an infected population depends on how easily the illness is spread, mode of transmission, and amount of contact between infected and uninfected individuals. Locations with higher density populations are more susceptible to pandemic outbreaks, as the disease can be transmitted more easily, with the exception of **TBD's**. Additionally, vulnerable populations, especially the young and the elderly (who have weaker immune systems), are at greater risk for both contracting a disease and suffering fatal or severe consequences. The Flu most frequently spreads through the air or by touch; when an infected person coughs, infected droplets go into the air or onto their hands, facilitating transmission of the disease to other people (WHO 2015).

When a pandemic or disease outbreak occurs, WHO and other public health institutions begin tracking the disease outbreak, treatment, and more. Ebola was a significant pandemic concern for American public health officials in 2014; however, the disease has primarily remained in Africa to date. Should a pandemic take hold in the United States, the Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH) would be actively involved in managing the outbreak and treatment of the disease.

Influenza viruses with the potential to reach pandemic levels include the avian influenza A (H5N1) and avian influenza H7N9 (CDC 2015). Several years ago, the swine influenza (H1N1) was of particular concern. H1N1 was first detected in people in the United States in April 2009. On June 11, 2009, WHO signaled that a pandemic of 2009 H1N1 flu was underway (CDC 2009). In Pike County, there have been 8,862 confirmed COVID-19 cases (as of April 5, 2022) since the start of the pandemic. Of those confirmed cases, there have been 95 reported deaths associated with the virus. A total of 73,814 vaccinations have been administered to Pike County residents (PADOH, COVID-19 Vaccine Dashboard 2022).

Although Ebola and Zika are still recognized as global health threats, Pike County is primarily concerned with the possibility of a pandemic flu outbreak, COVID-19 pandemic, and tick-borne diseases due to the presence of summer camps and sources of outdoor recreation in the County.

4.3.1.3 Range of Magnitude

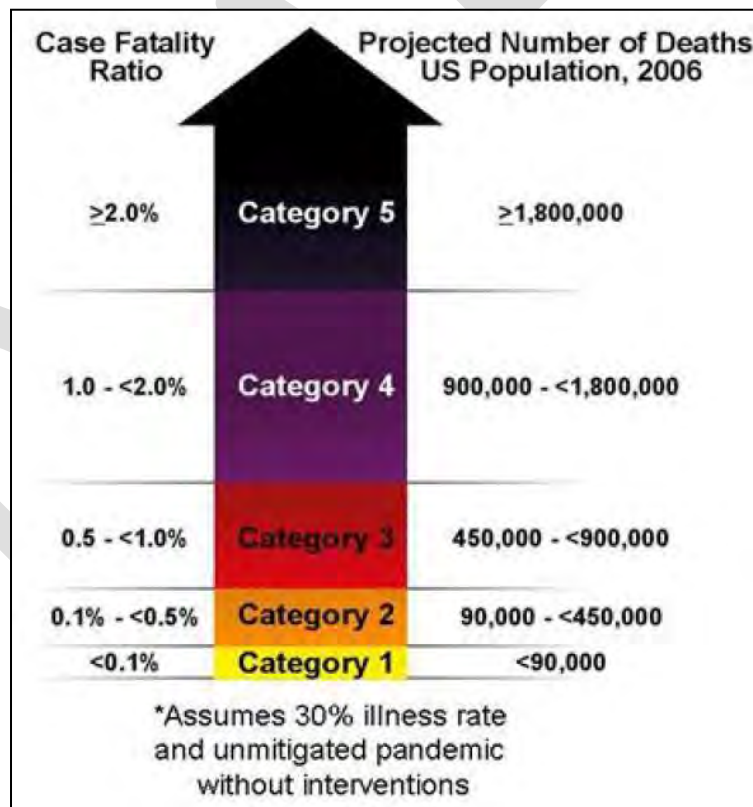


Severity of a pandemic depends on a number of factors, as indicated above. These include aggressiveness of the disease, ease of transmission, and factors associated with the impacted community (e.g., access to medical care, demographic data, and population density). Advancements in medical technologies have greatly reduced the number of deaths caused by influenza. 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.

During the planning process of this plan update, Pike County was experiencing the COVID-19 pandemic. The United States saw over 80 million confirmed cases and nearly 1 million deaths as a result of the pandemic.

The CDC and Prevention Community Strategy for Pandemic Influenza Mitigation guidance introduced a Pandemic Severity Index (PSI), which uses the case fatality ratio as the critical driver for categorizing the severity of a pandemic. The index is designed to estimate the severity of a pandemic on a population to allow better forecasting of the impact of a pandemic, and to enable recommendations on the use of mitigation interventions that are matched to the severity of influenza pandemic. Pandemics are assigned to one of five discrete categories of increasing severity (Category 1 to Category 5) (CDC 2016b). Figure 4.3.1-1 illustrates the five categories of the PSI.

Figure 4.3.1-1. Pandemic Severity Index



Source: CDC 2016b

WHO described a series of pandemic phases in 1999 and revised these in 2005 and 2009 to provide a global framework and aid in pandemic preparedness and response planning. In addition to facilitating implementation of



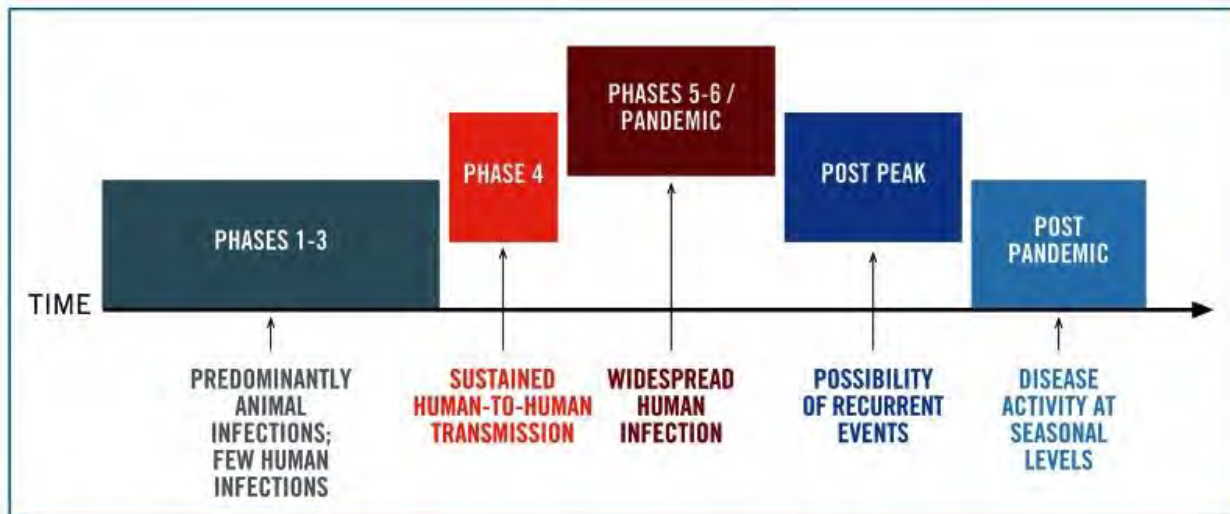
preparedness recommendations, the phases also help provide greater understanding of when an event is considered to have reached pandemic levels. The six phases are shown on Figure 4.3.1-2 below and are described as follows:

- Phase 1: No viruses circulating among animals have been reported among humans.
- Phase 2: An animal influenza virus circulating among domesticated or wild animals has caused known infection in humans and is now considered a potential pandemic threat.
- Phase 3: An animal or human-animal influenza reassortment virus has caused sporadic cases or small clusters of disease in people but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks. Limited human-to-human transmission may occur under some circumstances, such as close contact between an infected person and an unprotected caregiver.
- Phase 4: Verified human-to-human transmission of an animal or human-animal influenza reassortment virus **is able to cause “community-level outbreaks.”** The ability to cause sustained disease outbreaks in a community marks a significant upwards shift in the risk of a pandemic. Any country that suspects or has verified such an event should urgently consult with WHO so that the situation can be jointly assessed and a decision made by the affected country if implementation of a rapid pandemic containment operation is warranted. Phase 4 indicates a significant increase in risk of a pandemic but does not necessarily mean that a pandemic is a forgone conclusion.
- Phase 5: There has been human-to-human spread of the virus into at least two countries in one WHO region. While most countries will not be affected at this stage, the declaration of Phase 5 is a strong signal that a pandemic is imminent, and that the time to finalize the organization, communication, and implementation of the planned mitigation measures is short.
- Phase 6: The pandemic phase is characterized by community-level outbreaks in at least one other country in a different WHO region, in addition to the criteria defined in Phase 5. Phase 6 indicates a global pandemic is underway.

During the post-peak period, pandemic disease levels in impacted areas will start to see a drop in reported cases below peak observed levels. The post-peak period often signifies that pandemic activity is decreasing; however, it is uncertain if additional waves or virus strains will occur and areas will need to be prepared for additional waves. Previous pandemics have been characterized by waves of activity spread over months (WHO 2022).



Figure 4.3.1-2. Pandemic Influenza Phases



Source: WHO 2009

A worst-case scenario would be entry of the United States into a Phase 6-designation of an influenza or other pandemic, whereby local community outbreaks would occur in Pike County. This would affect most of the population, causing significant numbers of fatalities and disrupting normal living conditions. The most likely scenario is a seasonal flu or a Phase 3- or 4-designation. In these cases, a few residents might get sick, but most of the County would not be directly impacted.

Mosquito-Borne Diseases

Since it was discovered in the western hemisphere, WNV has spread rapidly across North America, affecting thousands of birds, horses and humans. WNV swept from the New York City region in 1999 to almost all of the continental U.S., seven Canadian provinces and throughout Mexico and parts of the Caribbean by 2004 (USGS 2016). The CDC has a surveillance program for WNV. Data is collected on a weekly basis and reported for five categories: wild birds, sentinel chicken flocks, human cases, veterinary cases and mosquito surveillance (CDC 2011). For Zika virus, the CDC is tracking the spread of the virus in the United States and around the world.

Tick-Borne Diseases

Ticks can transmit numerous diseases, including Lyme disease, Anaplasmosis, Babesiosis, Ehrlichiosis, Spotted Fever Rickettsiosis, and Powassan Virus.

- Lyme disease - Typical symptoms include fever, headache, fatigue, and a characteristic skin rash called erythema migraines. If left untreated, infection can spread to joints, the heart, and the nervous system. Patients with Lyme disease are frequently misdiagnosed with chronic fatigue syndrome, fibromyalgia, multiple sclerosis, and various psychiatric illnesses, including depression. Misdiagnosis with these other diseases may delay the correct diagnosis and treatment as the underlying infection progresses unchecked (PADOH, Lyme Disease 2022).



- Anaplasmosis – early signs and symptoms are usually mild or moderate and may include fever, chills, severe headache, muscle aches, nausea, vomiting, diarrhea, and loss of appetite (PADOH, Anaplasmosis Fact Sheet 2021).
- Babesiosis – some people have no symptoms while others develop flu-like symptoms. This includes fever, chills, sweats, headache, body ache, loss of appetite, nausea, or fatigue. When *Babesia* parasites infect and destroy red blood cells, anemia, jaundice, and dark urine can develop (PADOH, Babesiosis Fact Sheet 2021).
- Ehrlichiosis - symptoms are generally nonspecific and can range from very mild to very severe illness. Symptoms may include fever, headache, muscle ache, fatigue, nausea, vomiting, diarrhea, confusion, and conjunctivitis. Rash occurs in up to 60 percent of children but is less common in adults. Older or immunocompromised individuals are likely to suffer a more serious illness (PADOH, Ehrlichiosis Fact Sheet 2021).
- Spotted Fever Rickettsiosis – the first sign is generally a dark scab (eschar) at the site of the tick bite. Several days after the eschar appears, other signs and symptoms can develop. This includes fever, headache, rash, and muscle aches (CDC, Other Spotted Fever Group Rickettsioses 2019).
- Powassan Virus – many people infected with Powassan do not have symptoms. For people with symptoms, the time from tick bite to feeling sick ranges from one week to one month. Initial symptoms can include fever, headache, vomiting, and weakness. Symptoms of severe disease include confusion, loss of coordination, difficulty speaking, and seizures (CDC, Powassan Virus 2021).

Influenza, Coronavirus, Measles and Ebola

The exact size and extent of an infected population depends on how easily the illness will spread, the mode of transmission, and the amount of contact between infected and uninfected individuals. The transmission rates of pandemic illnesses are often higher in more densely populated areas. The Ebola virus is spread to others through direct contact; it is not spread through the air like influenza.

Pandemic flu should not be confused with seasonal flu. Seasonal flu is a less severe concern because of its regularity of occurrence and predictability. The following Table 4.3.1-1 lists key differences between pandemic and seasonal flus.

Table 4.3.1-1. Seasonal Flu vs Pandemic Flu

Pandemic Flu	Seasonal Flu
Rarely happens (three times in 20 th 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.	Usually some immunity built up from previous exposure.
Healthy people may be at increased risk for serious complications.	Usually only people at high risk, 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 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 U.S. 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 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

4.3.1.4 Past Occurrence

The following section provides information regarding past occurrences of pandemic events.

West Nile Virus

West Nile Virus arrived in the United States in 1999 and was first detected in Pike County in 2000 when mosquito pools, dead birds and/or horses tested positive for the virus. Since then, the number of positive counties in Pennsylvania, human cases, and West Nile deaths has fluctuated with the temperature and precipitation each year. Table 4.3.1-2 illustrates the virus's overall cases, human cases, and mortality from 2016-2020. In Pike County, there have been birds and mosquitoes that have tested positive for the virus, however there have been no positive human cases and therefore no human deaths.

Table 4.3.1-2. Previous West Nile Virus occurrences in Pike County from 2016 – 2020

Year	Number of Positive Cases	Positive Human Cases	Human Deaths
2016	0	0	0
2017	0	0	0
2018	1	0	0
2019	0	0	0
2020	0	0	0

Source: PA West Nile Control Project 2020

Tick-Borne Diseases

Pennsylvania has led the nation in confirmed cases of Lyme disease for three straight years and for the first time deer ticks have been found in each of Pennsylvania's 67 counties. Table 4.3.1-3 shows the number of reported cases of Lyme disease in Pike County from 2015 to 2019. Data for 2020 was not available at time of publication.

Table 4.3.1-3. Previous Lyme Disease Occurrences in Pike County from 2015-2019

Year	Number of Reported Cases
2015	82
2016	114
2017	92
2018	59
2019	89

Source: (Health, 2019 Lyme and Other Tickborne Disease Surveillance Report 2021)

Influenza

The United States Department of Health and Human Services estimates that influenza pandemics have occurred for at least 300 years at unpredictable intervals. There have been several pandemic influenza outbreaks over the past 100 years. A list of events worldwide is shown in Table 4.3.1-4.

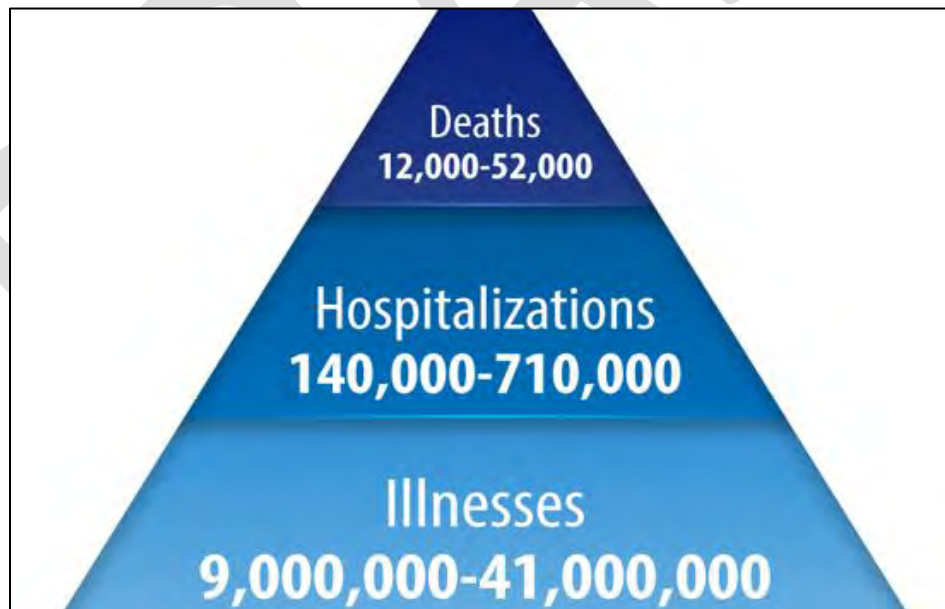
*Table 4.3.1-4. List of previous significant outbreaks of influenza over the past century*

Date	Pandemic Name/Subtype	Worldwide Deaths (Approximate)
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 / 2009 H1N1	18,036

Source: Global Security 2009

Deaths occurred in the United States as a result of the Spanish Flu, Asian flu, and Hong Kong Flu outbreaks. The Spanish Flu claimed 500,000 lives in the United States, and there were 350,000 cases in Pennsylvania – 150,000 were in Philadelphia alone. Most deaths resulting from the Asian flu occurred between September 1957 and March 1958; there were about 70,000 deaths in the United States and approximately 15 percent of the population of Pennsylvania was affected. The first cases of the Hong Kong Flu in the U.S. were detected in September 1968 with deaths peaking between December 1968 and January 1969 (Global Security 2009). More recently, 43 cases of 2009 H1N1 have been confirmed in Pike County resulting in 1 death.

Epidemiologists and public health officials consistently track the rate of influenza or influenza-like-illnesses (ILI) to monitor potential pandemic threats. This also allows them to provide annual data on ILI seasonal outbreaks. Figure 4.3.1-5 below shows the biweekly national number of cases of ILI from the 2010-2011 season through the 2019-2020 season, distinguishing each type of ILI by a unique color.

Table 4.3.1-5. Est. Range of Annual U.S. Flu Burden (2010-2011 through 2019-2020 Flu Seasons)

The Pennsylvania Department of Health maintains an influenza surveillance data archive that provides summaries for each influenza season, dating back to 2005/2006. Table 4.3.1-6 shows the number of reported cases of influenza in Pike County from 2015 to 2020.



Table 4.3.1-6. Reported Influenza Cases in Pike County, 2015 – 2020

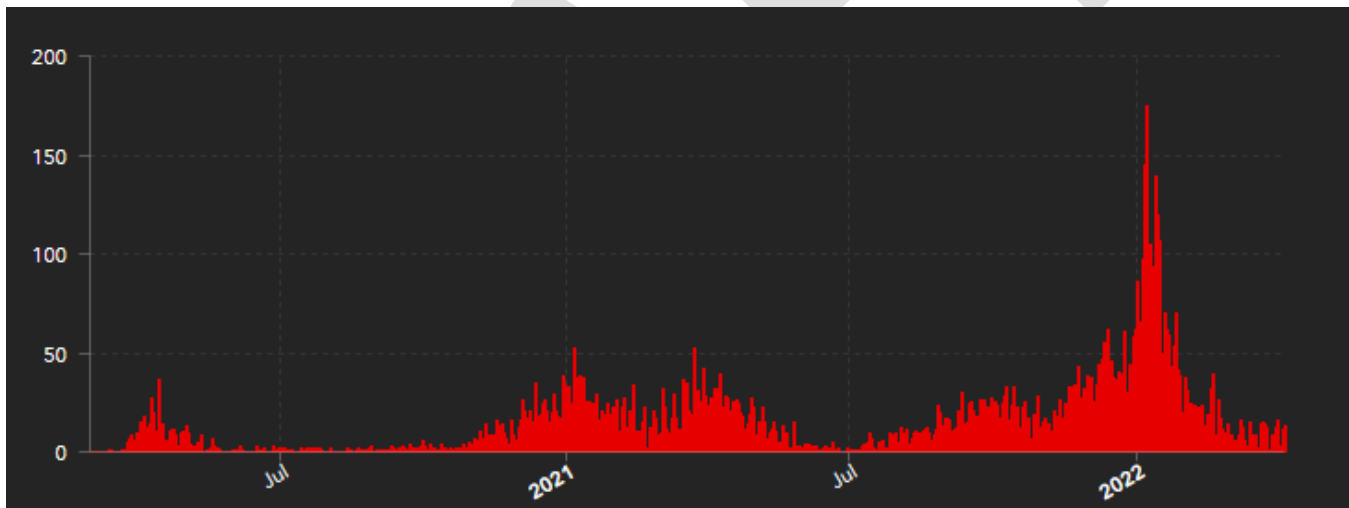
Year	Number of Reported Cases
2015	103
2016	207
2017	174
2018	232
2019	388
2020	Unavailable

Source: Pennsylvania Department of Health 2021

COVID-19 Pandemic

Since the onset of the pandemic, multiple variants of the virus emerged and become dominant in many countries since 2021, Alpha, Beta, Gamma, Delta, and Omicron being the most virulent. As of April 5, 2022, Pike County has 8,872 confirmed cases since the start of the pandemic, and 95 deaths (PADOH, COVID-19 Vaccine Dashboard 2022).

Table 4.3.1-7. Daily Rate of COVID-19 Cases in Pike County, PA



4.3.1.5 Future Occurrence

It is difficult to predict when the next disease outbreak will occur and how severe it will be because viruses are always changing. The United States and other countries are constantly preparing to respond to pandemics. The Department of Health and Human Services and others are developing supplies of vaccines and medicines. In addition, the United States has been working with the WHO and other countries to strengthen detection of disease and response to outbreaks. Preparedness efforts are ongoing via the Pennsylvania Department of Health, and local health departments to empower local health departments and their community partners to promote local readiness, foster community resilience and to ensure comprehensive, coordinated, and effective responses.

In Pike County, the probability for a future disease outbreak event is dependent on several factors. One factor that influences the spread of disease is population density. Populations that live close to one another are more likely



to spread diseases. As population density increases in the County, so too will the probability of a disease outbreak event occurring. When there is a significant change in a circulating strain of a virus, more of the population is susceptible and the strain has the ability to rapidly spread from person to person (Management 2019).

As for mosquito-borne and tick-borne diseases, as long as mosquitoes and ticks are found in Pike County, the risk of contracting WNV, Lyme disease, or other diseases carried by these insects exists. Instances of WNV have been generally decreasing throughout the northeast United States due to planning and eradication efforts. However, some scientists anticipate an increase in WNV and other mosquito-borne diseases due to changing climate conditions creating suitable habitats for mosquitoes (CDC, West Nile Virus in the United States 2013). Disease-carrying ticks will continue to inhabit Pike County and the threat of Lyme disease and other tick-borne diseases will continue. Similar to mosquitoes, there are eradication efforts in place to control the tick population and new methods of control are being developed (Steere, Coburn and Glickstein 2004). Therefore, based on all available information and available data regarding mosquito and tick populations, it is anticipated that mosquito- and tick-borne diseases will continue to be a threat to Pike County.

The future occurrence of disease outbreak in Pike County can be considered possible as defined by the Risk Factor Methodology probability criteria (see Table 4.4-5).

4.3.1.6 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 disease outbreak hazard on Pike County in the following subsections:

- Overview of vulnerability
- Data and methodology used for the evaluation
- Impacts on: (1) life, health, and safety of residents; (2) general building stock; (3) critical facilities; (4) economy; and (5) environment
- Future changes that may impact vulnerability
- Change of vulnerability since the 2017 HMP

While some information was available during the 2022 update of the HMP, Pike County will revisit the overall impacts of the COVID-19 pandemic during the plan maintenance cycle.

Impact on Life, Health, and Safety

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. 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 (CDC 2010).

4.3.1-7 shows the demographic change in children and the elderly from 2000 through 2019 in Pike County. Pike County has seen a significant population increase in individuals over 65 years of age, but a decrease in individuals



under 5 years of age. Therefore, Pike County is slightly vulnerable to both seasonal influenza and pandemic influenza, such as the H1N1 pandemic.

Table 4.3.1-8. Demographic Trends for Vulnerable Populations

Vulnerable Population	2010 Census	2019 Census Estimate	2000 to 2019 Change
Under 5 years	2,823	1,894	-929
65 years and over	9,303	12,152	2,849

Source: U.S. Census Bureau 2021

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.

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 2020-2021 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 Pike 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 Impact on 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

Understanding future changes that impact vulnerability in the County can assist in planning for future development and ensuring that appropriate mitigation, planning, and preparedness measures are in place. The County considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development.
- Projected changes in population.
- Other identified conditions as relevant and appropriate, including the impacts of climate change.

Projected Development and Changes in Population

As the population increases, so too does the possibility for spreading an infectious disease. This is exacerbated by future growth causing higher density in populated areas.

Climate Change

The relationship between climate change 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 n.d.). Localized changes in climate and human interaction may also be a factor in the spread of disease.

The relationship between climate change and infectious diseases 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 climate change 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 climate change accelerates, it is likely to work synergistically with many of these factors, especially in populations increasingly subject to massive migration and malnutrition (Harmon 2010).

Change of Vulnerability Since the 2017 Hazard Mitigation Plan

Overall, the County's vulnerability has not changed since the 2017 HMP; therefore, the entire County will continue to be exposed and vulnerable to the disease outbreak hazard.



4.3 Hazard Profiles

4.3.2 Drought

This section provides a profile and vulnerability assessment of the drought hazard in Pike County. Drought is a period characterized by long durations of below normal precipitation. Drought conditions occur in virtually all climatic zones, yet characteristics of drought vary significantly from one region to another, relative to normal precipitation within respective regions. Drought can affect agriculture, water supply, aquatic ecology, wildlife, and plant life. Drought is a temporary irregularity in typical weather patterns and differs from aridity, which reflects low rainfall within a specific region and is a permanent feature of the climate of that area.

Drought can be defined or grouped in four categories:

- Meteorological drought is a measure of departure of precipitation from normal, defined solely by reference to relative degree of dryness. Because of climatic differences, dryness considered a drought at one location of the country may not be considered 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 effects of precipitation shortfalls on stream flows and water levels in reservoirs, lakes, and groundwater.
- Socioeconomic drought is associated with supply and demand of an economic good, with elements of meteorological, hydrological, and agricultural drought. 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 (National Drought Mitigation Center [NDMC] 2012).

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 habitat. Further consequences of these impacts include reductions in crop yields, rangeland, and forest productivity that may lower incomes of farmers and agribusinesses; increased prices of food and timber; increased unemployment; reduction in tax revenues as expenditures decline; increased crime, foreclosures, and migration; and exhausted disaster relief funds. The many impacts of drought can be categorized as economic, environmental, or social.

Scientists at this time do not know how to predict drought more than one month in advance for most locations. Predicting drought depends on the ability to forecast precipitation and temperature. Anomalies of precipitation and temperature may last from several months to several decades. How long they last depends on interactions between



the atmosphere and the oceans, soil moisture and land surface processes, topography, internal dynamics, and accumulated influence of weather systems on the global scale (NDMC Date Unknown).

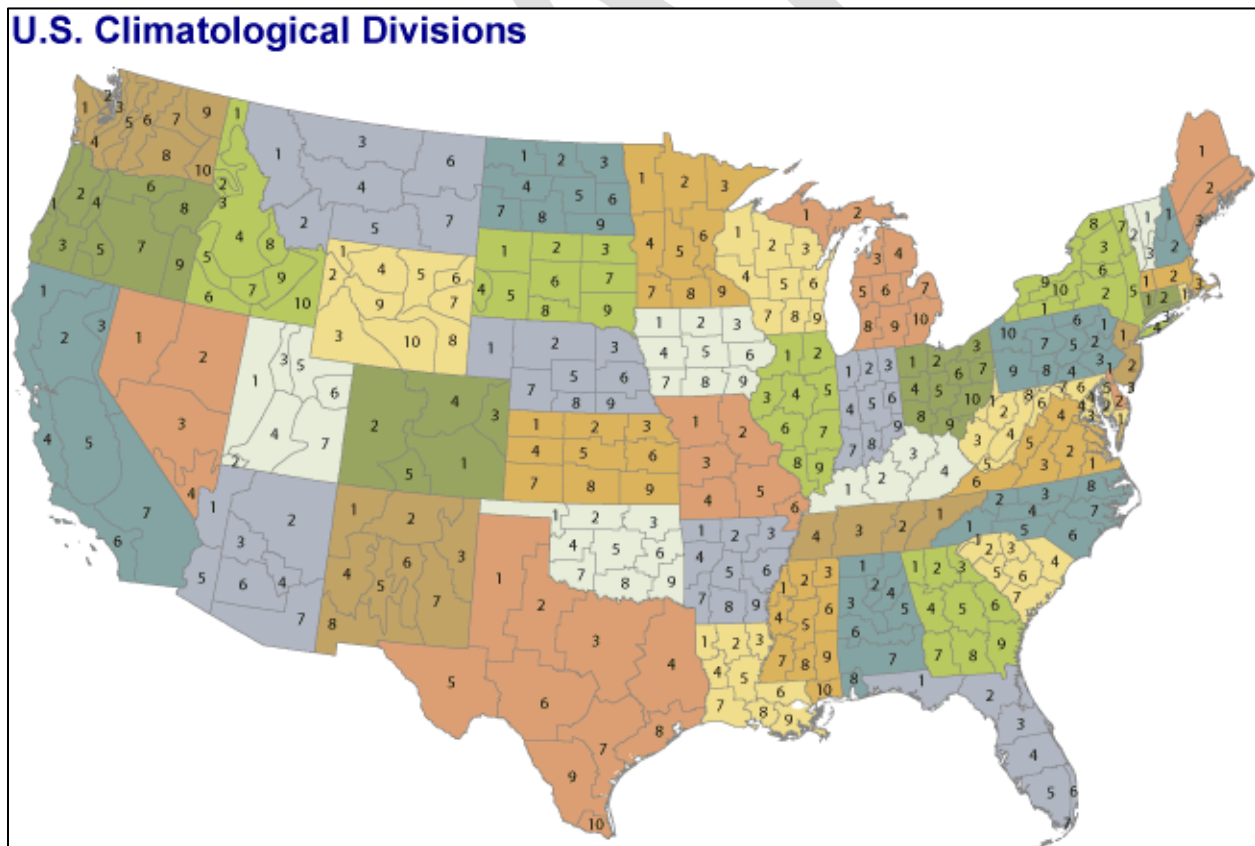
4.3.2.1 Location and Extent

Droughts are regional in scope and may affect the entirety of Pike County rather than only individual municipalities within the County. Droughts may also concurrently affect counties near Pike County, or even the entire State. Generally, areas along waterways will indicate 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 359 climate divisions. The boundaries of these divisions typically coincide with county boundaries, except in the western United States where they are based largely on drainage basins (Climate Prediction Center [CPC] 2005).

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 (National Climatic Data Center [NCDC] 2015). Figure 4.3.2-1 shows the climate divisions throughout the United States, and Figure 4.3.2-2 shows the climate divisions of Pennsylvania. Pike County is within the Pocono Mountains climate division.

Figure 4.3.2-1. Climate Divisions in the United States



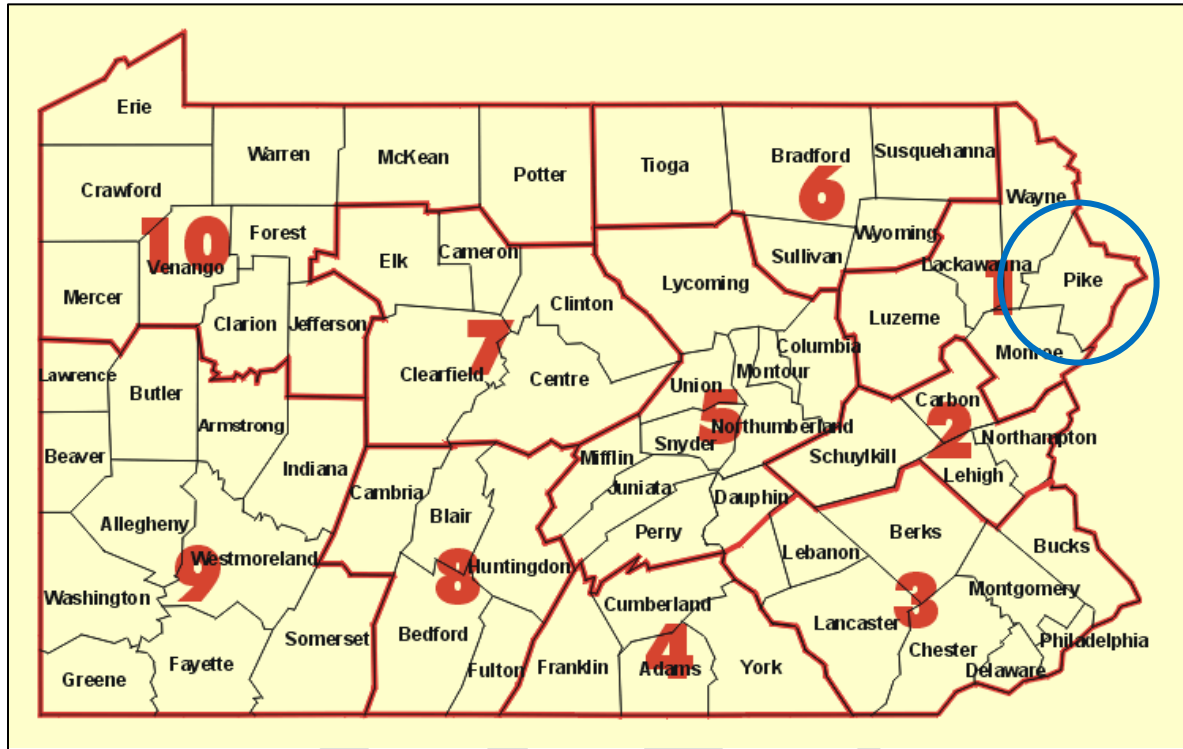
Source: NOAA NCEI 2012

Notes: Climate division names vary from state to state. 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

Figure 4.3.2-2. Climate Divisions of Pennsylvania



Source: CPC 2005

Note (1): 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

Note (2): The blue circle indicates the location of Pike County.

Particularly at locations where citizens rely on wells for drinking water, water supplies are vulnerable to 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 can 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—**Pike County residents who depend on private domestic wells have this greater “hidden vulnerability” to droughts.**

According to the Pennsylvania Groundwater Information System (PaGWIS) there are 8,509 domestic private wells in Pike County. PaGWIS is maintained by Pennsylvania Department of Conservation and Natural Resources (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 dataset of domestic wells available. Refer to the Vulnerability Assessment for further discussion. According to the PADEP Drinking Water Reporting System, there are 237 drinking water systems that serve over 87,000 people in Pike County. The primary source of water for these systems is groundwater (PADEP 2022).



In addition to domestic wells in the County, residents may also receive their water from municipal water providers. According to the U.S. Environmental Protection Agency (EPA), there are 38 community water systems in Pike County. These systems provide water year-round to over 41,000 people. Public water systems in the County procure their water from groundwater. Additionally, there are 214 non-transient or transient non-community water systems that provide water to over 51,000 people. Non-transient, non-community water systems provide water to the same people, but not year round (e.g. schools that have their own water system). Transient, non-community water systems do not consistently provide water to the same people (e.g. rest stops, campgrounds, gas stations). These systems all receive water from groundwater sources. Table 4.3.2-1 below provides information regarding the community water systems located within Pike County, as identified by the U.S. EPA.

Table 4.3.2-1. Community Water Systems in Pike County

Water System Name	Population Served	Primary Water Source Type
Al's Acres (Palmyra Township)	N/A	N/A
Al-Wa-Da (Palmyra Township)	N/A	N/A
Ann & Howell Development (Palmyra Township)	N/A	N/A
Aqua PA Fawn Lake Forest	6,533	Groundwater
Aqua PA Tafton Wilson Hill	80	Groundwater
Aqua PA Tanglewood Lakes	1,321	Groundwater
Aqua PA Woodledge Village	58	Groundwater
Claude Seeley Dev. (Palmyra Township)	N/A	N/A
Colony Cove (Palmyra Township)	N/A	N/A
Coutts Bros. Dev. (Palmyra Township)	N/A	N/A
Crescent Lake North Comm Assoc	80	Groundwater
Deerhaven White Beauty View Es	53	Groundwater
Earl Unger Dev. (Palmyra Township)	N/A	N/A
East Cove Woods (Shohola)	N/A	N/A
The Escape (Palmyra-Greene)	N/A	N/A
Evergreen Park (Shohola)	N/A	N/A
Grampas Woods Estates	45	Groundwater
Happy Hollow	89	Groundwater
Hemlock Farms (Main)	8,321	Groundwater
Hitching Post Assoc	90	Groundwater
Killiam Tract	39	Groundwater
Lake Wallenpaupack Estates POA	204	Groundwater
Laurel Lane Development Assoc	179	Groundwater
Laurel Woods Mobile Home Park	70	Groundwater
Milford Senior Care	110	Groundwater
Milford Water Authority	2,420	Groundwater under influence of surface water
Moon Valley Falls	120	Groundwater
Muni Auth Of Boro Of Matamoras	2,900	Groundwater
Oak Manor Estates	46	Groundwater
Pawc All Seasons System	100	Groundwater



Water System Name	Population Served	Primary Water Source Type
Pawc Marcel Lakes	845	Groundwater
Pawc Milford Landing	468	Groundwater
Pawc Pocono Mtn Lake Forest	180	Groundwater
Pawc Saw Creek Estates	6,833	Groundwater
Pawc Wild Acres	2,943	Groundwater
Pike County Correctional Facil	376	Groundwater
Pine Ridge System	2,450	Groundwater
Poc Mtn Lake Est Sect 1e	140	Groundwater
Pocono Mtn Lake Estates Sect5a	150	Groundwater
Pocono Ranch Lands Sect 4	225	Groundwater
Rustic Acres Mhp	73	Groundwater
Tamiment Resort	1,200	Groundwater
Tanglewood Ski Aqua PA	690	Groundwater
The Escape	1,100	Groundwater
Tranquility Falls	121	Groundwater
Twin Lakes Utilities Inc	300	Groundwater
Wheatfield Village	35	Groundwater
White Sand Springs	40	Groundwater

Source: U.S. EPA 2016; Pike County Office of Community Planning 2010

N/A Not available

4.3.2.2 Range of 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.

Pennsylvania Department of Environmental Protection (PADEP) and Pennsylvania Emergency Management Agency (PEMA) manage water supply droughts in Pennsylvania according to the following four conditions of drought defined in the Commonwealth of Pennsylvania 2013 Standard Hazard Mitigation Plan (PA HMP):

- **Drought Watch:** A period to alert government agencies, public water suppliers, water users, and the public regarding potential for future drought-related problems. 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 ask for 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 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 ask for more stringent conservation actions.
- **Drought Emergency:** During this drought stage, water management entities marshal 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 dislocations. 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 Pa. 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 Water Rationing:** This fourth condition of drought is not defined as a drought stage. Local municipalities may, with the approval of the Pennsylvania Emergency Management 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 Pa. 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 (PEMA 2013).

Pennsylvania uses five parameters to assess drought conditions: precipitation deficits, stream flows, reservoir storage levels, groundwater levels, and a measure of soil moisture. These are described in detail below.

- **Precipitation Deficits:** As rainfall provides the basis for both groundwater and surface water resources, precipitation deficits are the earliest indicators of a potential drought. The National Weather Service (NWS) records “normal” monthly precipitation data for each county in Pennsylvania. These figures are generated from long-term monthly and decennial averages of precipitation, and are updated at the end of each decade based on the most recent 30 years. Monthly totals less than normal values represent precipitation deficits, which are then converted to percentages of the normal values. Table 4.3.2-2 lists the drought conditions (defined in the PA HMP and noted above) that are indicated by various precipitation deficit percentages (PEMA 2013).

Table 4.3.2-2. 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
4	20	30	40
5	20	30	40
6	20	30	40
7	18.5	28.5	38.5



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)
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 2013

- **Stream Flows:** Stream flows, which typically lag up to 2 months behind precipitation normals in signaling a drought, offer the second earliest indication of drought conditions. PADEP uses 73 U.S. Geological Survey (USGS)-maintained stream gauges throughout the State as its drought monitoring network, computing 30-day average stream flow values for each stream gauge based on the entire period of record for each gauge. For example, the Tonoloway Creek gauge near Needmore has data records as far back as October 1965 from which the long-term, 30-day average, or normal, flows are now determined. Drought status is determined from stream flows based on exceedances rather than percentages. The various stages of drought watch, warning, and emergency conditions are indicated, respectively, by 75-, 90-, and 95-percent exceedances of 30-day average flows (PEMA 2013). Detailed descriptions of these data collection methods appear in the PA HMP.
- **Reservoir Storage Levels:** Water level storage in several large public water supply reservoirs is another indicator that PADEP uses for drought monitoring. Depending on total quantity of storage and length of the refill period for the various reservoirs, PADEP uses varying percentages of storage drawdown to indicate the three drought stages for each reservoir (PEMA 2013).
- **Groundwater Levels:** Groundwater levels can be an indicator of a developing drought, although low readings may lag up to 3 months behind drought-indicative precipitation readings. This lag occurs because storage of nearly 80 trillion gallons of groundwater throughout the Commonwealth disguises precipitation deficits before significant lack of groundwater recharge becomes noticeable (PEMA 2013).
USGS also maintains groundwater monitoring wells in each county throughout the Commonwealth. Groundwater measurements taken from these wells at exceedances of 75, 90, and 95 percent are used to indicate drought watch, warning, and emergency statuses, respectively. Within the USGS well network, the 30-day average depth-to-groundwater readings are analyzed in relation to long-term, 30-day averages based on the period of record for each county well (PEMA 2013).
- **Soil Moisture:** NOAA's **Palmer Drought Severity Index** (PDSI) provides soil moisture information for evaluating the scope, severity, and frequency of prolonged periods of abnormally dry or wet weather. The tool is frequently used to indicate availability of irrigation water supplies, reservoir levels, range conditions, amount of stock water, and forest fire potential. Although notably ineffective for monitoring short-term drought, the PDSI is effective for determining long-term droughts, and as such is most frequently used to delineate disaster areas (CPC 2005).

Table 4.3.2-3 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 (NDMC 2013).



Table 4.3.2-3. Palmer Drought Severity Index (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 2013; PEMA 2013

Availability and management of water supply are discussed in the 2009 Pennsylvania State Water Plan, a joint effort by the Statewide Water Resources Committee and PADEP. In 2009, the PADEP Secretary approved an updated State Water Plan to guide management of the State'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 application of policies to facilitate reduced water uses and resource demands at critical peak times. The Plan provides inventories of water availability, as well as 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 damages from extreme drought and flooding conditions. An update of the plan is currently underway (PADEP 2021).

4.3.2.3 Past Occurrence

Historical information has been drawn from many sources to recount previous occurrences and losses associated with drought events throughout Pennsylvania and Pike 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.

According to the National Centers for Environmental Information (NCEI) Storm Events Database, Pike County underwent three drought events between January 1, 1950 and June 30, 2020. Overall, these events led to \$200,000 in crop damages (NCEI 2021).

Since November 1980, PADEP indicated that Pike County has undergone 18 drought-watch declarations, 16 drought-warning declarations, and 13 drought-emergency declaration between November 1980 and February 2021 (PADEP 2021). Additionally, according to the Cornell Northeast Regional Climate Center (NRCC), Pike County is located within the Pocono Mountains Climate Division, which has experienced seven drought periods of two or more months within severe or extreme drought (NRCC 2021).

According to FEMA, between 1954 and 2021, 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 impacted many counties. However, not all counties were included in the disaster declaration. FEMA, PEMA, and other sources



indicate that Pike County was included in the major disaster declaration (DR-206) as a result of a drought-related event (FEMA 2021).

Based on all sources researched, drought events between 1963 and 2021 that have affected Pike County are identified in Table 4.3.2-4. Please note that not all sources have been identified or researched, and therefore Table 4.3.2-4 may not include all events that have occurred throughout the County.

Table 4.3.2-4. Pike County Declared Drought Status from 1963 to 2021

Date	Event Type	FEMA Declaration Number (if applicable)	County Designated ?	Losses / Impacts / PDSI Value	Source(s)
October – December 1963	Drought	N/A	N/A	Three month duration of severe to extreme drought conditions in the Pocono Mountains Climate Division, which includes Pike County. Lowest PDSI for the Climate Division was -3.64 recorded in October 1963.	NRCC
August 1964 – April 1966	Water Shortage / Drought	DR-206	Yes	Twenty-one month duration of severe to extreme drought conditions in the Pocono Mountains Climate Division, which includes Pike County. Lowest PDSI for the Climate Division was -5.47 recorded in July 1965.	FEMA, NRCC
June – November 1966	Drought	N/A	N/A	Six month duration of severe to extreme drought conditions in the Pocono Mountains Climate Division, which includes Pike County. Lowest PDSI for the Climate Division was -4.29 recorded in August 1966.	NRCC
January – February 1967	Drought	N/A	N/A	Two month duration of severe to extreme drought conditions in the Pocono Mountains Climate Division, which includes Pike County. Lowest PDSI for the Climate Division was -3.95 recorded in February 1967.	NRCC
1977	Drought	N/A	N/A	The Matamoras Municipal Water Authority was forced to drill several new wells when their original artesian wells began to dry up. For several weeks, water was pumped across the Delaware River Bridge from Port Jervis, New York into the Matamoras system.	Pike County HMP 2012
November 18, 1980 – April 20, 1982	Drought Emergency	N/A	N/A	According to the NRCC, there was a two month duration of severe to extreme drought conditions in the Pocono Mountains Climate Division, which includes Pike County, from December 1980 to January 1981. Lowest PDSI for the Climate Division during this time frame was -3.95 recorded in January 1981.	PADEP, NRCC
November 10, 1982 – February 8, 1983	Drought Warning	N/A	N/A	No impacts and/or losses identified for this event.	PADEP
February 8, 1983 – March 28, 1983	Drought Warning	N/A	N/A	No impacts and/or losses identified for this event.	PADEP
January 23, 1985 – April 26, 1985	Drought Warning	N/A	N/A	No impacts and/or losses identified for this event.	PADEP
April 26, 1985 – December 19, 1985	Drought Emergency	N/A	N/A	No impacts and/or losses identified for this event.	PADEP
July 7, 1988 - August 24, 1988	Drought Watch	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012



Date	Event Type	FEMA Declaration Number (if applicable)	County Designated ?	Losses / Impacts / PDSI Value	Source(s)
August 24, 1988 - December 12, 1988	Drought Watch	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
June 28, 1991 - July 24, 1991	Drought Watch	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
July 24, 1991 - August 16, 1991	Drought Emergency	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
August 16, 1991 - September 13, 1991	Drought Emergency	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
September 13, 1991 - October 21, 1991	Drought Emergency	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
October 21, 1991 - January 16, 1992	Drought Emergency	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
January 17, 1992 - April 20, 1992	Drought Emergency	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
April 20, 1992 - June 23, 1992	Drought Warning	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
September 1, 1995 - September 20, 1995	Drought Warning	N/A	N/A	Lowest PDSI for the Pocono Mountains Climate Division was -3.64 recorded in September 1995.	PADEP, NRCC, Pike County HMP 2012
September 20, 1995 - November 8, 1995	Drought Emergency	N/A	N/A	Lowest PDSI for the Pocono Mountains Climate Division was -3.64 recorded in September 1995.	PADEP, NRCC, Pike County HMP 2012
November 8, 1995 - December 18, 1995	Drought Warning	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
August 1997	Drought	N/A	N/A	The impacted counties had approximately \$1.4 million in crop damage. Pike County had approximately \$200,000 in crop damage as a result of this drought event.	NCEI
December 3, 1998 - December 8, 1998	Drought Watch	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
December 8, 1998 - December 14, 1998	Drought Watch	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
December 14, 1998 - December 16, 1998	Drought Warning	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012

4.3.2: DROUGHT





Date	Event Type	FEMA Declaration Number (if applicable)	County Designated ?	Losses / Impacts / PDSI Value	Source(s)
December 16, 1998 - January 15, 1999	Drought Warning	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
January 15, 1999 - March 15, 1999	Drought Warning	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
March 15, 1999 - June 10, 1999	Drought Watch	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
June 10, 1999 - June 18, 1999	Drought Warning	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
June 18, 1999 - July 20, 1999	Drought Warning	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
July 20, 1999 - September 30, 1999	Drought Emergency	N/A	N/A	The lowest PDSI for the Pocono Mountains Climate Division was -3.65 recorded in August 1999.	PADEP, NRCC, Pike County HMP 2012
July 1999	Drought	N/A	N/A	Governor Tom Ridge – Governor's Proclamation, Individual Assistance, Hazard Mitigation Grant Program – Amended to include all 67 counties for an agricultural disaster.	PEMA
September 30, 1999 - December 16, 1999	Drought Watch	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
December 16, 1999 - Feb 25, 2000	Drought Watch	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
Feb 25, 2000 - May 5, 2000	Drought Watch	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
August 24, 2001 - November 6, 2001	Drought Watch	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
November 6, 2001 - December 5, 2001	Drought Watch	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
December 5, 2001 - Feb 12, 2002	Drought Warning	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
Feb 12, 2002 - May 13, 2002	Drought Emergency	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
September 5, 2002 - November 7, 2002	Drought Watch	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
April 11, 2006 - June 30, 2006	Drought Watch	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012

4.3.2: DROUGHT





Date	Event Type	FEMA Declaration Number (if applicable)	County Designated ?	Losses / Impacts / PDSI Value	Source(s)
August 8, 2007 - September 5, 2007	Drought Watch	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
September 16, 2010 – November 10, 2010	Drought Warning	N/A	N/A	No impacts and/or losses identified for this event.	PADEP, Pike County HMP 2012
June 28, 2012 – November 8, 2012	Drought	N/A	N/A	The combined effects of drought, high winds, hail, excessive heat, excessive rain, flash flooding, Hurricane sandy, snowstorms, and NorEasters, led to the USDA disaster declaration (S3487) for Pike County.	USDA
2014	Drought	N/A	N/A	Drought conditions led to a USDA disaster declaration (S3759) for Pike County.	USDA
March 24, 2015 – June 17, 2015	Drought Watch	N/A	N/A	No impacts and/or losses identified for this event.	PADEP
June 17, 2015 – July 10, 2015	Drought Watch	N/A	N/A	No impacts and/or losses identified for this event.	PADEP
April – September 2015	Drought	N/A	N/A	Excessive heat and drought led to a USDA disaster declaration (S3930) for Pike County.	USDA
November 2016	Drought Warning/Watch	N/A	N/A	The PADEP declared a drought watch for Pike County on November 9 th and the county is still under a drought watch as of November 23 rd . The PADEP encourages those under a drought watch to reduce their nonessential water use by 5%.	PADEP
December 2016 – February 2017	Drought Watch	N/A	N/A	No impacts and/or losses identified for this event.	PADEP

Sources: FEMA 2021; NCEI 2021; NRCC 2016; Pike County HMP 2018; PADEP 2021; USDA 2021

FEMA Federal Emergency Management Agency

N/A Not applicable

NCEI National Centers for Environmental Information

NRCC Northeast Regional Climate Center

PADEP Pennsylvania Department of Environmental Protection

PDSI Palmer Drought Severity Index

PEMA Pennsylvania Emergency Management Agency

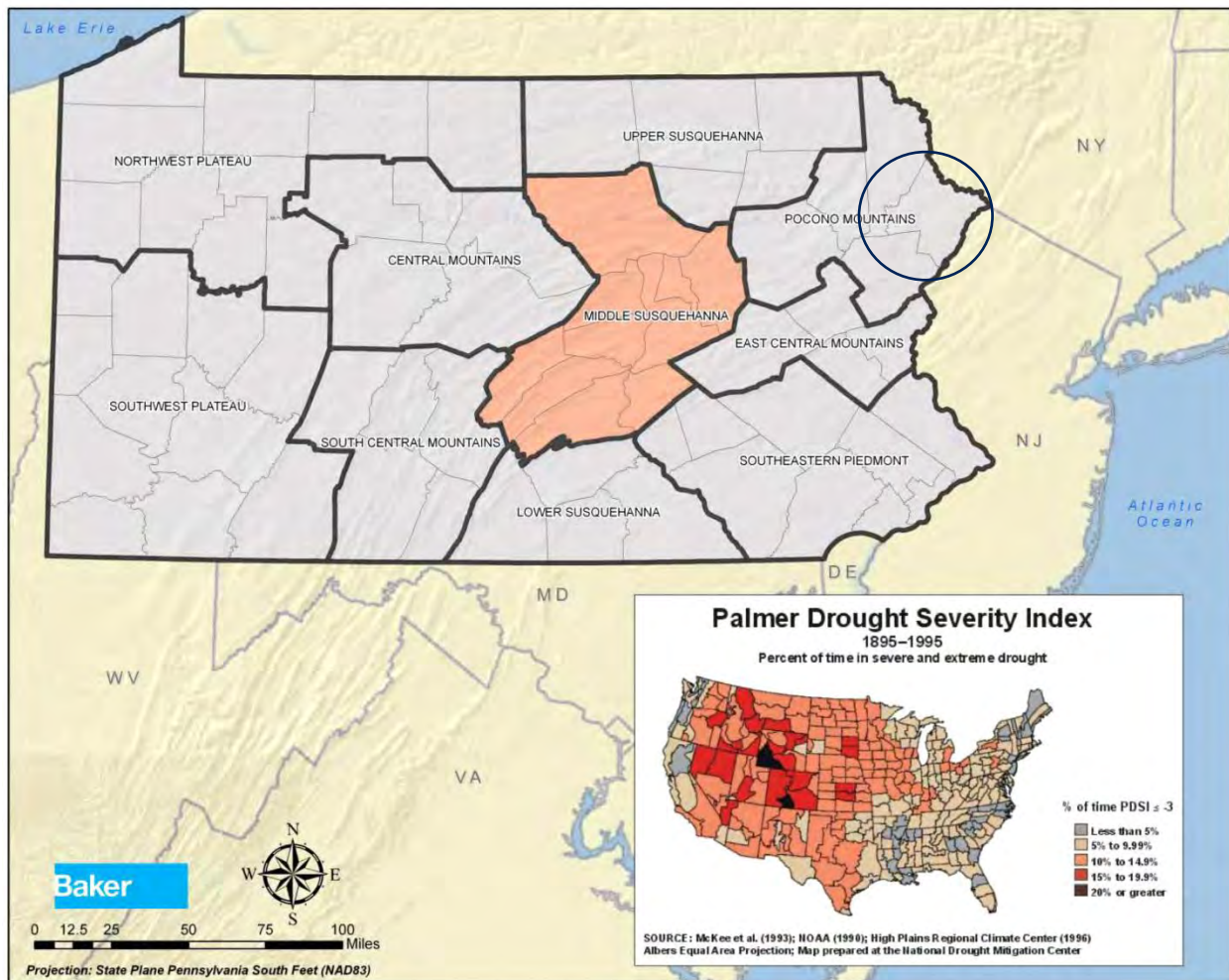
USDA U.S. Department of Agriculture

4.3.2.4 Future Occurrence

Based on the monthly Palmer Drought Severity Index, as computed by the National Centers for Environmental Information, the Pocono Mountains Climate Division (includes Pike County) was in extreme drought for 1.2 percent of the time and in severe drought for 3.4 percent of the time (based on data from January 1895 to November 2016). As presented in the 2013 Pennsylvania State Hazard Mitigation Plan, between 1895 and 1995, Pike County was in severe or extreme drought for less than 5 percent of the time period (see Figure 4.3.2-3). This is equivalent to a PDSI value less than or equal to -3.



Figure 4.3.2-3. Palmer Drought Severity Index for Pennsylvania (1895 to 1995)



Source: PEMA 2013

Note: The blue circle indicates the approximate location of Pike County

It is estimated that Pike County will continue to experience direct and indirect impacts of drought and its impacts on occasion, with secondary effects causing potential disruption or damage to agricultural activities and creating shortages in water supply within communities

The future occurrence of drought in Pike County can be considered *highly likely* as defined by the Risk Factor Methodology probability criteria (see Table 4.4-5). Due to the increasing demand for water by the increasing population base and the growing tourist population, droughts will continue to be a problem.

4.3.2.5 Vulnerability Assessment

To understand risk, a community must evaluate assets exposed and vulnerable within the identified hazard area. For the drought hazard, all of Pike 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 a



drought. This section evaluates and estimates potential impacts of the drought hazard on Pike County in the following subsections:

- Overview of vulnerability
- Data and methodology used for the evaluation
- Impacts on: (1) life, health, and safety of residents; (2) general building stock; (3) critical facilities; (4) economy; and (5) environment
- Future changes that may impact vulnerability
- Change of vulnerability since the 2017 HMP

Overview of Vulnerability

Pike County is vulnerable to drought. Assets at particular risk include any open land or structures along the wildland/urban interface (WUI) that could become vulnerable to the wildfire hazard caused by extended periods of low rain and high heat, usually associated with drought. In addition, water supply resources could be impacted by extended periods of low rain. Finally, vulnerable populations could be particularly susceptible to the drought hazard and cascading impacts because of age, health conditions, and limited ability to mobilize to shelter, cooling, and medical resources.

Data and Methodology

At the time this HMP was updated, insufficient data were available to model long-term potential impacts of a drought on Pike County. Over time, additional data will be collected to allow better analysis of this hazard. Preliminary assessments based on available data are provided below.

Impact on Life, Health, and Safety

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, reduced quality of life, and inequities in distribution of impacts and disaster relief. The infirm, young, and elderly are particularly susceptible to drought and extreme temperatures, sometimes associated with drought conditions, due to their age, health conditions, and limited ability to mobilize to shelters, cooling, and medical resources. Impacts on the economy and environment may have social implications as well (New York State Disaster Preparedness Commission [NYSDPC] 2011). For the purposes of this HMP, the entire population of the County is considered vulnerable to drought events.

All of Pike County's water supply is provided by groundwater, either through private wells, municipal water authorities or community water systems. There are two municipal water supply districts in Pike County (US Census GID, 2007). These districts serve residents in Matamoras and Milford Boroughs. Future droughts will quickly affect those systems relying on surface supplies while those on wells should be able to handle short-term droughts without any major problem. However, longer-term droughts which inhibit recharging of groundwater aquifers will extend the problems for water suppliers and well owners for an undetermined length of time. With a limited number of exceptions, few of the water systems in the County provide large storage capacity. Many of the small water systems operate with limited **funds and little money is being invested for any improvements. As the county's** population grows, more water is being removed from the aquifer. Unless significant improvements to the infrastructure are made to improve storage



capability, many suppliers could find it increasingly difficult to meet the demands over extended periods of below normal precipitation when the aquifer is not being adequately recharged.

Pike County residents that use private domestic wells are also vulnerable to droughts because their wells can dry up. There are 8,509 of these domestic wells in Pike County, with at least one in every municipality. Table 4.3.2-5 shows the number of domestic wells per municipality as collected by the Pennsylvania Groundwater Information System (PaGWIS). According to this dataset, residents in Dingman Township are the most vulnerable to the water supply issues related to droughts because of the high amount of wells that are reported there. It is important to note, however, that the well data collected by PaGWIS relies on voluntary submissions of well record data by well drillers; therefore, it is not a complete database of all domestic wells in the County.

Table 4.3.2-5. Number of Reported Domestic Wells in Pike County

Municipality	Number of Reported Domestic Wells	Municipality	Number of Reported Domestic Wells
Blooming Grove Township	233	Milford Borough	103
Delaware Township	1,026	Milford Township	212
Dingman Township	2,832	Palmyra Township	369
Greene Township	1,009	Porter Township	180
Lackawaxen Township	563	Shohola Township	521
Lehman Township	1,063	Westfall Township	307
Matamoras Borough	19	Unidentified Municipality	72
TOTAL	8,509		

Source: PaGWIS, 2021

N/A Information for this municipality was not reported

Impact on General Building Stock and Critical Facilities

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), also known as the Wildland-Urban Interface (WUI). Therefore, all assets in and adjacent to the WUI zone—including population, structures, critical facilities, lifelines, and businesses—are considered vulnerable to wildfire.

Impact on the Economy

A prolonged drought can exert serious direct and indirect economic impacts on a community or across the County. A summary of impacts on the economy is presented in Table 4.3.2-6.

Table 4.3.2-6. Impacts on the Economy

Losses to Agricultural Producers	Losses to Livestock Producers	Losses of Timber Production
Annual and perennial crop losses	Reduced productivity of rangeland	Wildland fires
Damage to crop quality	Reduced milk production	Tree disease
Income loss for farmers due to reduced crop yields	Forced reduction of foundation stock	Insect infestation
Reduced productivity of cropland (wind erosion, long-term loss of organic matter, etc.)	High cost/unavailability of water for livestock	Impaired productivity of forest land



Losses to Agricultural Producers	Losses to Livestock Producers	Losses of Timber Production
Insect infestation	Cost of new or supplemental water resource development (wells, dams, pipelines)	Direct loss of trees, especially young ones
Plant disease	High cost/unavailability of feed for livestock	Losses to Transportation Industry
Wildlife damage to crops	Increased feed transportation costs	Loss from impaired navigability of streams, rivers, and canals
Increased irrigation costs	High livestock mortality rates	Decline in food production/disrupted food supply
Cost of new or supplemental water resource development (wells, dams, pipelines)	Disruption of reproduction cycles (delayed breeding, more miscarriages)	Increase in food prices
Losses of Fishery Production	Decreased stock weights	Increased importation of food (higher costs)
Damage to fish habitat	Increased predation	Losses to Water Suppliers
Loss of fish and other aquatic organisms due to decreased flows	Grass fires	Revenue shortfalls and/or windfall profits
Losses to Recreation and Tourism Industry	Energy-related Effects	Cost of water transport or transfer
Loss to manufacturers and sellers of recreational equipment	Increased energy demand and reduced supply because of drought-related power curtailments	Cost of new or supplemental water resource development
Losses related to curtailed activities: hunting and fishing, bird watching, boating, etc.	Costs to energy industry and consumers associated with substituting more expensive fuels (oil) for hydroelectric power	

Source: NYSDPC 2011

Note: Dark blue cell boxes indicate a new category of economic loss; all losses immediately underneath that category pertain to that loss type.

Loss estimates are based on lost agricultural revenues statewide. Table 4.3.2-7 below 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 2017 USDA Census of Agriculture. If the County would lose its agricultural yield due to drought, total losses could amount to almost \$900,000. Table 4.3.2-8 details potential losses associated with County livestock by providing livestock totals for the County and their associated market value. Livestock, poultry, and associated products have a potential loss value of nearly \$446,000 (USDA 2017).

Table 4.3.2-7. Estimated County Losses Relating to Agricultural Production

Impacted Farmland Acreage	Market Value Of All Agricultural Products
24,700	\$892,000

Source: USDA 2017

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

Livestock and Poultry	Inventory	Market Value Of All Livestock, Poultry, and Their Products
Cattle and Calves	\$74,000	\$446,000
Hogs and Pigs	D	
Sheep, Goats, Wool, Mohair, Milk	\$22,000	
Poultry and Egg	\$27,000	

Source: USDA 2017

Note: Market value of livestock and poultry is provided only by total value and not available by category.

(D) – Amount omitted from report

According to the USDA, Pike County has experienced \$0 in crop loss insurance payments on claims caused by drought events since 1948.



Impact on the Environment

As summarized in the PA HMP, environmental impacts of drought include:

- Hydrologic effects – lower water levels in reservoirs, lakes, and ponds; reduced streamflow; loss of wetlands; estuarine impacts; groundwater depletion and land subsidence; effects on water quality such as increases in salt concentration and water temperature
- Damage to animal species – lack of feed and drinking water; disease; loss of biodiversity; migration or concentration; and reduction and degradation of fish and wildlife habitat
- Damage to plant communities – loss of biodiversity; loss of trees from urban landscapes and wooded conservation areas
- Increased number and severity of fires
- Reduced soil quality
- Air quality effects – dust and pollutants
- Loss of quality in landscape through loss in plants and plant diversity
- Increase in nitrate levels, which can negatively affect health of pregnant women and children (PEMA 2013).

Future Changes That May Impact Vulnerability

Understanding future changes that impact vulnerability in the County can assist in planning for future development and ensuring that appropriate mitigation, planning, and preparedness measures are in place. The County considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development.
- Projected changes in population.
- Other identified conditions as relevant and appropriate, including the impacts of climate change.

Projected Development and Changes in Population

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. Any increase in population will lead to an increase in the demand for drinking water.

Climate Change

Climate is defined not just as average temperature and precipitation but also by type, frequency, and intensity of weather events. Both globally and at the local level, climate change 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 climate change on human health, society, and the environment (U.S. Environmental Protection Agency [EPA] 2014).

The PADEP was directed by the Climate Change Act (Act 70 of 2008) to initiate a study of potential impacts of global climate change on the Commonwealth. The June 2009 Pennsylvania Climate Impact Assessment and October 2013 **Pennsylvania Climate Impact Assessment Updates** main findings indicate that Pennsylvania is very likely to undergo



increased temperatures in the 21st century. Increases in temperature will likely lead to increased evapotranspiration, and thus an increase in soil-moisture-**related droughts throughout late spring and early fall**. Pennsylvania's precipitation climate is projected to become more extreme in the future, with longer dry periods and greater intensity of precipitation (although the number of severe storms may in fact decrease). Most models project an increase in the maximum number of consecutive dry days in a year, a drought indicator (Shortle et al. 2009, 2013).

Future improvements in modeling smaller-scale climatic processes can be expected and will lead to improved understanding of how the changing climate will alter temperature, precipitation, storm frequency, and intensity in Pennsylvania. Understanding this information can help provide better indications of future drought events (Shortle et al. 2009).

Change of Vulnerability Since the 2017 Hazard Mitigation Plan

Overall, the County's vulnerability has not changed since the 2017 HMP; therefore, the entire County will continue to be exposed and vulnerable to the drought hazard.

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4.3 Hazard Profiles

4.3.3 Drowning

Drowning is death from suffocation, typically associated with swimming, fishing, boating or bridge accidents, or suicide. Every day, about ten people die from unintentional drowning. Of these, two are children aged 14 or younger. Drowning ranks fifth among the leading causes of unintentional injury death in the United States. From 2005-2014, there were an average of 3,536 fatal unintentional drownings (non-boating related) annually in the United States — about 10 deaths per day. An additional 332 people died each year from drowning in boating-related incidents. Drowning rates are particularly high for children ages 1-14. The Centers for Disease Control and Prevention (CDC) estimates that drowning is the second leading cause of injury death (after motor vehicle crashes) among children ages 1-14. (CDC 2021).

Drowning accidents can be categorized as unintentional, suicide, homicide, or undetermined depending on the circumstances (PA DOH 2004). Unintentional drowning can be a significant hazard in communities with numerous water bodies (e.g. ponds, lakes, rivers, etc.) and extensive outdoor recreational activity. In addition, drowning accidents can occur in swimming pools at private residences as above ground pools such as “kiddie pools” and inflatable pools become more popular.

4.3.3.1 Location and Extent

Drowning can be a significant hazard in communities with numerous bodies of water (ponds, lakes, rivers, etc.) and extensive outdoor recreational activity. Pike County has been and continues to grow in popularity as a tourist destination. Water related recreational opportunities such as fishing, boating, and swimming are popular among visitors. Some of the most popular tourist destinations in Pike County are the Delaware Water Gap National Recreation Area waterfalls, Lake Wallenpaupack in Greene and Palmyra Townships, Pecks Pond in Porter Township, two lakes at Promised Land State Park in Greene Township, and the Delaware River specifically in the Delaware Water Gap National Recreational Area. In addition to natural bodies of water, swimming pools are another location where drownings occur. Many swimming pools are located at residences and at hotels, resorts, and residential communities located throughout Pike County.

One of the most popular tourist destinations in the County is Lake Wallenpaupack where drownings have historically taken place. The Palmyra Township Beach is the only public beach on Lake Wallenpaupack; however, there are numerous other private properties surrounding the lake.

Drownings also have occurred in the Delaware River, where the danger stems from swift currents, deep holes, and sudden drop offs. Milford Beach is a popular swimming location along the Delaware River and contains a federal boat launch in addition to its sand beach.

4.3.3.2 Range of Magnitude

By definition, drowning generally results in death. However, nonfatal drownings can cause brain damage that may result in long-term disabilities including memory problems, learning disabilities, and loss of basic nervous system



functions. In a typical year, counties in Pennsylvania can range from having 0 to 100 drowning incidents depending on factors such as the physical environment (access to water bodies) and a combination of social and cultural issues (wanting to learn how to swim and interest in recreational water-related activities).

Drowning is ranked fifth for the leading cause by unintentional injury in Pennsylvania. Between 1990 and 2019, 2,983 drowning deaths were reported in Pennsylvania. Across the state, 34-percent of residents who died from drowning were under the age of 24 (PA DOH 2021).

A worst-case scenario for drowning occurred in July of 2009 when a man drowned when boating with family and friends in Lake Wallenpaupack. Numerous rescue teams from Pennsylvania, New York, and New Jersey, including the FBI, state police, state Fish & Boat Commission and area volunteer response teams assisted in the search for the body (News Eagle 2009). It took a week to recover the body from the water because of cold water temperatures and the nature of the bottom of the lake. It was the second drowning in Lake Wallenpaupack that month.

4.3.3.3 Past Occurrence

There is no official federal, state, or county reporting system for drownings; however, the Pennsylvania Department of Health has a report of drowning deaths that occurred in Pike County between 1999 and 2019. Table 4.3.3-1 lists the number of deaths from drowning and submersion in the county. The data does not include information about the water bodies where the drownings occurred.

Table 4.3.3-1. Incidents of drowning and submersion that have occurred in Pike County

Years	Number of Deaths
1999	0
2000	0
2001	1
2002	2
2003	0
2004	1
2005	0
2006	3
2007	0
2008	0
2009	3
2010	0
2011	1
2012	0
2013	1
2014	2
2015	0
2016	0
2017	0
2018	0
2019	1
2020	5



Years	Number of Deaths
2021	2
TOTAL: 22	

Source: PA DOH Enterprise Data Dissemination Informatics Exchange (EDDIE) 2021; Pike County Emergency Management 2022

According to the National Park Service, between 1980 and 2008 there have been 56 deaths due to drowning in the Upper Delaware River, which stretches from Wayne County to Milford. Twenty-nine of those that drowned were swimming or wading and the average age was 28. The National Park Service report does not include the specific locations in the Upper Delaware River where the drownings occurred (Pike County HMP 2012). Between June and July 2021, seven people drowned in the Delaware River. Six of the deaths occurred in the river between Sullivan and Orange counties in New York and Pike County, PA (Pike County Courier 2021).

Available details regarding drowning incidents that occurred in Pike County are discussed below:

- February 2006 – A boater went missing on the Delaware River in Westfall Township; a search was conducted, and the body was recovered.
- April 2008 – A search was conducted on the Delaware River in Lehman Township for two boaters. The report is inconclusive as to the status of the boaters.
- May 2009 - **A man's body was discovered near a dock in Lake Wallenpaupack.**
- July 2009 - A mother of two wandered away from a beached boat and died of an accidental drowning in Lake Wallenpaupack.
- September 2009 - **A Florida man drowned in Lake Wallenpaupack near the Seeley's Landing area.**
- May 31, 2010 – A 31-year-old man drowned while trying to swim across the Delaware River at Milford Beach.
- July 2016 – A man drowned in Westcolang Lake in Lackawaxen Township

4.3.3.4 Future Occurrence

It is impossible to predict when and where drowning may occur; however, given past occurrences of drownings in Pike County the majority have occurred in Lake Wallenpaupack or the Delaware River. During the warm summer months, as activities such as swimming, boating and fishing increase, and as such, so does the likelihood of drowning.

For the 2022 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of drowning events for Pike County. Information from the 2017 **County HMP, the Pennsylvania Department of Health's** Enterprise Data Dissemination Informatics Exchange (EDDIE) system and internet searches were used to identify the number of drowning events that occurred between 2001 and 2021. 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 drowning occurring in any given year in Pike County.

Table 4.3.2-5. *Probability of Future Drowning Events*

Hazard Type	Number of Occurrences Between 1999 and 2021	Percent Chance of occurrence in any given year
Drowning	22	95%



Sources: Pike County HMP 2017; EDDIE 2021; Pike County Emergency Management 2022

Based on past occurrence and the popularity of Pike County as a tourist destination for water-related recreation, the future occurrence of drowning in Pike County can be considered *highly likely* as defined by the Risk Factor Methodology probability criteria (see Table 4.4-1).

4.3.3.5 Vulnerability Assessment

To understand risk, a community must evaluate assets exposed and vulnerable within the identified hazard area. For the drowning hazard, waterbodies of Pike County have been identified as the hazard area. This section evaluates and estimates potential impacts of the drowning hazard in Pike County in the following subsections:

- Overview of vulnerability
- Data and methodology used for the evaluation
- Impacts on: (1) life, health, and safety of residents; (2) general building stock; (3) critical facilities; (4) economy; and (5) environment
- Future changes that may impact vulnerability
- Change of vulnerability since the 2017 HMP

Overview of Vulnerability

As tourism continues to increase in Pike County and number of visitors grows, drowning is likely to continue without mitigation actions in place. Municipalities that border Lake Wallenpaupack and the Delaware River are more vulnerable to drownings as their residents have easiest access to the water bodies. However, residents from other municipalities and from outside the County also frequent these natural assets.

Data and Methodology

At the time of this plan update, insufficient data were available to model long-term potential impacts of drowning events in Pike County. Over time, additional data will be collected to allow better analysis of this hazard. Preliminary assessments based on available data are provided below.

Impact on Life, Health, and Safety

In 2009, the rules for the Upper Delaware River, from Hancock, NY to Sparrowbush, NY (slightly upstream of Milford Beach) were changed to make wearing life jackets mandatory for people of all ages when river gage heights at Barryville or Callicoon surpass six feet. This may reduce risk of drowning hazards in the upper river valley Pike County municipalities that border the Delaware River, however, Milford Beach is situated below the area covered by those rules.

According to the Pennsylvania Fish & Boat Commission, all children 12 years of age and younger on all Commonwealth waters must wear a personal floatation device (PFD or life jacket) while underway on any boat 20-feet in length or less and on all canoes and kayaks. All boats must have a U.S. Coast Guard approved wearable PFD on board for each person. In addition, anyone towed behind a boat (regardless of age and activity), all personal watercraft operators and passengers, and sailboarders (wind surfers) must wear a life jacket. Further, in addition to PFDs, boats 16 feet and over must have a throwable device on board (excluding canoes and kayaks) (PA FBC 2021). In 2012, the Pennsylvania Fish & Boat Commission mandated that a person shall wear a U.S. Coast Guard-approved



PFD during cold weather months (November 1st through April 30th) while underway or at anchor on boats less than 16 feet in length or any canoe or kayak to increase chance of survival in cold water (PA FBC 2021).

Impact on General Building Stock and Critical Facilities

Drowning events are a threat to life and do not have an impact on the general building stock. Drownings may result in an increase in the responses of critical facilities for first responders, slightly reducing critical services.

Impact on the Economy

Drowning events may result in a decrease in tourism of locations that are focused on swimming and aquatic recreation.

Impact on the Environment

Drowning events are not expected to have any impact on the environment.

Future Changes That May Impact Vulnerability

Understanding future changes that impact vulnerability in the County can assist in planning for future development and ensuring that appropriate mitigation, planning, and preparedness measures are in place. The County considered the following factors to examine potential conditions that may affect hazard vulnerability:

- Potential or projected development.
- Projected changes in population.
- Other identified conditions as relevant and appropriate, including the impacts of climate change.

Projected Development

Areas targeted for potential future growth and development within the next 5 to 10 years have been identified across the county in Section 2 (County Profile). Increases in population, particularly in areas recreationally serviced by waterbodies, may result in an increase in drowning events.

Projected Changes in Population

The population of the entire county is estimated to be 54,257 by the year 2040, which represents a net population decrease of 3,112 people (5.4 percent) in a 30-year period. 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 Pike County to better assess magnitudes of hazards and develop more specific mitigation plans and strategies.

Climate Change

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, climate change can alter prevalence and severity of weather extremes. While predicting changes in drowning events under a changing climate is difficult, understanding vulnerabilities to potential changes is a critical part of estimating effects of future climate change on human health, society, and the environment (U.S. Environmental Protection Agency [EPA] 2006).



Warming temperatures may increase the summer tourism season. An increase in air temperatures may increase the frequency of swimming and therefore the likelihood of drowning events.

Change of Vulnerability Since the 2017 Hazard Mitigation Plan

Overall, **the County's vulnerability has not changed since the 2017 HMP; therefore, the entire County will continue to be exposed and vulnerable to the drowning hazard.**

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4.3 Hazard Profiles

4.3.4 Earthquake

An earthquake is sudden movement of the Earth's surface caused by release of stress accumulated within or along the edge of the Earth's tectonic plates, a volcanic eruption, or a manmade explosion (Shedlock and Pakiser 1997). Most earthquakes occur at the boundaries where the Earth's tectonic plates meet (faults); less than 10 percent of earthquakes occur within plate interiors. As plates continue to move and plate boundaries change geologically over time, weakened boundary regions become part of the interiors of the plates. These zones of weakness within the continents can cause earthquakes, which are a response to stresses that originate at the edges of the plate or in the deeper crust (Shedlock and Pakiser 1997).

According to the U.S. Geological Survey (USGS) Earthquake Hazards Program, an earthquake hazard is any **disruption associated with an earthquake that may affect residents' normal activities**. This category includes surface faulting, ground motion (shaking), landslides, liquefaction, tectonic deformation, tsunamis, and seiches. Each of these terms is defined below:

- Surface faulting: Displacement that reaches the Earth's surface during a slip along a fault. Commonly occurs with shallow earthquakes—those with an epicenter of less than 20 kilometers (km).
- Ground motion (shaking): Movement of the earth's surface from earthquakes or explosions. Ground motion or shaking is produced by waves generated by a sudden slip on a fault or sudden pressure at the explosive source, and that travel through the Earth and along its surface.
- Landslide: Movement of surface material down a slope.
- Liquefaction: A process by which water-saturated sediment temporarily loses strength and acts as a fluid, like the wet sand near the water at the beach. Earthquake shaking can cause this effect.
- Tectonic Deformation: Change in the original shape of a material caused by stress and strain.
- Tsunami: A sea wave of local or distant origin that results from large-scale seafloor displacements associated with large earthquakes, major sub-marine slides, or exploding volcanic islands.
- Seiche: Sloshing of a closed body of water, such as a lake or bay, from earthquake shaking (USGS 2012).

Ground shaking is the primary cause of earthquake damage to man-made structures. Damage can be increased when soft soils amplify ground shaking. Soils influence damage in different ways. Soft soils can amplify the motion of earthquake waves, producing greater ground shaking and increasing stresses on built structures on the land surface. Loose, wet, sandy soils also can cause damage when they lose strength and flow as a fluid when shaken, causing foundations and underground structures to shift and break (Stanford 2003).

The National Earthquake Hazard Reduction Program (NEHRP) developed five soil classifications (A to E) distinguished by soil shear-wave velocity that alters severity of an earthquake; each classification is listed in Table 4.3.4-1. 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 4.3.4-1. 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 Pike County.

4.3.4.1 Location and Extent

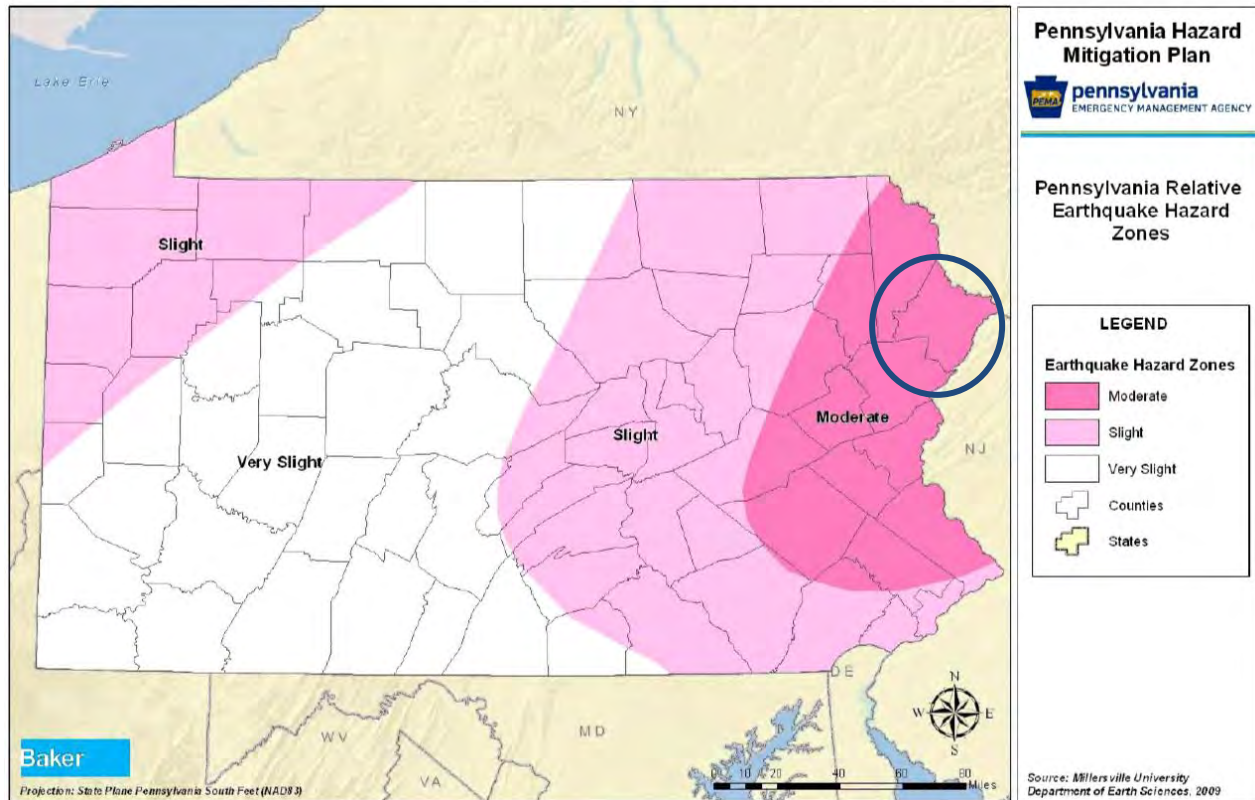
Focal depth and geographic position of the epicenter of an earthquake commonly determine its location. Focal depth **of an earthquake is the depth from the Earth's surface to the region where an earthquake's energy originates (the focus or hypocenter)**. The epicenter of an earthquake **is the point 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.

According to the Pennsylvania Bureau of Topographic and Geologic Survey, events that occur in the Commonwealth involve very small impact areas (less than 100 km in diameter). The most seismically active region in the Commonwealth is in southeastern Pennsylvania in the area of Lancaster County (Pennsylvania Emergency Management Agency [PEMA] 2013). Areas of Pennsylvania, including Pike County, may be subject to the effects of earthquakes with epicenters outside the Commonwealth.

Pennsylvania has three earthquake hazard area zones: very slight, slight, and moderate (shown on Figure 4.3.4-1) (PEMA 2013). **Pike County is within the "moderate zone"**.



Figure 4.3.4-1. Pennsylvania Earthquake Hazard Zones



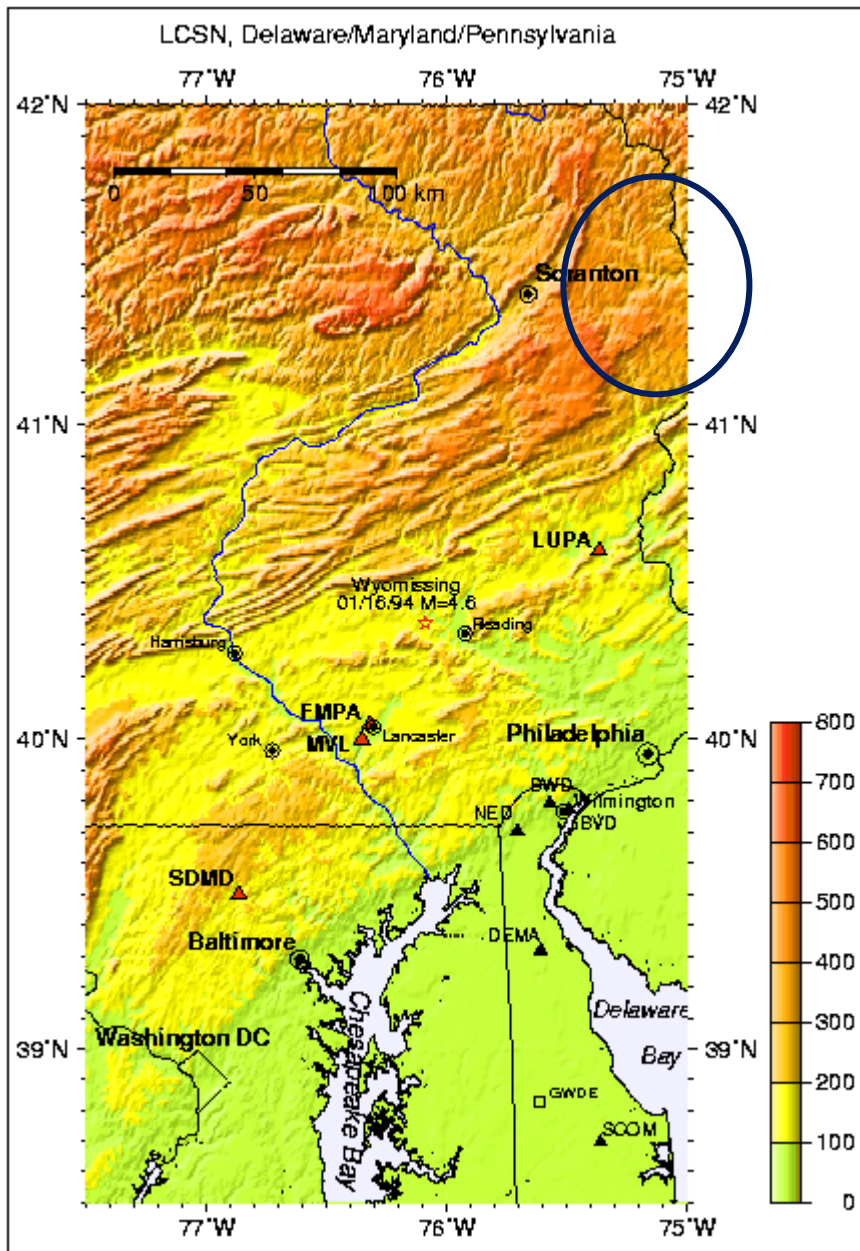
Source: PEMA 2013

Note: Pike County is within the blue oval on the map.

The Lamont-Doherty Cooperative Seismographic Network (LCSN) monitors earthquakes that occur primarily in the northeastern United States. Goals of the project are to compile a complete earthquake catalog for this region, assess earthquake hazards, and study causes of earthquakes in the region. LCSN operates 40 seismographic stations in the following seven states: Connecticut, Delaware, Maryland, New Jersey, New York, Pennsylvania, and Vermont. Figure 4.3.4-2 shows locations of seismographic stations in eastern Pennsylvania. The figure shows one station, Lehigh University station, is the closest station to Pike County. There is a station located in Basking Ridge, NJ as well. The network is composed of broadband and short-period seismographic stations (LCSN 2014).



Figure 4.3.4-2. Lamont-Doherty Seismic Stations Locations in Eastern Pennsylvania



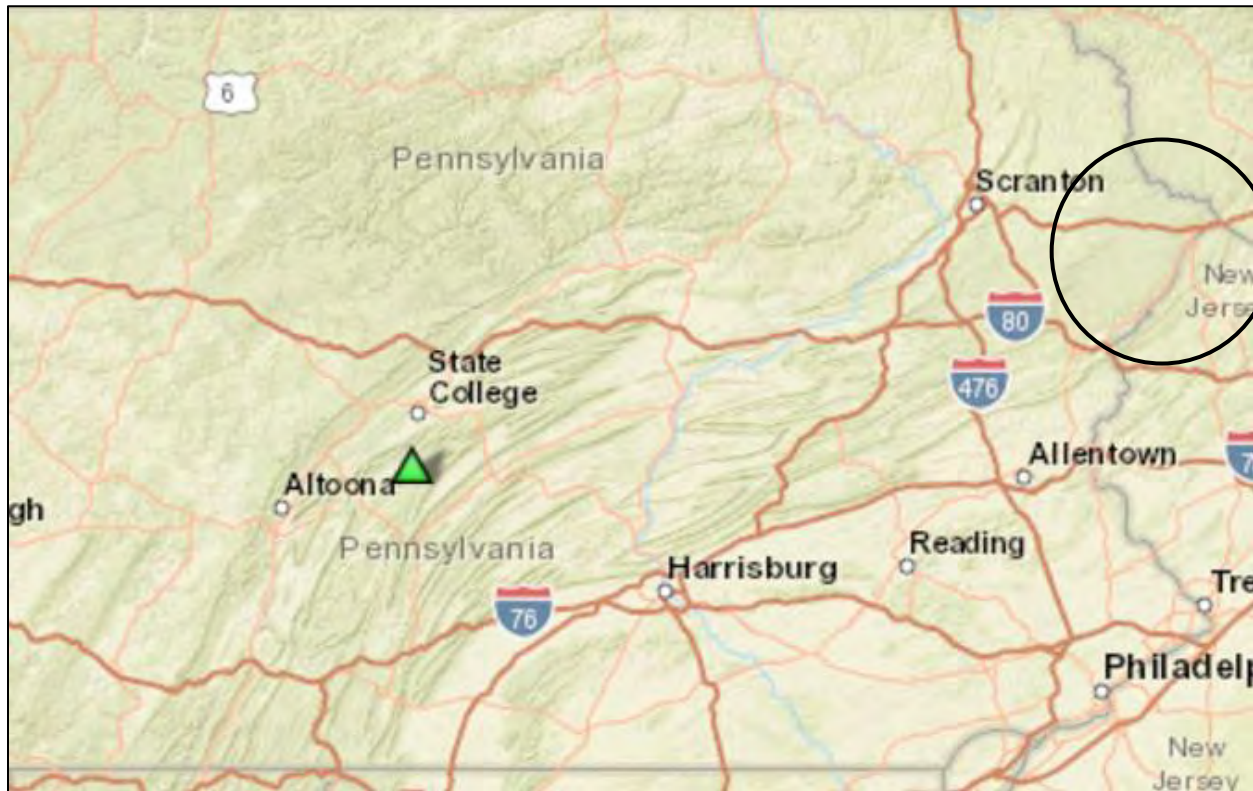
Source: LCSN 2014

Note: Pike County is within the oval on the map.

In addition to the Lamont-Doherty Seismic Stations, USGS operates a global network of seismic stations to monitor seismic activity. While no seismic stations are within Pike County, nearby stations are in State College, Pennsylvania. Figure 4.3.4-3 shows their locations.



Figure 4.3.4-3. USGS Seismic Stations



Source: USGS 2016

Note: Seismic station locations are indicated by green triangles, and Pike 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 for illustrating shaking intensity and damage assessments** (USGS 2021).

Earthquakes above a magnitude 5.0 can cause damage near their epicenters, and larger-magnitude earthquakes can cause damage over larger, wider areas. Earthquakes in Pennsylvania appear to be centered in the southeastern portion and northwestern corner of the Commonwealth.

4.3.4.2 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 4.3.4-2 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 Pike County or near the border in an adjacent county, causing mild damage in populated areas.

Table 4.3.4-2. Richter Scale Magnitudes

Richter Magnitude	Earthquake Effects
2.5 or less	Usually not felt, but can be recorded by seismograph
2.5 to 5.4	Often felt, but causes only minor damage
5.5 to 6.0	Slight damage to buildings and other structures
6.1 to 6.9	May cause a lot of damage in very populated areas
7.0 to 7.9	Major earthquake; serious damage
8.0 or greater	Great earthquake; can destroy communities near the epicenter

Source: PEMA 2013

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 expresses 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 Pike County.

Table 4.3.4-3. 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	Some people feel it	
III	Slight	Felt by people resting; feels like a truck rumbling by	
IV	Moderate	Felt by people walking	
V	Slightly Strong	Sleepers awake; church bells ring	<4.8
VI	Strong	Trees sway; suspended objects swing; objects fall off shelves	<5.4
VII	Very Strong	Mild alarm; walls crack; plaster falls	<6.1
VIII	Destructive	Moving cars uncontrollable; masonry fractures; poorly constructed buildings are damaged	<6.9
IX	Ruinous	Some houses collapse; ground cracks; pipes break open	<7.3
X	Disastrous	Ground cracks profusely; many buildings are destroyed; liquefaction and landslides are widespread	
XI	Very Disastrous	Most buildings and bridges collapse; roads, railways, pipes, and cables are destroyed; general triggering of other hazards occurs	<8.1
XII	Catastrophic	Total destruction; trees fall; ground rises and falls in waves	>8.1

Source: PEMA 2013

Seismic hazards are often expressed in terms of Peak Ground Acceleration (PGA) and Spectral Acceleration (SA). USGS defines PGA and SA as the following: "PGA is what is experienced by a particle on the ground. Spectral Acceleration (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 2012). 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. At 10 percent *g* PGA, ground acceleration is 10 percent that of gravity (New Jersey Office of Emergency Management [NJOEM] 2011). PGA and SA hazard maps provide insight into location-specific vulnerabilities (New York State Disaster Preparedness Commission [NYSDPC] 2011).

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 (NYSDPC 2011). Damage levels from an earthquake vary with intensity of ground shaking and with seismic capacity of structures, as noted in Table 4.3.4-4.

Table 4.3.4-4. Damage Levels Experienced in Earthquakes

Ground Motion Percentage	Explanation of Damages
1-2% <i>g</i>	Motions are widely felt by people; hanging plants and lamps swing strongly, but damage levels, if any, are usually very low.
Below 10% <i>g</i>	Usually causes only slight damage, except in unusually vulnerable facilities.
10-20% <i>g</i>	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% <i>g</i>	May cause significant damage in some modern buildings and very high levels of damage (including collapse) in poorly designed buildings.
≥50% <i>g</i>	May causes higher levels of damage in many buildings, even those designed to resist seismic forces.

Source: NJOEM 2019

Note: % *g* Peak Ground Acceleration

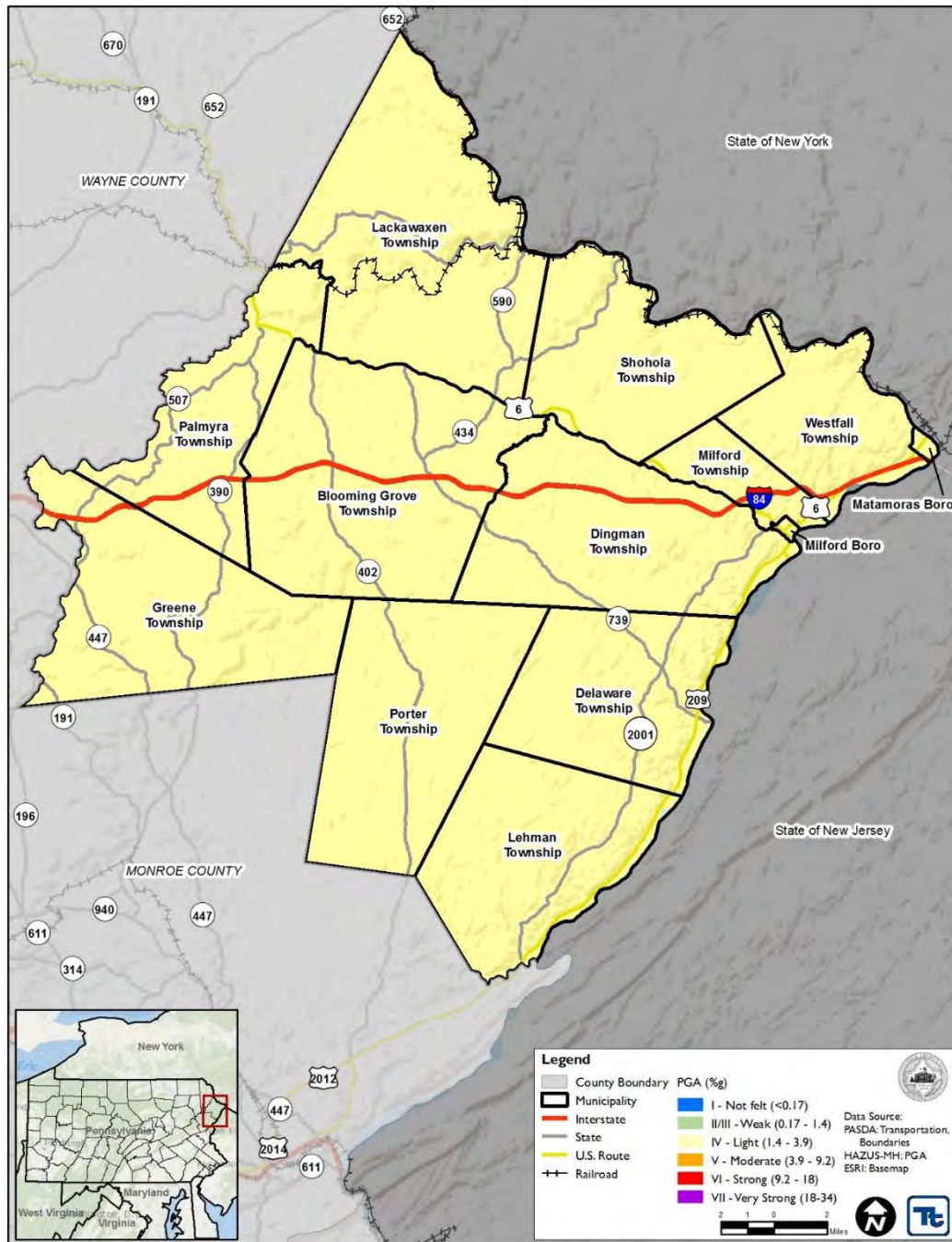
National maps of earthquake shaking hazards have been produced since 1948. These maps provide information essential for creating and updating seismic design requirements for building codes, insurance rate structures, earthquake loss studies, retrofit priorities, and land use planning applied in the United 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, 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 and others 2001).

To analyze the earthquake hazard in Pike County, a probabilistic assessment was conducted for the 100-, 500- and 2,500-year mean return periods (MRP) in Hazards U.S. – Multi-Hazard (HAZUS-MH) 3.0. A HAZUS analysis evaluates statistical likelihood that a specific event will occur and the consequences of that event. A 100-year MRP event is an earthquake with a 1-percent chance that the mapped ground motion levels (PGA) will be exceeded in any given year. 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. A 2,500-year MRP event (the worst-case scenario) is an earthquake with 0.04-percent chance that the mapped PGA will be exceeded in any given year.



Figures 4.3.4-4 through 4.3.4-6 illustrate the geographic distribution of PGA (percent *g*) across Pike County for each event. Potential losses estimated by HAZUS-MH for the MRP and the associated PGA are discussed in the Vulnerability Assessment section (Section 4.3.4.5) of this profile.

Figure 4.3.4-4. Peak Ground Acceleration Modified Mercalli Scale in Pike County for a 100-Year MRP Earthquake Event



Source: HAZUS-MH 3.1

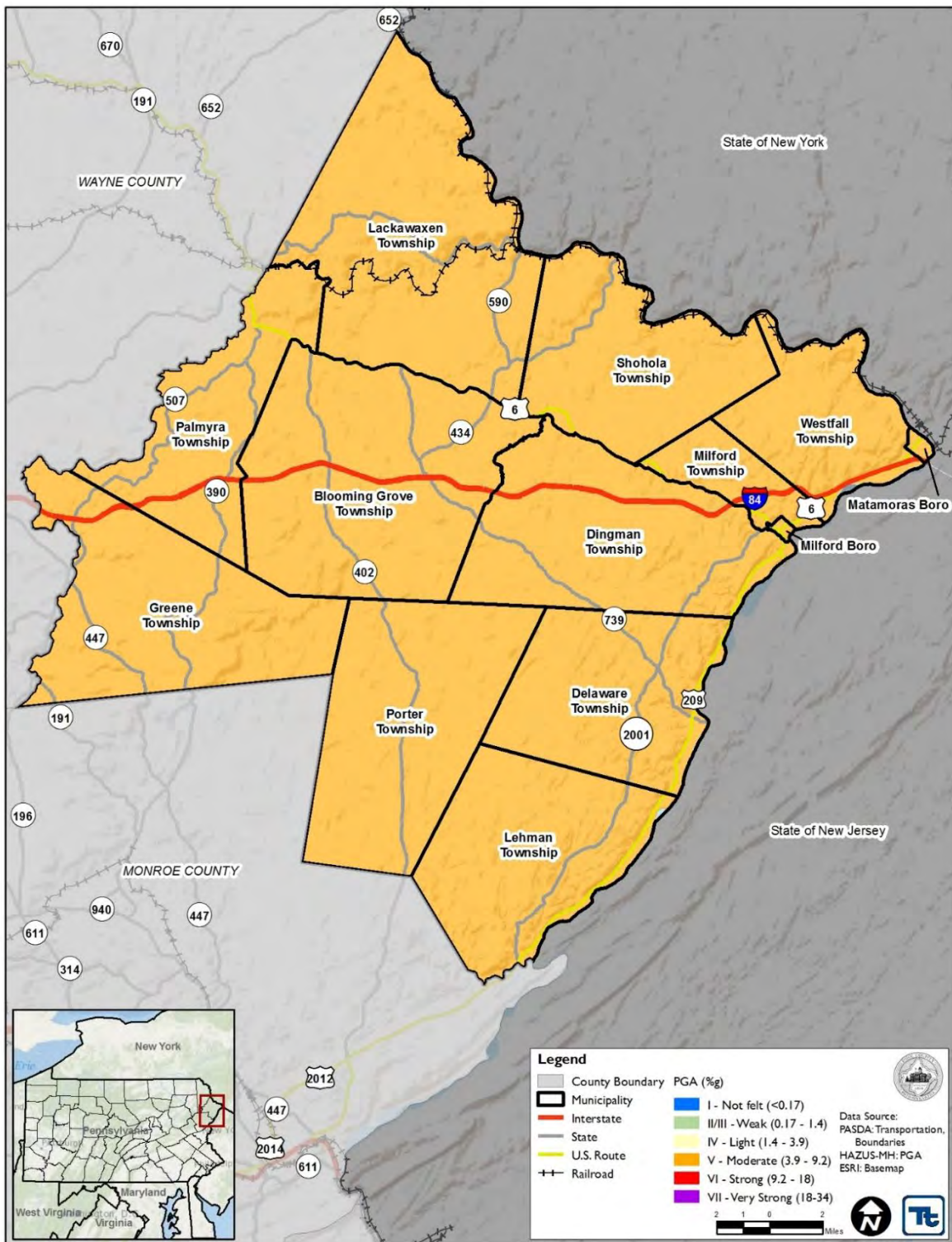
Note: The peak ground acceleration for the 100-year MRP is 1.5-1.6%g.

4.3.4: EARTHQUAKE





Figure 4.3.4-5. Peak Ground Acceleration Modified Mercalli Scale in Pike County for a 500-Year MRP Earthquake Event

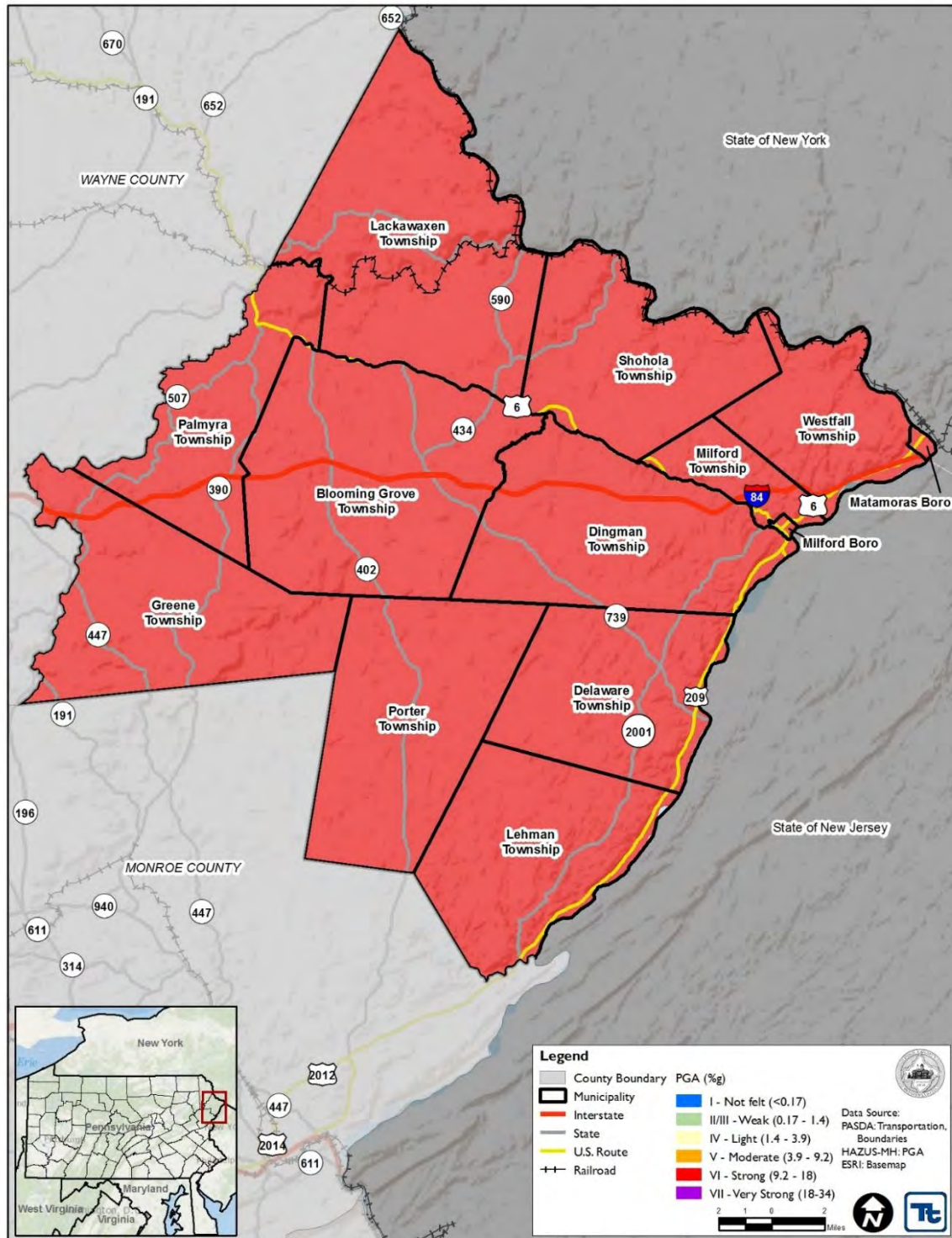


Source: HAZUS-MH 3.1

Note: The peak ground acceleration for the 500-year MRP is 4.6-5.4%g.



Figure 4.3.4-6. Peak Ground Acceleration Modified Mercalli Scale in Pike County for a 2,500-Year MRP Earthquake Event



Source: HAZUS-MH 3.1

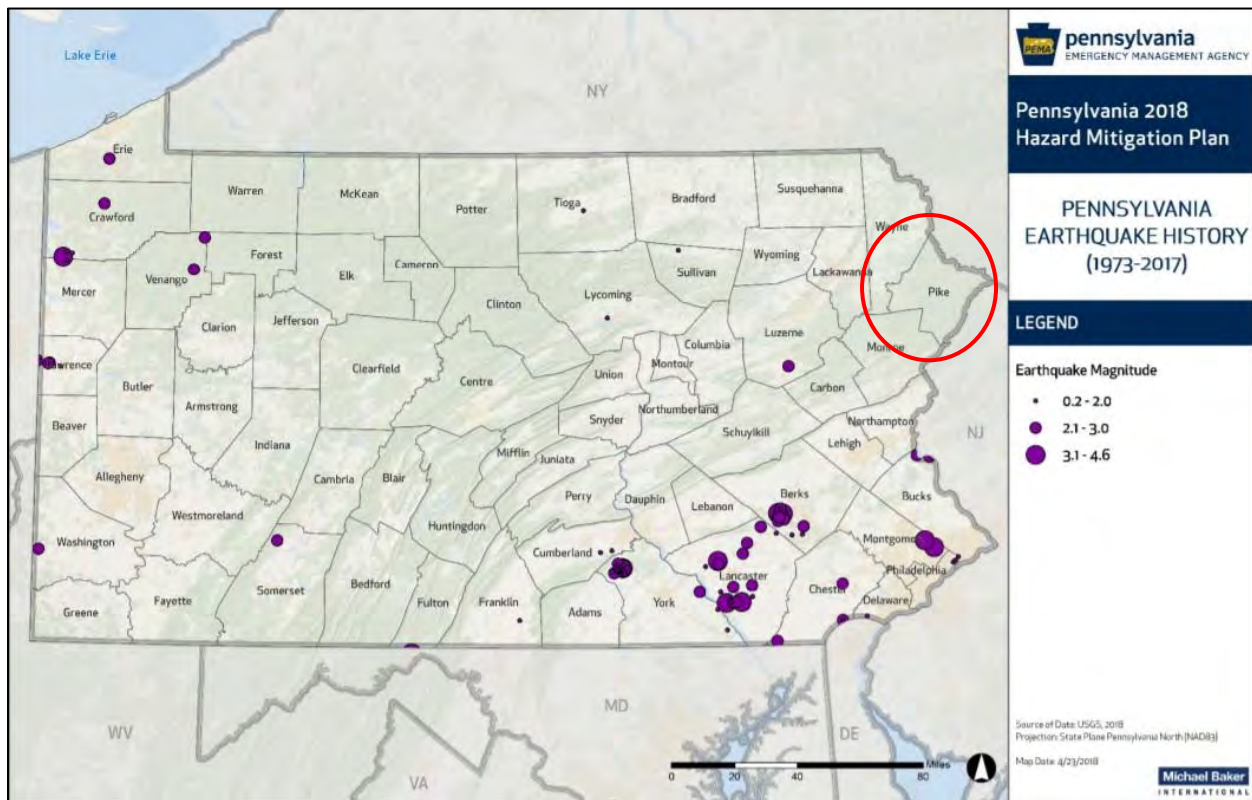
Note: The peak ground acceleration for the 2,500-year MRP is 12.3-16.6%g.



4.3.4.3 Past Occurrence

The historical record of earthquakes goes back approximately 200 years. In Pennsylvania, about 48 earthquakes have caused light damage since the Colonial period. Nearly half of these events had out-of-state epicenters (PEMA 2018, USGS 2014). Figure 4.3.4-7 is a map of earthquake epicenters in Pennsylvania from 1973 to 2017. No earthquakes had an epicenter in Pike County and no damages were reported in Pike County.

Figure 4.3.4-7. Earthquake Epicenters in Pennsylvania



According to the USGS, there have been no earthquake epicenters recorded in Pike County between 1724 and August 30, 2021. Recorded epicenters closest to Pike County were a 3.0 magnitude earthquake on April 27, 1974 in Luzerne County; and 1.0 on March 18, 2002, 1.3 on February 21, 2006, and 2.4 on February 16, 2006 in Sussex County, New Jersey (USGS 2021). **PEMA's Pennsylvania Disaster History list includes no significant earthquake events in Pennsylvania, and no Federal Emergency Management Agency (FEMA) major disaster (DR) / emergency declarations (EM) have occurred for significant earthquake events in Pennsylvania (FEMA 2021).** Additionally, **according to the USGS "Did You Feel It", Pike County residents reported having felt the recent earthquakes that occurred in Sussex County (USGS 2021).**

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. Since then, an earthquake with a magnitude of 5.8 occurred in Louisa County, Virginia; it was felt throughout Pennsylvania, causing evacuations, minor damage, and emergency infrastructure inspections (PEMA 2013).

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, including Pike County.

4.3.4.4 Future Occurrence

Earthquakes cannot be predicted and may occur any time of the day or year. Major earthquakes are infrequent in the State and 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 historic record, the future probability of damaging earthquakes impacting Pike County is low.

According to the USGS earthquake catalog, between 1950 and 2021, there have been no earthquakes with epicenters in Pike County. Earthquakes have occurred outside of Pike County but it is unknown as to whether or not those events had direct or indirect impacts on County assets. 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).

4.3.4.5 Vulnerability Assessment

To understand risk, a community must evaluate which assets are exposed or vulnerable in the identified hazard area. The entire County has been identified as exposed to the earthquake hazard. Therefore, all assets in Pike County (population, structures, critical facilities, and lifelines) described in the County Profile (Section 2), are vulnerable. The following section provides an evaluation and estimation of the potential impact of the earthquake hazard on Pike County, including the following:

- Overview of vulnerability
- Data and methodology used for the evaluation
- Impact on: (1) life, safety, and health of residents; (2) general building stock; (3) critical facilities; (4) economy; (5) environment; and (6) future growth and development
- Effect of climate change on vulnerability
- Further data collections that will assist understanding of this hazard over time.

Overview of Vulnerability

Earthquakes usually occur without warning and can be felt in areas at great distance from their point of origin. Extent of damage depends on density of population, as well as building and infrastructure construction in the area shaken by the quake. Some areas may be more vulnerable than others based on soil type, age of buildings, and building codes in place. Compounding potential for damage is that, historically, Building Officials Code Administration (BOCA)



in the northeastern United States was developed to address local concerns including heavy snow loads and wind; **seismic requirements for design criteria are not as stringent compared to the West Coast's reliance on the more** seismically-focused Uniform Building Code. Thus, a smaller earthquake in the northeastern United States can cause more structural damage than it would in the western part of the United States.

The entire population and general building stock inventory of the County are at risk for damage or loss from impacts of an earthquake. Potential losses associated with earth shaking were calculated for Pike County for the 100-, 500-, and 2,500-year MRP events. A summary of the data used and methodology applied for this assessment appears below, followed by impacts on population, existing structures, critical facilities, and the economy within Pike County.

Data and Methodology

A probabilistic assessment was conducted for the 100-, 500-, and 2,500-year MRP in HAZUS-MH 3.1 to analyze the earthquake hazard and provide a range of loss estimates for Pike County. The probabilistic method uses historical earthquake information from historical earthquakes and inferred faults, locations, and magnitudes, and computes probable ground-shaking levels that may be experienced during a recurrence period by Census tract. According to the New York City Area Consortium for Earthquake Loss Mitigation (NYCEM), probabilistic estimates are best for urban planning, land use, zoning, and seismic building code regulations (NYCEM 2003). The default assumption is a magnitude-7.0 earthquake for all return periods.

In addition to the probabilistic scenarios cited, an annualized loss run was conducted in HAZUS 3.1 to estimate annualized general building stock dollar losses within Pike County. The annualized loss methodology combines estimated losses associated with ground shaking for each return period, which are based on values from the USGS seismic probabilistic curves. Annualized losses are useful for mitigation planning because they provide a baseline that can be used to compare (1) the risk of one hazard across multiple jurisdictions, and (2) the degree of risk of all hazards for each participating jurisdiction.

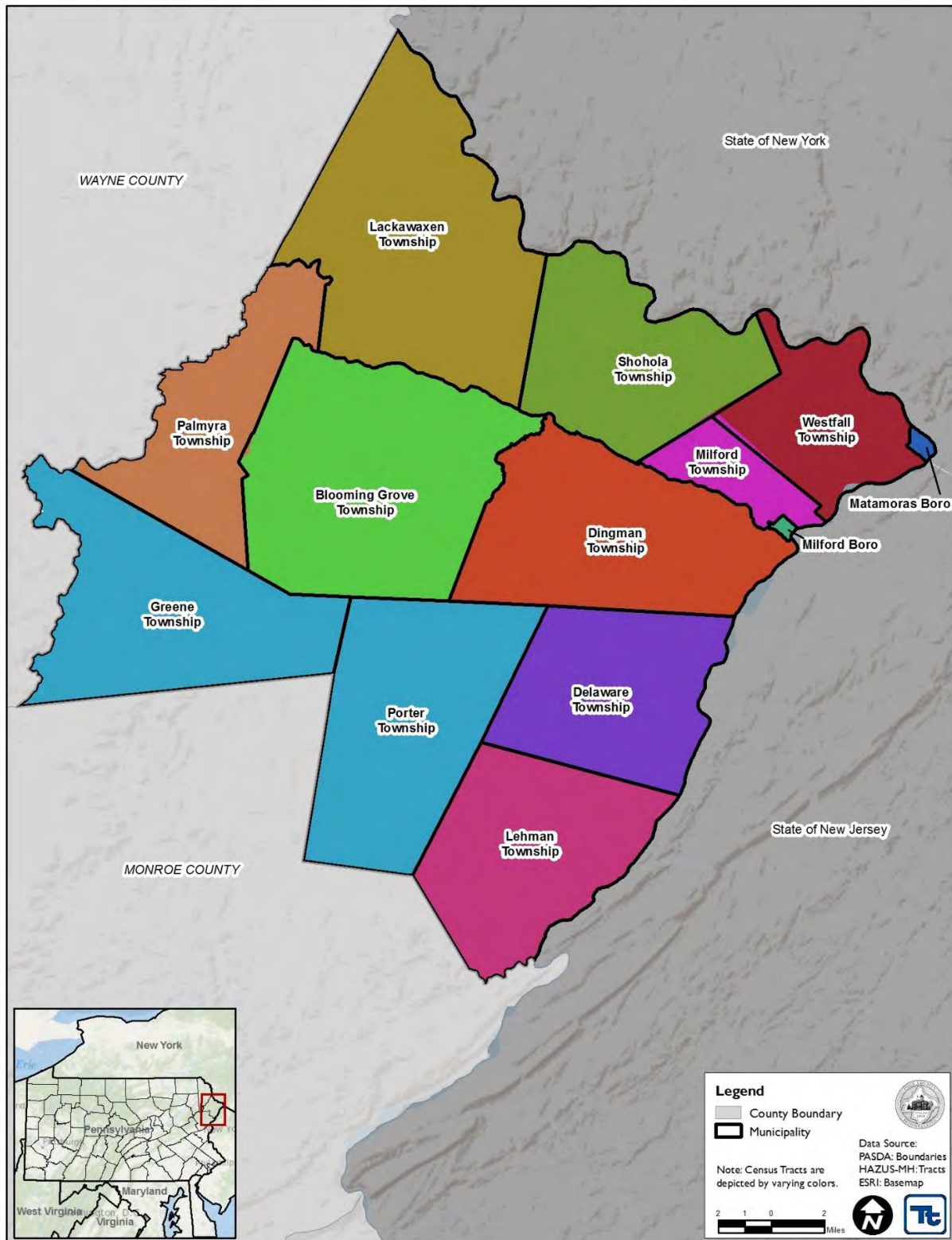
As noted in the HAZUS-MH Earthquake User Manual, **"Uncertainties are inherent in any loss estimation methodology.** They arise in part from incomplete scientific knowledge concerning earthquakes and their effects upon buildings and facilities. They also result from the approximations and simplifications 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 a factor of 2 or more."** However, HAZUS potential loss estimates are acceptable for the purposes of this Hazard Mitigation Plan (HMP).

The occupancy classes available in HAZUS-MH 3.1 were condensed into the following categories to facilitate the analysis and presentation of results: residential, commercial, industrial, agricultural, religious, government, and educational. Residential loss estimates address both multi-family and single-family dwellings. Impacts on critical facilities and utilities were also evaluated.

HAZUS-MH 3.1 generates results at the Census-tract level. Boundaries of the U.S. Census tracts are not always coincident with municipal boundaries in Pike County. Results in subsequent tables are presented for the U.S. Census tracts, with the associated municipalities listed for each tract. Figure 4.3.4-8 below shows spatial relationships between U.S. Census tracts and municipal boundaries.



Figure 4.3.4-8. HAZUS-MH Census Tracts in Pike County



Source: HAZUS-MH 3.1

4.3.4: EARTHQUAKE



Impact on Life, Health, and Safety

Overall, the entire population of Pike County is exposed to the earthquake hazard event. According to the 2020 U.S. Census, Pike County had a population of 58,535 people. The impact of earthquakes on life, health, and safety depends on the severity of the event. Risks to public safety and loss of life from an earthquake in Pike County are minimal, with higher risk occurring in buildings as a result of damage to the structure, or people walking below building ornamentation and chimneys that may be shaken loose and fall as a result of the quake.

Populations considered most vulnerable are located in the built environment, particularly near unreinforced masonry construction. In addition, the vulnerable population includes the elderly (persons over the age of 65) and individuals living below the Census poverty threshold. These 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.

Residents may be displaced or require temporary to long-term sheltering as a result of the event. The number of people requiring shelter is generally less than the number displaced, as some displaced persons use hotels or stay with family or friends after a disaster event. HAZUS-MH 3.0 does not estimate any displaced persons or population that may require short-term sheltering as a result of the 100-year event. Table 4.3.4-5 summarizes the estimated sheltering needs for Pike County.

Table 4.3.4-5. Summary of Estimated Sheltering Needs for Pike County

Scenario	Displaced Households	Persons Seeking Short-Term Shelter
500-Year Earthquake	4	2
2,500-Year Earthquake	39	22

Source: HAZUS-MH 3.1

Structural building damage correlates strongly to the number of injuries and casualties from an earthquake event (NYCEM 2003). Furthermore, different sectors of the community would be exposed to the hazard depending on time of day of occurrence. For example, HAZUS considers that maximum residential occupancy occurs at 2:00 a.m.; educational, commercial, and industrial sectors maximum occupancy at 2:00 p.m.; and peak commute time at 5:00 p.m. Whether affected directly or indirectly, the entire population would have to deal with consequences of earthquakes to some degree. Business interruption could prevent people from working, road closures could isolate populations, and loss of functions of utilities could affect populations that suffered no direct damage from an event. HAZUS-MH 3.1 estimates no injuries or casualties in Pike County as a result of a 100-year MRP event. Table 4.3.4-6 summarizes estimated number of injuries, hospitalizations, and casualties as a result of the 500-year MRP event. Table 4.3.4-7 summarizes estimated number of injuries, hospitalizations, and casualties as a result of the 2,500-year MRP event.

Table 4.3.4-6. Estimated Number of Injuries, Hospitalizations, and Casualties from the 500-Year MRP Earthquake Event

Level of Severity	Time of Day		
	2:00 a.m.	2:00 p.m.	5:00 p.m.
Injuries	4	3	3



Level of Severity	Time of Day		
	2:00 a.m.	2:00 p.m.	5:00 p.m.
Hospitalization	1	0	0
Casualties	0	0	0

Source: HAZUS-MH 3.1

Table 4.3.4-7. Estimated Number of Injuries, Hospitalizations, and Casualties from the 2,500-Year MRP Earthquake Event

Level of Severity	Time of Day		
	2:00 a.m.	2:00 p.m.	5:00 p.m.
Injuries	28	24	20
Hospitalization	6	4	3
Casualties	1	1	1

Source: HAZUS-MH 3.1

Impact on General Building Stock and Critical Facilities

After consideration of the population exposed to the earthquake hazard, an evaluation of value of general building stock exposed to and damaged by the 100-, 500- and 2,500-year MRP earthquake events occurred. In addition, annualized losses were calculated by use of HAZUS-MH 3.1. **The entire study area's general building stock is considered at risk and exposed to this hazard.**

The HAZUS-MH 3.1 model estimates value of exposed building stock and loss (in terms of damage to exposed stock). The County Profile section of this HMP (Section 2) presents statistics on replacement values of general building stock (structure and contents).

A probabilistic model was run to estimate annualized dollar losses within Pike County by application of HAZUS-MH 3.1. Annualized losses are useful for mitigation planning because they provide a baseline that can be used to compare (1) risk of one hazard across multiple jurisdictions, and (2) degree of risk of all hazards within each participating jurisdiction. Notably, annualized loss does not predict losses in any particular year. Estimated earthquake annualized losses are approximately \$130K per year (building and contents) within the County.

According to NYCEM, where earthquake risks and mitigation were evaluated in the New York, New Jersey, and Connecticut region, most damage and loss caused by an earthquake would directly or indirectly result from ground shaking (NYCEM 2003). NYCEM found a strong correlation between PGA and damage a building might undergo. The HAZUS-MH model is based on the best available earthquake science and aligns with these statements. HAZUS-MH 3.0 methodology and model were used to analyze the earthquake hazard for the general building stock within Pike County. Figure 4.3.4-6 through Figure 4.3.4-8 earlier in this profile illustrate the geographic distribution of PGA (g) across the County for the 100-, 500-, and 2,500-year MRP events.

In addition, according to NYCEM (NYCEM 2003), a building's construction determines how well it can withstand the force of an earthquake. The NYCEM report indicates that un-reinforced masonry buildings are most at risk during an earthquake because the walls are prone to collapse outward, whereas steel and wood buildings absorb more of the earthquake's energy. Additional attributes that affect a building's capability to withstand an earthquake's force include



its age, number of stories, and quality of construction. HAZUS-MH considers building construction and age of buildings in its analysis. Default building ages and building types already incorporated into the inventory were used because the default general building stock was used for this HAZUS-MH analysis.

Potential building damage was evaluated by HAZUS-MH 3.1 across the following damage categories: none, slight, moderate, extensive, and complete. Table 4.3.4-8 provides definitions of these categories of damage for a light wood-framed building; definitions for other building types are included in the HAZUS-MH technical manual documentation. General building stock damage for these damage categories by occupancy class on a countywide basis is summarized for the 500- and 2,500-year events in Table 4.3.4-9.

Table 4.3.4-8. 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 2012

Table 4.3.4-9. Estimated Buildings Damaged by General Occupancy for 500-year and 2,500-year MRP Earthquake Events

Category	Average Damage State									
	500-Year MRP					2,500-Year MRP				
	None	Slight	Moderate	Extensive	Complete	None	Slight	Moderate	Extensive	Complete
Residential	35,993 (93.7%)	958 (2.5%)	306 (<1%)	37 (<1%)	4 (<1%)	31,380 (81.7%)	3,968 (10.3%)	1,608 (4.2%)	301 (<1%)	42 (<1%)
Commercial	707 (1.8%)	24 (<1%)	8 (<1%)	1 (<1%)	0 (0%)	571 (1.5%)	101 (<1%)	56 (<1%)	11 (<1%)	1 (<1%)
Industrial	202 (<1%)	6 (<1%)	2 (<1%)	0 (0%)	0 (0%)	163 (<1%)	28 (<1%)	17 (<1%)	3 (<1%)	0 (0%)
Education, Government, Religious, and Agricultural	160 (<1%)	5 (<1%)	1 (<1%)	0 (0%)	0 (0%)	132 (<1%)	21 (<1%)	12 (<1%)	2 (<1%)	0 (0%)

Source: HAZUS-MH 3.1

HAZUS-MH 3.1 estimates no damage to Pike County's general building stock as a result of a 100-year MRP event. Table 4.3.4-10 summarizes estimated building value (buildings and contents) for annualized loss, 500-, and 2,500-year MRP earthquake events. Damage loss estimates include structural and non-structural damage to buildings



and loss of contents. Table 4.3.4-11 summarizes estimated value (buildings and contents) damaged by 500-, and 2,500-year MRP earthquake events.

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Table 4.3.4-10. Estimated Building Value (Building and Contents) Damaged by the Annualized, 500-, and 2,500-Year MRP Earthquake Events

Municipality	Total Replacement Cost Value (Building and Contents)	Estimated Total Damages*			Percent of Total Building and Contents		
		Annualized Loss	500-Year	2,500-Year	Annualized Loss	500-Year	2,500-Year
Blooming Grove Township	\$1,160,095,000	\$9,943	\$940,204	\$8,262,952	<1%	<1%	<1%
Delaware Township	\$1,496,677,000	\$16,099	\$1,391,456	\$14,114,607	<1%	<1%	<1%
Dingman Township	\$1,983,140,000	\$20,685	\$1,816,568	\$17,810,638	<1%	<1%	<1%
Greene Township-Porter Township	\$1,345,239,000	\$11,812	\$1,080,585	\$9,774,890	<1%	<1%	<1%
Lackawaxen Township	\$1,231,620,000	\$10,119	\$987,409	\$8,149,543	<1%	<1%	<1%
Lehman Township	\$1,992,003,000	\$21,862	\$1,843,282	\$19,560,495	<1%	<1%	<1%
Matamoras Borough	\$377,318,000	\$4,401	\$367,013	\$3,855,277	<1%	<1%	1.0%
Milford Borough	\$413,430,000	\$5,214	\$386,500	\$4,469,173	<1%	<1%	1.1%
Milford Township	\$672,467,000	\$7,431	\$587,203	\$6,353,488	<1%	<1%	<1%
Palmyra Township	\$1,244,033,000	\$9,753	\$946,874	\$7,888,975	<1%	<1%	<1%
Shohola Township	\$759,299,000	\$7,544	\$671,580	\$6,297,048	<1%	<1%	<1%
Westfall Township	\$383,781,000	\$4,707	\$379,989	\$4,026,964	<1%	<1%	1.0%
Pike County (Total)	\$13,059,102,000	\$129,570	\$11,398,663	\$110,564,051	<1%	<1%	<1%

Source: HAZUS-MH 3.1

Notes:

Total amount is sum of damages for all occupancy classes (residential, commercial, industrial, agricultural, educational, religious, and government).

As stated at the beginning of the vulnerability analysis, HAZUS-MH 3.1 generates results at the Census-tract level. Boundaries of Census tracts are not always coincident with municipal boundaries in Pike County. Results in the table are for Census tracts, with associated municipalities listed for each tract. See Figure 4.3.4-9 for a visual breakdown of Census tracts.



Table 4.3.4-11. Estimated Value (Building and Contents) Damaged by the 500- and 2,500-Year MRP Earthquake Events

Municipality	Total Improved Value (Building and Contents)	Estimated Residential Damage		Estimated Commercial Damage	
		500-Year	2,500-Year	500-Year	2,500-Year
Blooming Grove Township	\$1,160,095,000	\$922,639	\$8,069,267	\$14,089	\$151,778
Delaware Township	\$1,496,677,000	\$1,262,246	\$12,551,230	\$82,373	\$994,134
Dingman Township	\$1,983,140,000	\$1,664,635	\$15,990,275	\$87,237	\$1,018,970
Greene Township-Porter Township	\$1,345,239,000	\$1,011,947	\$9,011,052	\$47,530	\$525,055
Lackawaxen Township	\$1,231,620,000	\$968,772	\$7,956,673	\$12,857	\$130,234
Lehman Township	\$1,992,003,000	\$1,730,691	\$18,119,467	\$60,192	\$766,878
Matamoras Borough	\$377,318,000	\$292,721	\$2,966,815	\$55,288	\$656,757
Milford Borough	\$413,430,000	\$131,795	\$1,391,758	\$191,391	\$2,316,248
Milford Township	\$672,467,000	\$443,418	\$4,675,451	\$110,440	\$1,286,744
Palmyra Township	\$1,244,033,000	\$925,187	\$7,662,456	\$15,136	\$157,062
Shohola Township	\$759,299,000	\$599,961	\$5,483,587	\$36,691	\$410,009
Westfall Township	\$383,781,000	\$286,457	\$2,915,012	\$81,343	\$962,760
Pike County (Total)	\$13,059,102,000	\$10,240,470	\$96,793,041	\$794,566	\$9,376,628

Source: HAZUS-MH 3.1

Notes: As stated at the beginning of the vulnerability analysis, HAZUS-MH 3.1 generates results at the Census-tract level. Boundaries of Census tracts are not always coincident with municipal boundaries in Pike County. Results in the table are for Census tracts, with associated municipalities listed for each tract. See Figure 4.3.4-9 for a visual breakdown of Census tracts.



An estimated \$11 million in damages would occur to buildings in the County during a 500-year earthquake event. This takes into account structural damage, non-structural damage, and loss of contents, representing less than 1 percent of total replacement value for general building stock in Pike County (total replacement value within the County would exceed \$13 billion.) For the 2,500-year earthquake event, HAZUS-MH estimates more than \$110 million in damages (<1 percent of the building stock). Residential and commercial buildings would undergo most damage from earthquake events. Earthquakes can cause secondary hazard events such as fires. According to the HAZUS-MH earthquake model, no fires are anticipated as a result of the 100-, 500-, or 2,500-year MRP events.

After consideration of general building stock exposed to and damaged by each earthquake event, critical facilities were evaluated. All critical facilities (essential facilities, transportation systems, lifeline utility systems, high-potential loss facilities, and user-defined facilities) in Pike County are considered exposed and vulnerable to the earthquake hazard. The Critical Facilities subsection of this HMP in Section 2 (County Profile) discusses the inventory of critical facilities in Pike County.

HAZUS-MH 3.1 estimates the probability that critical facilities may sustain damage as a result of the 100-, 500-, and 2,500-year MRP earthquake events. Additionally, HAZUS-MH estimates percent functionality of each facility days after the event. Table 4.3.4-12 (500-year MRP earthquake event) and Table 4.3.4-13 (2,500-year MRP earthquake event) list percent probabilities that critical facilities and utilities would sustain damages within the damage categories (column headings), and list percent functionalities after different numbers of days following those events (column headings). During and following a 100-Year MRP event, HAZUS-MH 3.1 estimates nearly 100% functionality of emergency facilities (police, fire, Emergency Medical Services [EMS], and medical facilities), schools, utilities, and specific facilities identified by Pike County as critical. Therefore, impact on critical facilities by a 100-year event would not be significant.

Table 4.3.4-12. Estimated Damage to and Loss of Functionality of Critical Facilities and Utilities in Pike County for the 500-Year MRP Earthquake Event

Name	Percent Probability of Sustaining Damage					Percent Functionality			
	None	Slight	Moderate	Extensive	Complete	Day 1	Day 7	Day 30	Day 90
Critical Facilities									
Medical	100	0	0	0	0	100	100	100	100
Police	99-100	<1	<1	0	0	99-100	100	100	100
Fire	99-100	<1	<1	0	0	99-100	100	100	100
EOC	99.7-99.8	<1	<1	0	0	100	100	100	100
School	99	<1	<1	0	0	99	100	100	100
Utilities									
Wastewater	100	0	0	0	0	100	100	100	100

Source: HAZUS-MH 3.1

Notes: EOC = Emergency Operations Center



Table 4.3.4-13. Estimated Damage to and Loss of Functionality of Critical Facilities and Utilities in Pike County for the 2,500-Year MRP Earthquake Event

Name	Percent Probability of Sustaining Damage					Percent Functionality			
	None	Slight	Moderate	Extensive	Complete	Day 1	Day 7	Day 30	Day 90
Critical Facilities									
Medical	88	8	3	<1	<1	88	96	100	100
Police	67-83	11-18	5-11	0-3	<1	67-83	85-94	96-99	98-99
Fire	67-83	11-18	5-11	0-3	<1	67-83	84-94	96-99	98-99
EOC	79-82	12-13	6-7	0-1	<1	79-82	92-93	99	99
School	67-73	15-18	9-11	2-3	<1	67-73	84-88	96-97	98
Utilities									
Wastewater	47-64	29-39	6-13	0-1	<1	61-74	98-99	99-100	100

Source: HAZUS-MH 3.1

Notes: EOC = Emergency Operations Center

Impact on Economy

Earthquakes also impact the economy, causing loss of business function, damage to inventory, relocation costs, wage loss, and rental loss during repair or replacement of buildings. A HAZUS-MH analysis estimated total economic loss associated with each earthquake scenario, including building- and lifeline-related losses (such as transportation and utility losses) based on available inventory (facility or geographic information system [GIS] point data only). Direct building losses are estimated costs to repair or replace damages to buildings. These losses are reported in the Impact on General Building Stock section presented earlier. Lifeline-related losses include costs of direct repair to transportation and utility systems, and are reported in terms of probability of reaching or exceeding a specified level of damage caused by a given level of ground motion. Additionally, economic loss includes business interruption losses associated with inability to operate a business as a result of damage sustained during the earthquake, as well as temporary living expenses for those displaced. These losses are discussed below.

Significantly, for a 500-year event, HAZUS-MH 3.1 estimates that the County would incur approximately \$3.8 million in income losses (wage, rental, relocation, and capital-related losses) in addition to structural, non-structural, and content building stock losses (\$11.41 million). For a 2,500-year event, HAZUS-MH estimates that the County would incur approximately \$25 million in income losses, and approximately \$111 million in structural, non-structural and content building stock losses.

The HAZUS-MH analysis did not take into account damage to roadway segments. However, these features assumedly would undergo damage as a result of ground failure, and an earthquake event thus would interrupt regional transportation and distribution of materials. According to HAZUS-MH Earthquake User Manual, losses to the community resulting from damages to lifelines could be much greater than costs of repair (FEMA 2012).

Earthquake events can significantly damage road bridges; this is important because they often provide the only access to certain neighborhoods. Because softer soils can generally follow floodplain boundaries, bridges that cross watercourses should be considered vulnerable. A key factor in degree of vulnerability is age of a facility, which helps indicate the standards the facility was built to achieve.



HAZUS-MH Earthquake User's Manual also estimates volume of debris that may be generated as a result of an earthquake event to enable the study region to prepare and rapidly and efficiently manage debris removal and disposal. Debris estimates are divided into two categories: (1) reinforced concrete and steel that require special equipment to break up before transport, and (2) brick, wood, and other debris that can be loaded directly onto trucks with bulldozers (FEMA 2012).

No debris would be generated as a result of a 100-year earthquake event. HAZUS-MH 3.1 estimates generation of more than 8,500 tons of debris by a 500-year MRP event, and nearly 50,000 tons by a 2,500-year MRP event. Table 4.3.4-14 summarizes estimated debris generated by 500- and 2,500-year MRP earthquake events.

Table 4.3.4-14. Estimated Debris Generated by 500- and 2,500-year MRP Earthquake Events

Municipality	500-Year		2,500-Year	
	Brick/Wood (tons)	Concrete/ Steel (tons)	Brick/Wood (tons)	Concrete/ Steel (tons)
Blooming Grove Township	672	126	3,193	893
Delaware Township	867	174	4,399	1,422
Dingman Township	1,081	221	5,433	1,770
Greene Township-Porter Township	706	142	3,437	1,068
Lackawaxen Township	738	137	3,391	929
Lehman Township	1,201	243	6,224	2,049
Matamoras Borough	220	52	1,109	456
Milford Borough	190	66	986	668
Milford Township	262	87	1,326	819
Palmyra Township	651	122	3,029	833
Shohola Township	429	89	2,102	703
Westfall Township	242	62	1,255	575
Pike County (Total)	7,259	1,522	35,885	12,186

Source: HAZUS-MH 3.1

Notes: As stated at the beginning of the vulnerability analysis, HAZUS-MH 3.1 generates results at the Census-tract level. Boundaries of Census tracts are not always coincident with municipal boundaries in Pike County. Results in the table are for Census tracts, with associated municipalities listed for each tract. See Figure 4.3.4-9 for a visual breakdown of Census tracts

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 or toxic material containments.

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

Future Growth and Development

As discussed in Section 2.4 of this HMP, areas targeted for future growth and development have been identified across the County. Human exposure and vulnerability to earthquake impacts in newly developed areas are anticipated to be similar to those current within the County. Current 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.

Effect of Climate Change on Vulnerability

Impacts of global climate change on earthquake probability are unknown. Some scientists say 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 2004).

Secondary impacts of earthquakes could be magnified by climate change. Soils saturated by repetitive storms could undergo liquefaction during seismic activity as a result of the increased saturation. Dams storing increased volumes of water as a result of changes in the hydrograph could fail during seismic events. No current models are available to estimate these impacts.



4.3 Hazard Profiles

4.3.5 Environmental Hazards

For the purposes of this HMP update, the environmental hazards section primarily focuses on hazardous material release and pollution, fire from oil and gas well drilling, and the acidic drainage from the exposure of pyritic rock in Pike County. Hazardous material releases can occur at facilities or along transportation routes. These releases can result in injury or death and contaminate air, water and soils. Activities associated with oil and gas well drilling can cause fire and pollute streams and drinking water. New to this HMP update is stream and groundwater contamination from exposing pyritic rock during road construction and/or other developments resulting in acidic drainage into the environment. Another concern is the application of salt and brine to roads to de-ice during winter months which can also potentially lead to groundwater contamination. This section provides a profile and vulnerability assessment of the environmental hazards in Pike County.

Hazardous Materials Release

Hazardous materials fall into several categories, such as flammable and combustible materials, compressed gases, explosive and blasting agents, radioactive materials, oxidizing materials, poisons, and corrosive liquids. Hazardous materials incidents are generally unintentional and associated with transportation accidents or accidents at fixed facilities such as spills. However, hazardous materials can be released as a criminal or terrorist act. Any release can result in injury and death and may contaminate air, water and/or soils.

Product release into the local environment can be generated from a fixed facility or at any location along a route of travel, and may be the result of carelessness, technical failure, external incidents, or an intentional act against the facility or container. Volatility of products stored or transported, along with potential impact on a local community, may increase the risk of intentional acts against a facility or transport vehicle. Release of certain products considered HazMat can immediately and adversely impact the general population, ranging from inconvenience of 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. Although explosions are often associated with environmental hazards (resulting from loss of containment of HazMat), explosions are profiled under Section 4.3.17 – Structural Fire and Explosion in this HMP update.

Oil and Gas Wells

Marcellus Shale-related activities consist of the extraction of natural gas from the Marcellus Shale formation via horizontal drilling and a process known as **“hydraulic fracturing” that pumps water, mixed with sand and potentially hazardous chemicals, into the shale formation under high pressure to fracture the shale around the well, allowing natural gas to flow freely.** Upon completion of the hydraulic fracturing process, the used water, often referred to as **“frac fluid,” must be treated to remove chemicals and minerals (Pennsylvania Department of Environmental Protection [PADEP] 2016).** Active drilling has not yet commenced in Pike County; however, extensive drilling is currently being conducted as near as 30 miles west of Pike County in the Susquehanna River Basin. Fracking has been banned in the Delaware River Basin by the Delaware River Basin Commission (DRBC) in areas that drain to special-protection waters, an area which includes Pike County (NPR 2021).



The Utica Shale underlies a significant portion of Pennsylvania as well and is also a source of natural gas. In the subsurface, Utica Shale is located a few thousand feet below the Marcellus Shale. The Utica Shale is currently receiving a lot of attention because it is yielding large amounts of natural gas, natural gas liquids and crude oil to wells drilled in eastern Ohio and western Pennsylvania (King from Geology.com). According to PA DCNR, there is one well in Pike County penetrating the Utica Shale formation or deeper (PA DCNR 2016).

Pike County has three conventional wells; two are active dry hole wells and one is a plugged dry hole well (PADEP 2016). Dry hole wells are completed wells that are not productive of oil and/or gas. Plugged wells are non-productive wells that have been filled with cement (PADEP 2014). Marcellus Shale drilling may increase the potential for environmental issues within Pennsylvania. Drilling and pipelines could affect water quality and quantity, during both hydraulic fracturing and wastewater treatment phases of the drilling process (Extension 2012). All oil and gas exploration and drilling in the State is regulated under all or part of the state oil and gas laws, the Clean Streams Law, the Dam Safety and Encroachments Act, the Solid Waste Management Act, the Water Resources Planning Act, and the Worker and Community Right to Know Act. The Delaware River Basin Commission also regulates oil and gas (unconventional gas drilling) within the Delaware River Basin. PADEP is responsible for reviewing and issuing drilling permits, inspecting drilling operations, and responding to complaints about water quality problems. PADEP inspectors conduct routine and unannounced inspections of drilling sites and wells statewide (PADEP 2016).

Pyrite

Pyrite, or iron sulfide, also known as 'fools gold' is one of the most common sulfide minerals. Because of its high sulfur content, when exposed to the atmosphere or water, pyrite forms sulfuric acid. These acidic conditions inhibit plant growth at the surface and if water infiltrates into the pyrite-laden rock, the resulting oxidation can acidify the water enabling it to dissolve metals in adjacent rocks such as copper, zinc, aluminum, manganese, and silver. The occurrence of acid drainage depends on numerous factors, including rock type, mineralogy, geochemistry, geologic structure (e.g., fractures, joints, and faults), changing the water table, surface and sub-surface hydrology, extent of geologic weathering, and depositional environments. If the drainage is uncontrolled, the acidic and metal-bearing water can drain into and contaminate streams and/or migrate into the groundwater (Hudson et. al, 1999 from AGI; and PADCNR 2016).

4.3.5.2 Location and Extent

Hazardous Materials Release

Facilities that use, manufacture, or store hazardous materials in Pennsylvania must comply with both Title III of the Federal Superfund Amendments and Reauthorization Act (SARA), also known as the Emergency Planning and Community Right-to-Know Act (EPCRA), and the Commonwealth's reporting requirements under the Hazardous Materials Emergency Planning and Response Act (1990-165), as amended. The community right-to-know reporting requirements keep communities abreast of the presence and release of chemicals at individual facilities. EPCRA was designed to ensure that state and local communities are prepared to respond to potential chemical accidents through Local Emergency Planning Committees (LEPCs). LEPCs are charged with developing emergency response plans for SARA Title III facilities; these plans cover the location and extent of hazardous materials, establish evacuation plans, response procedures, methods to reduce the magnitude of a materials release, and establish methods and schedules for training and exercises.



Because SARA Title III facilities are covered under their own unique planning process and are continually evaluated through the LEPC, this HMP will focus on the Environmental Protection Agency (EPA)-identified hazardous materials sites. This dataset, publicly available at <https://www3.epa.gov/enviro/>, includes a number of materials facilities. Using this dataset will help to provide a more complete picture of the risk of hazardous materials releases in the County.

Pike County has 63 EPA-regulated facilities located throughout the county. Several of these facilities are located in close proximity to population centers that could be affected should a major accident or spill occur (EPA 2016). In addition to the EPA-regulated facilities, there are two natural gas transmission lines [Columbia Gas and Tennessee Gas (Kinder Morgan)] that cross the County and pose a threat of hazardous material release (PHMSA 2016).

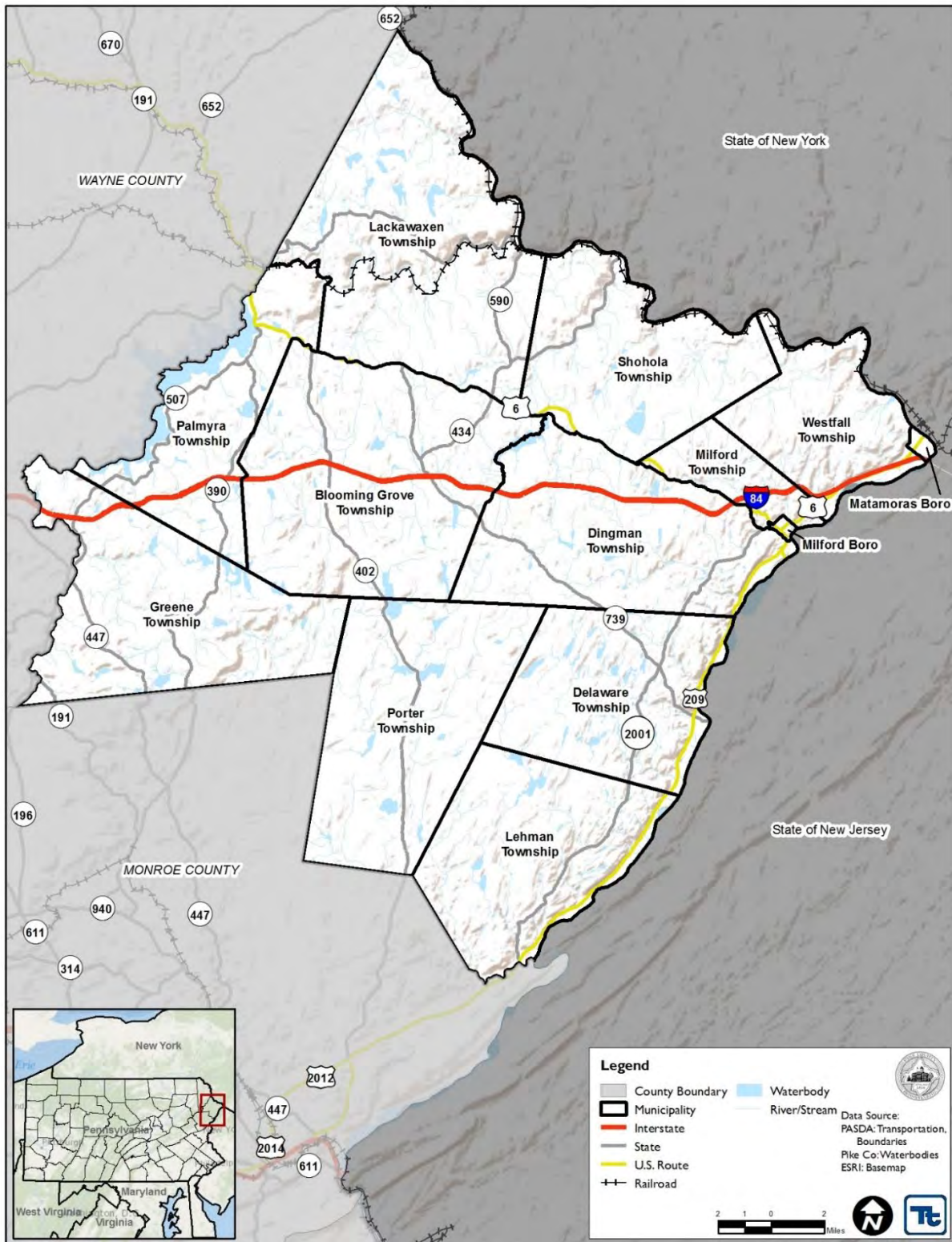
The U.S. Department of Transportation (DOT) categorizes HazMat into the following nine classes based on chemical characteristics posing risk:

- 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.

Pike County has a few highly traveled highways and a railway network that pose a risk for hazardous material incidents. These networks transport hazardous material daily, on Interstate 84, US Route 6, US Route 209, PA 402, and PA 739. These major roads pass through the more populous areas. Similarly, rail lines pass through residential areas and near Matamoras Borough where larger numbers of people could be vulnerable should a serious accident occur in these places. These major transportation routes are shown in Figure 4.3.5-1.



Figure 4.3.5-1. Major Transportation Routes Used to Transport Hazardous Materials in Pike County



Source: Pike County 2016



Based on past occurrences, hazardous material releases within Pike County have been accidental and have not been considered terrorist or criminal acts. 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.

Oil and Gas Wells

Since 2005, natural gas exploration activities in the Marcellus Shale Formation have increased significantly in the Commonwealth of Pennsylvania. According to maps produced by PADEP, in 2008, 195 Marcellus Shale wells were drilled; two years later, in 2010, 1,386 Marcellus Shale wells had been drilled. This number has decreased recently. Between 2014 and 2015, a total of 2,159 wells were drilled in Pennsylvania; however, none are located in Pike County (PennState University 2015). Most drilling has occurred in the northern-central and southwestern portions of the State, with highest numbers of 2015 Marcellus Shale drilling permits issued in Bradford, Susquehanna, Greene, and Washington Counties.

Figure 4.3.5-2 shows the extent of the Marcellus Shale Formation. Pike County lies completely within the shale formation, so it may be vulnerable to shale drilling in the future. Additionally, there are active and abandoned oil/gas wells in three of the 13 municipalities in Pike County, though none are Marcellus Shale wells. Two of the existing wells are active dry hole wells and one is a plugged dry hole well. Figure 4.3.5-3 shows the location of these wells.

Figure 4.3.5-4 illustrates the approximate extent of Utica Shale in Pennsylvania. This map shows that Utica Shale **Formation occurs in Pike County's subsurface or outcrop formations (PADCNR 2011). As noted, there is no known Utica-Shale formation drilling in Pike County.**

Pyrite

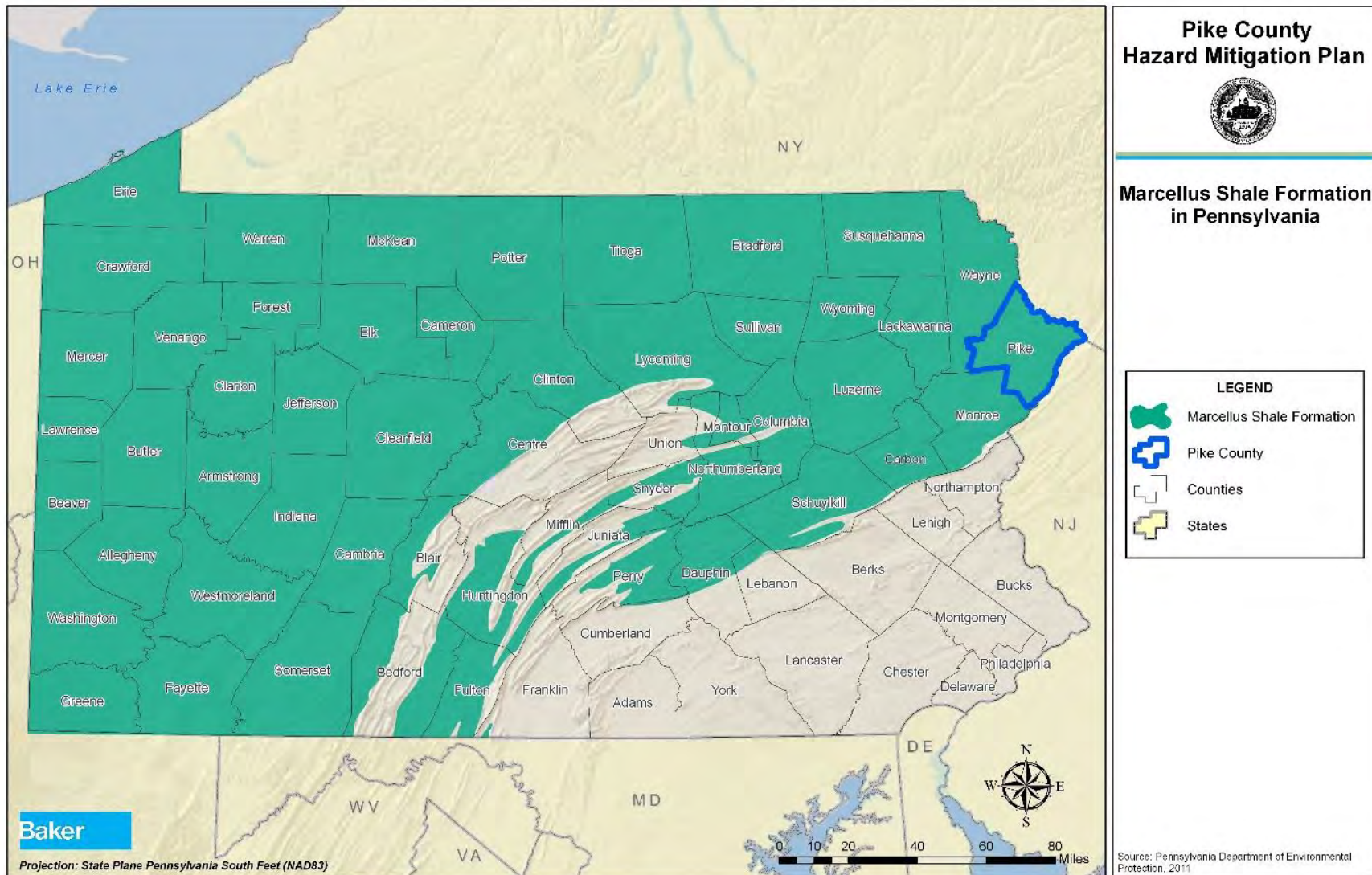
The presence of sulfide-bearing rock formations and isolated occurrences of sulfide deposits in Pennsylvania **depends on a wide variety of factors including the rock's depositional and structural history, its mineralogy and geochemistry, and present surface and subsurface hydrologic and geochemical environment.** As noted, most cases of acidic drainage in Pennsylvania involves iron sulfide minerals, such as pyrite, and its exposure to air to create iron oxides and acidic water. Coal-bearing rocks of Pennsylvania are a source of acidic drainage.

Figure 4.3.5-5 illustrates geologic units containing potentially significant acid-producing sulfide minerals. Pike County is not identified on this map as containing these geologic units (Pennsylvania Geological Survey 2005).

However, construction activities have uncovered pyrite in borings in Pike County (Pocono Record 2017). According to the Pennsylvania Geological Survey, the only reliable way to anticipate acidic drainage is by conducting site-specific assessments. Pre-site investigation data is often available from previous studies, including college theses, consultant reports, geologic survey reports, aerial photographs, existing geophysical surveys, and the like. There is, however, no substitute for site specific information including interviews with local residents, geologic logs of borings, analysis of site geochemistry (water and rock), and other sources of information.



Figure 4.3.5-2. Map of Marcellus Shale Formation in Pennsylvania

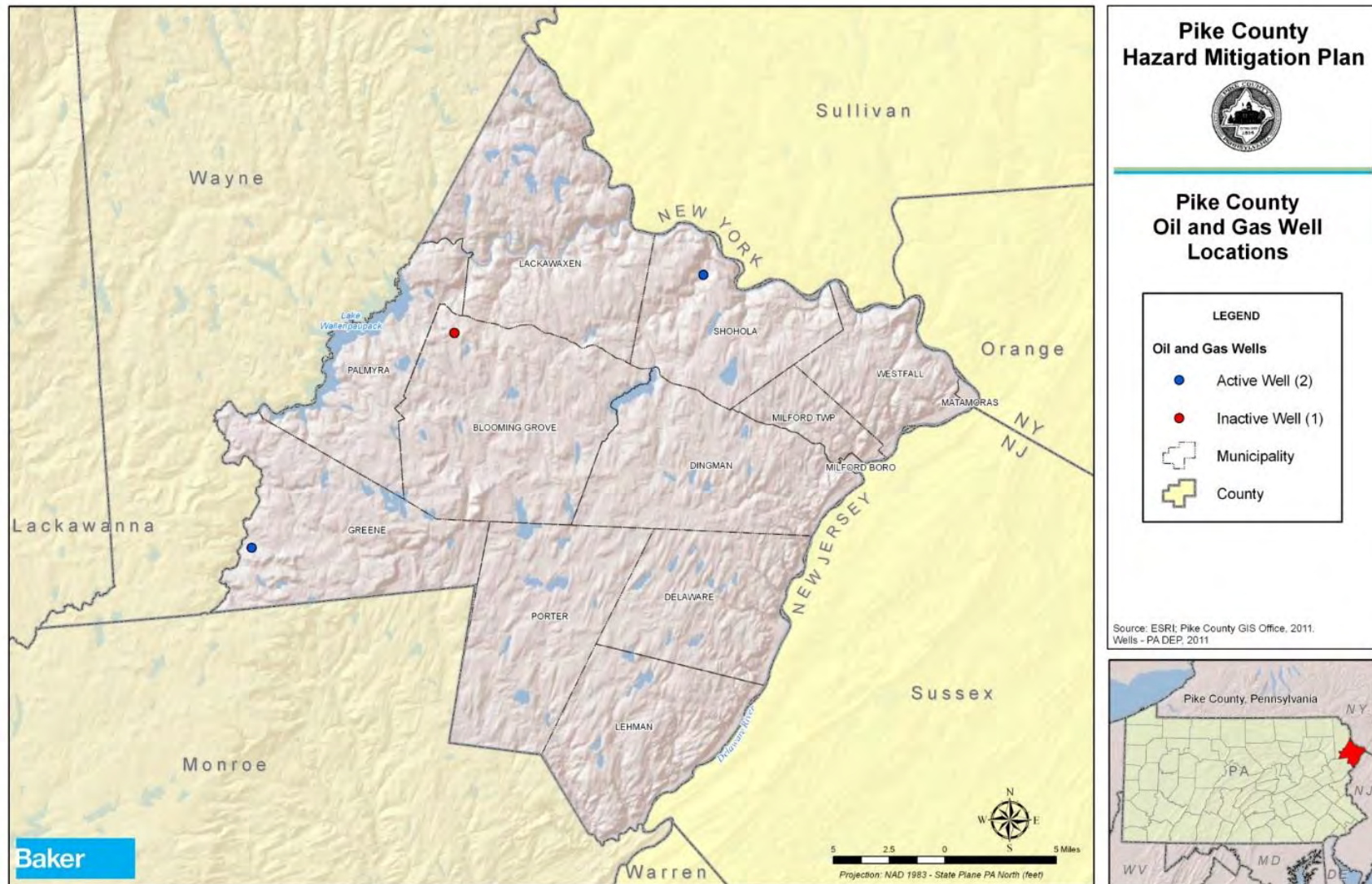


Source: PA DEP 2011

4.3.5: ENVIRONMENTAL HAZARDS



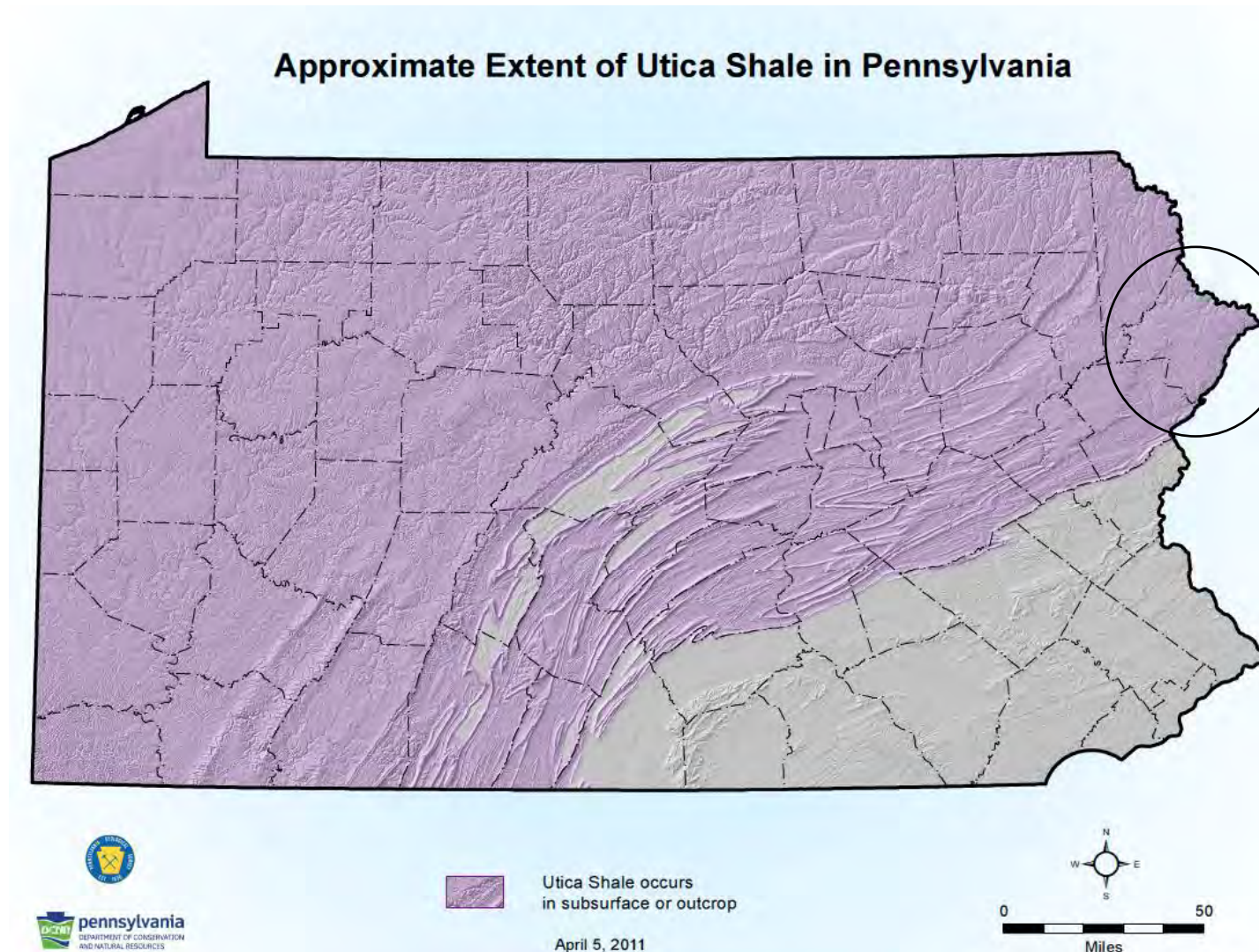
Figure 4.3.5-3. Oil and Gas Well Locations in Pike County



Source: PA DEP 2011



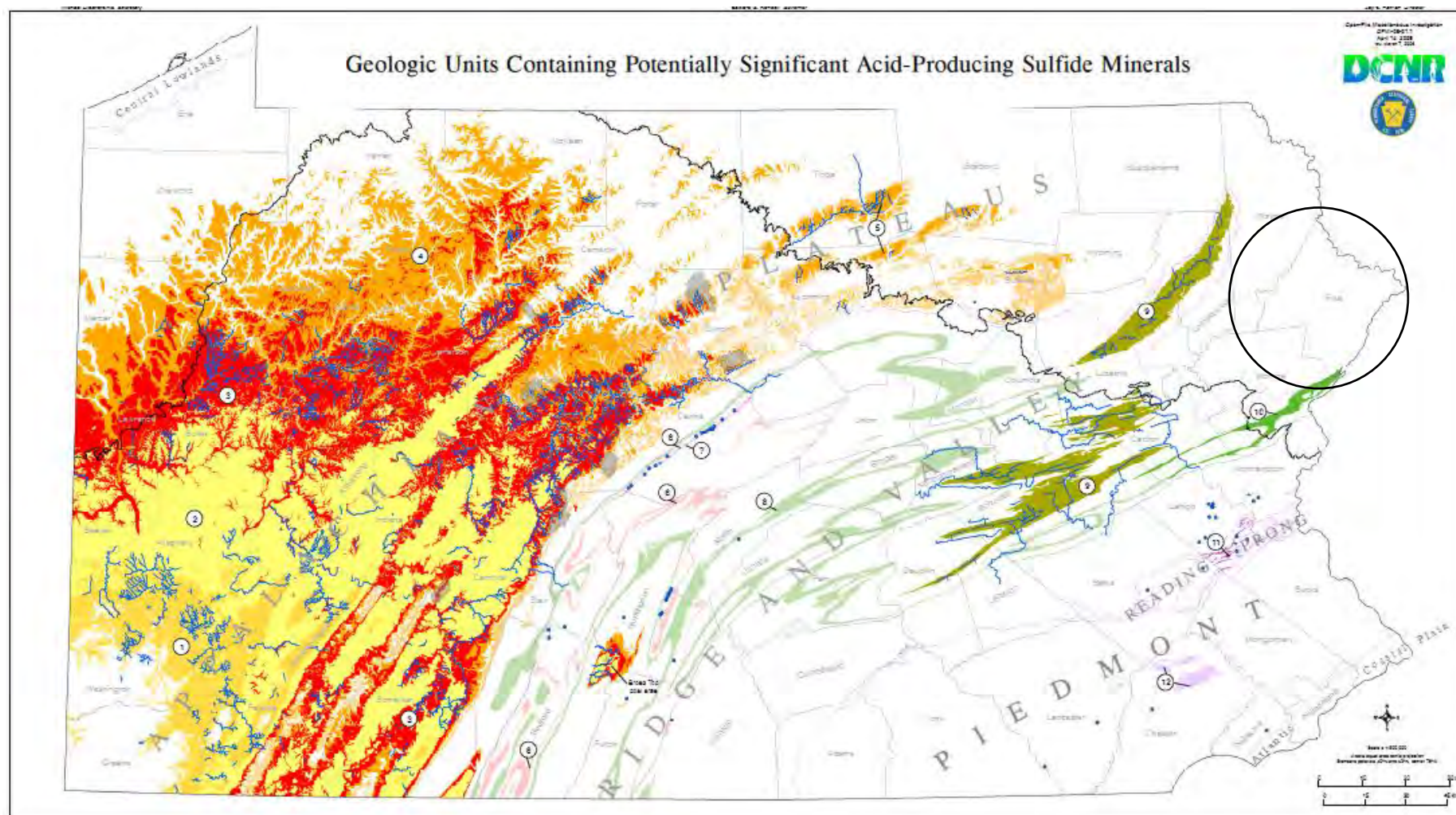
Figure 4.3.5-4. Approximate Extent of Utica Shale in Pennsylvania



Source: PA DCNR, 2011
Note: The black circle marks the location of Pike County.



Figure 4.3.5-5. Geologic Units Containing Potentially Significant Acid-Producing Sulfide Minerals



Source: Pennsylvania Geological Survey, 2005

Note: The black circle marks the location of Pike County.



4.3.5.3 Range of Magnitude

Environmental hazard incidents within Pike County could range from minor petroleum spills to large, facility-based incidents that could lead to loss of life and property, and damage to the environment and the economy. Severity of an incident varies with type of material released and distances and related response times for emergency response teams. Areas within closest proximity to the releases are generally at greatest risk, yet depending on the agent, 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.

Hazardous Materials Release

A hazardous material release, 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. Mitigating conditions, on the other hand, are characteristics of the target and its physical environment that can reduce effects of a hazard. These conditions include:

- 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.
- Non-compliance 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 hazardous material site – if occurring within a Special Flood Hazard Area (SFHA), a materials release could cause larger-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.
- The application of salt or brine to de-ice roads.

At the lower end of the range of magnitude, a small amount of hazardous materials released in a remote area can trigger an evacuation of the area around the spill and a cleanup effort. The worst case scenario for a hazardous material release occurred in January 1995 when 1,000 gallons of diesel fuel was spilled after a Conrail freight train derailed near Parkers Glen in Shohola Township (PEIRS 2002-2009).

Oil and Gas Wells and Pipelines

Oil and gas well drilling and oil and gas-containing pipelines can exert a variety of effects on the environment. Abandoned oil and gas wells not properly plugged can contaminate groundwater and consequently drinking water wells. Surface waters and soil are sometimes polluted by brine (a salty wastewater product of oil and gas well drilling), by oil spills at a drilling site, or by a pipeline breach. These events can spoil public drinking water supplies and significantly harm vegetation and aquatic animals.

In order to extract natural gas, hydraulic fracking must be implemented along with drilling wells. Wells are drilled first and then are cased in to protect groundwater from natural gas or other substances. Next, to fracture the shale around the well, the drillers pump the fracking water, which is a mix of water, sand and chemicals, into the well to force natural gas extraction. Natural gas well fires occur when natural gas is ignited at a well site. Often, these fires erupt during



drilling when a spark from machinery or equipment ignites the gas. The initial explosion and resulting flames can seriously injure or kill individuals in the immediate area. These fires are often difficult to extinguish due to the intensity of the flame and abundance of the fuel source.

Although there are no active Utica or Marcellus Shale gas wells in the County, there are two other active wells. A possible worst-case scenario for oil and gas well incidents in Pike County would be if one of these wells in the County were to experience a blowout. This would potentially cause an explosion and could lead to contamination of water supplies for nearby well-dependent populations.

4.3.5.4 Past Occurrence

Hazardous Materials Release

With some exceptions, the majority of hazardous material release incidents over the years has involved petroleum product spills along the highways or has involved the railroad. Most of these are the result of collisions or derailments and have a limited impact on people and the environment. The number and quantity of hazardous materials being produced, stored and transported continue to increase each year in Pennsylvania. 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 incident may be based on events that led up to an explosion.

Table 4.3.5-1 provides a description of hazardous material events that occurred in Pike County from 1978 to 2021. Most of the incidences happened during transit, but a few occurred at fixed sites.

Table 4.3.5-1. Previous Hazardous Materials Incidents in Pike County

Date	Location	Material Involved	Type of Incident/Details
January 1978	Westfall Township	Acetaldehyde	Conrail freight train derailed north of Mill Rift; one derailed tank car containing acetaldehyde began leaking and required the evacuation of several residences along the Delaware River in both Pennsylvania and New York.
December 1990	Milford Township	Carbon bisulfate	A Yellow freight tractor-trailer jack-knifed on icy Route 84 west of the Milford exit. One tandem trailer, carrying twelve 55-gallon drums of Carbon bisulfate overturned spilling cargo. Emergency officials closed portions of Route 84 for up to 12 hours to allow for safe clean up
February 1992	Milford Township	Natural Gas	The odor of natural gas forced the evacuation of 54 patients at the former Milford Head Trauma center (Facility has since closed and is now the location of Belle-Reve).
November 1993	Milford Township	Non-toxic substance	One lane of Route 84 westbound near the Milford exit was closed for a period of time, while emergency officials investigated a material leaking from a tractor-trailer. Material was later identified as a non-toxic substance
August 1994	Westfall Township	Chlorine gas	A chlorine gas leak occurred at Matamoras Municipal Water Authority Well #5 in Westfall Township. One individual was taken to the hospital for treatment.
January 1995	Shohola Township	Diesel fuel	The lead locomotive of a Conrail freight train derailed in Shohola Township in the area near Parkers Glen. The derailment resulted in the unit, turning on its side, releasing close to 1000 gallons of diesel fuel
August 1999	Palmyra Township	Various substances	A tractor-trailer parked at the Route 390 exit of Route 84 was reported to be leaking something. Trailer was carrying a mixed load of hazardous waste material. TEEM Environmental responded and cleaned up two



Date	Location	Material Involved	Type of Incident/Details
			leaking drums – one a flammable material, the other a non-toxic polymer, similar to glue
December 1999	Dingman Township	Flammable solution	A tractor-trailer accident along Route 84 in Dingman Township resulted in at least twelve 400-lb containers of a highly flammable solution to leak. TEEM Environmental provided clean up.
February 13, 2002	Porter Township	Unknown	Unknown
May 5, 2002	Delaware Township	Unknown	Storage tank leaking due to heat expansion
May 21, 2002	Dingman Township	Diesel fuel	Diesel fuel spill; cleanup was carried out by PennDOT and My Place Towing
June 26, 2002	Porter Township	Unknown	Unknown
July 20, 2002	Delaware Township	Pesticide	Pesticide spill during spraying of repellent
November 28, 2002	Matamoras Borough	Gasoline	Motor vehicle accident occurred resulting in 40 gallons of gasoline spilling on the ground at a gas station
January 14, 2003	Delaware Township	Gasoline	Less than 55 gallons of petroleum product spilled; limited impact on environment, soils or waterways
February 20, 2003	Blooming Grove Township	Kerosene	A residential storage tank leaked about 75 gallons of kerosene; cleanup by a private contractor
April 3, 2003	Milford Borough	Dye tear gas	Dye tear gas packs detonated in the Wayne Bank; building was vented after emergency units responded; no injuries reported
May 22, 2003	Greene Township	Diesel fuel	Motor vehicle accident occurred on Interstate 84 involving a tractor trailer; the saddle tank on the trailer ruptured, spilling about 120 gallons of diesel fuel; cleanup by a private contractor, and no injuries reported
October 1, 2003	Blooming Grove Township	Diesel fuel	A multi-vehicle accident took place on interstate 84 involving a tractor trailer; the saddle tank ruptured on the trailer and approximately 100 gallons of diesel fuel spilled. cleanup by a private contractor, and no injuries reported
November 6, 2003	Delaware Township	Gasoline	Less than 55 gallons of petroleum product spilled; limited impact on environment, soils or waterways
December 19, 2003	Milford Township	Diesel fuel	An unknown source leaked 70 gallons of diesel fuel onto gravel; some fuel spilled into a drain leading to a local stream that is part of the Milford Water Authority watershed protection area; cleanup provided by TEEM Environmental
June 2, 2004	Dingman Township	Diesel fuel	Less than 55 gallons of petroleum product spilled; limited impact on environment, soils or waterways; cleanup provided by PennDOT
Jul 13, 2004	Westfall Township	Diesel fuel	A diesel fuel tank was punctured, spilling 70 gallons of fuel onto a roadway; cleanup provided by local emergency units
January 12, 2005	Milford Township	Diesel fuel	On Interstate 84, the saddle tank of a tractor-trailer ruptured, spilling about 125 gallons of diesel fuel; cleanup by a private contractor, and no injuries reported
February 14, 2005	Dingman Township	Diesel fuel	Unknown quantity of diesel fuel spilled onto ground from an overturned tractor-trailer; cleanup provided by a private contractor
May 23, 2005	Matamoras Borough	Natural Gas	Maintenance crew ruptured a gas line, releasing natural gas; leak was secured by the local gas company without incident; no injuries reported
May 25, 2005	Palmyra Township	Heating oil	A delivery truck spilled an unknown amount of heating oil onto the ground; Lake Wallenpaupack may have received some of the spill; cleanup provided by a private contractor
May 27, 2005	Palmyra Township	Unknown	A chemical spilled from a tractor-trailer at a rest stop on Interstate 84; no injuries reported
June 2, 2005	Blooming Grove Township	Diesel fuel	Less than 55 gallons of petroleum product spilled; limited impact on environment, soils or waterways; cleanup provided by local emergency units
June 3, 2005	Palmyra Township	Diesel fuel	Less than 55 gallons of petroleum product spilled; limited impact on environment, soils or waterways; cleanup provided by a private contractor
December 28, 2005	Westfall Township	Diesel fuel	Accident involving a tractor-trailer occurred on Interstate 84; the saddle tank ruptured on the trailer, and an unknown amount of diesel fuel spilled onto the roadway; cleanup coordinated by emergency crews



Date	Location	Material Involved	Type of Incident/Details
January 5, 2006	Westfall Township	Caustic soda	Water system was inadvertently contaminated with caustic soda; a teacher, student and the principal of the Delaware Valley School District, Middle School received minor burn injuries; DEP is monitoring the situation
February 14, 2006	Blooming Grove Township	Diesel fuel	Less than 55 gallons of petroleum product spilled; limited impact on environment, soils or waterways; cleanup provided by local emergency units
March 2, 2006	Blooming Grove Township	Diesel fuel	A tractor-trailer was jackknifed and about 250 gallons of diesel fuel were spilled; cleanup provided by Lords Valley Towing
April 25, 2006	Matamoras Borough	Natural Gas	A gas line was ruptured at a construction site causing a release of natural gas; the local gas company secured the release without incident
June 8, 2006	Palmyra Township	Diesel fuel	Less than 55 gallons of petroleum product spilled; limited impact on environment, soils or waterways; cleanup provided by local emergency units
June 12, 2006	Dingman Township	Asphalt	Asphalt Spill; Clean up by Datom Products
June 14, 2006	Matamoras Borough	Gasoline	Less than 55 gallons of petroleum product spilled; limited impact on environment, soils or waterways; cleanup provided by local emergency units
August 2, 2006	Lehman Township	Diesel fuel	Less than 55 gallons of petroleum product spilled; limited impact on environment, soils or waterways; cleanup provided by local emergency units
September 21, 2006	Blooming Grove Township	Diesel fuel	A fuel tank on a tractor-trailer was punctured by road debris, spilling an indeterminate amount of diesel fuel on a berm; cleanup was provided by a private contractor and no injuries were reported
October 1, 2006	Dingman Township	Diesel fuel	Less than 55 gallons of petroleum product spilled; limited impact on environment, soils or waterways; cleanup provided by local emergency units
November 15, 2006	Greene Township	Diesel fuel	Less than 55 gallons of petroleum product spilled; limited impact on environment, soils or waterways; cleanup provided by local emergency units
December 9, 2006	Lehman Township	Diesel fuel	Less than 55 gallons of petroleum product spilled; limited impact on environment, soils or waterways; cleanup provided by local emergency units
February 2, 2007	Dingman Township	Liquid oxygen	A truck transporting liquid oxygen started to leak; emergency units secured the leak
May 14, 2007	Matamoras Borough	Natural gas	A main gas line was ruptured at a construction site and caused a natural gas release; Orange and Rockland Gas Company secured the release without incident
May 31, 2007	Lehman Township	Propane	Propane release occurred; the release was secured by local emergency units and no injuries were reported
June 4, 2007	Blooming Grove Township	X-ray development acid	A van transporting x-ray development acid was reported to be on fire; cleanup was organized by emergency units and no injuries were reported
July 27, 2007	Westfall Township	Hydraulic Oil	Less than 55 gallons of petroleum product spilled; limited impact on environment, soils or waterways; cleanup provided by local emergency units
August 4, 2007	Blooming Grove Township	Gasoline	A vehicle accident on the McConnell Spillway resulted in an unknown amount of gasoline spilling; cleanup coordinated by emergency units and no injuries were reported
August 11, 2007	Greene Township	Diesel fuel	Less than 55 gallons of petroleum product spilled; limited impact on environment, soils or waterways; cleanup provided by local emergency units
September 7, 2007	Blooming Grove Township	Diesel fuel	Less than 55 gallons of petroleum product spilled; limited impact on environment, soils or waterways; cleanup provided by local emergency units
October 19, 2007	Dingman Township	Diesel fuel	A tractor-trailer spilled approximately 70 gallons of diesel fuel; cleanup coordinated by emergency units
December 11, 2007	Blooming Grove Township	Diesel fuel	A saddle tank ruptured on a tractor-trailer spilling an unknown quantity of diesel fuel onto a roadway; cleanup was coordinated by emergency units



Date	Location	Material Involved	Type of Incident/Details
May 23, 2008	Delaware Township	Gypsy Moth spray	After Gypsy Moth spraying occurred, tank washout activities caused an undetermined amount of spray to be released into the Wild Acres Lake
August 3, 2008	Westfall Township	Gasoline	Gasoline spilled but had a limited impact on environment, soils or waterways; cleanup provided by local emergency units
August 11, 2008	Palmyra Township	Gasoline	A vehicle was driven into a pond and resulted in spilling unknown quantities of gasoline and oil; cleanup coordinated by the State Police
November 5, 2008	Dingman Township	Natural gas	A Columbia Gas Company transmission line exploded, causing a natural gas release and for Interstate 84 to close; Columbia Gas Company secured the release without incident
April 28, 2009	Palmyra Township	Toxic/Infectious Substance	A leak of an unknown chemical substance occurred at a rest stop on Interstate 84; local fire units responded and cleanup was coordinated by TEEM Environmental
September 17, 2011	Blooming Grove Township	Diesel Fuel	80 gallons of diesel fuel was cleaned up in Blooming Grove Township
April 14, 2014	Milford Township	Diesel Fuel	40 gallons of diesel fuel was cleaned up at an exit along I-84 in Milford Township
November 5, 2015	Palmyra Township	Combustible Liquid Spill	While delivering chemical into an above ground storage tank, the hose ruptured and discharged between 23 and 30 gallons. The product went on to the stone and soil and then under the storage tank.
July 7, 2015	Westfall Township	Gasoline Release	20 gallons of gasoline was cleaned up in Westfall Township
July 22, 2015	Delaware Township	Gasoline	40 gallons of gasoline was cleaned up in Delaware Township
January 12, 2016	Greene Township	Diesel Fuel	150 gallons of diesel fuel was cleaned up in Greene Township on I-84 as a result of a vehicle accident
March 26, 2016	Palmyra	Gasoline	Gasoline was dumped in a storm drain; 5 gallons of gasoline was cleaned up
April 26, 2016	Blooming Grove Township	Gasoline	15 gallons of gasoline was cleaned up
June 3, 2016	Blooming Grove Township	Diesel Fuel	65 gallons of diesel fuel was cleaned up
June 5, 2016	Palmyra Township	Gasoline	A spill at a gas station led to a clean-up of 15 gallons of gasoline at the Promised Land Truck Stop in Palmyra Township
July 22, 2016	Delaware Township	Gasoline	40 gallons of gasoline was cleaned up
September 25, 2016	Greene Township	Gasoline	A fuel spill at a gas station led to the clean-up of 10 gallons of fuel
October 4, 2017	Lackawaxen Township	Gas Leak	A construction crew ruptured a 24-inch gas line.
June 22, 2017	Lackawaxen Township	Carbon Monoxide	14 people were taken to a hospital to be checked after carbon monoxide filled the home they were staying in.

Source: 2012 Pike County HMP; 2017 Pike County HMP; PHSMA 2016: North American Hazmat Situations and Deployments Map 2021: Pike County 2016

Oil and Gas Wells

Environmental incidents including water contamination and fire spurring from oil and gas well drilling have occurred numerous times in Pennsylvania over the past century. Being that there is very little oil and gas well drilling in Pike County and no Marcellus shale drilling, there have been no past occurrences of oil and gas well accidents in Pike County. However, there have been many natural gas incidents occurring in nearby counties as gas companies rush to develop the natural gas deposits from Marcellus Shale. In April 2011, a large spill occurred in Bradford County during fracking operations, and seven families were asked to evacuate their homes. An unknown amount of contaminated fluids spilled from the well, and reportedly contaminated a local creek that runs into the Susquehanna River. In Clearfield County in 2010, high gas pressure during the fracking process caused a rupture that discharged polluted water and explosive gas for sixteen hours. Though the drilling took place in a remote area at least a mile from any homes and no one was injured, it was still a major accident where the drilling process went out of control (Pike County HMP 2012).



Pyrite

Pyrite was found in borings collected for the reconstruction of SR 2001 (Milford Road) in Lehman Township in Pike County. **The Route 2001 road improvement project was temporarily put on hold because of pyrite's discovery and** debate resulted as to where to dispose of the rock (Pocono Record 2016). As of January 2017, PennDOT has applied for a permit from PA DEP to treat the rock at two road sites in Lehman Township; the proposal also includes a groundwater monitoring plan. The permit is still in technical review (Pocono Record 2017).

4.3.5.5 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 hazardous materials, incidents can and will happen at any time. Additionally, the County is home to 63 EPA-regulated 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. Additionally, hazardous materials are transported along the highways and railroads in the county, making transportation accidents involving hazardous materials a concern for the county as well.

As for oil and gas well incidents, it is difficult to predict when and where these hazards will arise. Stringent monitoring through the PADEP will reduce the likelihood of potential impacts to the community and environment. Incidents involving oil and gas wells are expected to remain relatively low; however, it may increase if development of Marcellus Shale progresses in Pike County. Pike County started a Marcellus Shale Task Force in October 2010 which will help the county begin to plan for future impacts of Marcellus Shale on the region.

While hazardous materials incidents in Pike 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 future occurrence of drought in Pike County can be considered highly likely as defined by the Risk Factor Methodology probability criteria (see Table 4.4-5).

4.3.5.6 Vulnerability Assessment

Facilities that produce, use, or ship HazMat within the Commonwealth of Pennsylvania are required to comply with regulations set forth within the federal SARA and the Emergency Planning and Community Right to Know Act (EPCRA), and the Commonwealth of Pennsylvania reporting requirements under the Hazardous Materials Emergency Planning and Response Act (Act 165). According to the 2019 State HMP, Pike County does not have any SARA Title III facilities (Pennsylvania State HMP 2019).

As stated above, Pike County has a few highly traveled highways and a railway network that pose a risk for hazardous material incidents. These networks transport hazardous material daily, on Interstate 84, US Route 6, US Route 209, PA 402, and PA 739. These major roads pass through the more populous areas. Similarly, rail lines pass through residential areas and near Matamoras Borough where larger numbers of people could be vulnerable should a serious accident occur in these places.



To determine potential impact on Pike County, a 0.25-mile buffer was placed around the identified major roadways, as well as a 0.5-mile radius around each SARA Type III facility to define the hazard area. Populations and features of the built environment within this area may be directly or indirectly affected by an environmental hazard. The hazard area was overlaid upon the 2010 U.S. Census population data in Geographic Information System (GIS) (U.S. Census 2010). U.S. Census blocks are not consistent with these boundaries; blocks with their centroids within the hazard area were determined to be affected. A qualitative discussion is included regarding oil and gas wells in Pike County. It should be noted that at the time of the vulnerability assessment, the 2020 U.S. Census data was not available. Therefore, the 2010 U.S. Census and the 2019 American Community Survey (ACS) population estimates were used for this plan update.

To understand risk, a community must evaluate what assets are exposed and vulnerable to the identified hazard. For environmental hazards, all of Pike County is exposed to the hazard. Therefore, all assets in the county (population, structures, critical facilities and lifelines), as described in the County Profile (Section 2), are exposed and potentially vulnerable to the release of hazardous substances. The following text evaluates and estimates the potential impact of the hazardous substances hazard on the county including:

- Impact on: (1) life, health and safety of residents, (2) general building stock, (3) critical facilities, (4) economy, and (5) future growth and development
- Effect of climate change on vulnerability
- Further data collections that will assist understanding this hazard over time

Impact on Life, Health, and Safety

Environmental hazards most significantly impact the residential population in Pike County. The majority of incidents reported in the County were related to (1) petroleum spills, which may be the result of motor vehicle incidents; and (2) other chemical releases and spills. Table 4.3.5-3 lists estimated Pike County populations vulnerable to environmental hazard areas.

Table 4.3.5-2. Estimated Pike County Populations Vulnerable to Environmental Hazard Areas

Municipality	Total Population	Population within ¼ mile of major roadways	Percent Population	Population within vulnerability radii of SARA Facility	Percent Population
Blooming Grove Township	4,819	297	6.2%	0	0%
Delaware Township	7,396	471	6.4%	0	0%
Dingman Township	11,926	402	3.4%	394	3.3%
Greene Township	3,956	756	19.1%	0	0%
Lackawaxen Township	4,994	648	13.0%	0	0%
Lehman Township	10,663	0	0.0%	0	0%
Matamoras Borough	2,469	1,904	77.1%	0	0%
Milford Borough	1,021	1,003	98.2%	0	0%
Milford Township	1,530	792	51.8%	179	11.7%



Municipality	Total Population	Population within ¼ mile of major roadways	Percent Population	Population within vulnerability radii of SARA Facility	Percent Population
Palmyra Township	3,312	1,263	38.1%	0	0%
Porter Township	485	6	1.2%	0	0%
Shohola Township	2,475	216	8.7%	0	0%
Westfall Township	2,323	1,003	43.2%	0	0%
Pike County (Total)	57,369	8,761	15.3%	573	<1%

Source: U.S. Census 2010; Pike County 2015; EPA 2017

Notes: At the time of the vulnerability assessment, the 2020 U.S. Census data was not available. Therefore, the 2010 U.S. Census and the 2019 American Community Survey (ACS) population estimates were used for this plan update.

% Percent

SARA Superfund Amendments and Reauthorization Act

Impacts on General Building Stock

Potential losses to the general building stock caused by a hazardous substance's incident are 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 because of a hazardous substance 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.

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

There are approximately 35 miles of Interstate Route 84 that crosses east to west across the County from the Delaware River at the Matamoras - Westfall border to the Wayne County border at Greene Township. This road is a major route from the New England states west. It is a vulnerable corridor for hazardous waste accidents as many materials, including high level radioactive waste are transported through the corridor. Other potential sources of hazardous materials include two natural gas transmission lines that cross the County, each with a compressor station, and several fuel dispensing facilities with large bulk tanks containing either fuel oil, diesel fuel, kerosene, or propane.

Regarding railroad transport of hazardous materials, Norfolk Southern took over operation of approximately 26 miles of its Southern Tier Route along the Delaware River from Conrail in 1999. A January 2001 listing of the top 50 commodities showed that approximately 6,000 carloads of hazardous materials were transported along this line in the previous 12 months – liquefied petroleum amounted to 1,900 car loads. In January 2005, Norfolk Southern leased this line to the Central New York Railroad, which is owned by the New York, Susquehanna and Western Railroad. This railroad has plans to improve the track conditions with hope of increasing traffic. It appears that more trains may now be using the line than have used it for many years thus making populations that live along the lines vulnerable to hazardous material accidents.



Jurisdictions that are home to EPA-identified hazardous material facilities should be considered vulnerable to releases from these fixed facilities. Westfall Township has the most hazardous materials facilities with two, followed by Delaware Township and Milford Township which each host one facility. Lackawaxen, Palmyra, Shohola, Blooming Grove, Greene, Porter, Lehman, and Delaware townships have much lower relative vulnerability to fixed hazardous materials incidents because they have no hazardous material facilities although communities that border a site would be vulnerable (Pike County HMP 2012).

According to the EPA Envirofacts database, Pike County does not have any TRI, TSCA or Superfund sites (EPA 2016). Jurisdictions without fixed hazardous materials facilities in general do not have vulnerable structures or critical facilities. However, it is important to note that even if a jurisdiction houses no hazardous materials sites, it may be vulnerable to a release event occurring in an adjacent municipality.

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.

There are two natural gas transmission pipelines that bisect the County. They are displayed in figure 4.3.19-1. Breaks in the pipelines could result in hazardous material releases as well as explosions and utility interruptions. Municipalities most vulnerable to pipeline accidents include Westfall, Milford, Dingman, Delaware, Lehman, Shohola, and Lackawaxen Township.

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.

Although there are only two oil or gas wells in Pike County, all 13 communities in Pike County are vulnerable on some level, directly or indirectly, to environmental hazards resulting from oil and gas well and pipeline activity. Surface waters closest to well sites are most vulnerable to damage and oil and gas industry workers are most likely to be affected by gas well fires.

In addition, well drilling and operation poses a threat to groundwater resources. One of the greatest fears of residents in Marcellus Shale counties is that groundwater will become contaminated as a result of developing the natural gas deposits. Groundwater is currently the sole source of drinking water in Pike County according to a watershed specialist from the Pike County Conservation District and the majority of Pike County residents obtain their groundwater from wells drilled into bedrock (Kane 2009). Private water supplies such as domestic drinking water wells in the vicinity of oil and gas wells are at risk of contamination from brine and other pollutants including methane which can pose a fire hazard. Ideally vulnerability of private drinking well owners would be established by comparing distance of drinking water wells to known oil and gas well locations but this data is not available at this time. Private drinking water is largely unregulated and information on these wells is submitted to the Pennsylvania Topographic and Geologic Survey by water well drillers. Therefore, the existing data is largely incomplete and/or inaccurate (PaGWIS). Table 4.3.5-4 shows the number of oil wells, gas wells, and domestic drinking water wells by jurisdiction.



Table 4.3.5-3. Number of oil wells, gas wells and domestic drinking water wells by jurisdiction

Municipality	Oil and Gas Wells				Domestic Drinking Water Wells
	Active	Abandoned	Inactive	Plugged	
Blooming Grove Township	0	0	0	1	233
Delaware Township	0	0	0	0	1,026
Dingman Township	0	0	0	0	2,832
Greene Township	1	0	0	0	1,009
Lackawaxen Township	0	0	0	0	563
Lehman Township	0	0	0	0	1,063
Matamoras Borough	0	0	0	0	19
Milford Borough	0	0	0	0	103
Milford Township	0	0	0	0	212
Palmyra Township	0	0	0	0	369
Porter Township	0	0	0	0	180
Shohola Township	1	0	0	0	521
Westfall Township	0	0	0	0	307
Unidentified Municipality	-	-	-	-	75
Pike County (TOTAL)	2	0	0	1	8,509

Source: PAGWIS, PADEP

Note: 87 domestic wells did not have an associated municipality in the attribute table.

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 Pike 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.

HazMat incidents can lead to closures of major transportation routes in Pike County. Closures of waterways, railroads, airports, and highways as a result of these incidents can hinder delivery of goods and services. Potential impacts may be local, regional, or statewide depending on the magnitude of the event and the extent of disruptions to services. In 2019, the United States experienced nearly \$1 billion of damages in HazMat transportation incidents (PHMSA 2019).

Impact on the Environment

As discussed above, environmental hazards and explosion incidents discussed above can profoundly affect the surrounding environment. Contamination of soil, and surface water and groundwater supplies, can result in many direct impacts on surrounding populations and ecosystems. Local flora and fauna within hazard areas are also at risk. The application of salt to de-ice roads may impact groundwater and contaminate potable drinking water sources near major highway corridors and state highway routes in the County.

Cascading Impacts to Other Hazards

Hazardous substance events can cause utility failure. If a spill or other release occurred, water quality and supply could stop or drastically decrease while the facility restored service. HazMat events can also occur along



transportation networks. In 2019, the United States experienced over 250 incidents of derailments and accidents from HazMat spills (PHMSA 2019). While HazMat transportation along railroads has traditionally been reliable, a HazMat spill along any transportation network could result in disruption and accidents (Barkan, C. Kawprasert A. 2008).

Future Growth and Development

As discussed in Section 2.4, areas targeted for future growth and development have been identified across Pike County. Any areas of growth could be impacted by environmental hazards if within identified hazard areas discussed throughout Section 4.3 of this HMP.

Estimated population projections provided by the Center of Rural Pennsylvania indicate that **Pike County's** population will continue to decrease into 2040, decreasing the total population to approximately 54,257 persons (The Center of Rural Pennsylvania 2014). The 2010 Census for Pike County reported a total population of 57,369 and an estimated 2019 population of 55,453. This is approximately at 3.3-percent decrease. However, the population increased to 58,535 (5.6-percent increase) according to the 2020 Census. It is anticipated that the County's population will decrease over the years, exposing more residents to HazMat exposure areas.

Climate Change

Environmental hazard incidents are human-caused hazard; however, as noted, their release may be the result from natural hazard events. Climate change may potentially increase the frequency and magnitude of flood and severe weather events which may lead to an increased release of hazardous materials at both fixed sites and in-transit.

Additional Data and Next Steps

Overall, Pike County remains vulnerable to hazardous material release events. As the oil and gas industry continues to grow, the County may become more vulnerable to any impacts from the industry.



4.3 Hazard Profiles

4.3.6 Extreme Temperatures

This section provides a profile and vulnerability assessment of the extreme temperature hazard in Pike County. Extreme temperature includes both heat and cold events, which can have a significant impact to human health, commercial/agricultural businesses and primary and secondary effects on infrastructure (e.g., burst pipes and power failure). **What constitutes “extreme cold” or “extreme heat” can vary across different areas of the country, based on what the population is accustomed to.**

Extreme cold events are when temperatures drop well below normal in an area. In regions relatively unaccustomed to winter weather, near freezing temperatures **are considered “extreme cold.”** Extreme cold temperatures are generally characterized in temperate zones by the ambient air temperature dropping to approximately 0°F or below (CDC 2007). Extremely cold temperatures often accompany a winter storm, which can cause power failures and icy roads. Although staying indoors as much as possible can help reduce the risk of car crashes and falls on the ice, individuals may also face indoor hazards. Many homes will be too cold—either due to a power failure or because the heating system is not adequate for the weather. The use of space heaters and fireplaces to keep warm increases the risk of household fires and carbon monoxide poisoning (CDC 2007).

Extreme heat is defined as temperatures which hover 10 degrees or more above the average high temperature for a region and that last for several weeks (CDC 2016). A heat wave is defined as a period of abnormally and uncomfortably hot and unusually humid weather. Typically, a heat wave lasts two or more days (NWS 2009). There is no universal definition of a heat wave because the term is relative to the usual weather in a particular area. The term heat wave is applied both to routine weather variations and to extraordinary spells of heat which may occur only once a century (Meehl 2004).

Urbanized areas and urbanization create an exacerbated type of risk during an extreme heat event, compared to rural and suburban areas. As defined by the U.S. Census, urban areas are classified as all territory, population, and housing units located within urbanized areas and urban clusters. The term urbanized area denotes an urban area of 50,000 or more people. Urban areas under 50,000 people are called urban clusters. The U.S. Census delineates urbanized area and urban cluster boundaries to encompass densely settled territory, which generally consists of:

- A cluster of one or more block groups or census blocks each of which has a population density of at least 1,000 people per square mile.
- Surrounding block groups and census blocks each of which has a population density of at least 500 people per square mile.
- Less densely settled blocks that form enclaves or indentations or are used to connect discontinuous areas with qualifying densities (U.S. Census Bureau 2010).

As these urban areas develop and change, so does the landscape. Buildings, roads, and other infrastructure replace open land and vegetation. Surfaces that were once permeable and moist are now impermeable and dry. These



changes cause urban areas to become warmer than the surrounding areas. This forms an 'island' of higher temperatures (EPA 2019).

The term 'heat island' describes built up areas that are hotter than nearby rural areas. The annual mean air temperature of a city with more than one million people can be between 1.8 °F and 5.4°F warmer than its surrounding areas. In the evening, the difference in air temperatures can be as high as 22°F. Heat islands occur on the surface and in the atmosphere. On a hot, sunny day, the sun can heat dry, exposed urban surfaces to temperatures 50°F to 90°F hotter than the air. Heat islands can affect communities by increasing peak energy demand during the summer, air conditioning costs, air pollution and greenhouse gas emissions, heat-related illness and death, and water quality degradation (EPA 2019).

4.3.6.1 Location and Extent

Location

Pike County is susceptible to extreme temperatures in the summer and winter seasons and they can occur anywhere in the County. Average minimum temperatures in Pike County ranged from 34°F to 38°F (Figure 4.3.6-1) and average maximum temperatures range from 55°F to 61°F (Figure 4.3.6-2) (PEMA 2013).

Figure 4.3.6-1. Excessive Cold and Wind Chill Warnings (2005-2017)

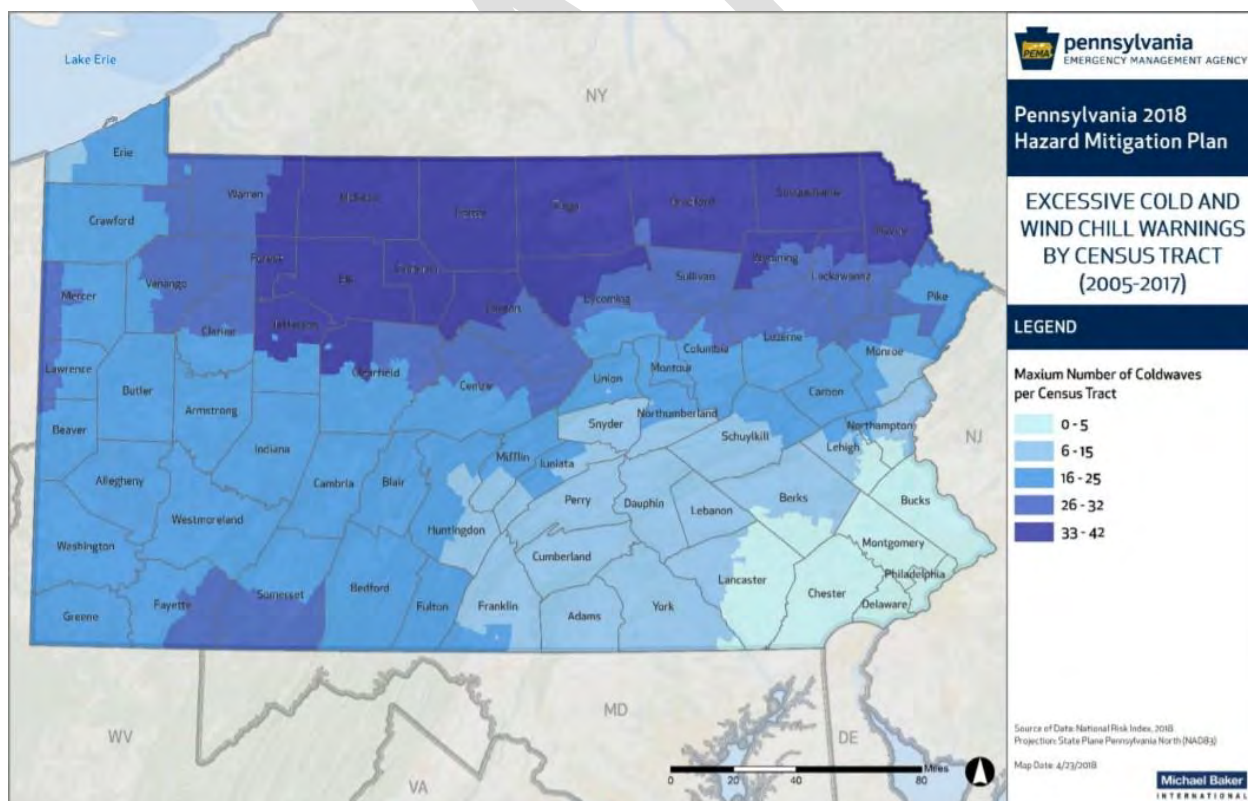
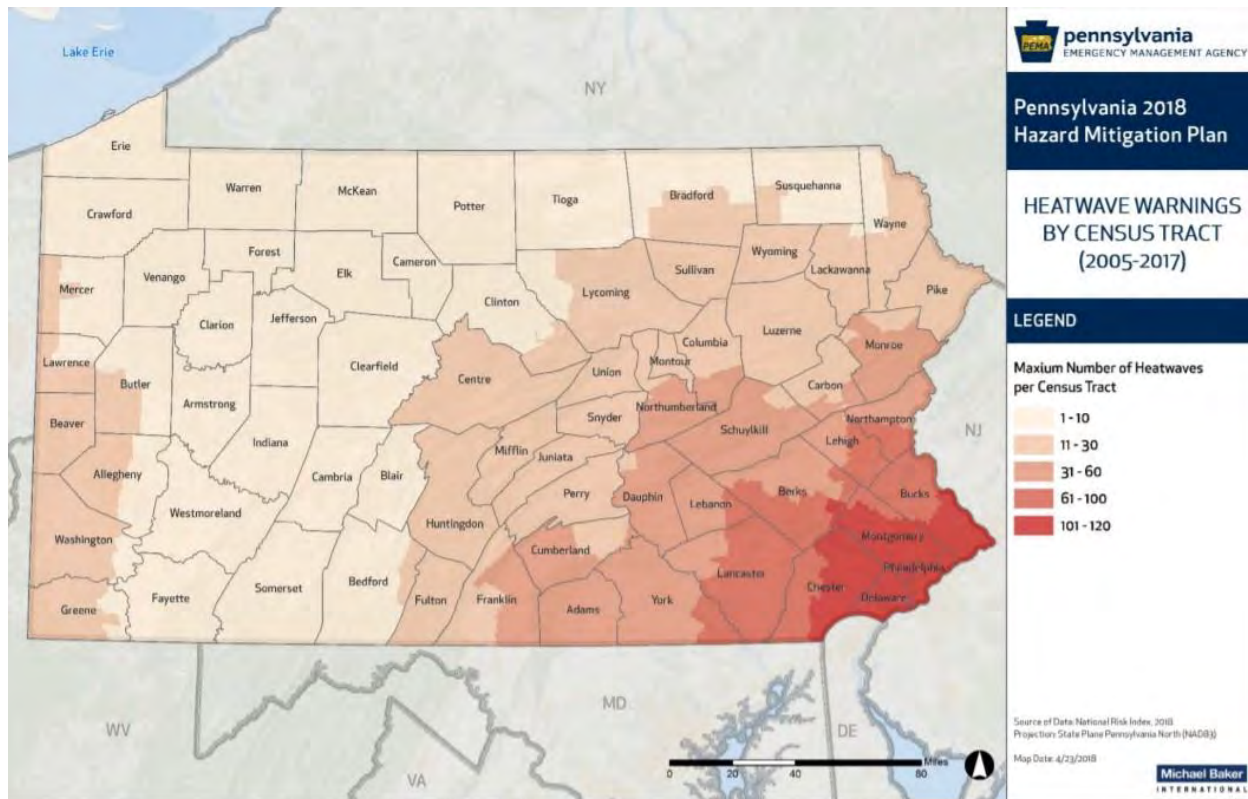




Figure 4.3.6-2. Heatwave Warnings (2005-2017)

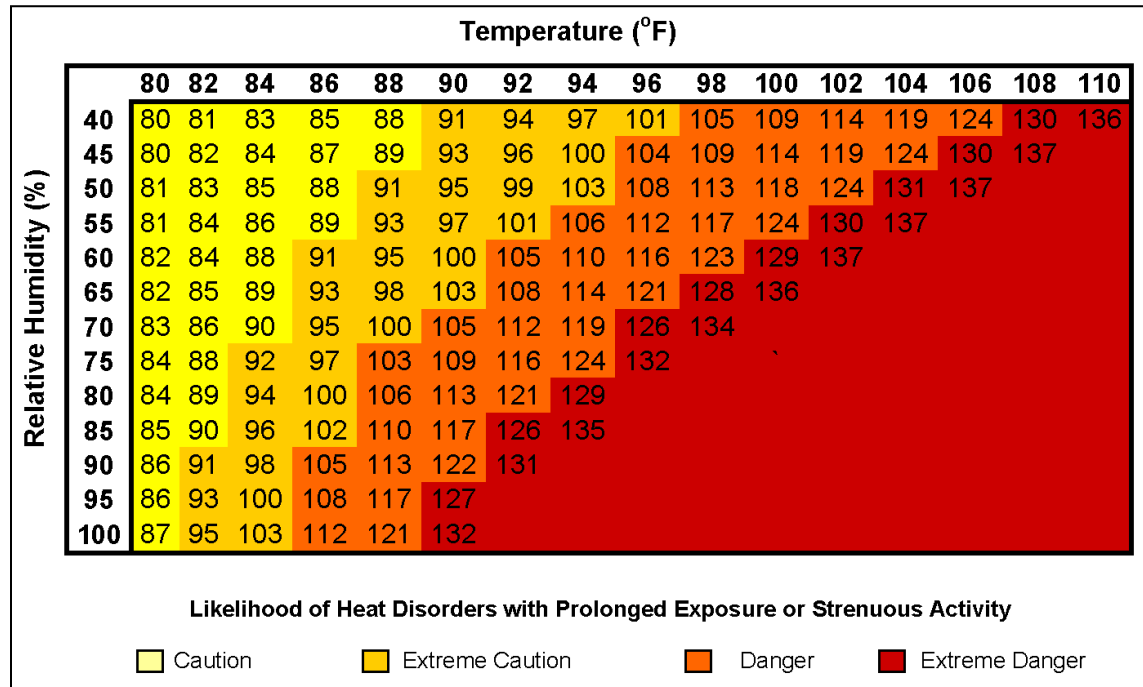


Extreme Heat

NOAA's heat alert procedures are based mainly on Heat Index values. The Heat Index is given in degrees Fahrenheit. The Heat Index is a measure of how hot it really feels when relative humidity is factored in with the actual air temperature. To find the Heat Index temperature, the temperature and relative humidity need to be known. Once both values are known, the Heat Index will be the corresponding number with both values (Figure 4.3.6-3). The Heat Index indicates the temperature the body feels. It is important to know that the Heat Index values are devised for shady, light wind conditions. Exposure to full sunshine can increase heat index values by up to 15°F. Strong winds, particularly with very hot dry air, can also be extremely hazardous (NWS 2013).



Figure 4.3.6-3. NWS Heat Index Chart



Source: NWS 2015
°F degrees Fahrenheit
% percent

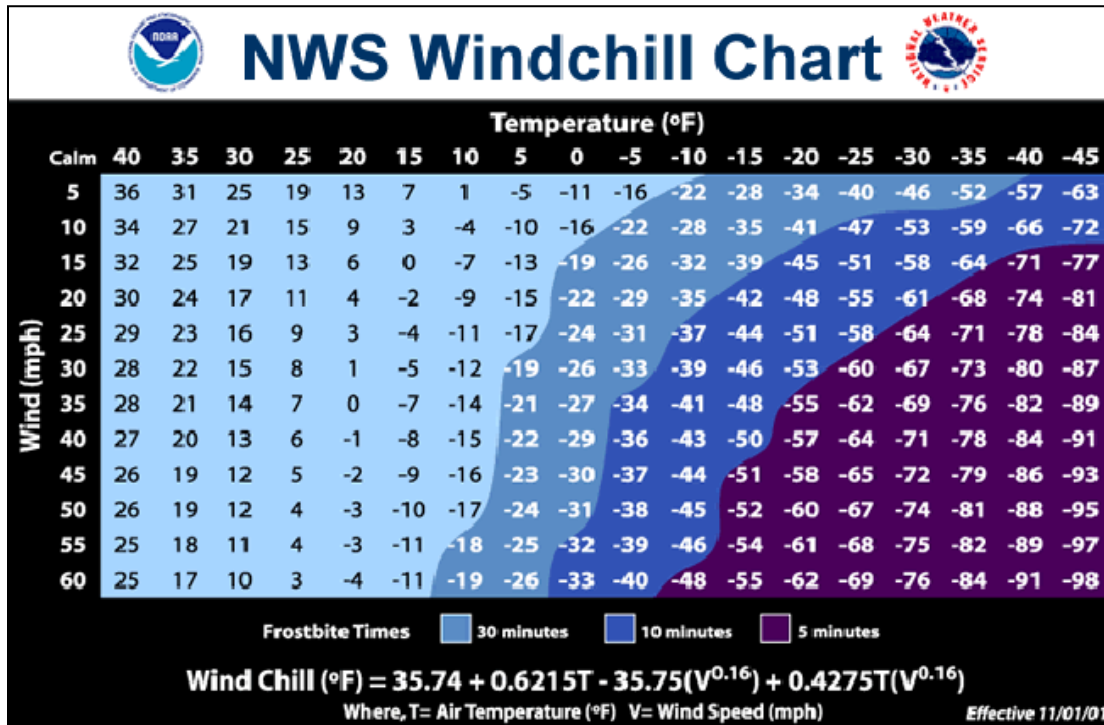
Extreme Cold

The extent (severity or magnitude) of extreme cold temperatures are generally measured through the Wind Chill Temperature (WCT) Index. Wind Chill Temperature is the temperature that people and animals feel when outside and it is based on the rate of heat loss from exposed skin by the effects of wind and cold. As the wind increases, the body is cooled at a faster rate causing the skin's temperature to drop (NWS Date Unknown).

On November 1, 2001, the NWS implemented a new WCT Index. It was designed to more accurately calculate how cold air feels on human skin. The table below shows the new WCT Index. The WCT Index includes a frostbite indicator, showing points where temperature, wind speed, and exposure time will produce frostbite to humans. Figure 4.3.6-4 shows three shaded areas of frostbite danger. Each shaded area shows how long a person can be exposed before frostbite develops (NWS Date Unknown).



Figure 4.3.6-4. NWS Wind Chill Index



Source: NWS Date Unknown
°F degrees Fahrenheit
mph miles per hour

4.3.6.2 Range of Magnitude

Extreme temperatures can cause a range of impacts to communities that include health impacts, transportation, agriculture, and energy.

Meteorologists can accurately forecast extreme temperature event development and the severity of the associated conditions with several days lead time. These forecasts provide an opportunity for public health and other officials to notify vulnerable populations. For heat events, the NWS issues excessive heat outlooks when the potential exists for an excessive heat event in the next three to seven days. Watches are issued when conditions are favorable for an excessive heat event in the next 24 to 72 hours. Excessive heat warning/advisories are issued when an excessive heat event is expected in the next 36 hours (NWS 2021). Winter temperatures may fall to extreme cold readings with no wind occurring. Currently, the only way to headline very cold temperatures is with the use of the NWS-designated Wind Chill Advisory or Warning products. When actual temperatures reach Wind Chill Warning criteria with little to no wind, extreme cold warnings may be issued (NWS 2021).

Cold temperatures can be dangerous to humans and animals exposed to the cold. Without heat and shelter, cold temperatures can lead to hypothermia, frostbite, and even death. As stated above, cold temperatures are typically measured through the Wind Chill Temperature index. The values represent what the temperature actually feels like to humans and animals under cold, windy conditions. The effect of cold temperatures will vary by individual (CDC 2007).



Extremely high temperatures cause heat stress which can be divided into four categories (Figure 4.3.6-5). Each category is defined by apparent temperature which is associated with a heat index value that captures the combined effects of dry air temperature and relative humidity on humans and animals. Major human risks for these temperatures include heat cramps, heat syncope, heat exhaustion, heatstroke, and death. Although the figure below serves as a guide for various danger categories, the impacts of high temperatures will vary from person to person based on age, health and other factors. The elderly and very young are most vulnerable to health-related impacts of extreme temperatures (PEMA 2013).

Figure 4.3.6-5. Adverse Effects of Prolonged Exposures to Heat on Individuals

Category	Heat Index	Health Hazards
Extreme Danger	130 °F – Higher	Heat Stroke / Sunstroke is likely with continued exposure.
Danger	105 °F – 129 °F	Sunstroke, muscle cramps, and/or heat exhaustion possible with prolonged exposure and/or physical activity.
Extreme Caution	90 °F – 105 °F	Sunstroke, muscle cramps, and/or heat exhaustions possible with prolonged exposure and/or physical activity.
Caution	80 °F – 90 °F	Fatigue possible with prolonged exposure and/or physical activity.

Source: NWS 2009

4.3.6.3 Past Occurrence

Many sources provided historical information regarding previous occurrences and losses associated with extreme temperature events throughout Pike County. With so many sources reviewed for the purpose of this HMP, 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.

Based on the Midwestern Regional Climate Center (MRCC) data, Table 4.3.6-1 presents the extreme cold (minimum) and hot (maximum) temperature records for the weather stations located in Pike County between 1895 and 2021.

Table 4.3.6-1. MRCC Temperature Extremes

Station Name	Average Maximum (°F)	Average Minimum (°F)	Highest Max (°F)	Date	Lowest Minimum (°F)	Date
Hawley 1 E	59	35	100	8/26/1948	-31	January 21, 1994

Source: MRCC 2021

Note: There may be some potential problems with the data collected at the stations. The values of the all-time records for stations with brief histories are limited in accuracy and could vary from nearby stations with longer records. Although the data sets have been through quality control, there is still a need for more resources to quality control extremes. The record sets are for single stations in the cooperative observer network and are limited to the time of operation of each station under one coop number. The records for a place may need to be constructed from several individual station histories. Some of the data may vary from NWS records due to NWS using multiple stations and additional sources like record books (MRCC, Date Unknown).

Between 1954 and 2021, Pennsylvania has not been included in major disaster (DR) or emergency (EM) declarations as a result of extreme temperatures (FEMA 2021). Agriculture-related disaster declarations are quite common. One-half to two-thirds of the counties in the U.S. have been designated as disaster areas in each of the past several years. The USDA Secretary of Agriculture is authorized to designate counties as disaster areas to make emergency loans to producers suffering losses in those counties and in counties that are contiguous to a designated county. Between



2012 and 2021, Pennsylvania has been included in 49 USDA declarations related to extreme temperatures. Pike County has been included in eight of these declarations.

- S3249 (2012) – frosts and freezes
- S3251 (2012) – frosts, freezes, high winds, and hail
- S3427 (2012) – drought, excessive heat
- S3487 June – November 2012 - The combined effects of drought, high winds (derecho), hail, excessive heat, excessive rain, flash flooding, Hurricane Sandy, snowstorm, and Nor'easter
- S3696 December 2013-April 2014 – Freeze
- S3759 (2014) – freeze
- S3930 April-September 2015 – Excessive heat and drought
- S4748 (2020) – frost and freeze

Table 4.3.6-2 discusses extreme temperature events that occurred in Pike County. Between 1996 and 2021, Pike County has experienced 10 extreme temperature events (NOAA-NCEI 2021). However, details for all events were not readily available. As stated above, many sources were researched for historical information regarding extreme temperature events; however, the table below may not include all extreme temperature events that have impacted Pike County.

Table 4.3.6-2. Extreme Temperature Events in Pike County, 1996 to 2021

Date(s) of Event	Event Type	Description
October 4, 1996	Cold/Wind Chill	A very cold air mass moved into central New York State and northeastern Pennsylvania. Widespread freeze conditions were observed. In Pike County, the Hawley weather station recorded a low of 25°F on October 4 th .
January 17, 1997	Cold/Wind Chill	An arctic air mass moved into northeast Pennsylvania and lasted for two days. Air temperatures dropped to near zero over much of the region. During the day, readings only reached single digits and lower teens. At night, temperatures ranged from -5°F to -15°F. In addition to the cold temperatures, strong winds impacted the area as well. Wind chills of -35° to -55°F were common over the northern tier of the Commonwealth. In Pike County, the Hawley weather station recorded a low of 6°F on the 17 th .
September 28-29, 2000	Extreme Cold/Wind Chill	A widespread freeze occurred across central New York State and northeastern Pennsylvania. Temperatures below 30 degrees were observed. In Pike County, at the Hawley weather station, temperature lows of 28°F and 34°F were recorded for those dates.
August 1-10, 2001	Heat	<p>The first nine days of August included a significant heat wave. Locations in northeast Pennsylvania reported temperatures in the upper 90s to lower 100s. Numerous high temperature records were set during this time. The heat wave peaked on the 9th when many locations saw temperatures above 100°F.</p> <p>In Pike County, between August 7th and 9th, temperatures were in the low to mid 90s. At the Hawley NWS weather station, temperatures ranged from 92°F to 94°F, with the highest temperature recorded on August 9th. At the Matamoras weather station, temperatures during this time period ranged from 93°F to 99°F, with the highest temperature recorded on August 10th.</p>



Date(s) of Event	Event Type	Description
January 10, 2004	Cold/Wind Chill	Cold temperatures moved into northeast Pennsylvania bringing cold temperatures of below zero to most locations. In Pike County, at the Hawley weather station, the maximum temperature for the 10 th was 6°F and the minimum temperature was -8°F. The County had approximately \$5,000 in property damage from this event.
January 15-16, 2004	Cold/Wind Chill	Cold temperatures and winds of 15 to 25 mph impacted northeastern Pennsylvania. The combination of the cold and wind produced wind chill values of -15°F to -35°F. Many schools were closed due to the temperatures. The temperatures also caused problems with cars and busses. Some residences and businesses had damage from frozen pipes. In Pike County, the maximum temperatures for these two days ranged from 7°F to 9°F and the minimum temperatures ranged from -3°F to -6°F (recorded at the Hawley weather station). Damages in the county were approximately \$10,000 from this event.
December 14, 2005	Cold/Wind Chill	Arctic cold air caused morning temperatures to be below zero, with most between -5°F and -10°F. Temperatures in Pike County ranged from 0°F to -11°F.
January 1, 2006	Heat	Central New York and Northeast Pennsylvania experienced one of the warmest Januarys on record since reliable records have been kept. January 2006 was the warmest January on record in Syracuse, New York. The average monthly temperature recorded at Hancock Field was 33.4 degrees, breaking the old record of 33.2 degrees set in 1990. There was also a lack of snow for the month, with only 12.1 inches recorded. This was the third lowest on record. Meanwhile, January was the second warmest on record in Binghamton, NY. The average temperature of 30.8 degrees fell short of the 31.5 degree record set in 1990. Wilkes-Barre Scranton International Airport recorded the second warmest January on record with an average temperature of 34.9 degrees. The warmest January on record remains 35.2 degrees in 1990.
July 21-23, 2011	Excessive Heat	For three days, high temperatures across parts of northeastern Pennsylvania rose above the 90s. In Pike County, temperatures across the county reached well into the 90s. At the Hawley weather station, temperatures ranged from 87°F to 95°F.
March 17, 2012	Heat	<p>A period of record warm temperatures was experienced across northeast Pennsylvania from March 17th to the 23rd as the jet stream was pushed farther north than is typical for this time of year and persistent southerly flow developed over an unusually large area of the United States. Temperatures across northeast Pennsylvania reached well into the 70s during this stretch, with some typically warmer valley locations near or just above 80 degrees. The climate station at the airport in Avoca broke the record for the warmest March on record, with the mean temperature nearly 12 degrees above normal.</p> <p>Temperatures across northeast Pennsylvania were anomalously warm for the month, with the warmest stretch occurring from the 17th to the 23rd when temperatures reached well into the 70s, with readings as high as the lower 80s in typically warmer valley locations.</p>

Sources: NOAA NCEI 2021; NWS 2021; FEMA 2021

Note: The NOAA-NCEI database used to develop this table did not report any extreme temperature events in Pike County from 2012 to 2021.



4.3.6.4 Future Occurrence

Extreme temperature events occur each year throughout Pike County. It is estimated that the county will continue to experience temperature extremes annually that may induce secondary hazards such as potential snow, hail, ice or windstorms, thunderstorms, drought, human health impacts, utility failures, and transportation accidents.

For the 2022 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of extreme temperature events for Pike County. Information from NOAA-NCEI storm events database were used to identify the number of extreme temperature events that occurred between 1996 and 2021. 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 38.46-percent chance of an extreme temperature event occurring in any given year in Pike County.

Table 4.3.6-3. Probability of Future Extreme Temperature Events

Hazard Type	Number of Occurrences Between 1996 and 2021	Percent chance of occurrence in any given year
Extreme Temperature	10	38.46%

Sources: NOAA-NCEI 2021

The future occurrence of extreme temperature in Pike County can be considered likely as defined by the Risk Factor Methodology probability criteria (see Table 4.4-5).

4.3.6.5 Vulnerability Assessment

All of Pike County is vulnerable to extreme temperature events. The following subsections discuss Pike County's vulnerability, in a qualitative nature, to the severe winter weather hazard.

Impact on Life, Health, and Safety

Extreme temperature events have potential health impacts including injury and death. According to the Centers for Disease Control and Prevention, populations most at risk to extreme cold and heat events include the following: 1) the elderly, who are less able to withstand temperatures extremes due to their age, health conditions and limited mobility to access shelters; 2) infants and children up to four years of age; 3) individuals who are physically ill (e.g., heart disease or high blood pressure), 4) low-income persons that cannot afford proper heating and cooling; and 5) the general public who may overexert during work or exercise during extreme heat events or experience hypothermia during extreme cold events (CDC 2007).

Meteorologists can accurately forecast extreme heat event development and the severity of the associated conditions with several days of lead time. These forecasts provide an opportunity for public health and other officials to notify vulnerable populations, implement short-term emergency response actions and focus on surveillance and relief efforts on those at greatest risk. Adhering to extreme temperature warnings can significantly reduce the risk of temperature-related deaths.



Impact on General Building Stock

All of the building stock in the County is exposed to the extreme temperature hazard. Refer to Section 2 which summarizes the building inventory in Pike County. Extreme heat generally does not impact buildings. Losses may be associated with the overheating of heating, ventilation, and air conditioning (HVAC) systems. Extreme cold temperature events can damage buildings through freezing/bursting pipes and freeze/thaw cycles. Additionally, manufactured homes (mobile homes) and antiquated or poorly constructed facilities may have inadequate capabilities to withstand extreme temperatures.

Impact on Critical Facilities

All critical facilities in the County are exposed to the extreme temperature hazard. Impacts to critical facilities are the same as described for general building stock. Additionally, it is essential that critical facilities remain operational during natural hazard events. Extreme heat events can sometimes cause short periods of utility failures, commonly **referred to as "brown-outs", due to increased usage** from air conditioners, appliances, etc. Similarly, heavy snowfall and ice storms, associated with extreme cold temperature events, can cause power interruption as well. Backup power is recommended for critical facilities and infrastructure.

Impact on the Economy

Extreme temperature events also have impacts on the economy, including loss of business function and damage/loss of inventory. Business-owners may be faced with increased financial burdens due to unexpected repairs caused to the building (e.g., pipes bursting), higher than normal utility bills or business interruption due to power failure (i.e., loss of electricity, telecommunications).

The agricultural industry is most at risk in terms of economic impact and damage due to extreme temperature events. Extreme heat events can result in drought and dry conditions and directly impact livestock and crop production. Based on the 2017 Census of Agriculture, there were 53 farms in Pike County, with a total of 24,700 acres of land in farms. The average farm size was 466 acres. **Pike County's farms had a total market value of products sold of over \$892,000, averaging \$16,830 per farm (USDA 2017).**

An extreme heat event could result in drought conditions and have a serious impact on a community. During an extreme temperature event, there may be an increased demand for water and electricity which may lead to shortages and a higher cost for these resources.

Impact on the Environment

Extreme temperature events can also impact the environment. For example, freezing and warming weather patterns create changes in natural processes. An excess amount of snowfall and earlier warming periods may affect natural processes such as flow within water resources (USGS nd). Likewise, rain-on-snow events also exacerbate runoff rates with warming winter weather.

Extreme heat events can have particularly negative impacts on aquatic systems, contributing to fish kills, aquatic plant die offs, and increased likelihood of harmful algal blooms.



Future Growth and Development

Areas targeted for potential future growth and development within the next 5 years have been identified across Pike County. Refer to Section 2.4 of this HMP. Any areas of growth could be potentially impacted by the extreme temperature hazard because the entire County is exposed and potentially vulnerable.

Estimated population projections provided by the Center of Rural Pennsylvania indicate that Pike County's population will continue to decrease into 2040, decreasing the total population to approximately 54,257 persons (The Center of Rural Pennsylvania 2014). This is approximately a 5.4 percent decrease from the County's 2010 population. Any increase in population will increase the amount of the population vulnerable to extreme temperatures.

Climate Change

Climate is defined not just as average temperature and precipitation, but also by type, frequency, and intensity of weather events. Both globally and at the local level, climate change potentially can alter prevalence and severity of weather extremes such as winter storms. While predicting changes in winter storm 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.

The climate of Pennsylvania has changed in several ways. Over the past 100 years, annual average temperatures have been rising across the Commonwealth. Future improvements in modeling smaller-scale climatic processes can be expected and will lead to improved understanding of ways in which changing climate will alter temperature, precipitation, and storm events in Pennsylvania (Shortle et al. 2009).

As the climate warms, extreme cold events might decrease in frequency, while extreme heat events might increase in frequency; the shift in temperatures could also result in hotter extreme heat events. With increased temperatures, vulnerable populations could face increased vulnerability to extreme heat and its associated illnesses, such as heatstroke and cardiovascular and kidney disease. Additionally, as temperatures rise, more buildings, facilities, and infrastructure systems may exceed their ability to cope with the heat.

Additional Data and Next Steps

Overall, the County's exposure and vulnerability have not changed, and the entire County will continue to be exposed and vulnerable to extreme temperature events.



4.3 Hazard Profiles

4.3.7 Flood

This section provides a profile and vulnerability assessment of the flood hazard in Pike County. Floods are one of the most common natural hazards in the United States and are the most prevalent type of natural disaster occurring in Pennsylvania. Over 94 percent of the State's municipalities have been designated as flood-prone areas. Both seasonal and flash floods have been causes of millions of dollars in annual property damages, loss of lives, and disruption of economic activities (Pennsylvania Emergency Management Agency [PEMA] 2013).

The Federal Emergency Management Agency's (FEMA) definition of flooding is "a general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties from the overflow of inland or tidal waters or the rapid accumulation of runoff of surface waters from any source" (FloodSmart.gov 2015).

Most floods fall into three categories: riverine, coastal, and shallow (FEMA 2015). Other types of floods may include ice-jam floods, flash floods, stormwater floods, alluvial fan floods, dam failure floods, and floods associated with local drainage or high groundwater (as indicated in the previous flood definition). For the purpose of this Plan and as deemed appropriate by the Planning Team, riverine, flash, ice-jam, dam failure, and stormwater flooding are the main flood types of concern for Pike County. These types of floods are further discussed below.

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 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 2015, Illinois Association for Floodplain and Stormwater Management 2006).

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 2011).

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 (Pennsylvania Emergency Management Agency [PEMA] 2013). Time elapsed 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 flood waters (NWS 2011). 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 inability of the soil to absorb additional precipitation (FEMA 2008).

Ice-Jam Floods

An ice jam is an accumulation of ice that acts as a natural dam and restricts 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 (Northeast States Emergency Consortium [NESEC] Date Unknown, U.S. Army Corps of Engineers [USACE] 2002).

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 a heavy rainfall, snowmelt, or warmer temperatures (USACE 2002).

Dam Failure Floods

A dam is an artificial barrier that can impound water, wastewater, or any liquid-borne material for the purpose of storage or control of water (FEMA 2010). Dams are man-made structures built across a stream or river that impound water and reduce flow downstream (FEMA 2004). They are built for purposes of power production, agriculture, water supply, recreation, and flood protection. Dam failure is any malfunction or abnormality outside of the design that **adversely affects a dam's primary function of impounding water** (FERC 2011). Dams can fail for one or a combination of the following reasons:

- Overtopping caused by floods that exceed capacity of the dam (inadequate spillway capacity)
- Prolonged periods of rainfall and flooding
- Deliberate acts of sabotage (terrorism)
- Structural failure of materials used in dam construction
- Movement and/or failure of the foundation supporting the dam
- Settlement and cracking of concrete or embankment dams
- Piping and internal erosion of soil in embankment dams
- Inadequate or negligent operation, maintenance, and upkeep
- Failure of upstream dams on the same waterway
- Earthquake (liquefaction/landslides) (FEMA 2010).

Flooding can occur when a dam fails or breaks, producing effects similar to flash floods. Areas most susceptible to effects of floods are low-lying areas near water or downstream from a dam (FERC 2011).



Stormwater Floods

Stormwater flooding described below is due to local drainage issues and high groundwater levels. Locally, heavy precipitation may produce flooding in areas other than delineated floodplains or along recognizable channels. 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 1997).

High groundwater levels can be a concern and cause problems even where there is no surface flooding. While stormwater flooding can cause damage to structures and foundations, basements in particular are susceptible to high groundwater levels. Seasonally high groundwater is common in many areas, while elsewhere high groundwater occurs only after a long period of above-average precipitation (FEMA 1997).

Heavy rainfall that overwhelms a developed area's stormwater infrastructure causing flooding is commonly referred to as urban flooding. Urban flooding can be worsened by aging and inadequate infrastructure and over development of land. The growing number of extreme rainfall events that produce intense precipitation are resulting in increased urban flooding (Center for Disaster Resilience 2016). While riverine and coastal flooding is mapped and studied by FEMA, urban flooding is not.

NOAA defines urban flooding as the flooding of streets, underpasses, low lying areas, or storm drains. (NOAA 2009). Urban drainage flooding is caused by increased water runoff due to urban development and inadequate 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. The systems 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. Because 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 prior to development in that area (Harris 2008).

4.3.8.2 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, flooding 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 is smaller than the floodplain associated with a flood that has a 0.2-percent annual chance of occurring (PEMA 2013). Floodplain maps of each Pike 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.



Pike County's biggest flooding threat remains along the Delaware River corridor and portions of the Lackawaxen River. Other major creeks within the County include the East Branch Wallenpaupack, Shohola, Billings, and Blooming Grove Creek. Lake Wallenpaupack also comprises a portion of the County's western border and is prone to flooding. It was also noted that Broadhead Road in Lehman Township is prone to flooding.

Most municipalities in Pike County have flood-prone areas because they are located along streams, creeks, or lakes. In addition, community development of the floodplain has resulted in frequent flooding. For inland areas, excess water from snowmelt or rainfall accumulates and overflows onto stream banks and adjacent floodplains.

Table 4.3.7-1 lists total land areas within the 1-percent and 0.2-percent annual chance flood zones calculated via a spatial analysis referencing the 2000 Digital Flood Insurance Rate Map (DFIRM).

Table 4.3.7-1. Total Land Areas in the 1-Percent and 0.2-Percent Annual Chance Flood Zones (Acres)

Municipality	NFIP-Participating Community	Total Area (acres)	1% Flood Event Hazard Area		0.2% Flood Event Hazard Area	
			Area (acres)	% of Total	Area (acres)	% of Total
Blooming Grove Township	Yes	49,458	1,986	4.02%	1,986	4.02%
Delaware Township	Yes	29,210	1,230	4.21%	1,230	4.21%
Dingman Township	Yes	38,493	2,892	7.51%	2,996	7.78%
Greene Township	Yes	39,581	2,305	5.82%	2,305	5.82%
Lackawaxen Township	Yes	51,955	1,641	3.16%	1,641	3.16%
Lehman Township	Yes	32,205	1,975	6.13%	1,975	6.13%
Matamoras Borough	Yes	509	125	24.56%	419	82.32%
Milford Borough	Yes	321	58	18.07%	61	19.00%
Milford Township	Yes	7,931	157	1.98%	163	2.06%
Palmyra Township	Yes	25,249	3,385	13.41%	3,385	13.41%
Porter Township	Yes	38,699	5,185	13.40%	5,185	13.40%
Shohola Township	Yes	30,101	928	3.08%	946	3.14%
Westfall Township	Yes	19,302	924	4.79%	1,237	6.41%
Pike County (Total)	-	363,014	22,791	6.28%	23,529	6.48%

Source: FEMA 2000

Note: Areas listed include areas of inland waterways

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 2010, Pike 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 for use in preparing 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.

Pike County's draft Stormwater Management Plan is dated July 2010. Figure 4.3.7-1 shows PADEP-designated watersheds with critical facilities in Pike County.

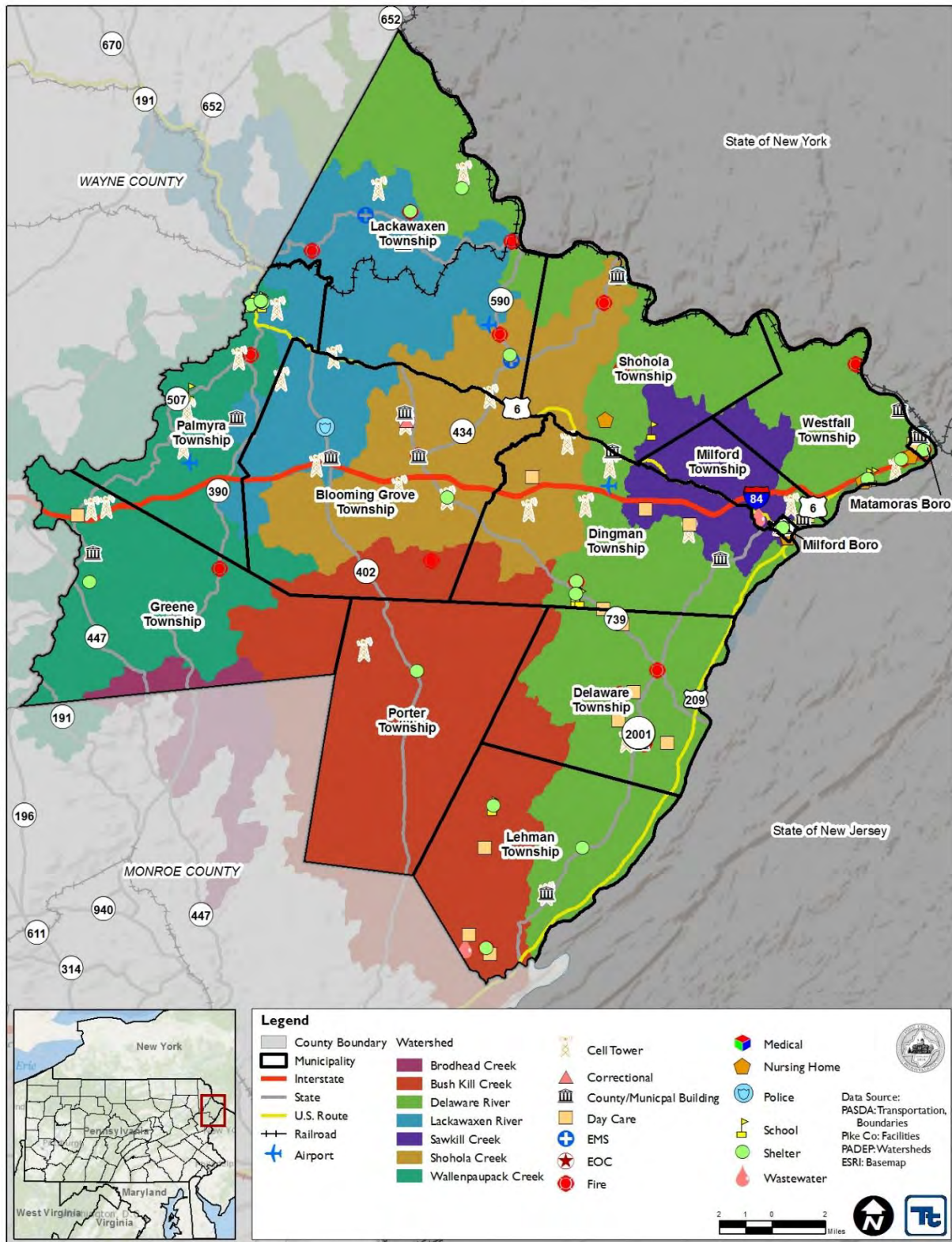
The 2000 FEMA Flood Insurance Study (FIS) for Pike County also documents the major flooding problems in the County, including areas along the Delaware River that flood at any point during the year (FEMA FIS 2000). Additionally, there are several floodprone areas in the Sawkill Creek Watershed area and Delaware Township. The Sawkill Creek Watershed is located in the eastern portion of Pike County and is contained within five municipalities: Dingman Township, Milford Borough, Milford Township, Shohola Township, and Westfall Township. The Sawkill Creek drains a watershed area of approximately 25 square miles and includes the following primary tributaries: Savantine Creek, Pinchot Brook, Dimmick Meadow Brook, Vantine Brook, and Sloat Brook. Areas of flooding were identified in the Sawkill Creek Watershed Act 167 Stormwater Management Plan. Township Road 428 (Schoccappe Road) in Milford Township floods during heavy rains. Pinchot Brook floods onto the roadway. The roads serving this area were constructed on severe slopes which has led to erosion and flooding problems where the primary subdivision road intersects State Route 2011.

In the 1994 Act 167 Lackawaxen River Watershed Stormwater Management Plan for Wayne, Pike and Lackawana Counties, the following areas of Pike County were identified as locations of flooding problems:

- State Route 4004 in Blooming Grove Township
- Kimbles Road (T 367) along Decker Creek and adjacent wetland



Figure 4.3.7-1. PADEP-Designated Watersheds with Critical Facilities



[Source: PADEP]



FEMA Regulatory Flood Zones

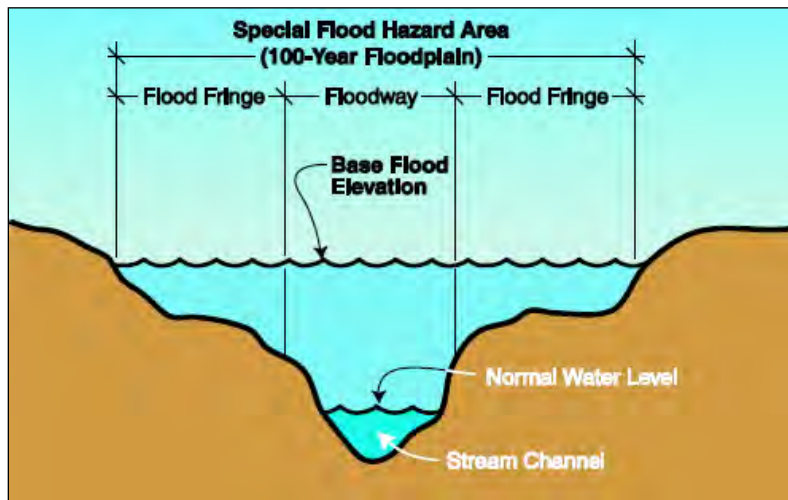
According to FEMA, flood hazard areas are defined as areas on a map shown to be inundated by a flood of a given magnitude. These areas are determined by use of statistical analyses of records of river flow, storm tides, and rainfall; information obtained through consultation with the community; floodplain topographic surveys; and hydrologic and **hydraulic analyses. Flood hazard areas are delineated on FEMA's Flood Insurance Rate Maps (FIRM), which are** official maps of a community on which the Federal Insurance and Mitigation Administration has delineated both Special Flood Hazard Areas (SFHA) and the risk premium zones applicable to the community. These maps identify SFHAs, 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 2003, 2005, 2008). **Pike 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 which 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 flood is a regulatory standard used by federal agencies and most states to administer floodplain management programs. The 1-percent annual chance flood is used by NFIP as the basis for insurance requirements nationwide. FIRMs also depict 0.2-percent annual chance flood designations (FEMA 2003). Figure 4.3.7-2 depicts the SFHA, the base flood elevation, the flood fringe, and the floodway areas of a floodplain for the 1-percent annual chance flood.



Figure 4.3.7-2. Floodplain Illustration



Source: PEMA 2013

The SFHA serves as the primary regulatory boundary used by FEMA and Pennsylvania. Digitized Flood Insurance Rate Maps (DFIRM), FIRMs, and other flood hazard information can be referenced to identify the expected spatial extent of flooding from a 1-percent annual chance event and 0.2-percent annual chance event.

At the time this Plan was written, the 2000 DFIRMs were considered the best available, and were used for the risk analysis. Figure 4.3.7-3 illustrates NFIP flood zones in Pike County. 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.

Flood Insurance Study

In addition to FIRM and DFIRMs, FEMA also provides Flood Insurance Studies (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 2008). The countywide FIS for Pike County was last completed in 2000, at the same time as the DFIRM revisions.

Dam Failure

Dam failures cause serious downstream flooding either because of partial or complete dam collapse. Failures are usually associated with intense rainfall and prolonged flood conditions, however, dam breaks may occur during dry periods as a result of progressive erosion of an embankment. The greatest threat from a dam break is to areas immediately downstream.

There are many sources that track the number and classification of dams in Pike County. According to the Pennsylvania Department of Environmental Protection (PA DEP), there are 147 dams in Pike County, 50 of which are classified as high hazard dams (category 1 and 2). The PA DEP defines a high hazard dam as **“any dam so located as to endanger populated areas downstream by its failure”** [Def. added May 16, 1985, P.L.32, No. 15]. A spatial dataset maintained by Pike County indicates there are 45 high hazard dams in the County.

In addition to the dams located within the County, there are dams located outside of Pike County which have the potential to inflict loss or hardship upon municipalities within the County. One is the dam at the Swinging Bridge Reservoir along the Mongaup River in Sullivan County, New York. A failure of this dam would release a large volume of water into the Mongaup River which drains to the Delaware River and would impact many Pike County communities that border the river. In addition, the New York City reservoirs along the Delaware River and the Neversink River in New York also pose a significant threat should a major failure occur (Pike County HMP 2012).

High hazard dams receive two inspections each year – once by a professional engineer on behalf of the owner and once by a DEP inspector (PA DEP 2016). High hazard dams are required to have an Emergency Action Plan (EAP) in place which should be reviewed at a minimum of every two years. While not available for all dams, downstream inundation maps can be obtained from the DEP for some of the high hazard dams.

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 19,000 records from across the United States. According to the USACE-CRREL, Pike County underwent or may have been impacted by four historical ice jam incidents

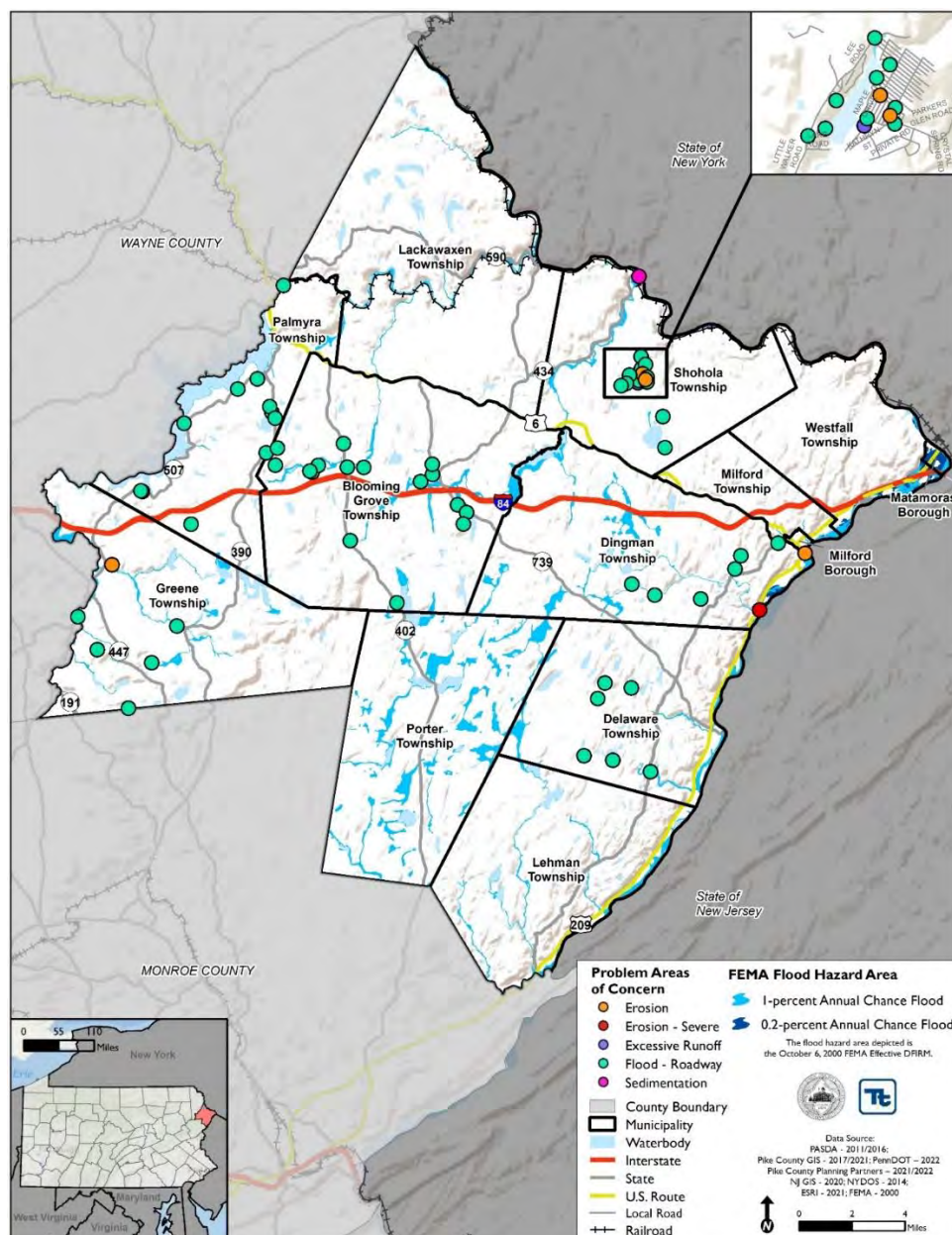


between 1784 and 2021 (USACE 2021). Ice Jams have formed along Delaware River and Shohola Creek. Historical events are further mentioned in the “Previous Occurrences” section of this hazard profile.

Flood Problem Areas

For this plan update, the County and municipalities identified areas known to flood, particularly those associated with stormwater flooding which does not traditionally have mapping as flood issues can quickly arise and also be addressed and solved through mitigation to prevent future flooding issues. Potential flood related problems identified include erosion, excessive runoff, flooded roadways, and sedimentation. Figure 4.3.7-4 illustrates these areas throughout the County.

Figure 4.3.7-4. Flood Problem Areas in Pike County





4.3.8.3 Range of Magnitude

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 floodwaters. 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 2013).

Several factors determine severity of floods, including intensity and duration, topography, ground cover, and rate of snowmelt. Water runoff is greater in areas with steep slopes and little or no vegetative ground cover. 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 2013).

Rainfall in Pennsylvania is about average for the eastern United States. Amounts of precipitation can be divided into the following six categories:

- Very light rain – precipitation rate of <0.01 inch per hour
- Light rain – precipitation rate between 0.01 inch and 0.04 inch per hour
- Moderate rain – precipitation rate between 0.04 inch and 0.16 inch per hour
- Heavy rain – precipitation rate between 0.16 inch and 0.63 inch per hour
- Very heavy rain – precipitation rate between 0.63 inch and 2 inches per hour
- Extreme rain – precipitation rate greater than 2 inches per hour (PEMA 2013).

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, soil acts as a sponge. When the land is saturated or frozen, infiltration into the ground slows, and any more water that accumulates must flow as runoff (Harris 2008).

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:

- Minor Flooding – minimal or no property damage, but possibly some public threat or inconvenience.
- Moderate Flooding – some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations are necessary.
- Major Flooding – extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations are necessary (NWS 2011).

The extent or magnitude of a dam failure event can be measured in terms of the classification of the dam. FEMA has three classification levels of dams: low, significant, and high. The classification levels build on each other. The hazard potential classification system should be used with the understanding that the failure of any dam or water-retaining structure could represent a danger to downstream life and property (FEMA 2004). Each of FEMA's dam classification levels is described below:



- Low hazard potential dams are those where failure or misoperation 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 are those where failure or misoperation would result in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas.
- High hazard potential dams are those where failure or misoperation will probably cause loss of human life.

USACE developed the classification system shown in Table 4.3.7-2 for the hazard potential of dam failures. The USACE hazard rating system is based only on the potential consequences of a dam failure; it does not take into account the probability of failures.

Table 4.3.7-2. U.S. Army Corps of Engineers 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 location, 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 2011

Note:

- Categories are assigned to overall projects, not individual structures at a project.
- Loss-of-life potential is based on inundation mapping of the area downstream of the project. Analysis of loss-of-life potential should take into account the population at risk, time of flood wave travel, and warning time.
- 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.
- 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.
- 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.

A worst case scenario for flooding occurred in September 2004, following a very wet August that included some rain from the remnants of Tropical Storm Bonnie and Tropical Depression Charley. Remnants of Hurricane Frances dumped an average of 3 inches in the county on September 8th. On September 18th, Tropical Depression Ivan dumped 4 to 5 inches of rain over an already saturated county causing widespread damage. Rainfall for August and September averaged over 20 inches across the county. In addition to the damage caused by runoff, many streams flooded. Rainfall in the headwaters of the Delaware River was such that both the Lackawaxen River and Delaware River rose above flood stage causing the evacuation of many low lying areas, including portions of Westfall Township, Matamoras Borough, and Lackawaxen Township. Pike County qualified for both Public Assistance and Individual Assistance as part of the Presidential Declaration of Major Disaster. Over 300 property owners applied for Individual Assistance. Many roads remained closed for weeks while repairs were made. Particularly hard hit were Shohola, Lackawaxen, Palmyra, Greene, Dingman, Delaware and Lehman Townships. Two county-owned bridges – one in



Shohola Township and one in Lehman Township - sustained major damage. A portion of the Twin Lakes road was washed away.

4.3.8.4 Past Occurrence

Pike County has a long history of flooding events. While flooding is often localized to streets and small neighborhoods, the County has historically experienced periodic storm events that affect multiple communities over a large area. Past building practices often resulted in homes being constructed in the FEMA designated floodplains, exacerbating flooding problems within certain communities.

There are gauges at Barryville (BRYN6) and Matamoras/Port Jervis (MTMP1) which are used to monitor hydrologic conditions on the Delaware River. The National Weather Service uses flood categories as forecast points which describe the severity of flood impacts in the river/stream reach. Table 4.3.7-3 summarizes the flood categories in feet at each of these gauges; and Table 4.3.7-4 summarizes the top historic crests at these locations.

Table 4.3.7-3. Flood Categories at the Barryville (BRYN6) and Matamoras/Port Jervis (MTMP1) Gages

Flood Category	Flood Category Definition	Barryville (in feet)	Matamoras/ Port Jervis (in feet)
Major Flood Stage	Life-threatening and extensive inundation of structures and roads; significant evacuations are expected at this stage.	26	21.5
Moderate Flood Stage	Inundation of buildings usually begins at this stage; roads are likely to be closed and some areas cut off (evacuations may be necessary).	22	20
Flood Stage	Gage height above which a rise in water surface level begins to create a hazard to lives, property or commerce; issuance of flood warnings is linked to flood stage.	17	18
Action Stage	Level where the NWS needs to take some type of mitigation action in preparation for possible significant hydrologic activity	15	16

Source: NWS 2021; NWS 2021

Table 4.3.7-4. Historic Crests at the Barryville (BRYN6) and Matamoras/Port Jervis (MTMP1) Gages

Barryville		Matamoras/Port Jervis	
Feet	Date	Feet	Date
28.97	June 28, 2006	26.60	February 12, 1981
26.40	August 19, 1955	25.50	March 8, 1904
24.80	April 30, 2005	23.91	August 19, 1955
24.09	September 18, 2004	23.10	October 10, 1903
23.19	May 23, 1942	21.47	June 28, 2006
22.18	January 20, 1996	20.52	April 3, 2005
20.90	February 11, 1981	19.52	September 18, 2004
20.07	March 22, 1948	18.50	March 7, 1923
20.06	June 29, 1973	18.37	January 20, 1996
19.28	March 15, 1986		

Source: NWS 2017



According to the National Oceanic and Atmospheric Administration's National Climatic Data Center (NOAA NCDC) storm event database, Pike County experienced 23 flood events between January 1, 1950, and August 30, 2021 (the date range of data availability). Total property damages as a result of these flood events were estimated at \$52,270,000. This total also includes damages to other counties.

Between 1954 and 2021, the Commonwealth of Pennsylvania underwent 33 FEMA-declared, flood-related disaster declarations (DR) or emergencies classified as one or a combination of the following disaster types: severe storms, mudslides, flash flooding, tropical storms, tropical depressions, high winds, and rains. 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 2021). Pike County was included in nine of the declarations, as listed in Table 4.3.7-5

Based on all sources researched, known flooding events that have affected Pike County and its municipalities, resulting in property damages, are listed in Table 4.3.7-5. With flood documentation for the Commonwealth of Pennsylvania so extensive, not all sources have been identified or researched. Therefore, Table 4.3.7-5 may not include all events that have occurred throughout the County.



Table 4.3.7-5. Flooding Events between 1950 and 2020 in Pike County

Date of Event	Event Type	Location	FEMA Declaration Number (if applicable)	County Designated?	Losses / Impacts
August 1955	Remnants of Hurricanes Connie and Diane	Countywide	DR-40	No	The remnants of Hurricanes Connie and Diane caused flooding in Pike County as a result of heavy rains. Both storms moved through the area less than one week apart. After a relatively dry summer, the two storms dumped closed to 20 inches of rain over a wide area with some areas receiving more. The results were devastating, particularly along the Lackawaxen and Delaware Rivers and the many streams.
August 1969	Severe Storms and Flooding	Countywide	DR-273	Yes	N/A
June 1972	Remnants of Hurricane Agnes	Countywide	DR-355	No	The remnants of Hurricane Agnes produced very heavy rains across most of Pennsylvania including Pike County. There was some minor flooding within the county.
February 1981	Ice Jams	Matamoras, Westfall	N/A	N/A	A series of ice jams along both the Lackawaxen and Delaware. Rivers caused significant flooding. Significant property damage occurred in Matamoras, Westfall and Lackawaxen and Port Jervis, NY. One Matamoras resident lost her life. Telephone and natural gas service were lost when lines that crossed the Delaware River were taken down or ruptured. (A near repeat occurred in 1982). Residents were eligible for SBA loans to rebuild.
November 27, 1993	Flash/Flash Flood	Eastern Pennsylvania	N/A	N/A	General rainfall totals of 2.50 to 3.50 inches occurred throughout eastern Pennsylvania with numerous locations receiving 4.00 to 5.00 inches.
September 27, 1994	Flash/Flash Flood	Countywide	N/A	N/A	The worst damage was along the Sawkill Creek. Three households along the creek had to be evacuated in Milford.
January 19, 1996	Severe Storms and Flooding / Flash Flood	Countywide	DR-1093	Yes	According to the Pennsylvania State Climatologist, the county had \$23 million in damages from this event.
September 8, 1996	Flash Flood	Milford	N/A	N/A	Serious street flooding was reported in Milford. Also, local law enforcement officials had to rescue 500 to 700 people from the agricultural fairgrounds as flood waters rapidly reached a depth of one to two feet.
May 31-June 2, 1998	Severe Storms, Tornadoes and Flooding	Countywide	DR-1219	Yes	N/A
September 16, 1999	Flood	Countywide	N/A	N/A	Water was seen rushing down hillsides where numerous road washouts were reported.
July 16, 2000	Urban/Small Stream Flood	Countywide	N/A	N/A	Minor flooding was reported in the southern portion of the county due to heavy thunderstorm rains.



Date of Event	Event Type	Location	FEMA Declaration Number (if applicable)	County Designated?	Losses / Impacts
June 26, 2002	Flash Flood	Shohola	N/A	N/A	Localized heavy thunderstorm rains caused numerous road washouts in Shohola Township. A state of emergency was declared in the township due to the washouts and also to trees and wires blocking the roads. According to the Pennsylvania State Climatologist, the county had \$70,000 in damages from this event.
June 21, 2003	Flash Flood	Milford and Dingman Townships	N/A	N/A	State route 739 washed out in Dingman Township. Heavy rain fell during the afternoon into the evening of the 21st. Radar estimated 2 to 3 inches of rain fell. Rain also fell on the 20th making the ground saturated. According to the Pennsylvania State Climatologist, the county had \$20,000 in damages from this event.
May 12, 2004	Flash Flood	Pecks Pond	N/A	N/A	Pecks Pond, Pike County. Flash flood – 2 to 3 feet of water on Route 402.
August 12, 2004	Flash Flood	Shohola	N/A	N/A	Shohola, Pike County. Flash Flood – Numerous road washouts from flash flooding reported in the towns of Shohola, Lackawaxen, Porter, and Blooming Grove. This included the settlements of Lords Valley and Pecks Pond. According to the Pennsylvania State Climatologist, the county had \$1 million in damages from this event.
August 30, 2004	Flash Flood	Milford	N/A	N/A	Heavy rain caused numerous roads to flood just west of Milford. Rainfall amounts were 1.5 to 3 inches. According to the Pennsylvania State Climatologist, the county had \$5,000 in damages from this event.
September 8-9, 2004	Severe Storms and Flooding Associated with Tropical Depression Frances	Countywide	DR-1555	Yes	N/A
September 18, 2004	Flash Flood (Tropical Depression Ivan)	Countywide	DR-1557	Yes	Rainfall amounts were 4 to 7 inches which started on the 16th and continued into the 18th. This rain was from the remnants of hurricane Ivan. Most creeks and streams went out of their banks. In addition, the Delaware and Lackawaxen Rivers had major flooding. About a dozen rescues were performed. Over 100 roads were closed. The entire village of Newfoundland was evacuated. 6 bridges were closed. 2 businesses were closed. According to the Pennsylvania State Climatologist, the county had \$15 million in damages from this event.
April 2, 2005	Severe Storms and Flooding	Pike County and Southern Wayne County	DR-1587	Yes	Lackawaxen River at Hawley rose to its flood stage of 11 feet and crested, which was the fourth highest crest on record. The high crest was partially due to Lake Wallenpaupack making high releases. This was the second highest flood of record and the highest in almost 50 years.



Date of Event	Event Type	Location	FEMA Declaration Number (if applicable)	County Designated?	Losses / Impacts
April 3, 2005	Flash Flood	Countywide	DR-1555	Yes	Storm from the Ohio Valley brought 2 to 4 inches of rain. Rivers and streams already had high flows due to rainstorm and snowmelt. Numerous roads, bridges and buildings were damaged. All streams and creeks were out of their banks. A state of emergency was declared in Matamoras. 100 homes were damaged. 15 homes had damage to the foundations and were condemned.
October 8, 2005	Flash Flood	Southeastern Pike County	N/A	N/A	Streams and creeks went out of their banks. Many roads were closed. 6 to 10 inches of rain fell in this area.
June 28, 2006	Flood	Milford	DR-1649	Yes	Major flooding occurred along the Delaware River from Matamoras, PA and Port Jervis, NY south through the eastern border of Pike County.
March 11, 2011	Flash Flood	Dingmans Ferry	N/A	N/A	Rainfall amounts ranged from 1.5 to 2 inches, with isolated amounts over 3 inches in Pike County resulting in road flooding throughout the County.
August 26-30, 2011 September 3-October 5, 2011	Hurricane Irene Tropical Storm Lee	Countywide	DR-4025 DR-4030	Yes No	<p>Hurricane Irene and Tropical Storm Lee are two recent storm events that impacted Pike County resulting in rainfall and flooding. Hurricane Irene made landfall in the United States on August 27, 2011. It was downgraded to a tropical storm as it headed north and remnants of it affected Pike County with rainfall on August 28th. Tropical Storm Lee developed as a tropical disturbance in the Gulf of Mexico and was a particularly large and slow-moving storm. By the time it reached Pennsylvania, the storm had lost its tropical characteristics and merged with an upper level trough positioned over the eastern third of the US. The storm then stalled over Pennsylvania, bringing rainfall to the region.</p> <p>While both storm events brought rainfall and flooding to Pike County, neither Hurricane Irene nor Tropical Storm Lee resulted in flooding and damages that surpassed other major storm events that have impacted Pike County and resulted in worst case scenarios or record flood levels. According to the Pike County EMA, the results of the two storms were minor in comparison to other storms that have affected the County. Hurricane Irene resulted in more of an impact to Pike County than Tropical Storm Lee. Many homes had flooded basements as a result of sump pump failure from periods of utility interruption during Irene. There were approximately 120 structures which were classified as minor, affected, or inaccessible due to damages resulting from the storm. No homes or businesses were destroyed or suffered major damage that would render the structures inhabitable for an extended period of time. In addition, while there was some damage to municipal roads and some municipal property, no public buildings or treatment facilities were damaged. There were however a few bridges or private</p>



Date of Event	Event Type	Location	FEMA Declaration Number (if applicable)	County Designated?	Losses / Impacts
					culverts that were damaged by Irene. According to the Pike County EMA, there were few, if any reports of damage from Tropical Storm Lee. The rainfall was not as steady as it was with Hurricane Irene. Damages that did occur from Lee were only additional damage to roads that were already damaged by Hurricane Irene.
August 22, 2014	Flash Flood	Lackawaxen	N/A	N/A	Flash flood waters rushed into Woodloch Pines Resort near Hawley. Several parts of the resort were flooded after heavy rains.
August 4, 2020	Flash Flood	Greentown, Lackawaxen	N/A	N/A	Rain and embedded thunderstorms moved through Northeast Pennsylvania on the 4th associated with Tropical Storm Isaias. Widespread rainfall of 3 to 5 inches occurred across the region. Locally heavy rainfall produced areas of flash flooding.

Sources: NOAA-NCEI 2021; FEMA 2021; Pike County HMP 2012; Pennsylvania State Climatologist 2016

DR Federal Disaster Declaration
EM Emergency Management
EMA Emergency Management Agency
FEMA Federal Emergency Management Agency
NCEI National Centers for Environmental Information

NOAA National Oceanic Atmospheric Administration
N/A Not applicable / not available
SBA Small Business Administration
US United States



Ice jams are a frequent occurrence on the Delaware River near Pike County and on the Lackawaxen River. Based on review of the CRREL database and recording of several events in news articles, Table 4.3.7-6 lists the ice-jam events that have occurred in or near the County between 1780 and 2021. 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 Pike County. Information regarding losses associated with these reported ice jams was limited.

Table 4.3.7-6. Ice Jam Events in Pike County between 1780 and 2021

City (Additional Geographic Identifier)	River	Jam Date	Water Year	Gage Number	Impact
Shohola	Shohola Creek	February 26, 1926	1926	1432500	Discharge 800 cfs affected by ice
Bushkill	Delaware River	February 5, 1970	1970	Unknown	An ice jam was reported on the Delaware River two miles north of Bushkill. The water level rose 10 feet above normal, but no flooding had occurred.
Matamoras	Delaware River	January 1, 1981	1981	Unknown	A midwinter ice jam was reported at Port Jervis followed by the spring break-up, causing flooding in Matamoras
Matamoras	Delaware River, Lackawaxen River	February 15, 1981	1981	Unknown	An ice jam and heavy rain event led to the evacuation of 4,000 people. In Matamoras, 44 businesses and 400 homes were damaged. A woman's body was found outside her home after she drowned from this event. This event also impacted Port Jervis in New York State. The flooding caused \$3.5 million in damages.
Dingman's Ferry to Milford	Delaware River	February 1988	1988	-	In February of 1988, a 10-mile ice jam was reported on the Delaware River stretching from Dingmans Ferry to just north of Milford. Backwater flooding occurred just north of the ice jam.
Milford	Delaware River	January 1999	1999	-	In January of 1999, an ice jam that formed in New York moved down the Delaware River and lodged south of Milford. It resulted in minor flooding.

Source: CRREL 2021; New York Times 1981; The Morning Call 1988; The Morning Call 1999

Notes:

Although events were reported for Pike 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

4.3.8.5 Future Occurrence

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) 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 one-percent annual chance flood is a flood which has a one percent chance of occurring over a given year. The DFIRMs identify areas subject to the 1- and 0.2-percent-annual-chance flooding. Areas subject to 2- 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 4.3.7-7 shows a range of flood recurrence intervals and associated probabilities of occurrence.



Table 4.3.7-7. 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

Source: Pike County HMP 2012

Based on the historic and more recent flood events in Pike County, it is clear that the County has a high probability of flooding for the future. The fact that the elements required for flooding exist and that major flooding has occurred throughout the County in the past, whether major or minor, suggests that many people and properties are at risk from the flood hazard in the future.

For the 2022 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of flooding events for Pike 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 2021. 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 33.33-percent chance of flood event occurring in any given year in Pike County.

Table 4.3.7-8. Probability of Future Flooding Events

Hazard Type	Number of Occurrences Between 1950 and 2021	Percent chance of occurrence in any given year
Flash Flood	13	18.06%
Flood	5	6.94%
Ice Jam	6	8.33%
Total	24	33.33%

Sources: NOAA-NCEI 2021; CRREL 2021; Pennsylvania State Climatologist 2016; The Morning Call, 1988; The Morning Call, 1999

It is estimated that Pike County will continue to experience direct and indirect impacts of flooding events annually that may induce secondary hazards such as coastal erosion, storm surge in coastal areas, 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 Pike County has been adjusted and characterized as *highly likely*, when taking into consideration flash flooding, as defined by the Risk Factor Methodology probability criteria (see Table 4.4-1).



4.3.8.6 Vulnerability Assessment

To understand risk, a community must evaluate the assets exposed or vulnerable within the identified hazard area. For the flood hazard, the 1-percent (100-year) and 0.2-percent (500-year) annual chance flood events are examined. The following sections evaluate and estimate potential impact of flooding in Pike County, presenting:

- Overview of vulnerability
- Data and methodology used for the evaluation
- Impact on (1) life, health, and safety; (2) general building stock and critical facilities; (4) the economy; (5) the environment; and (6) future growth and development
- Effects of climate change on vulnerability

Overview of Vulnerability

Flood is a significant concern for Pike County. To assess risk, exposures to the 1-percent and 0.2-percent annual chance flood events were examined, and potential losses were calculated for the 1- percent annual chance flood event. The flood hazard exposure and loss estimate analysis is presented below.

Data and Methodology

The 1-percent and 0.2-percent annual chance flood events were examined to evaluate Pike County's risk from and vulnerability to the flood hazard. Polygons representing the 1-percent and 0.2-percent annual chance events from the DFIRM dated October 2000 were used to estimate exposure. Figure 4.3.7-3 shown earlier in this section illustrates the flood boundaries used for this vulnerability assessment. A 1-percent annual chance flood depth grid was generated for use in HAZUS-MH 3.1 to estimate potential losses within the County. The DFIRM data from 2000 and elevation data from the County were used to develop the depth grid.

The version of the HAZUS-MH model applied to conduct Pike County's vulnerability assessment uses 2010 U.S. Census demographic data. Pike County's current spatial data do not support a countywide HAZUS-MH general building stock update at this time; therefore, the dasymetric census block configuration from HAZUS-MH was used.

To estimate exposure to the building stock, default dasymetric building stock data from HAZUS-MH 3.1 was used for replacement cost value and number of structures within the hazard area. Data from HAZUS-MH are at the census block level and are calculated by use of 2014 RS Means valuations.

Impact on Life, Health, and Safety

Impacts of flooding on life, health, and safety depend on several factors including severity of the event and whether or not adequate warning time is provided to residents. Assumedly, 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 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); the degree of that impact varies and is not strictly measurable.

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. Molds 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 (Centers for Disease Control and Prevention [CDC] 2015).

Molds and mildews are not the only public health risk associated with flooding. Floodwaters 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-MH are not equipped to measure public health impacts. The best level of mitigation for these impacts is to be aware that they can occur, educate the public on prevention, and be prepared to deal with these vulnerabilities in responding to flood events.

To estimate the population exposed to the 1-percent annual chance flood event, the FEMA DFIRM floodplain boundaries were overlaid upon the Census Block 2010 boundaries and 2019 ACS data in Geographic Information Systems (GIS). Please note that the 2020 Census was not available during the planning process; therefore, 2010 Census and 2019 ACS statistics were used for this plan update. Census blocks are not consistent with boundaries of the floodplain, and gross overestimate or underestimate of exposed population can occur via use of the centroid or intersect of the Census block with these zones. Limitations of these analyses are recognized, and thus results are used only to provide a general estimate.

The 2010 Census blocks with their centroids located in the flood boundaries were used to calculate the estimated population exposed to this hazard. Table 4.3.7-9 lists the estimated population located within the 1-percent annual chance flood zone by municipality. Use of this approach resulted in an estimate of 1,749 people within the 1-percent annual chance floodplain (3.2 percent), and 3,894 people within the 0.2-percent annual chance floodplain (7.0 percent)

Table 4.3.7-9. Estimated Pike County Population Exposed to the 1- and 0.2-Percent Flood Hazard (2019 ACS)

Municipality	Total Population	1-Percent Annual Chance Event		0.2-Percent Annual Chance Event	
		Population in Hazard Area	Percent Population in Boundary	Population in Hazard Area	Percent Population in Boundary
Blooming Grove Township	4,645	69	1.5%	69	1.5%
Delaware Township	7,063	43	0.6%	43	0.6%



Municipality	Total Population	1-Percent Annual Chance Event		0.2-Percent Annual Chance Event	
		Population in Hazard Area	Percent Population in Boundary	Population in Hazard Area	Percent Population in Boundary
Dingman Township	11,619	302	2.6%	303	2.6%
Greene Township	3,825	182	4.8%	182	4.8%
Lackawaxen Township	5,020	95	1.9%	95	1.9%
Lehman Township	10,183	292	2.9%	292	2.9%
Matamoras Borough	2,336	62	2.6%	1,798	77.0%
Milford Borough	1,172	81	6.9%	84	7.2%
Milford Township	1,329	41	3.1%	43	3.2%
Palmyra Township	3,215	73	2.3%	73	2.3%
Porter Township	400	41	10.2%	41	10.2%
Shohola Township	2,133	45	2.1%	46	2.1%
Westfall Township	2,513	425	16.9%	826	32.9%
Pike County (Total)	55,453	1,749	3.2%	3,894	7.0%

Sources: U.S. Census 2010, ACS 2019; FEMA 2000

Note: At the time of the vulnerability assessment, the 2020 U.S. Census data was not available. Therefore, the 2010 U.S. Census and the 2019 American Community Survey (ACS) population estimates were used for this plan update.

% Percent

The table above shows Westfall Township has the largest portion of its population within the 1-percent annual chance event floodplain—16.9 percent of the population, while Matamoras Borough has the largest population within 0.2-percent annual chance events; 77.0 percent of its population is exposed. For this project, potential population exposed is used as a guide for planning purposes.

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.

Using 2010 U.S. Census data, HAZUS-MH 3.1 estimates potential sheltering needs based on a 1-percent annual chance flood event. During the 1-percent flood event, HAZUS-MH 3.1 estimates 1,865 households will be displaced, and 854 people will seek short-term sheltering, representing 1.5 percent of the Pike County population seeking short-term shelter. These statistics, by municipality, are listed in Table 4.3.7-10. The estimated displaced population and number of persons seeking short-term sheltering differ from the number of persons exposed to the 1-percent annual chance flood (Table 4.3.7-10), 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 4.3.7-10. Estimated Population Displaced or Seeking Short-Term Shelter from the 1-Percent Annual Chance Flood Event

Municipality	Total Population (2010 U.S. Census)	1-Percent Annual Chance Event	
		Displaced Households	Persons Seeking Short-Term Sheltering
Blooming Grove Township	4,819	52	2



Municipality	Total Population (2010 U.S. Census)	1-Percent Annual Chance Event	
		Displaced Households	Persons Seeking Short-Term Sheltering
Delaware Township	7,396	52	14
Dingman Township	11,926	216	31
Greene Township	3,956	118	18
Lackawaxen Township	4,994	141	16
Lehman Township	10,663	278	184
Matamoras Borough	2,469	224	130
Milford Borough	1,021	127	62
Milford Township	1,530	53	25
Palmyra Township	3,312	36	5
Porter Township	485	16	0
Shohola Township	2,475	81	8
Westfall Township	2,323	471	359
Pike County (Total)	57,369	1,865	854

Source: HAZUS-MH 3.1

Note: The population displaced and seeking shelter was calculated using 2010 U.S. Census data. At the time of the vulnerability assessment, the 2020 U.S. Census data was not available. Therefore, the 2010 U.S. Census was used for this plan update.

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 Strategies) of this Plan.

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.

To estimate replacement cost value exposure and number of structures in the hazard area, default dasymetric building stock data from HAZUS-MH 3.1 were used. Replacement cost values of the dasymetric Census blocks with their centroids in the floodplain were totaled. Table 4.3.7-11 lists building stock exposure per municipality, and Table 4.3.7-12 lists number of exposed structures per watershed.

In total, 519 structures, or 1.4-percent of the building stock, are within the 1-percent annual chance flood zone; and 1,727 structures, or 4.5-percent of the building stock, are within the 0.2-percent flood zone. Approximately \$189 million of building/contents are within the 1-percent annual chance flood zone in Pike County. This represents approximately 1.4-percent of the County's total general building stock replacement value inventory (\$13 billion). Also,



an estimated \$658 million of building/contents is within the 0.2-percent annual chance flood zone (5.0-percent of the County's total).

As discussed in the Methodology section, Pike County's current spatial data did not support a countywide HAZUS-MH general building stock update. Therefore, the HAZUS-MH flood model estimated potential damages to buildings in Pike County using the dasymetric dataset. Development of the dasymetric dataset involved removing homogeneous undeveloped areas (such as areas covered by bodies of water, parks, or forests) from the Census blocks. Cumulative building exposure is distributed only in developed sub-Census Block areas. As a result, more accurate flood loss determinations were produced using this dataset. Potential damage estimated to the Pike County general building stock inventory associated with the 1-percent annual chance flood exceeds \$2.9 billion. Building stock potential loss estimates per municipality are listed in Table 4.3.7-13.

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Table 4.3.7-11. Estimated General Building Stock Exposure to the 1-Percent Annual Chance Flood Event

Municipality	Total # Housing Units	Total RCV (Structure and Contents)	Total (All Occupancies)							
			1-Percent Annual Chance Event				0.2-Percent Annual Chance Event			
			# Units	% Total	Total RCV (Structure and Contents)	% Total	# Units	% Total	Total RCV (Structure and Contents)	% Total
Blooming Grove Township	3,998	\$1,160,095,000	22	<1%	\$4,649,000	<1%	22	<1%	\$4,649,000	<1%
Delaware Township	4,253	\$1,496,677,000	11	<1%	\$4,622,000	<1%	11	<1%	\$4,622,000	<1%
Dingman Township	5,480	\$1,984,820,000	223	4.1%	\$78,611,000	4.0%	223	4.1%	\$78,611,000	4.0%
Greene Township	3,275	\$956,640,000	72	2.2%	\$18,329,000	1.9%	72	2.2%	\$18,329,000	1.9%
Lackawaxen Township	4,562	\$1,231,170,000	5	<1%	\$1,590,000	<1%	5	<1%	\$1,590,000	<1%
Lehman Township	5,995	\$1,992,003,000	5	<1%	\$1,538,000	<1%	5	<1%	\$1,538,000	<1%
Matamoras Borough	972	\$377,318,000	6	<1%	\$1,882,000	<1%	781	80.3%	\$304,862,000	80.8%
Milford Borough	718	\$413,430,000	14	1.9%	\$6,256,000	1.5%	14	1.9%	\$6,256,000	1.5%
Milford Township	784	\$670,787,000	7	<1%	\$3,150,000	<1%	7	<1%	\$3,150,000	<1%
Palmyra Township	3,981	\$1,244,483,000	4	<1%	\$1,272,000	<1%	4	<1%	\$1,272,000	<1%
Porter Township	912	\$388,599,000	93	10.2%	\$38,300,000	9.9%	93	10.2%	\$38,300,000	9.9%
Shohola Township	2,311	\$759,299,000	46	2.0%	\$13,378,000	1.8%	46	2.0%	\$13,378,000	1.8%
Westfall Township	1,175	\$383,781,000	11	<1%	\$15,013,000	3.9%	444	37.8%	\$181,394,000	47.3%
Pike County (Total)	38,416	\$13,059,102,000	519	1.4%	\$188,590,000	1.4%	1,727	4.5%	\$657,951,000	5.0%

Source: HAZUS-MH 3.1; FEMA 2000

Notes:

% Percent

RCV Replacement cost value (structure and contents)



Table 4.3.7-12. Estimated General Building Stock Exposure by Watershed to the 1- and 0.2-Percent Annual Chance Flood Events

Watershed	Total Number of Housing Units	1% Annual Chance Flood Boundary		0.2% Annual Chance Flood Boundary	
		Number of Units	% of Total	Number of Units	% of Total
Brodhead Creek	192	0	0.0%	0	0.0%
Bushkill Creek	6,788	98	1.4%	98	1.4%
Delaware River	15,273	193	1.3%	1,401	9.2%
Lackawaxen River	2,781	27	1.0%	27	1.0%
Sawkill Creek	2,139	30	1.4%	30	1.4%
Shohola Creek	4,484	95	2.1%	95	2.1%
Wallenpaupack Creek	6,759	76	1.1%	76	1.1%
Pike County (Total)	38,416	519	1.4%	1,727	4.5%

Source: FEMA 2000, Eastern Pennsylvania Coalition for Abandoned Mine Reclamation (EPCAMR) 2014; HAZUS-MH 3.1



Table 4.3.7-13. Estimated General Building Stock Potential Loss to the 1-Percent Annual Chance Flood Event

Municipality	Total Replacement Cost Value	1% Annual Chance Event							
		All Occupancies		Residential		Commercial		Industrial, Religious, Education and Government	
		Estimated Loss	% of Total	Estimated Loss	% of Total	Estimated Loss	% of Total	Estimated Loss	% of Total
Blooming Grove Township	\$1,160,095,000	\$114,611	<1%	\$105,249	<1%	\$5,528	<1%	\$3,834	<1%
Delaware Township	\$1,496,677,000	\$135,830	<1%	\$131,741	<1%	\$2,848	<1%	\$1,241	<1%
Dingman Township	\$1,984,820,000	\$538,317	<1%	\$510,619	<1%	\$22,209	<1%	\$5,489	<1%
Greene Township	\$956,640,000	\$388,458	<1%	\$374,412	<1%	\$8,882	<1%	\$5,164	<1%
Lackawaxen Township	\$1,231,170,000	\$340,619	<1%	\$330,303	<1%	\$6,884	<1%	\$3,432	<1%
Lehman Township	\$1,992,003,000	\$462,309	<1%	\$444,218	<1%	\$14,144	<1%	\$3,947	<1%
Matamoras Borough	\$377,318,000	\$73,740	<1%	\$56,103	<1%	\$15,989	<1%	\$1,648	<1%
Milford Borough	\$413,430,000	\$95,052	<1%	\$51,230	<1%	\$32,096	<1%	\$11,726	<1%
Milford Township	\$670,787,000	\$75,168	<1%	\$67,705	<1%	\$4,222	<1%	\$3,241	<1%
Palmyra Township	\$1,244,483,000	\$286,405	<1%	\$285,121	<1%	\$480	<1%	\$804	<1%
Porter Township	\$388,599,000	\$179,652	<1%	\$176,133	<1%	\$2,173	<1%	\$1,346	<1%
Shohola Township	\$759,299,000	\$262,190	<1%	\$198,864	<1%	\$29,110	<1%	\$34,216	<1%
Westfall Township	\$383,781,000	\$305,954	<1%	\$223,545	<1%	\$70,659	<1%	\$11,750	<1%
Pike County (Total)	\$13,059,102,000	\$3,258,305	<1%	\$2,955,243	<1%	\$215,224	<1%	\$87,838	<1%

Source: HAZUS-MH 3.1

Note: % Percent



To further enhance the risk assessment, FEMA Region III provided the total exposure in the floodplain (TEIF) for Pike County. This data utilizes best available data including the 2010 U.S. Census geography and 2012 RS Means valuations. This data is used in lieu of the average annualized loss study. This data indicates the total exposure in the floodplain for Pike County is \$397,925,522. Table 4.3.7-14 below lists the TEIF for each municipality.

Table 4.3.7-14. 2010 TEIF Results by Municipality for Pike County

Municipality	TEIF 2010
Blooming Grove Township	\$23,968,400
Delaware Township	\$26,087,021
Dingman Township	\$58,050,910
Greene Township	\$32,241,499
Lackawaxen Township	\$20,740,483
Lehman Township	\$87,273,241
Matamoras Borough	\$6,317,334
Milford Borough	\$12,391,436
Milford Township	\$9,699,122
Palmyra Township	\$29,460,299
Porter Township	\$27,608,216
Shohola Township	\$13,933,447
Westfall Township	\$50,154,115
Pike County (Total)	\$397,925,522

Source: FEMA Region III

NFIP Statistics

In addition to total building stock modeling, individual data available regarding flood policies, claims, repetitive loss (RL) properties, and severe repetitive loss (SRL) properties were analyzed. According to section 1361A of the National Flood Insurance Act (NFIA), as amended, 42 *United States Code* (U.S.C.) 4102a, the definition of an 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 of these claims payments exceeding \$20,000
- At least two separate claims payments (building payments only), with the cumulative amount of the building portion of these claims payments exceeding the market value of the building.

Moreover, for both of the 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 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.

Pike County has 30 RL and 2 SRL properties spread across 6 municipalities. Table 4.3.7-15 categorizes numbers of RL properties by municipality and by occupancy class (non-residential or residential).



Table 4.3.7-15. Summary of Repetitive Loss Properties by Municipality

Municipality	Repetitive Loss Properties				
	2-4 Family	Assumed Condo	Non Residential	Other Residential	Single Family
Blooming Grove Township	0	0	0	0	0
Delaware Township	0	0	0	0	0
Dingman Township	0	0	0	0	1
Greene Township	0	0	0	0	0
Lackawaxen Township	0	0	0	0	2
Lehman Township	0	0	0	0	2
Matamoras Borough	0	0	0	0	5
Milford Borough	0	0	0	0	0
Milford Township	0	0	0	0	0
Palmyra Township	0	0	0	0	0
Porter Township	0	0	1	0	1
Shohola Township	0	0	0	0	0
Westfall Township	0	0	2	0	17
Pike County (Total)	0	0	3	0	28

Source: FEMA 2021

Table 4.3.7-16 summarizes NFIP policies and claims for Pike County as of July 31, 2021.

Table 4.3.7-16. NFIP Policies, Claims, and Repetitive Loss Statistics

Municipality	# Policies	# Claims (Losses)	# Repetitive Loss Properties	Total Loss Payments
Blooming Grove Township	7	2	0	\$40,387
Delaware Township	6	4	0	\$10,611
Dingman Township	19	12	1 RL	\$71,415
Greene Township	16	0	0	\$0
Lackawaxen Township	30	20	2 RL	\$558,100
Lehman Township	19	12	2 RL	\$47,562
Matamoras Borough	48	51	4 RL	\$13,717,300
Milford Borough	5	5	0	\$-*
Milford Township	9	6	0	\$43,149
Palmyra Township	7	1	0	\$3,785
Porter Township	1	7	2 RL	\$22,280
Shohola Township	9	4	0	\$5,777
Westfall Township	101	76	18 RL / 1 SRL	\$1,389,714
Pike County (Total)	277	200	29 RL / 1 SRL	\$15,910,080

Source: FEMA 2021a; FEMA 2021b

Notes: *data unavailable from FEMA

(1) Policies, claims, RL, and SRL statistics provided by FEMA, and are current as of July 31, 2021. Communities with SRL properties are noted in the column. The number of claims represents claims closed by July 31, 2021.

(2) Total building and content loss information was collected from the claims file provided by FEMA

FEMA Federal Emergency Management Agency

RL Repetitive loss



SRL Severe repetitive loss

Impact on Critical Facilities

In addition to consideration of general building stock at risk, risk of flood to critical facilities and utilities was evaluated. HAZUS-MH was used to estimate potential for flood loss to critical facilities exposed to the flood risk. Using depth/damage function curves, HAZUS estimates percent of damage to building and contents of critical facilities. HAZUS-MH estimates that few emergency and utility facilities within the County would be nonfunctional for more than 1 day, and most would undergo relatively minimal damages.

To address impacts on short-term functionality of critical facilities and utilities by a hazard during a disaster event, other facilities of neighboring municipalities may have to increase support response functions. Mitigation planning should consider means to reduce impacts on critical facilities and utilities and ensure that sufficient emergency and school services remain functional when a significant event occurs. Actions addressing shared services agreements are included in Section 6 (Mitigation Strategy) of this Plan.

Table 4.3.7-17 lists critical facilities and utilities within the 1-percent annual change flood boundary. Table 4.3.7-18 lists critical facilities and utilities within the 0.2 percent annual change flood boundary.

Table 4.3.7-17. Critical Facilities and Utilities Within the 1-Percent Annual Chance Flood Boundary

Municipality	Facility Types		
	Fire Station	Nursing Home	Shelter
Blooming Grove Township	0	0	0
Delaware Township	0	0	0
Dingman Township	0	0	1
Greene Township	0	0	0
Lackawaxen Township	0	0	0
Lehman Township	0	0	1
Matamoras Borough	0	0	0
Milford Borough	0	0	0
Milford Township	0	0	0
Palmyra Township	0	0	0
Porter Township	0	0	0
Shohola Township	0	0	0
Westfall Township	1	1	1
Pike County (Total)	1	1	3

Source: Pike County 2021, FEMA 2000



Table 4.3.7-18. Critical Facilities and Utilities Within the 0.2-Percent Annual Chance Flood Boundary

Municipality	Number of Critical Facilities Located in the 0.2-Percent Annual Chance Flood Event								
	Central Water Facility	Day Care	Fire	Municipal Building	Nursing Home	Police	School	Shelter	Wastewater
Blooming Grove Township	0	0	0	0	0	0	0	0	0
Delaware Township	0	0	0	0	0	0	0	0	0
Dingman Township	0	0	0	0	0	0	0	1	0
Greene Township	0	0	0	0	0	0	0	0	0
Lackawaxen Township	0	0	0	0	0	0	0	0	0
Lehman Township	0	0	0	0	0	0	0	1	0
Matamoras Borough	1	1	0	1	0	1	1	0	0
Milford Borough	0	0	0	0	0	0	0	0	0
Milford Township	0	0	0	0	0	0	0	0	0
Palmyra Township	0	0	0	0	0	0	0	0	0
Porter Township	0	0	0	0	0	0	0	0	0
Shohola Township	0	0	0	0	0	0	0	0	0
Westfall Township	0	0	1	1	3	0	0	1	1
Pike County (Total)	1	1	1	2	3	1	1	3	1

Source: Pike County 2021, FEMA 2000

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 damages, agricultural losses, business interruption, and impacts on tourism and tax base within Pike County. Damages to general building stock can be quantified by use of HAZUS-MH 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. For the purposes of this analysis, general building stock damages are discussed further.

Flooding can cause extensive damage to public utilities and disruptions in delivery of services. Loss of power and communications may occur, and drinking water and wastewater treatment facilities may be temporarily out of operation. Flooded streets and road blocks make it difficult for emergency vehicles to respond to calls for service. Floodwaters can wash out sections of roadway and bridges.

Direct building losses are estimated costs to repair or replace damage caused to buildings. Estimated potential damage to general building stock inventory associated with the 1-percent flood is approximately \$190 million, which represents 1.4 percent of **the County's** overall total general building stock inventory. These dollar value losses from the County's total building inventory replacement value, in addition to damages to roadways and infrastructure, would impact the local economy.

HAZUS-MH 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 4.3.7-19 summarizes the debris HAZUS-MH 3.1 estimates to result from a 1-percent annual chance flood event—32,000+ 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 4.3.7-19. Estimated Debris Generated from the 1-Percent Annual Chance Flood Event

Municipality	1% Flood Event			
	Total (tons)	Finish (tons)	Structure (tons)	Foundation (tons)
Blooming Grove Township	520	103	229	188
Delaware Township	23	12	6	5
Dingman Township	518	85	258	174
Greene Township	1,309	308	529	472
Lackawaxen Township	1,839	358	818	664
Lehman Township	536	288	138	111
Matamoras Borough	6,407	1,068	2,945	2,393
Milford Borough	5,241	959	2,546	1,736
Milford Township	392	74	172	146
Palmyra Township	86	18	38	30
Porter Township	99	95	1	3
Shohola Township	2,160	386	962	812
Westfall Township	13,046	2,221	6,412	4,413
Pike County (Total)	32,175	5,975	15,053	11,147

Source: HAZUS-MH 3.1

Impact on the Environment

As discussed, floodplains serve beneficial and natural functions on ecological/environmental, social, and economic levels. Areas in the floodplain that typically provide these natural functions and benefits are wetlands, riparian areas, sensitive areas, and habitats for rare and endangered species. Floods, however, can also lead to negative impacts on the environment. Loss of riparian buffers, land use change within a watershed, and introduction of non-natural contaminants may be environmental issues when floods occur (Montz and Tobin 1997, Rubin 2013).

To determine exposure of natural and beneficial land in Pike County to the flood hazard, acreages of wetlands and forested land were calculated. Table 4.3.7-20 lists results of these calculations.

Table 4.3.7-20. Acreage of Natural and Beneficial Land Within the Floodplain

	Area in the 1-Percent Annual Chance Floodplain (acres)	Area in the 0.2-Percent Annual Chance Floodplain (acres)
Wetlands	15,649	15,664
Forest	10,020	10,274

Sources: USGS National Land Cover Data (NLCD) 2014, FEMA 2000

The basic environmental impact of major flooding is morphological, and shape of a river valley is often determined more by a catastrophic event than a long, gradual, methodical process. This is a primary factor in formation of natural habitat for flora and fauna and may influence habitats beyond the river corridor (Hickey and Salas 1995).



Flooding can cause a wide range of environmental impacts including but not limited to erosion and loss of vegetation and habitats. These in turn may lead to decreased protection of the waterbody from adjacent land uses, and to degraded water quality. Moreover, floods may generate large amounts of tree and construction debris, disperse household hazardous waste into the fluvial system, and contaminate water supplies and wildlife habitats with extremely toxic substances. Floods of greater depth are likely to result in greater environmental damage than floods of lesser depth. Long-duration floods could exacerbate environmental problems because cleanup likely would be delayed and contaminants could remain in the environment for a longer period of time. Cleanup after a flood raises additional environmental concerns. The volume of debris to be collected, the extent to which public utilities (water supply systems and sewer operations) have been damaged, and the quantity of agricultural and industrial pollutants entering water bodies might present additional issues (Montz and Tobin 1997, Rubin 2013).

Future Growth and Development

As discussed in Section 2, areas targeted for future growth and development have been identified across the County. Any areas of growth could be impacted by the flood hazard if within identified hazard areas. The County intends to discourage development within vulnerable areas and to encourage higher regulatory standards on the local level.

Effect of Climate Change on Vulnerability

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 prevalence and severity of extremes such as flood events. While predicting changes of 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 (U.S. Environmental Protection Agency [EPA] 2006).

PADEP was directed by the Climate Change Act (Act 70 of 2008) to initiate a study of potential impacts of global climate **change on the Commonwealth. The June 2009 Pennsylvania Climate Impact Assessment's main findings** indicate that Pennsylvania is very likely to undergo increased temperatures in the 21st century. 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 due to 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 (Shortle et al. 2009).



4.3 Hazard Profiles

4.3.8 Hurricane, Tropical Storm, and Nor'Easter

The following section provides the hazard profile (hazard description, location, extent, previous occurrences and losses, probability of future occurrences, and impact of climate change) and vulnerability assessment for the **hurricane, tropical storm and Nor'Easter hazard in Pike County**.

Hurricanes and Tropical Storm

A tropical cyclone is a rotating, organized system of clouds and thunderstorms that originates over tropical or sub-tropical waters and has a closed low-level circulation. Tropical depressions, tropical storms, and hurricanes are all considered tropical cyclones. These storms rotate counterclockwise around the center in the northern hemisphere and are accompanied by heavy rain and strong winds (NWS 2013a). Almost all tropical storms and hurricanes in the Atlantic basin (which includes the Gulf of Mexico and Caribbean Sea) form between June 1 and November 30 (hurricane season). August and September are peak months for hurricane development (NOAA 2013a). Over a two-year period, the U.S. coastline is struck by an average of three hurricanes, one of which is classified as a major hurricane. Hurricanes, tropical storms, and tropical depressions pose a threat to life and property. These storms bring heavy rain, storm surge, and flooding (NOAA 2013b).

A tropical storm system is characterized by a low-pressure center and numerous thunderstorms that produce strong winds and heavy rain (winds are at a lower speed than hurricane-force winds, therefore categorized as a tropical storm instead of a hurricane). Tropical storms strengthen when water evaporated from the ocean is released as the saturated air rises, resulting in condensation of water vapor contained in the moist air. They are fueled by a different heat mechanism than other cyclonic windstorms such as **Nor'Easters** and polar lows. The characteristic that separates tropical cyclones from other cyclonic systems is that at any height in the atmosphere, the center of a tropical cyclone will **be warmer than its surroundings; a phenomenon called "warm core" storm systems** (NOAA 2013b).

A hurricane is a tropical storm that attains hurricane status when its wind speed reaches 74 or more miles per hour (mph). Tropical systems may develop in the Atlantic between the Lesser Antilles and the African coast, or may develop in the warm tropical waters of the Caribbean and Gulf of Mexico. These storms may move up the Atlantic Coast of the United States and impact the Eastern Seaboard, or move into the United States through the states along the Gulf Coast, bringing wind and rain as far north as New England, before moving offshore and heading east.

Nor'Easters

A Nor'Easter is a cyclonic storm that moves along the East Coast of North America. It is called a Nor'Easter because the damaging winds over coastal areas blow from a northeasterly direction. Nor'Easters can occur any time of the year, but are most frequent and strongest between September and April. These storms usually develop between Georgia and New Jersey within 100 miles of the coastline and typically move from southwest to northeast along the Atlantic Coast of the United States (NOAA 2013b).



In order to be called a Nor'Easter, a storm must have the following conditions, as per the Northeast Regional Climate Center (NRCC):

- Must persist for at least a 12-hour period
- Have a closed circulation
- Be located within the quadrilateral bounded at 45°N by 65°W and 70°W and at 30°N by 85°W and 75°W
- Show general movement from the south-southwest to the north-northeast
- Contain wind speeds greater than 23 miles per hour (mph)

A **Nor'Easter event can cause storm surges, waves, heavy rain, heavy snow, wind, and coastal flooding.** Nor'Easters have diameters that can span 1,200 miles, impacting large areas of coastline. **The forward speed of a Nor'Easter is usually much slower than a hurricane, so with the slower speed, a Nor'Easter can linger for days and cause tremendous damage to those areas impacted.** Approximately 20 to 40 **Nor'Easters** occur in the northeastern United States every year, with at least two considered severe (Storm Solution, 2014). The intensity of a **Nor'Easter can rival that of a tropical cyclone in that, on occasion, it may flow or stall off the mid-Atlantic coast resulting in prolonged episodes of precipitation, coastal flooding, and high winds.**

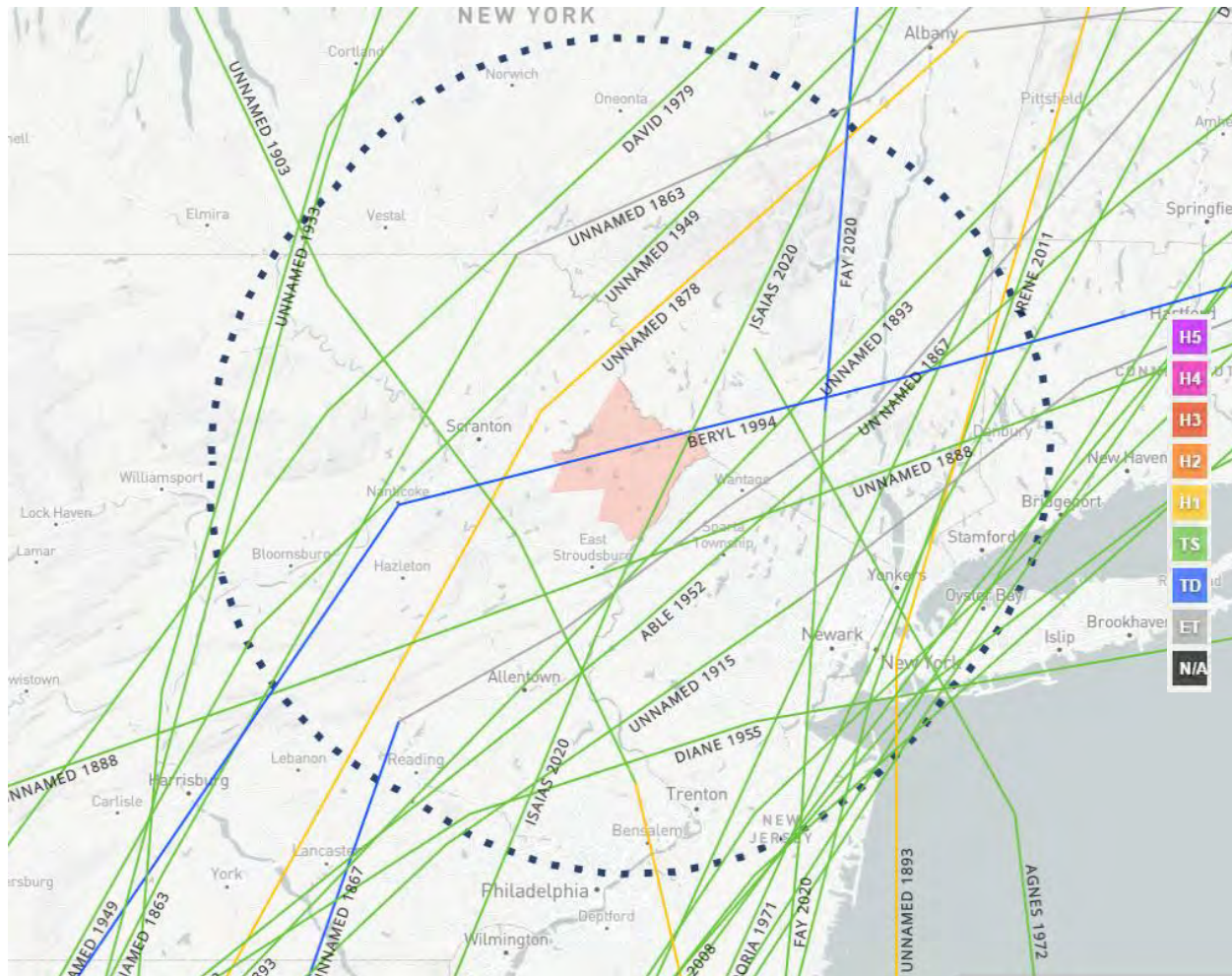
4.3.8.2 Location and Extent

While Pike County is not located **along the Atlantic Coast, hurricanes, tropical storms and Nor'Easters can track inland, bringing heavy rainfall, snow and strong winds.** These storms are regional events that can impact very large areas hundreds to thousands of miles across over the life the storm. Therefore, all communities within Pike County are equally subject to the impacts of **hurricanes, tropical storms, and Nor'Easters.** Areas in Pike County which are subject to flooding, wind, and winter storm damage are particularly vulnerable.

Tropical Storm and Hurricane Tracks

The National Oceanic and Atmospheric Administration's (NOAA) Historical Hurricane Tracks tool is a public interactive mapping application that displays Atlantic Basin and East-Central Pacific Basin tropical cyclone data. This interactive tool catalogs tropical cyclones that have occurred from 1842 to 2021 (latest date available from data source). Between 1842 and 2021, 27 events classified as either a hurricane, tropical storm, or tropical depression tracked within 65 nautical miles of Pike County. Figure 4.3.8-1 displays tropical cyclone tracks for Pike County that tracked within 65 nautical miles between 1861 and 2021 (27 events). Please note that this figure does not show Tropical Storm Irene or Lee because those storms did not pass within 65 nautical miles of Pike County. Nor does it show Hurricane Sandy, as that storm system was classified as an **"Extratropical" system, not as a tropical depression, tropical storm, or hurricane, when it passed through the region.** However, these and other events severely impacted **the county with strong winds, power outages, and other damage. Refer to the "Previous Events and Losses" section for further information regarding hurricane and tropical storm events that impacted Pike County.**

Figure 4.3.8-1. Historical Tropical Storm and Hurricane Tracks 1861 to 2021



Source: NOAA 2021

The National Weather Service (NWS) issues hurricane and tropical storm watches and warnings. These watches and warnings are issued or will remain in effect after a tropical cyclone becomes post-tropical, when such a storm poses a significant threat to life and property. The NWS allows the National Hurricane Center (NHC) to issue advisories during the post-tropical stage. The following are the definitions of the watches and warnings:

- *Hurricane/Typhoon Warning* is issued when sustained winds of 74 mph or higher are expected somewhere within the specified area in association with a tropical, subtropical, or post-tropical cyclone. Because hurricane preparedness activities become difficult once winds reach tropical storm force, the warning is issued 36 hours in advance of the anticipated onset of tropical storm-force winds. The warning can remain in effect when dangerously high water or combination of dangerously high water and waves continue, even though winds may be less than hurricane force.
- *Hurricane Watch* is issued when sustained winds of 74 mph or higher are possible within the specified area in association with a tropical, subtropical, or post-tropical cyclone. Because hurricane preparedness activities



become difficult once winds reach tropical storm force, the hurricane watch is issued 48 hours prior to the anticipated onset of tropical storm-force winds.

- *Tropical Storm Warning* is issued when sustained winds of 39 to 73 mph are expected somewhere within the specified area within 36 hours in association with a tropical, subtropical, or post-tropical storm.
- *Tropical Storm Watch* is issued when sustained winds of 39 to 73 mph are possible within the specified area within 48 hours in association with a tropical, sub-tropical, or post-tropical storm (NWS 2013b).

Nor'Easters

Nor'Easters are typically regional events, with most events impacting a large area of Pennsylvania. In many cases, surrounding states and even the northeast region of the United States can be affected by a single event. Coastal communities and other low-lying areas are particularly vulnerable to Nor'Easters. With Pike County's proximity to the Delaware River and the Atlantic Ocean, the county is exposed to the direct and indirect impacts of Nor'Easter events.

4.3.8.3 Range of Magnitude

The following provides details regarding the range of magnitude for hurricanes, tropical storms, and Nor'Easters.

Hurricane and Tropical Storm

The extent of a hurricane is categorized in accordance with the Saffir-Simpson Hurricane Scale. The Saffir-Simpson Hurricane Wind Scale is a 1-to-5 rating based on a hurricane's sustained wind speed. This scale estimates potential property damage. Hurricanes reaching Category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage. Category 1 and 2 storms are still dangerous and require preventative measures (NOAA 2009). Table 4.3.8-1 represents this scale, which is used to estimate the potential property damage and flooding expected when a hurricane makes landfall.

Table 4.3.8-1. The Saffir-Simpson Hurricane Scale

Category	Wind Speed (mph)	Expected Damage
1	74-95	Very dangerous winds will produce some damage: Homes with well-constructed frames could have damage to roof, shingles, vinyl siding, and gutters. Large tree branches will snap and shallow-rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110	Extremely dangerous winds will cause extensive damage: Homes with well-constructed frames could sustain major roof and siding damage. Many shallow-rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (major)	111-129	Devastating damage will occur: Homes with well-built frames may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (major)	130-156	Catastrophic damage will occur: Homes with well-built frames can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (major)	>157	Catastrophic damage will occur: A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Source: NOAA 2009
mph Miles per hour > Greater than



Mean Return Period

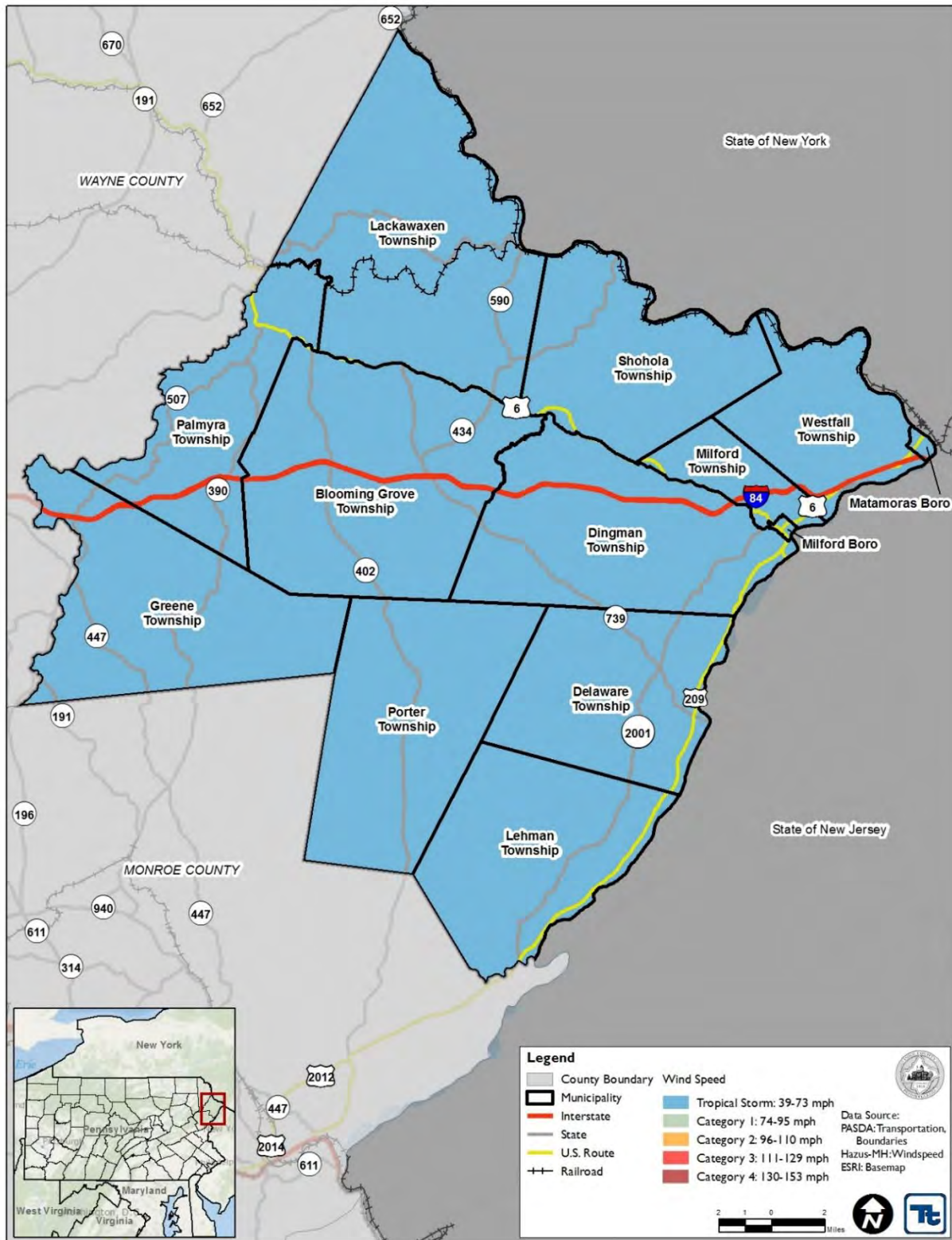
In evaluating the potential for hazard events of a given magnitude, a Mean Return Period (MRP) is often used. The MRP provides an estimate of the magnitude of an event that may occur within any given year based on past recorded events. MRP is the average period of time, in years, between occurrences of a particular hazard event, equal to the inverse of the annual frequency of exceedance (Dinicola 2009).

Figure 4.3.8-2 and Figure 4.3.8-3 display the estimated maximum 3-second gust wind speeds that can be anticipated in the study area associated with the 100- and 500-year MRP events. These peak wind speed projections were generated using HAZUS-MH model runs. The maximum 3-second gust wind speeds for Pike County are 54 to 58 mph (Tropical Storm), for the 100-year MRP event. The maximum 3-second gust wind speeds for Pike County are 66 to 76 mph (Tropical Storm to Category 1), for the 500-year MRP event. The storm tracks for the 100- and 500-year event were not available in HAZUS-MH 3.1; a HAZUS-acknowledged error in this version that will be addressed in the future. The associated impacts and losses from these 100-year and 500-year MRP hurricane events are discussed later in the Vulnerability Assessment subsection.

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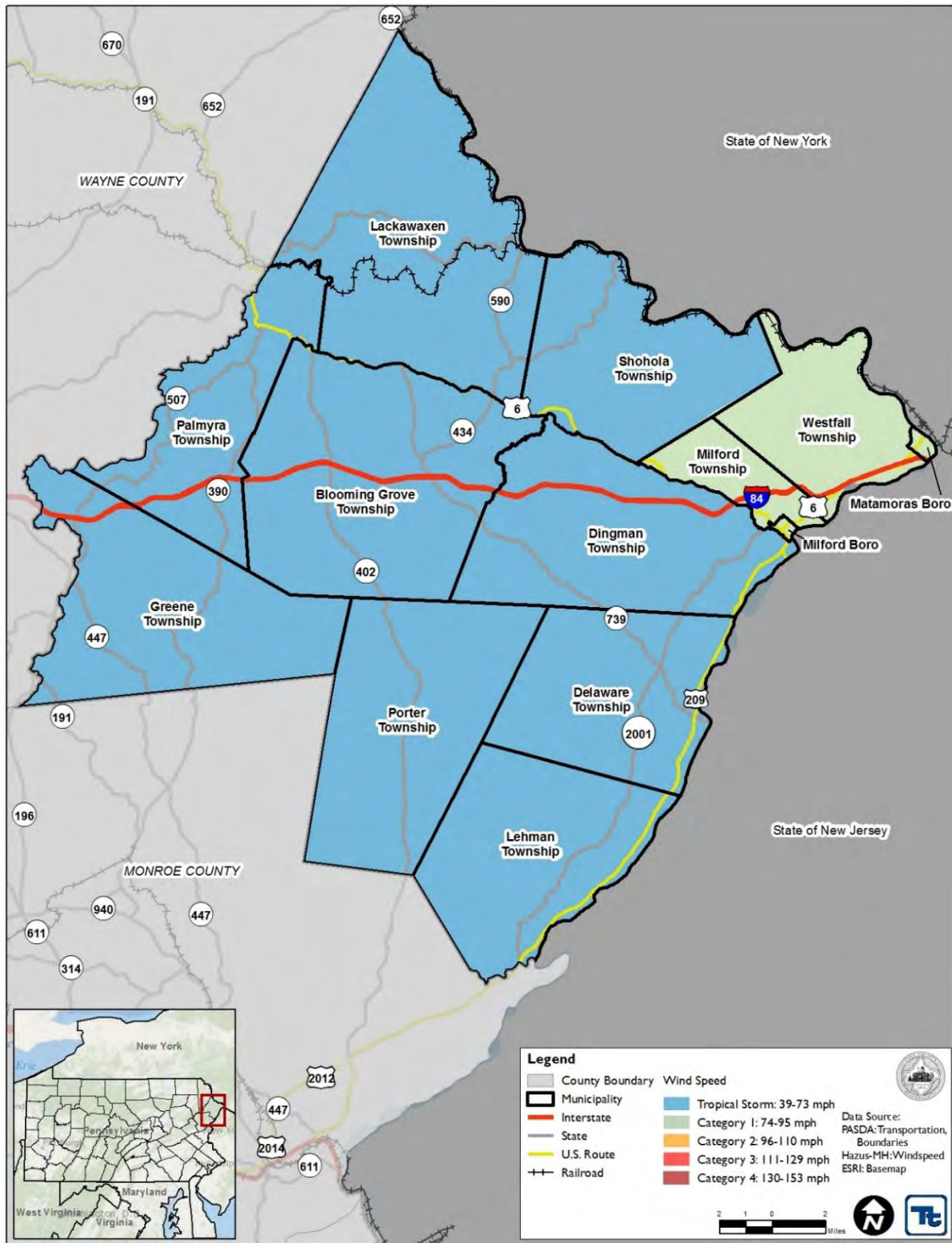
Figure 4.3.8-2. Wind Speeds for the 100-Year Mean Return Period Event



Source: HAZUS-MH 3.1



Figure 4.3.8-3. Wind Speeds for the 500-Year Mean Return Period Event



Source: HAZUS-MH 3.1



4.3.8.4 Nor'Easter

The extent of a **Nor'Easter** can be classified by meteorological measurements and by evaluating its societal impacts. NOAA's National Climatic Data Center (NCDC) is currently producing the Regional Snowfall Index (RSI) for significant snowstorms that impact the eastern two-thirds of the United States. The RSI ranks snowstorm impacts on a scale from 1 to 5. 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 2000 Census). The NCDC has analyzed and assigned RSI values to over 500 storms since 1900 (NOAA-NCDC 2016). Table 4.3.8-2 presents the five RSI ranking categories.

Table 4.3.8-2. 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	18.0+

Source: NOAA-NCDC 2016

Note: RSI = Regional Snowfall Index

4.3.8.5 Past Occurrence

The National Oceanic and Atmospheric Administration's Coastal Services Center maintains records of all coastal storms occurring in the United States since the 1850s. Table 4.3.8-3 lists all coastal storms having centers of circulation that pass through or within 65 nautical miles of Pike County. Typically, when these storms reach Pike County, they have lost their hurricane speed winds, so structural damage is usually not as bad as what coastal communities' experience.

Table 4.3.8-3. Tropical Cyclone Events Located Within 65 Nautical Miles of Pike County

Year	Event	Strength In/Near Pike County
1861	Not Named	Tropical Storm
1861	Not Named	Extratropical Storm
1861	Not Named	Tropical Storm
1863	Not Named	Tropical Storm
1863	Not Named	Tropical Storm
1866	Not Named	Extratropical Storm
1867	Not Named	Tropical Depression
1872	Not Named	Tropical Storm
1874	Not Named	Tropical Storm
1878	Not Named	Category 1 Hurricane
1888	Not Named	Tropical Storm
1893	Not Named	Category 1 Hurricane
1893	Not Named	Tropical Storm
1899	Not Named	Extratropical Storm
1903	Not Named	Category 1 Hurricane
1915	Not Named	Tropical Storm
1924	Not Named	Extratropical Storm
1929	Not Named	Extratropical Storm
1933	Not Named	Tropical Storm
1934	Not Named	Extratropical Storm



Year	Event	Strength In/Near Pike County
1945	Not Named	Extratropical Storm
1949	Not Named	Tropical Storm
1952	Able	Tropical Storm
1955	Diane	Tropical Storm
1959	Gracie	Extratropical Storm
1960	Brenda	Tropical Storm
1971	Doria	Tropical Storm
1972	Agnes	Tropical Storm
1979	David	Tropical Storm
1988	Chris	Extratropical Storm
1994	Beryl	Tropical Depression
1996	Bertha	Tropical Storm
2008	Hanna	Tropical Storm
2011	Irene	Tropical Storm
2018	Florence	Extratropical Storm
2020	Fay	Tropical Storm
2020	Isaias	Tropical Storm

Source: NOAA 2021

Between 1954 and 2021, FEMA issued a disaster (DR) or emergency (EM) declaration for the Commonwealth of Pennsylvania for 15 tropical cyclone-related events, classified as one or a combination of the following disaster types: hurricane, tropical storm, severe storms, flooding, and tropical depression. Of those events, Pike County has been included in five hurricane and tropical storm-related declarations during this time period (EM and DR) (FEMA 2021). Table 4.3.8-4 lists FEMA DR and EM declarations from 1955 to 2021 for this HMP update.

Table 4.3.8-4. FEMA DR and EM Declarations for Hurricane and Tropical Storm Events in Pike County

FEMA Declaration Number	Date(s) of Event	Event Type	Location
DR-340	June 1972	Tropical Storm Agnes	67 counties including Pike County
DR-1555	September 8-9, 2004	Severe Storms and Flooding associated with Tropical Depression Frances	67 counties including Pike County
DR-1557	September 17-October 1, 2004	Tropical Depression Ivan	67 counties including Pike County
DR-4025	August 26-30, 2011	Hurricane Irene	14 counties including Pike County
DR-4099	October 26-November 8, 2012	Hurricane Sandy	18 counties including Pike County

Source: FEMA 2021

It is important to note that a number of hurricane, tropical storm, and nor'easter events have impacted the County without tracking through or near it; these storm events include Hurricanes Agnes (1972), Floyd (1999), Henri/Isabel (2003), Diane (1955), Tropical Depression Ivan (2004), and Hurricane Sandy (2012). Additionally, the County recently experienced impacts of two other large storm events, Hurricane Irene and Tropical Storm Lee. Primary impacts of these two storms were related to flooding and little damage occurred as a result of wind. Details regarding both storms is as follows:

Hurricane Irene and Tropical Storm Lee are two recent storm events that impacted Pike County resulting in rainfall and flooding. Hurricane Irene made landfall in the United States on August 27, 2011. It was



downgraded to a tropical storm as it headed north and remnants of it affected Pike County with rainfall on August 28th. Tropical Storm Lee developed as a tropical disturbance in the Gulf of Mexico and was a particularly large and slow-moving storm. By the time it reached Pennsylvania, the storm had lost its tropical characteristics and merged with an upper level trough positioned over the eastern third of the US. The storm then stalled over Pennsylvania, bringing rainfall to the region (Pike County HMP 2012).

While both storm events brought rainfall and flooding to Pike County, neither Hurricane Irene nor Tropical Storm Lee resulted in flooding and damages that surpassed other major storm events that have impacted Pike County and resulted in worst case scenarios or record flood levels. According to the Pike County EMA, the results of the two storms were minor in comparison to other storms that have affected the County. Hurricane Irene resulted in more of an impact to Pike County than Tropical Storm Lee. Many homes had flooded basements as a result of sump pump failure from periods of utility interruption during Irene. There were approximately 120 structures which were classified as minor, affected, or inaccessible due to damages resulting from the storm. No homes or businesses were destroyed or suffered major damage that would render the structures inhabitable for an extended period of time. In addition, while there was some damage to municipal roads and some municipal property, no public buildings or treatment facilities were damaged. There were however a few bridges or private culverts that were damaged by Irene. According to the Pike County EMA, there were few, if any reports of damage from Tropical Storm Lee. There were no utility interruptions in Pike County during Tropical Storm Lee and the rainfall was not as steady as it was with Hurricane Irene. Damages that did occur from Lee were only additional damage to roads that were already damaged by Hurricane Irene (Pike County HMP 2012).

For this 2022 **HMP update, hurricane, tropical storm and Nor'Easters** events, including FEMA disaster declarations, which have impacted Pike County are identified in Table 4.3.8-5. Because documentation for these types of events is so extensive, not all sources have been identified or researched. Therefore, Table 4.3.8-5 may not include all events that occurred throughout the county.



Table 4.3.8-5. Hurricane, Tropical Storm and Nor'Easter Events Impacting Pike County

Date	Event Type	FEMA Declaration Number (if applicable)	County Designated?	Losses / Impacts
August 1955	Hurricanes Connie and Diane	N/A	N/A	The remnants of Hurricanes Connie and Diane caused flooding in Pike County as a result of heavy rains. Both storms moved through the area less than one week apart. After a relatively dry summer, the two storms dumped closed to 20 inches of rain over a wide area with some areas receiving more. The results were devastating, particularly along the Lackawaxen and Delaware Rivers and the many streams.
June 1972	Hurricane Agnes	DR-340	Yes	The remnants of Hurricane Agnes produced very heavy rains across most of Pennsylvania including Pike County. There was some minor flooding within the county.
September 8-9, 2004	Severe Storms and Flooding Associated with Tropical Depression Frances	DR-1555	Yes	N/A
September 18, 2004	Flood/Flash Flood (Tropical Depression Ivan)	DR-1557	Yes	Rainfall amounts were 4 to 7 inches which started on the 16th and continued into the 18th. This rain was from the remnants of hurricane Ivan. Most creeks and streams went out of their banks. In addition, the Delaware and Lackawaxen Rivers had major flooding. About a dozen rescues were performed. Over 100 roads were closed. The entire village of Newfoundland was evacuated. 6 bridges were closed. 2 businesses were closed. According to the Pennsylvania State Climatologist, the county had \$15 million in damages from this event.
August 26-30, 2011 September 3-October 5, 2011	Hurricane Irene Tropical Storm Lee	DR-4025 DR-4030	Yes No	<p>Hurricane Irene and Tropical Storm Lee are two recent storm events that impacted Pike County resulting in rainfall and flooding. Hurricane Irene made landfall in the United States on August 27, 2011. It was downgraded to a tropical storm as it headed north and remnants of it affected Pike County with rainfall on August 28th. Tropical Storm Lee developed as a tropical disturbance in the Gulf of Mexico and was a particularly large and slow-moving storm. By the time it reached Pennsylvania, the storm had lost its tropical characteristics and merged with an upper level trough positioned over the eastern third of the US. The storm then stalled over Pennsylvania, bringing rainfall to the region.</p> <p>While both storm events brought rainfall and flooding to Pike County, neither Hurricane Irene nor Tropical Storm Lee resulted in flooding and damages that surpassed other major storm events that have impacted Pike County and resulted in worst case scenarios or record flood levels. According to the Pike County EMA, the results of the two storms were minor in comparison to other storms that have affected the County. Hurricane Irene resulted in more of an impact to Pike County than Tropical Storm Lee. Many homes had flooded basements as a result of sump pump failure from periods of utility interruption during Irene. There were approximately 120 structures which were classified as minor, affected, or inaccessible</p>



Date	Event Type	FEMA Declaration Number (if applicable)	County Designated?	Losses / Impacts
				due to damages resulting from the storm. No homes or businesses were destroyed or suffered major damage that would render the structures inhabitable for an extended period of time. In addition, while there was some damage to municipal roads and some municipal property, no public buildings or treatment facilities were damaged. There were however a few bridges or private culverts that were damaged by Irene. According to the Pike County EMA, there were few, if any reports of damage from Tropical Storm Lee. There were no utility interruptions in Pike County during Tropical Storm Lee and the rainfall was not as steady as it was with Hurricane Irene. Damages that did occur from Lee were only additional damage to roads that were already damaged by Hurricane Irene.
October 28, 2011	Nor'Easter / Winter Storm	N/A	N/A	An early season winter storm brought wet snow across northeast Pennsylvania. Snow amounts varied depending on elevation. More than a foot of snow fell in the Poconos. In Pike County, snowfall totals across the county averaged around 12 inches.
October 26-November 8, 2012	Hurricane Sandy	DR-4099	Yes	<p>Hurricane Sandy brought high winds and locally heavy rains to northeast Pennsylvania. Peak sustained winds ranged from 30 to 40 mph with frequent gusts between 50 and 60 mph. The hardest hit area was the higher terrain areas, especially in the Poconos. Peak gusts were between 60 and 70 mph in the Poconos and other higher mountains of northeast Pennsylvania. The winds knocked down numerous trees and power lines, leaving approximately 110,000 people without power during the height of the storm. Pike County and the southern half of Wayne County were the hardest hit, with almost 60,000 people without power. In addition to the winds, rain was locally heavy and generally caused minor flooding.</p> <p>In Pike County, the high winds knocked down numerous trees and power lines throughout the county. There were numerous road closures throughout the county, including Interstate 84 and many state roads. Peak sustained winds were estimated at close to 40 mph with peak wind gusts measured at 75 mph, mainly over the southeast portion of the county. During the height of the storm, approximately 31,000 customers were without power and it took up to a week for power to be fully restored across the county.</p>
November 26, 2014	Nor'Easter	N/A	N/A	A Nor'Easter made its way up the east coast, bringing heavy snow to northeast Pennsylvania. In Pike County, snowfall totals ranged from six to 10 inches, with the highest amount of 10 inches recorded in the Town of Milford.
August 4, 2020	Tropical Storm Isaias	N/A	N/A	<p>Rain and embedded thunderstorms moved through Northeast Pennsylvania on the 4th associated with Tropical Storm Isaias. One of these embedded thunderstorms became severe and produced tree damage during the morning hours.</p> <p>Widespread rainfall of 3 to 5 inches occurred across the region. Locally heavy rainfall produced areas of flash flooding. Flash flood waters entered several residences in the Borough of Lackawaxen. Flash flooding inundated the basement and first floor of a home in Greentown.</p>

4.3.8: HURRICANE, TROPICAL STORM, AND NOR'EASTER





Sources: NOAA-NCEI 2021; FEMA 2021; Pike County HMP 2017

DR Federal Disaster Declaration

EM Emergency Management

EMA Emergency Management Agency

FEMA Federal Emergency Management Agency

NCEI National Centers for Environmental Information

NOAA National Oceanic Atmospheric Administration

N/A Not applicable / not available

SBA Small Business Administration

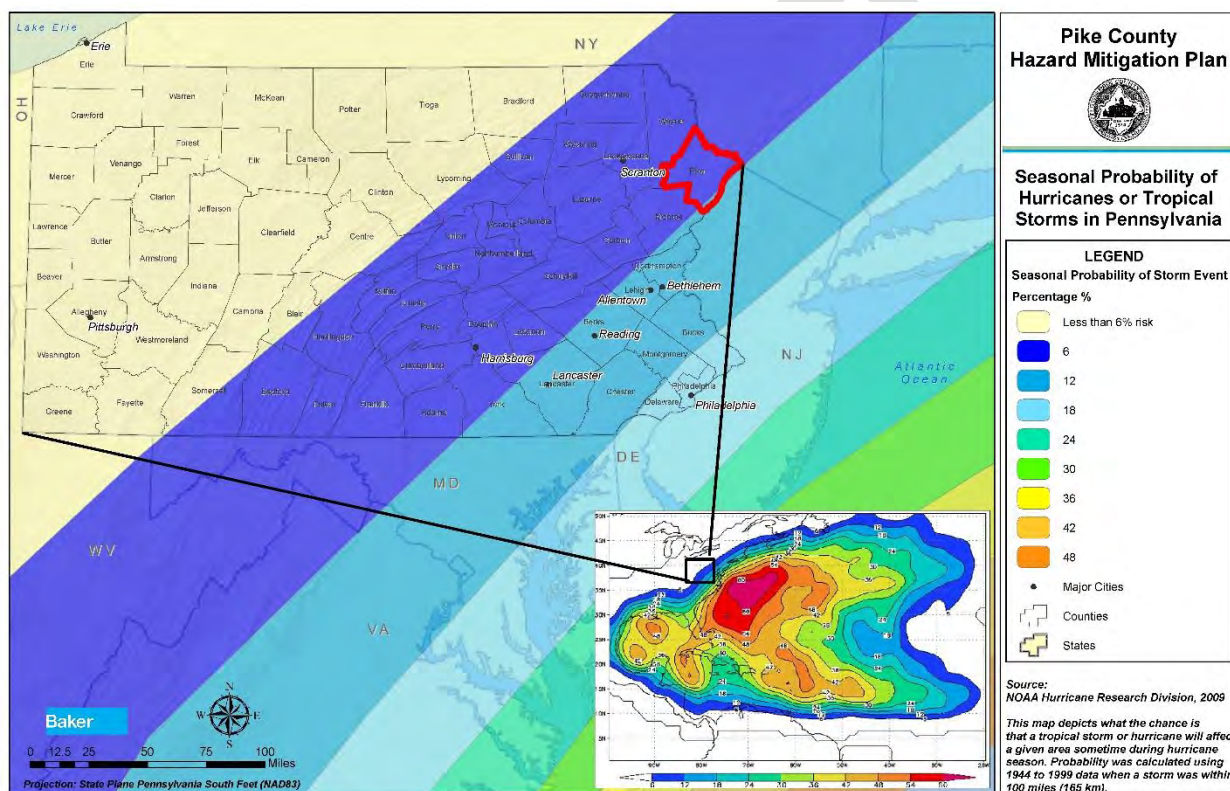
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4.3.8.6 Future Occurrence

Although hurricanes and tropical storms can cause flood events consistent with 1 percent- and 2 percent- level frequency, their probability of occurrence is measured relative to wind speed. The National Oceanic and Atmospheric Administration Hurricane Research Division published the map included as Figure 4.3.8-4 showing the chance that a tropical storm or hurricane will affect a given area during the entire Atlantic hurricane season spanning from June to November. Note that this figure does not provide information on the probability of various storm intensities. However, based on historical data between 1944 and 1999, this map reveals there is approximately a 6 to 12 percent chance of experiencing a tropical storm or hurricane event between June and November of any given year in the County (Pike County HMP 2017).

Figure 4.3.8-4. Seasonal Probability of a Hurricane or Tropical Storm affecting Pike County



Source: NOAA Hurricane Research Division, 2009

For the 2022 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of **hurricane, tropical storm and Nor'Easters** events for Pike County. Information from NOAA-NCEI storm events database, FEMA, and a NOAA Historical Hurricane Tracks search were used to identify the number of events that occurred between 1861 and 2021. 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.



Table 4.3.8-6. Probability of Future Hurricane, Tropical Storm and Extratropical Events

Hazard Type	Number of Occurrences Between 1861 and 2021	Percent chance of occurrence in any given year
Extra-Tropical Storms	15	9.3%
Tropical Depression	4	2.5%
Tropical Storm	21	13.0%
Hurricanes (all categories)	3	1.9%
TOTAL	43	26.7%

Source: NHC 2021; NOAA-NCEI 2021; FEMA 2021

It is estimated that Pike County will continue to experience direct and indirect impacts of hurricanes, tropical storms **and Nor'Easters** annually that may induce secondary hazards such as flooding, extreme wind, infrastructure deterioration or failure, utility failures, power outages, water quality and supply concerns, and transportation delays, accidents, and inconveniences. Therefore the future occurrence of hurricanes, tropical storms and Nor'Easters in Pike County can be characterized as *possible* as defined by the Risk Factor Methodology probability criteria (see Table 4.4-1).

4.3.8.7 Vulnerability Assessment

There are many similarities between **Nor'Easter** and hurricane events. Both types of events can bring high winds and heavy rainfalls or severe winter weather events, resulting in similar impacts on the population, structures, and the economy.

The high winds and air speeds often result in power outages, disruptions to transportation corridors and equipment, loss of workplace access, significant property damage, injuries and loss of life, and the need to shelter and care for individuals impacted by the events. A large amount of damage can be inflicted by trees, branches, and other objects that fall onto power lines, buildings, roads, vehicles, and, in some cases, people.

The entire inventory of the county is at risk of being damaged or lost due to impacts of hurricanes, tropical storms **and Nor'Easters**. Certain areas, infrastructure, and types of buildings are at greater risk than others due to proximity to flood waters, falling hazards, and their manner of construction. Potential losses associated with high winds were calculated for Pike County for the 100-year and 500-year MRP wind events.

To understand risk, a community must evaluate what assets are exposed or vulnerable to the identified hazard. For the hurricane and tropical storm hazard, all of Pike County has been identified as exposed. Therefore, all assets in the county (population, structures, critical facilities, and lifelines), as described in the County Profile (Section 2), are at risk. The following text evaluates and estimates the potential impact of the hurricane and tropical storm hazard on the county including:

- Impact on: (1) life, health, and safety of residents, (2) general building stock, (3) critical facilities, (4) economy, and (5) future growth and development
- Effect of climate change on vulnerability
- Change of vulnerability as compared to that presented in the 2017 Pike County HMP
- Further data collections that will assist understanding this hazard over time



Impact on Life, Health and Safety

For the purposes of this HMP, the entire population of Pike County (58,535 people) is exposed to hurricanes and tropical storm events (U.S. Census 2020). 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. 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 the location and construction quality of their housing. HAZUS-MH estimates no households will be displaced and temporary shelter will not be required as a result of the 100-year and 500-year MRP events.

Economically disadvantaged populations are more vulnerable because they are likely to evaluate their risk and make decisions based on the major economic impact to 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 are considered most vulnerable because they require extra time or outside assistance during evacuations and are more likely to seek or need medical attention which may not be available due to isolation during a storm event. Please refer to Section 4 for the statistics of these populations.

Impact on General Building Stock

After considering the population exposed to the hurricane hazard, the value of general building stock exposed to and damaged by 100- and 500-year MRP hurricane wind events was considered. Potential damage is the modeled loss that could occur to the exposed inventory, including damage to structural and content value based on the wind-only impacts associated with a tropical storm hurricane. The entire study area is considered at risk to the wind hazard. Please refer to Section 2 (County Profile) which presents the total exposure value for general building stock by occupancy class for Pike County.

Expected building damage was evaluated by HAZUS-MH across the following wind damage categories: no damage/very minor damage, minor damage, moderate damage, severe damage, and total destruction. Table 4.3.8-7 summarizes the definition of the damage categories.

Table 4.3.8-7. Description of Damage Categories

Qualitative Damage Description	Roof Cover Failure	Window Door Failures	Roof Deck	Missile Impacts on Walls	Roof Structure Failure	Wall Structure Failure
No Damage or Very Minor Damage Little or no visible damage from the outside. No broken windows, or failed roof deck. Minimal loss of roof over, with no or very limited water penetration.	≤2%	No	No	No	No	No
Minor Damage Maximum of one broken window, door or garage door. Moderate roof cover loss that can be covered to prevent additional water entering the building. Marks or dents on walls requiring painting or patching for repair.	>2% and ≤15%	One window, door, or garage door failure	No	<5 impacts	No	No
Moderate Damage Major roof cover damage, moderate window	>15% and ≤50%	> one and ≤ the larger of	1 to 3 panels	Typically 5 to 10	No	No



Qualitative Damage Description	Roof Cover Failure	Window Door Failures	Roof Deck	Missile Impacts on Walls	Roof Structure Failure	Wall Structure Failure
breakage. Minor roof sheathing failure. Some resulting damage to interior of building from water.		20% & 3		impacts		
Severe Damage Major window damage or roof sheathing loss. Major roof cover loss. Extensive damage to interior from water.	>50%	> the larger of 20% & 3 and ≤50%	>3 and ≤25%	Typically 10 to 20 impacts	No	No
Destruction Complete roof failure and/or, failure of wall frame. Loss of more than 50% of roof sheathing.	Typically >50%	>50%	>25%	Typically >20 impacts	Yes	Yes

Source: HAZUS-MH Hurricane Technical Manual

Table 4.3.8-8 summarizes the building value (structure only) damage estimated for the 100- and 500-year MRP hurricane wind-only events. **Damage estimates are reported for the county's probabilistic HAZUS-MH model scenarios.** The data shown indicates total losses associated with wind damage to building structure.



Table 4.3.8-8. Estimated Building Value (Structure Only) Damaged by the 100-Year and 500-Year MRP Hurricane-Related Winds

Municipality	Total Improvement Value (Structure Only)	Estimated Total Damages*			Percent of Total Building Improvement Value		
		Annualized Loss	100-Year	500-Year	Annualized Loss	100-Year	500-Year
Blooming Grove Township	\$768,042,000	\$4,523	\$93,340	\$458,268	<1%	<1%	<1%
Delaware Township	\$973,607,000	\$8,509	\$36,243	\$1,029,901	<1%	<1%	<1%
Dingman Township	\$1,287,496,000	\$10,319	\$54,850	\$1,403,863	<1%	<1%	<1%
Greene Township	\$624,259,000	\$3,897	\$75,851	\$348,282	<1%	<1%	<1%
Lackawaxen Township	\$816,292,000	\$3,639	\$65,256	\$499,744	<1%	<1%	<1%
Lehman Township	\$1,303,700,000	\$10,046	\$22,779	\$1,005,961	<1%	<1%	<1%
Matamoras Borough	\$237,231,000	\$2,577	\$255	\$443,427	<1%	<1%	<1%
Milford Borough	\$224,907,000	\$1,102	\$825	\$152,478	<1%	<1%	<1%
Milford Township	\$414,595,000	\$2,215	\$9,188	\$340,218	<1%	<1%	<1%
Palmyra Township	\$824,628,000	\$5,105	\$131,205	\$457,693	<1%	<1%	<1%
Porter Township	\$255,805,000	\$1,542	\$27,648	\$140,112	<1%	<1%	<1%
Shohola Township	\$488,962,000	\$3,808	\$29,727	\$552,051	<1%	<1%	<1%
Westfall Township	\$238,350,000	\$1,595	\$1,914	\$262,005	<1%	<1%	<1%
Pike County (Total)	\$8,457,874,000	\$58,878	\$549,080	\$7,094,001	<1%	<1%	<1%

Source: HAZUS-MH 3.1

*The Total Damages column represents the sum of damages for all occupancy classes (residential, commercial, industrial, agricultural, educational, religious and government) based on improvement value.

Table 4.3.8-9. Estimated Residential and Commercial Building Value (Structure Only) Damaged by the 100-Year and 500-Year MRP Hurricane-Related Winds

Municipality	Total Improvement Value (Structure Only)	Estimated Residential Damage		Estimated Commercial Damage	
		100-Year	500-Year	100-Year	500-Year
Blooming Grove Township	\$768,042,000	\$93,340	\$457,069	\$0	\$965
Delaware Township	\$973,607,000	\$36,243	\$1,022,507	\$0	\$4,697
Dingman Township	\$1,287,496,000	\$54,850	\$1,395,210	\$0	\$4,967
Greene Township	\$624,259,000	\$75,851	\$344,445	\$0	\$2,896



Municipality	Total Improvement Value (Structure Only)	Estimated Residential Damage		Estimated Commercial Damage	
		100-Year	500-Year	100-Year	500-Year
Lackawaxen Township	\$816,292,000	\$65,256	\$498,468	\$0	\$875
Lehman Township	\$1,303,700,000	\$22,779	\$999,481	\$0	\$3,598
Matamoras Borough	\$237,231,000	\$255	\$437,568	\$0	\$4,367
Milford Borough	\$224,907,000	\$825	\$139,082	\$0	\$9,999
Milford Township	\$414,595,000	\$9,188	\$331,981	\$0	\$6,287
Palmyra Township	\$824,628,000	\$131,205	\$456,068	\$0	\$1,129
Porter Township	\$255,805,000	\$27,648	\$139,258	\$0	\$388
Shohola Township	\$488,962,000	\$29,727	\$547,637	\$0	\$2,252
Westfall Township	\$238,350,000	\$1,914	\$256,180	\$0	\$5,173
Pike County (Total)	\$8,457,874,000	\$549,080	\$7,024,955	\$0	\$47,593

Source: HAZUS-MH 3.1



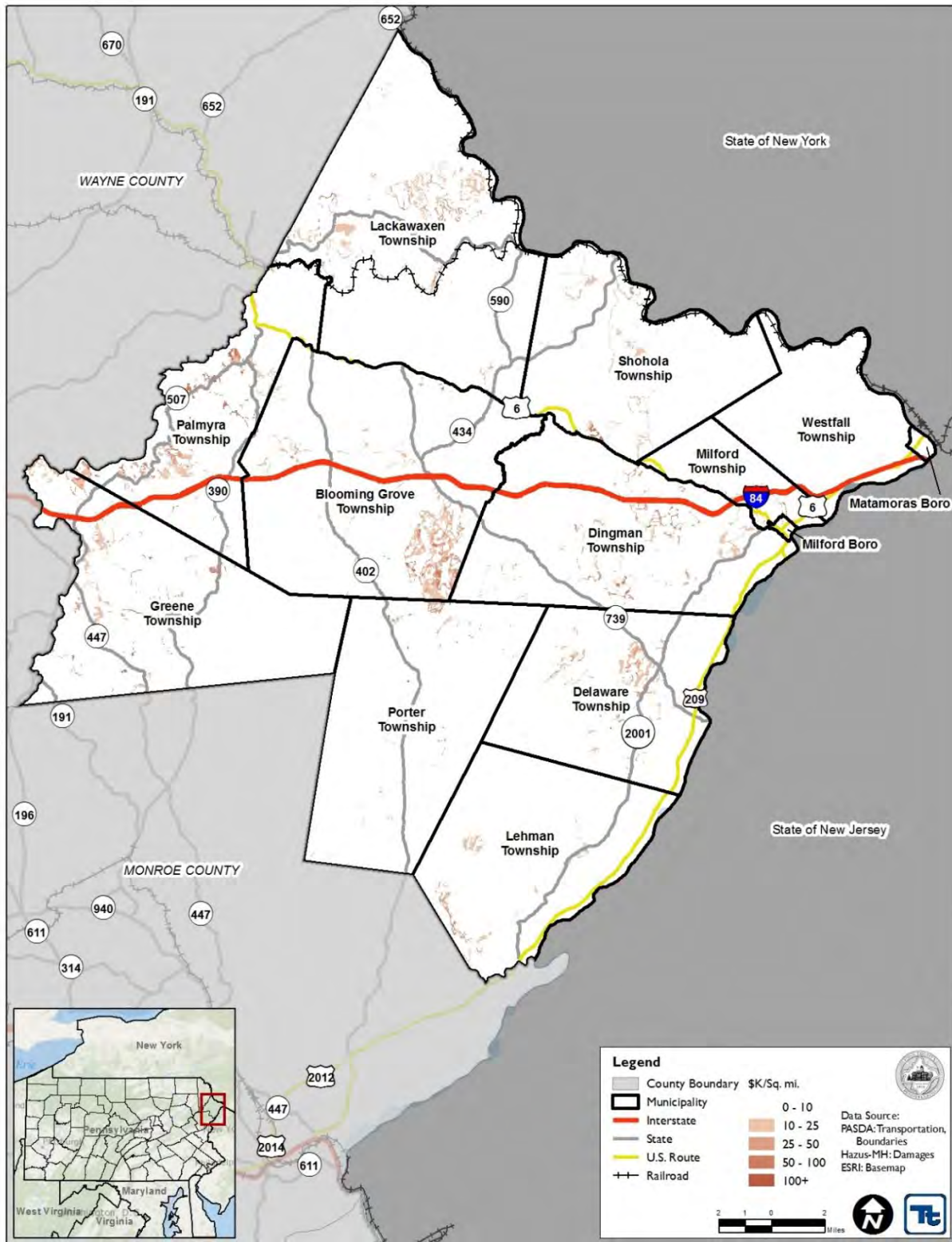
The total damage to buildings (structure only) for all occupancy types across Pike County is estimated to be \$549K for the 100-year MRP wind-only event, and approximately \$7 million for the 500-year MRP wind-only event. The majority of these losses are to the residential building category. Refer to Figures 4.3.8-4 and 4.3.8-5 that illustrate the density estimated building loss across Pike County for these two events.

Because of differences in building construction, residential structures are generally more susceptible to wind damage than commercial and industrial structures. The damage counts include buildings damaged at all severity levels from minor damage to total destruction. Total dollar damage reflects the overall impact to buildings at an aggregate level.

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Figure 4.3.8-5. Density of Losses for Structures (All Occupancies) for the 100-Year MRP Wind Event



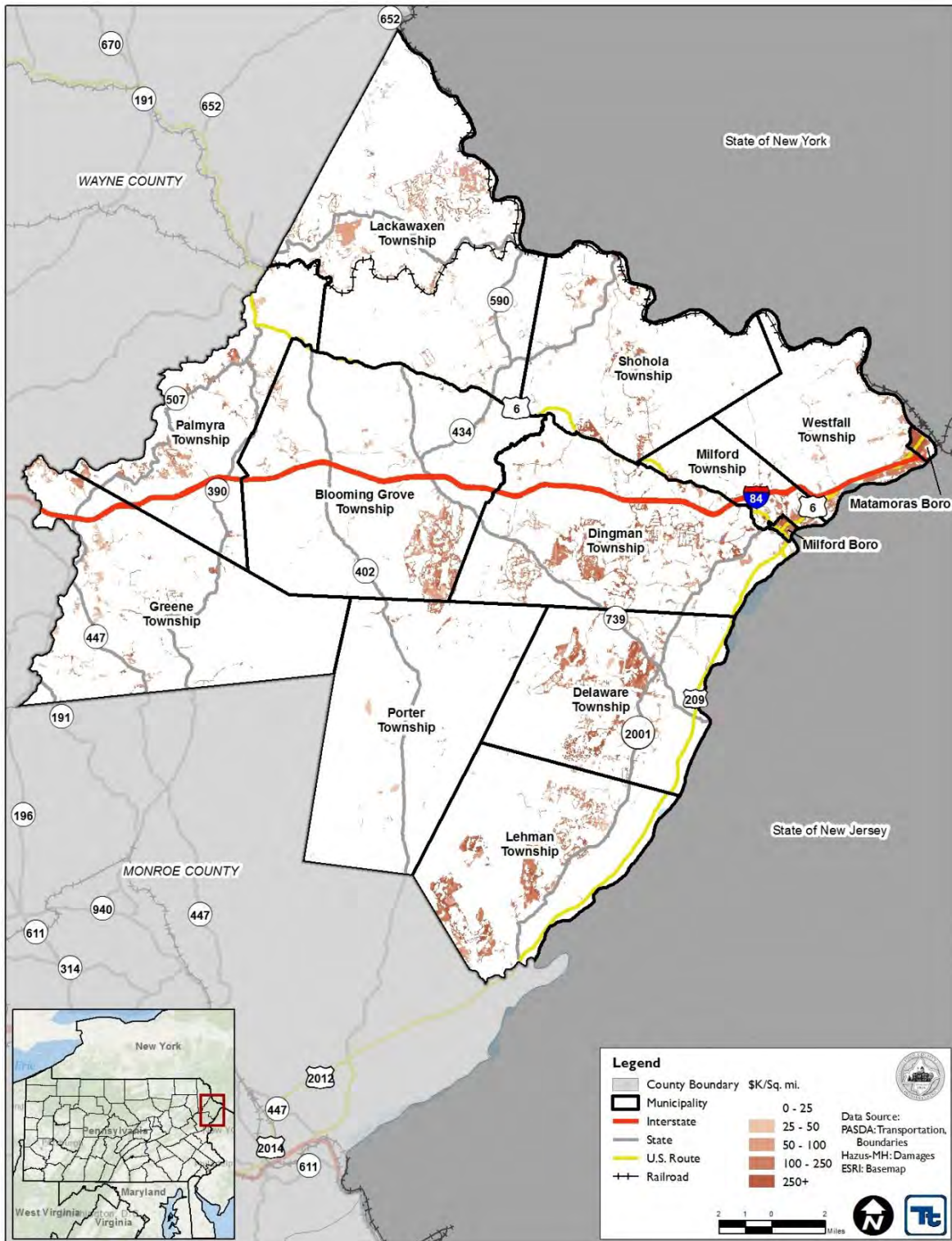
Source: HAZUS-MH 3.1

4.3.8: HURRICANE, TROPICAL STORM, AND NOR'EASTER





Figure 4.3.8-6. Density of Losses for Structures (All Occupancies) for the 500-Year MRP Wind Event



Source: HAZUS-MH 3.1



Impact on Critical Facilities

Overall, all critical facilities are exposed to the wind hazard associated with hurricane and tropical storm events. HAZUS-MH estimates the probability that critical facilities (i.e., medical facilities, fire/EMS, police, EOC, schools, and user-defined facilities such as shelters and municipal buildings) may sustain damage as a result of 100-year and 500-year MRP wind events. Additionally, HAZUS-MH estimates the loss of use for each facility in number of days. Due to the sensitive nature of the critical facility dataset, individual facility estimated loss is not provided.

HAZUS-MH estimates no damage to the critical facilities as a result of the 100-year event.

Table 4.3.8-10 summarizes the percent probability that each facility type may experience damage as a result of the 500-year MRP event. HAZUS-MH estimates no damage to the critical facilities as a result of the 100-year event.

Table 4.3.8-10. Estimated Impacts to Critical Facilities for the 500-Year Mean Return Period Hurricane-Related Winds

Facility Type	Loss of Days	500-Year Event			
		Percent-Probability of Sustaining Damage			
		Minor	Moderate	Severe	Complete
EOC	0	0-1	0	0	0
Medical	0	2	1	0	0
Police	0	0-1	0	0	0
Fire	0	0	0	0	0
Schools	0	0-1	0	0	0

Source: HAZUS-MH 3.1

Impact on Economy

Hurricanes and tropical storms also impact the economy, including: loss of business function (e.g., tourism, recreation), damage to inventory, relocation costs, wage loss and rental loss due to the repair/replacement of buildings. HAZUS-MH estimates the total economic loss associated with each storm scenario (direct building losses and business interruption losses). Direct building losses are the estimated costs to repair or replace the damage **caused to the building. This is reported in the “Impact on General Building Stock” subsection discussed earlier.** Business interruption losses are the losses associated with the inability to operate a business because of the wind damage sustained during the storm or the temporary living expenses for those displaced from their home because of the event.

For the 100-year MRP wind event, HAZUS-MH estimates less than \$1,000 in business interruption costs (income loss, relocation costs, rental costs and lost wages) and no inventory losses. For the 500-year MRP wind only event, HAZUS-MH estimates approximately \$13K in business interruption losses for the County, which includes loss of income, relocation costs, rental costs and lost wages, and no inventory losses.

Impacts to 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 suffer damage and impacts can result in the loss of power, which can impact business operations and can impact heating or cooling provision to the population.



HAZUS-MH 3.1 also estimates the amount of debris that may be produced as a result of the 100- and 500-year MRP wind events. Table 4.3.8-11 summarizes the estimated debris by municipality. Because the estimated debris production does not include flooding, this is likely a conservative estimate and may be higher if multiple impacts occur.

According to the HAZUS-MH Hurricane User Manual: *'The Eligible Tree Debris columns provide estimates of the weight and volume of downed trees that would likely be collected and disposed at public expense. As discussed in Chapter 12 of the HAZUS-MH Hurricane Model Technical Manual, the eligible tree debris estimates produced by the Hurricane Model tend to underestimate reported volumes of debris brought to landfills for a number of events that have occurred over the past several years. This indicates that there may be other sources of vegetative and non-vegetative debris that are not currently being modeled in HAZUS. For landfill estimation purposes, it is recommended that the HAZUS debris volume estimate be treated as an approximate lower bound. Based on actual reported debris volumes, it is recommended that the HAZUS results be multiplied by three to obtain an approximate upper bound estimate. It is also important to note that the Hurricane Model assumes a bulking factor of 10 cubic yards per ton of tree debris. If the debris is chipped prior to transport or disposal, a bulking factor of 4 is recommended. Thus, for chipped debris, the eligible tree debris volume should be multiplied by 0.4.'*

Table 4.3.8-11. Debris Production for 100- and 500-Year Mean Return Period Hurricane-Related Winds

Municipality	Brick and Wood (tons)		Concrete and Steel (tons)		Tree (tons)		Eligible Tree Volume (cubic yards)	
	100 Year	500 Year	100 Year	500 Year	100 Year	500 Year	100 Year	500 Year
Blooming Grove Township	0	1	0	0	0	0	0	0
Delaware Township	0	13	0	0	0	0	0	0
Dingman Township	0	20	0	0	0	0	0	0
Greene Township	0	3	0	0	0	0	0	0
Lackawaxen Township	0	4	0	0	0	0	0	0
Lehman Township	0	8	0	0	0	0	0	0
Matamoras Borough	0	16	0	0	0	0	0	0
Milford Borough	0	5	0	0	0	0	0	0
Milford Township	0	17	0	0	0	0	0	0
Palmyra Township	0	0	0	0	0	0	0	0
Porter Township	0	0	0	0	0	0	0	0
Shohola Township	0	21	0	0	0	0	0	0
Westfall Township	0	16	0	0	0	0	0	0
Pike County (Total)	0	124	0	0	0	0	0	0

Source: HAZUS-MH 3.1

Impact on the Environment

The impacts of hurricane-related windstorms on the environment typically take place over a larger area. Where these events occur, widespread, severe damage to plant species is likely. This includes uprooting or total destruction of trees and an increased threat of wildfire in areas where dead trees are not removed (PEMA 2018). Section 4.3.14 (Severe Weather) provides additional environmental impacts due to wind, and Section 4.3.7 (Flood) provides additional environmental impacts due to flooding from heavy rainfalls.



Future Growth and Development

Understanding future changes that impact vulnerability in Pike County can assist in planning for future development and ensuring that appropriate mitigation, planning, and preparedness measures are in place. It is anticipated that any new development and new residents will be exposed to the hurricane and tropical storm hazard. However, due to increased standards and codes, new development might be less vulnerable to wind-related hazards compared to the aging building stock.

As discussed and illustrated in Section 2, areas targeted for future growth and development have been identified across the county. Any areas of growth could **be potentially impacted by the Hurricane, Tropical Storm, Nor'Easter** hazard because the entire Planning Area is exposed and potentially vulnerable to the impacts associated with these events.

Effect of Climate Change on Vulnerability

Since the 1970s, **there has been a global increase in "tropical cyclone destructiveness" as measured by the Power Dissipation Index**. This increased tropical cyclone intensity and duration correlates with increased sea surface temperature. This suggests that future increases of tropical sea surface temperature might lead to future increases in tropical cyclone intensity and duration. However, there is a high level of uncertainty regarding the relationship between climate change and storm events. Future improvements in modeling smaller scale climatic processes can be expected and will lead to improved understanding of how the changing climate will alter temperature, precipitation, and storm events in Pennsylvania (Shortle et. al 2009).

The northeast region of the United States has experienced a greater increase in extreme precipitation than any other region in the U.S. between 1958 and 2010, the northeast experienced more than 70 percent increase in the amount of precipitation falling in rain events (NCA 2014). Refer to Section 4.3.7 (Flood) for a discussion related to the impact of climate change due to increases in rainfall. An increase in storms will produce more wind events and may increase tornado activity. Additionally, thunderstorms and increase in temperature can relate to the strength of a storm resulting **in tornadoes (NOAA 2020)**. **With an increased likelihood of strong winds and tornado events, all the County's assets** will experience additional risk for losses as a result of extreme wind events.

Additional Data and Next Steps

Pike County and its municipalities continue to be vulnerable to the hurricane, tropical storm, and Nor'easter hazard. Over time, the County may obtain additional data to support the analysis of this hazard. Data that will support the analysis include additional detail on past hazard events and impacts, building footprints, and specific building information, such as details on protective features (e.g., hurricane straps).



4.3.9 Invasive and Nuisance Species

This section provides a profile and vulnerability assessment for the invasive species hazard. An invasive species is a species that is not indigenous to a given ecosystem and that, when introduced to a non-native environment, is likely to cause economic or environmental harm or pose a hazard to human health. To further assist and identify invasive species in Pennsylvania, the U.S. Department of Agriculture (USDA) has provided a suite of Invasive Species Resources located online at the USDA National Invasive Species Information Center. The following link provides access to the Pennsylvania's Resource List: <https://www.invasivespeciesinfo.gov/us/pennsylvania>.

4.3.9.1 Location and Extent

An invasive species is a species that is not indigenous to a given ecosystem and that, when introduced to a non-native environment, is likely to cause economic or environmental harm, or pose a hazard to human health. The Commonwealth of Pennsylvania plays host to a number of invasive pathogens, insects, plants, invertebrates, fish, and higher mammals. These species have largely been introduced by the actions of humans. Common pathways for invasive species threats include unintentional release of species, the movement of goods and equipment that may unknowingly harbor species, smuggling, ship ballast, hull fouling, and escape from cultivation (PISC, 2010). Invasive species threats are generally divided into two main subsets:

- Aquatic Invasive Species are nonnative viruses, invertebrates, fish, and aquatic plants that threaten the diversity or abundance of native species, the ecological stability of the infested waters, human health and safety, or commercial, agriculture, aquaculture, or recreational activities dependent on such waters.
- Terrestrial Invasive Species are nonnative arthropods, vascular plants, higher vertebrates, or pathogens that complete their lifecycle on land instead of in an aquatic environment and whose introduction does or is likely to cause economic or environmental harm or harm to human health.

The Commonwealth of Pennsylvania HMP discusses a number of identified invasive species impacting the Commonwealth. For the purpose of this HMP update and as identified by the Pike County Steering Committee, the following will be discussed further:

- Emerald Ash Borer
- Hemlock Woolly Adelgid
- Gypsy moth
- Zebra Mussel
- Harmful Algal Bloom
- Spotted Lanternfly

Additionally, Pike County identified ticks and mosquitos as a concern due to the diseases they can carry and spread. Please refer to Section 4.3.1 (Disease Outbreak and Pandemic) for details regarding diseases spread by ticks and mosquitos. The location and extent of invasive threats depends on the preferred habitat of the species as well as the **species' ease of movement and establishment**. **The presence of invasive species has been reported throughout Pike County.**

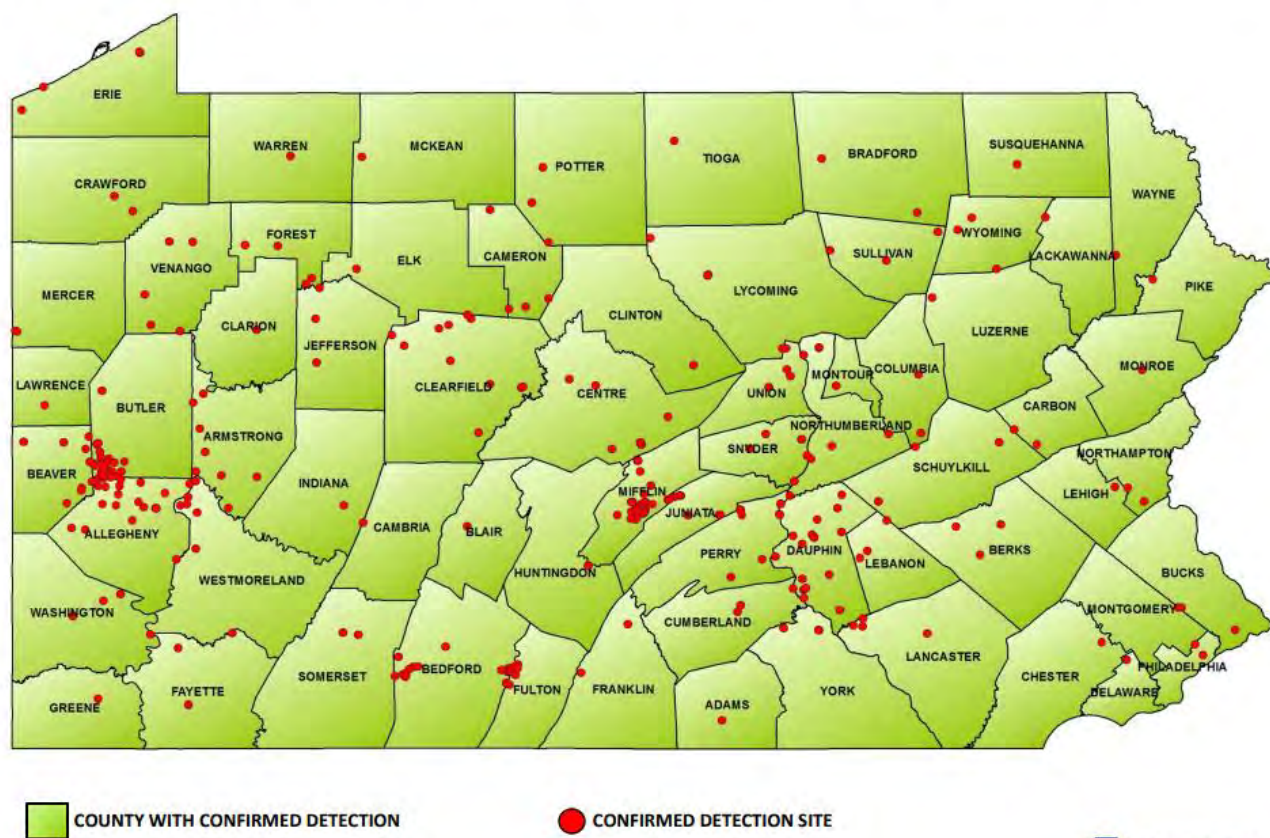


Emerald Ash Borer

The emerald ash borer (EAB) is a half-inch long metallic green beetle. Larvae of this beetle feed under the bark of ash trees. Their feeding eventually girdles and kills branches and entire trees. It was detected for the first time in Pennsylvania in late June 2007. EAB adults were identified in Cranberry Township in Butler County (DCNR 2016). EAB is currently quarantined throughout Pennsylvania and has been confirmed in at least 22 counties. Pike County has been included in the quarantine. The quarantine was established to slow the spread of EAB by the Pennsylvania Department of Agriculture. It makes it illegal to move out of the Commonwealth all hardwood firewood, ash trees of any size, ash saw logs, limbs, branches, stumps or roots (DCNR 2011). Between 2007 and 2019, EAB has been confirmed in nearly all counties of Pennsylvania with one detection site confirmed in Pike County (PA Department of Agriculture 2019).

Figure 4.3.9-1. Pennsylvania Confirmed Emerald Ash Borer Program Detections, 2007 to 2019

PENNSYLVANIA CONFIRMED EMERALD ASH BORER PROGRAM DETECTIONS 2007-2019



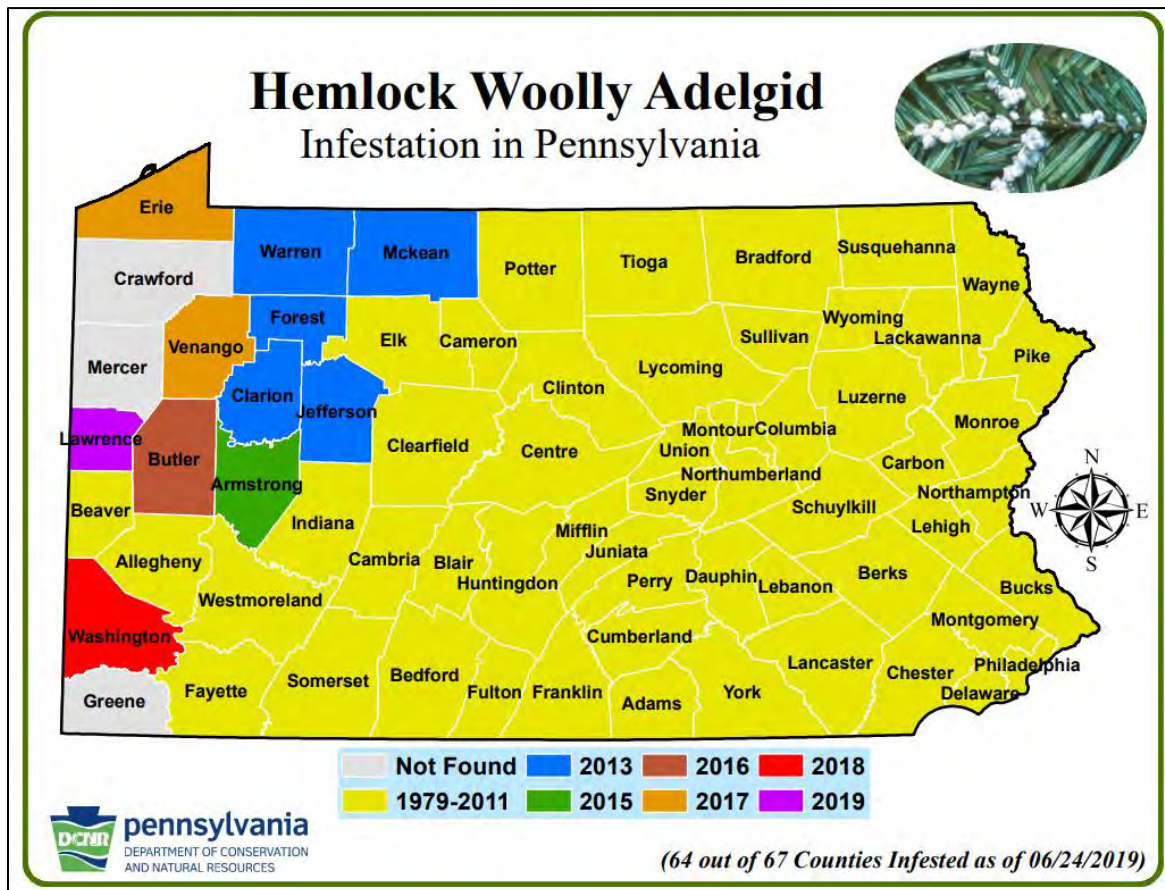
Hemlock Woolly Adelgid

The hemlock woolly adelgid, is a serious pest of Eastern hemlock in the northeastern states. This insect was first reported in southeastern Pennsylvania in the late 1960s and has spread to both ornamental and forest hemlocks. Adelgids are small, soft-bodied insects that are closely related to aphids. The hemlock woolly adelgid sucks sap from



the young branches which results in premature needle drop and branch dieback. Some trees die within four years while others persist in a weakened state for many years. As of June 2019, 64 out of 67 counties, including Pike County, are infested by hemlock woolly adelgid (DCNR 2019).

Figure 4.3.9-2. Hemlock Woolly Adelgid Infestation in Pennsylvania



Source: DCNR 2016

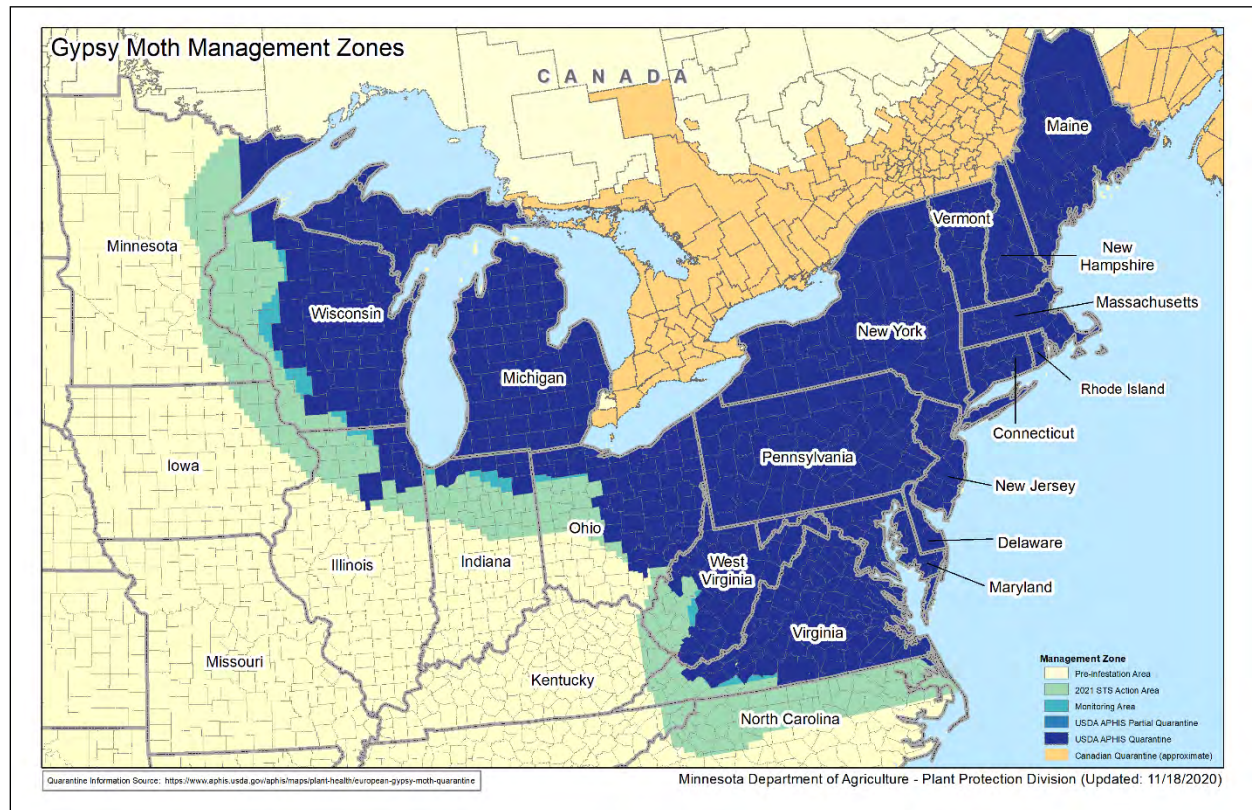
Gypsy Moth

The gypsy moth (*Lymantria dispar*) is a non-native insect from France that was introduced to Massachusetts in 1869. It is now established in 19 states, including Pennsylvania. Its caterpillar (larva) stage eats the leaves of a large variety of trees. A sample of some of the many species it eats includes oak, maple, apple, crabapple, aspen, willow, birch, mountain ash, pine and spruce. The populations of gypsy moths rise and fall in cycles. When populations are high, thousands of acres of trees can be damaged. In Pennsylvania, it was first discovered in Luzerne and Lackawanna Counties in 1932. A total of 4.3 million acres were defoliated in the Commonwealth during the historical peak year in 1990. Suppression programs have been carried out by the Pennsylvania Bureau of Forestry since 1968 to minimize the impacts of the gypsy moth. In 2016, Pike County was included in the gypsy moth suppression program. The County worked with the DCNR in a joint effort to spray for gypsy moth caterpillars in certain residential areas within Pike County. The insecticide was applied by aircraft, flying approximately 50 feet above the treetops (Pike County Conservation District 2016).



The USDA has a gypsy moth program that regulates the movement of gypsy moth host material from infested areas to other areas of the country. This program is a federal-state partnership that prevents the establishment of gypsy moths in areas of the United States that are not contiguous to current regulated states and counties. Figure 4.3.9-2 illustrates the quarantine areas of the United States. Pike County is located within a gypsy moth quarantine area.

Figure 4.3.9-3. Gypsy Moth Quarantine Areas in the United States



Source: Minnesota Department of Agriculture 2020

Zebra Mussel

The zebra mussel (*Dreissena polymorpha*) was accidentally introduced to the Great Lakes in the 1980's and has been spreading in Pennsylvania's waters. Zebra mussels grow on hard surfaces including the shells of native mussels, and in high densities can starve and suffocate native mussels by covering their shells completely. Zebra mussels are not as abundant in flowing waters as in lakes, but in rivers, such as the Hudson River (NY), they are persisting many years after their initial invasion (PNHP 2011).

According to the Pike County Natural Heritage Inventory, this species has been spotted in the Delaware River Watershed is not yet known in Pike County, but must be watched for its disastrous effects on ecosystems and economies (PNHP 2011).

Pennsylvania has a Noxious Weed law that prevents the propagation, sale, or transport of thirteen weed species within the Commonwealth. This includes purple loosestrife identified as a concern for Pike County. The Pennsylvania



Fish and Boat Commission maintains a list of Aquatic Invasive Species that are prohibited from possession, sale, barter, or distribution within the Commonwealth (PA Code 58.71.6). This list includes the zebra mussel.

Harmful Algal Bloom

Harmful Algal Blooms (HABs) occur when Cyanobacteria, commonly known as blue-green algae, grow in large, dense populations. They have been observed throughout Pennsylvania waters, including Pike County, and can occur almost anywhere in lakes, ponds, stormwater retention basins, rivers, streams, and reservoirs. HABs can produce toxins that are harmful to humans, pets, and livestock, and can negatively impact drinking water, swimming and fishing recreation, and aquatic ecosystems.

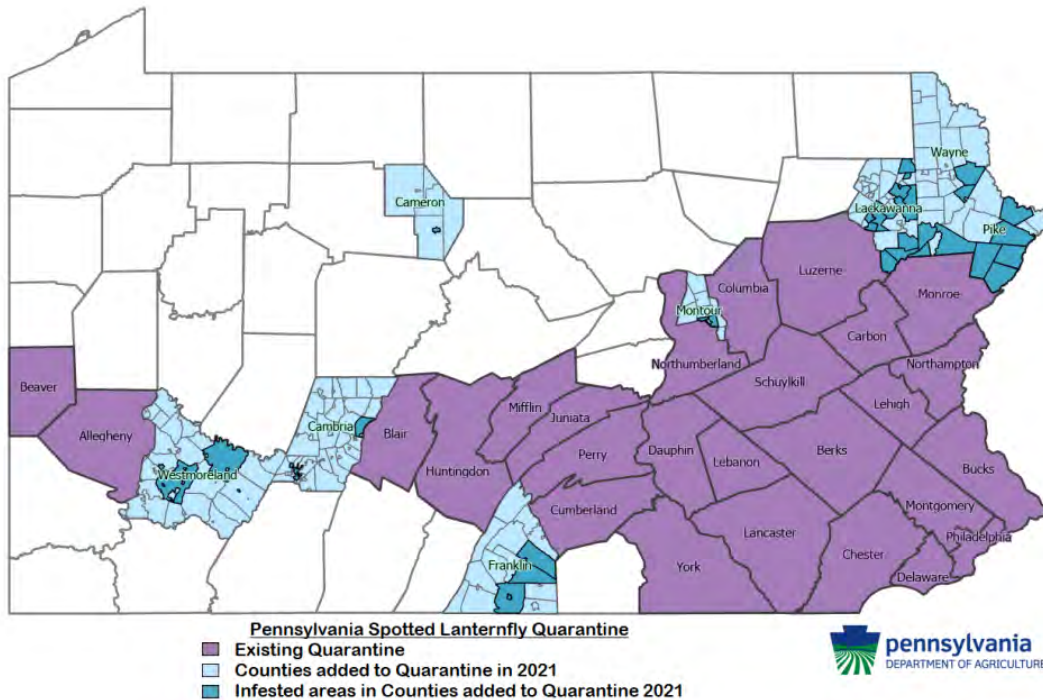
According to the Wallenpaupack Watershed, the occurrence, severity, and duration of HABs and suspected HABs has increased significantly in the past decade statewide and regionally. A visible bloom which the County typically experiences in varying degrees from July through October, is an indication for elevated risk, but HABs can occur without visible indicator (Wallenpaupack Watershed 2022).

Spotted Lanternfly

The Spotted Lanternfly is an invasive planthopper native to Asia first discovered in Pennsylvania in Berks County in 2014. It feeds on sap from a variety of plants but has a strong preference for plants important to **the State's** economy including grapevines, maples, black walnut, birch and willow. **Spotted Lanternfly's** feeding damage stresses plants which can decrease their health and in some cases cause death. In 2021, Pike County was added to the map of counties in the Pennsylvania where Spotted Lanternfly has been found. The County is now in quarantine, meaning that all individuals and businesses that make trips in and out of the County should comply with tips outlined on the **County's Conservation District website** (<https://pikeconservation.org/spotted-lanternfly/>).



Figure 4.3.9-4. Spotted Lanternfly Quarantine Areas



4.3.9.2 Range of Magnitude

The magnitude of invasive species threats ranges from nuisance to widespread killer and is generally amplified when the ecosystem or host species is already stressed, such as in times of drought. The already weakened state of the native ecosystem causes it to more easily succumb to an infestation. Some invasive species are not considered an agricultural pest and do not harm humans. However, other species can cause significant changes in the composition of an ecosystem. For example, EAB has 99% mortality rate for any ash tree it infects. Other species can clog waterways, smother native plants, and impact animals (PA HMP 2013).

There is a wide range of environmental impacts caused by invasive species. The aggressive nature of many invasive species can cause significant reductions in biodiversity by crowding out native species. This can affect the health of individual host organisms as well as the overall well-being of the affected ecosystem. Beyond causing human, animal, and plant harm, there are secondary impacts of invasive species that go beyond harm to host species and **ecosystems, particular in the case of invasive species that attack forests. Pennsylvania's forests prevent soil degradation and erosion, protect watersheds, stabilize slopes, and absorb carbon dioxide emissions.** The key role of forests in the hydrologic system means that if forest land is wiped out, the effects of erosion and flooding will be amplified. There is also an impact on agricultural harvests like honey. As a state with strong agricultural population, invasive species remain a hazard for the economic livelihood of the state (PA HMP 2013).

An example of a possible worst-case scenario for invasive species is the increase in population of hemlock woolly adelgid and their destruction to the Eastern hemlock population. Without this tree species, streams may increase in temperature, impacting the native brook trout; destroy wildlife cover; and impact forest aesthetics and recreational opportunities. An example of a possible worst-case scenario for HABs is the increase in frequency of occurrence in



waterbodies and have it impact drinking water and recreational water use. This can lead to health and economic impacts to the County and its residents.

4.3.9.3 Past Occurrence

Based on all sources researched, Pike County has been impacted by the above invasive and nuisance species. Documented harmful algal blooms, based on notification provided by Pennsylvania DEP and analysis of water samples, occurred on August 17th, 24th, and September 8th, 2020. These were determined to be HABs based on colony counts. Testing did not reveal the release of any toxins (Wallenpaupack Watershed 2022). Other specific occurrences and quantified losses for other invasive and nuisance species were not identified in the County.

4.3.9.4 Future Occurrence

According to the PISC, the probability of future occurrence for invasive species threats is on the rise because of the growing volume of transported goods, increasing technology, efficiency and speed of transportation and expanding international trade agreements. Expanded global trade has created opportunities for many organisms to be transported to, and establish themselves, in new countries and regions. Furthermore, climate change is contributing to the introduction of new invasive species. As maximum and minimum seasonal temperatures change, pests are able to establish themselves in previously inhospitable climates. This also gives introduced species an earlier start and increases the magnitude of their growth. This may shift the dominance of ecosystems in the favor of nonnative species (PA HMP 2013).

Based on historical documentation, increased incidences of infestation throughout Pennsylvania and the overall impact of changing climate trends, it is estimated that Pike County and all its jurisdictions will continue to experience the impacts of invasive species that may induce secondary hazards and health threats to the County population if they are not prevented, controlled or eradicated effectively.

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

4.3.9.5 Vulnerability Assessment

Pike County's exact vulnerability will depend on the invasive and nuisance species in question. In general, though, the University of Arizona and the National Invasive Species Information Center have identified the following characteristics of areas that are more likely to be invaded by invasive and nuisance species:

- Lack of natural predators or diseases that kept the species under control in its native environment
- Present vacant ecological niches that can be exploited by non-native species
- Lack of species diversity
- Lack of a multi-tiered canopy (in the case of invasive plants)
- Disturbed by fire, construction, or agriculture prior to invasion (University of Arizona 2006)

Estimated losses are difficult to quantify; however, infestation can impact Pike County's population and economy. Direct effects of infestation lead to cascading indirect impacts. As vegetation dies or becomes stressed and weakened by pests, such as the emerald ash borer, available fuel and high-intensity wildfires increase. As species



compositions change from infestation outbreaks, whole fire regimes can shift. Physical stresses on trees may also affect how trees respond to other natural hazards, such as hurricanes, drought, and ice storms (Kurtz 2007).

Because invasive species is currently present in Pike County, it is clear that the county is vulnerable to invasive and nuisance species. Despite quarantine and control efforts, invasive and nuisance species movement occurs across county lines through anthropogenic and natural modes, including freight shipping, transplantation, and animal movement. Considering the extent of the current infestations and neighboring county infestations, it is reasonable to **project that the county's vulnerability will increase.**

To understand risk, a community must evaluate what assets are exposed or vulnerable in the identified hazard area. For invasive and nuisance species, Pike County has been identified as the hazard area. Therefore, all assets in Pike County, as described in the County Profile section, are vulnerable to invasive and nuisance species. The following text evaluates and estimates the potential impact of infestation on the County including:

- Impact on: (1) life, health and safety of residents, (2) general building stock, (3) critical facilities, (4) economy, and (5) future growth and development
- Effect of climate change on vulnerability
- Further data collections that will assist understanding this hazard over time

Impact on Life, Health and Safety

The entire population of Pike County is vulnerable to invasive and nuisance species to some extent. The impacts of harmful algal blooms on life, health, and safety depend on several factors, including the severity of the event and whether citizens and tourists have become exposed to waters suspected of containing toxins associated with cyanobacteria. Routes of exposure include consumption, inhalation, and dermal exposure. The population living near or visiting waterbodies is at risk for exposure as well as those that use those waterbodies for recreation, fishing, and water supply. Contact with water containing harmful algal blooms can cause various health effects including diarrhea, nausea or vomiting; skin, eye, or throat irritation; and allergic reactions or breathing difficulties (CDC 2020).

Further, the population living near waterbodies is at risk for exposure to HABs as well as those that use those waterbodies for recreation, fishing, and water supply. Therefore, exposure should not be limited to only those who reside in a defined hazard zone, but visitors to Pike County waterbodies as well. Contact with water containing HABs can cause various health effects including diarrhea, nausea or vomiting; skin, eye, or throat irritation; and allergic reactions or breathing difficulties (NJDEP 2020).

Impact on General Building Stock and Critical Facilities

No structures are anticipated to be affected directly by infestation or invasive species; however, the emerald ash borer may cause a catastrophic loss of the ash tree throughout state forests, which could result in stream bank instability, erosion, and increased sedimentation. In addition, a preponderance of dead tree limbs could increase the occurrence of downed trees on roadways and utility lines during storms with heavy winds.

Some invasive plants have been shown to destabilize soil due to high densities and shallow root systems, negatively impacting nearby buildings and septic systems. Other invasive plant species have been known to clog culverts and streams, increasing flooding risk.



Impact on Economy

Impacts of infestation and invasive species on the economy and estimated dollar losses are difficult to measure and quantify. Costs associated with activities and programs implemented to conduct surveillance and address a variety of infestations within Pike County have not been quantified in available documentation. Although the economic impact has not been quantified for Pike County, state-wide agricultural losses because of invasive species were estimated at \$7,405,754,000 (PEMA 2018). As stated in Section 4.3.2 (Drought), Pike **County's agricultural products total over \$890,000**; any portion of that value is vulnerable to the effects of invasive species.

Impact on the Environment

Pike County's parks, forests, landscaping, and agricultural areas are vulnerable to spotted lanternfly, hemlock wooly adelgid, and EAB. Species that cause eventual destabilization of soil, such as invasive insects that destroy plants or invasive plants that outcompete native vegetation but have less effective root systems, can increase runoff into waterbodies. This can lead to increased harmful algal blooms and negative impact on drinking water supplies. Soil destabilization can also increase the likelihood of mudslides in areas with a steep slope.

Harmful algal blooms can release toxins that can kill fish and invertebrate (EPA 2019). Animals that prey on fish and invertebrates in surface waters, such as birds and mammals, may be affected if they ingest impacted prey. Both harmful and non-harmful algal blooms can have drastic impacts on oxygen levels in surface waters. When algae begin to die off following a bloom, bacteria begin to decompose the organic material. This decomposition consumes dissolved oxygen and releases carbon dioxide. If the bloom and die off is large enough, dissolved oxygen levels in aquatic systems can rapidly crash. Anoxic conditions connected to algal blooms have resulted in large fish and invertebrate kills.

Future Growth and Development

Areas targeted for potential future growth and development within the next 5 years have been identified across the County (further discussed in Section 2.4 of this HMP). Any areas of growth could be potentially impacted by the invasive and nuisance species hazard because the entire planning area is exposed and potentially vulnerable.

As discussed and illustrated in Section 2, areas targeted for future growth and development have been identified across the county. Any areas of growth could be potentially impacted by the invasive and nuisance species hazard because the entire Planning Area is exposed and potentially vulnerable to the impacts associated with these events.

Effects of Climate Change on Vulnerability

Climate change is contributing to the introduction of new invasive and nuisance species. As maximum and minimum seasonal temperatures change, invasive species are able to establish themselves in previously inhospitable climates. Evidence suggests that a changing climate will further increase the likelihood of invasive species impacting natural areas and that the consequences of those invasive species may be magnified. Warming temperatures also gives invasive species an earlier start and increases the magnitude of their growth (PA HMP 2013; U.S. Forest Service 2016).



Additional Data and Next Steps

Pike County and its municipalities continue to be vulnerable to the invasive and nuisance species hazard. Over time, the County may obtain additional data to support the analysis of this hazard.

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4.3.10 Geological Hazards

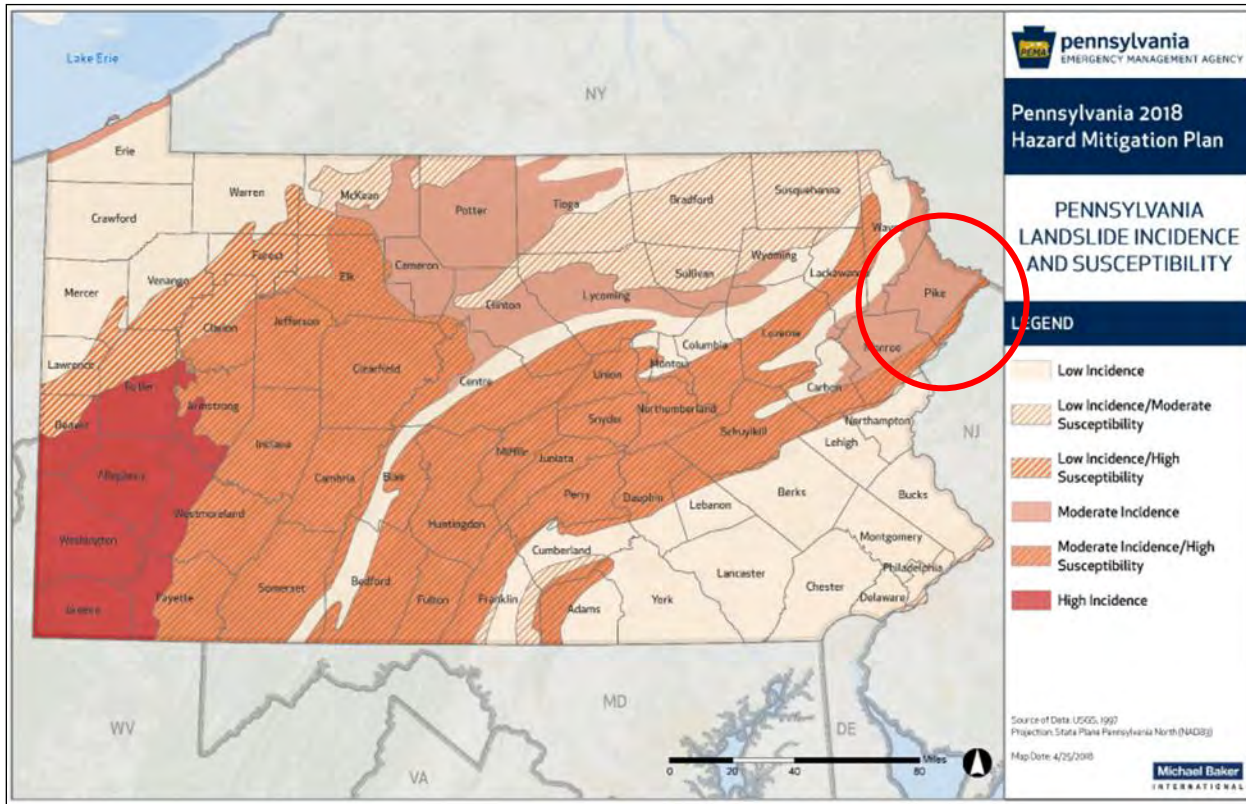
This section provides a profile and vulnerability assessment of the landslide hazard in Pike County. According to the U.S. Geological Survey (USGS), the term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows (USGS 2016). Landslides 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 (DCNR 2001).

4.3.10.1 Location and Extent

The entire U.S. experiences landslides, with 36 states having moderate to highly severe landslide hazards. Expansion of urban and recreational developments into hillside areas exposes more people to the threat of landslides each year. According to the USGS, Pike County has high landslide potential. For a figure displaying the landslide potential of the conterminous United States, please refer to <http://pubs.usgs.gov/fs/2005/3156/2005-3156.pdf> (USGS 2005).

Rockfalls and other slope failures occur in areas of Pennsylvania with moderate to steep slopes; however, most of Pennsylvania has areas susceptible to landslides. The southwestern area of Pennsylvania has the highest concentration of landslides (PEMA 2018). According to DCNR, 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. Major highway construction with large excavations and fills creates potential for landslides (DCNR 2016). Figure 4.3.10-1 shows the landslide susceptible areas across the Commonwealth. Pike County is noted as having a generally low susceptibility to landslides but includes local areas of high to moderate susceptibility.

Figure 4.3.10-1. Areas of Pennsylvania Susceptible to Landslides



Source: PEMA 2018

Note: The red circle indicates the approximate location of Pike County. Pike County is shown as having a generally moderate incidence but includes local areas of moderate incidence/high susceptibility.

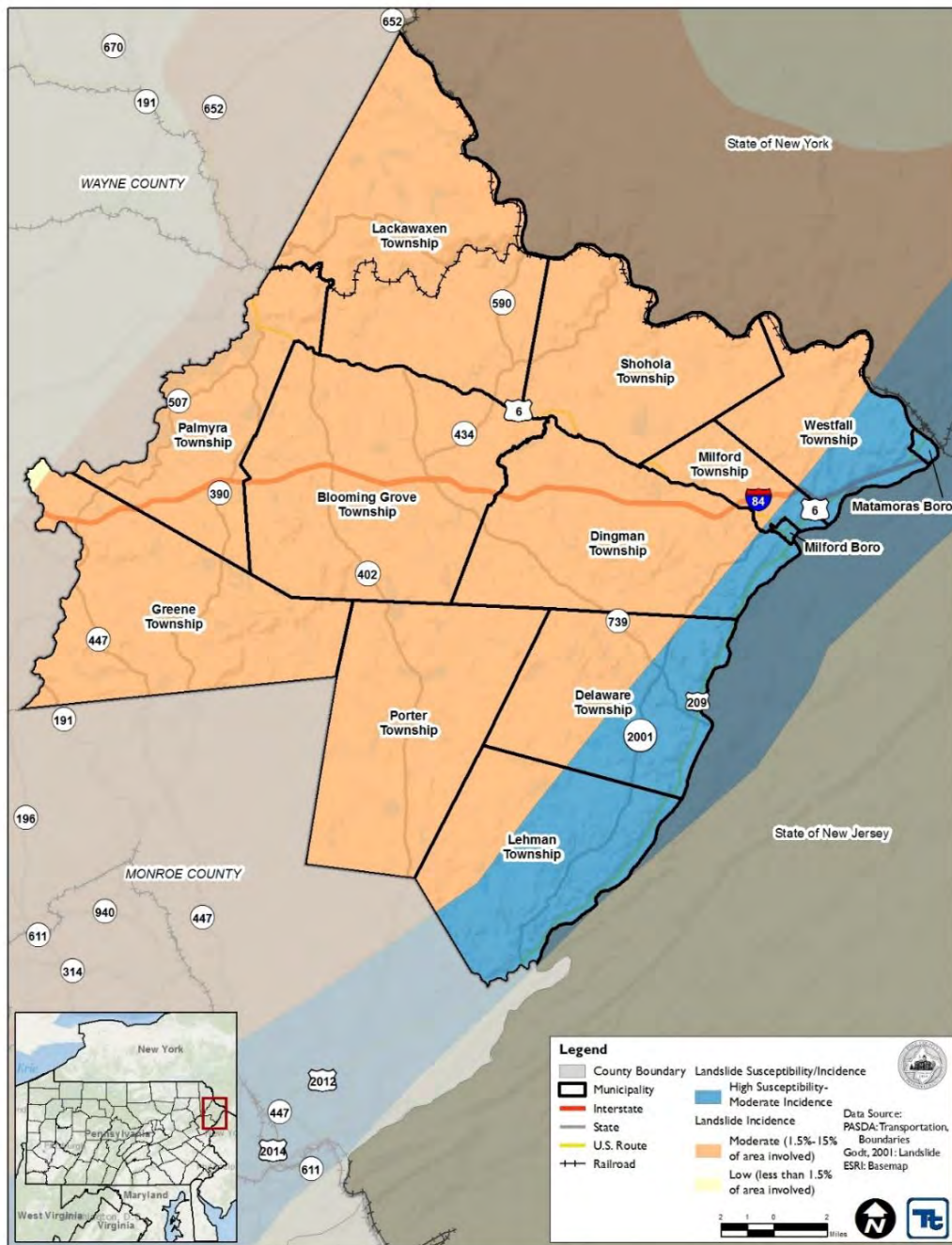
To determine the extent of a landslide hazard, the affected areas need to be identified and the probability of the landslide occurring within some time period needs to be assessed. Natural variables that contribute to the overall extent of potential landslide activity in any particular area include soil properties, topographic position and slope, and historical incidence. Predicting a landslide is difficult, even under ideal conditions and with reliable information. As a result, the landslide hazard is often represented by landslide incidence and/or susceptibility, as defined below:

- Landslide incidence is the number of landslides that have occurred in a given geographic area. High incidence means greater than 15% of a given area has been involved in landsliding; medium incidence means that 1.5 to 15% of an area has been involved; and low incidence means that less than 1.5% of an area has been involved (Radbruch-Hall 1982).
- 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. It can be assumed that 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. 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 (Radbruch-Hall 1982).



According to the Landslide Incidence and Susceptibility GIS layer from National Atlas as shown in Figure 4.3.10-2, the eastern portion of Pike County is located in the High-Susceptibility/Moderate-Incidence zone (Godt 2001). For the purposes of this planning effort, the High-Susceptibility/Moderate-Incidence zone is considered the hazard area. The remainder of the County is located in the Moderate Incidence zone, with a small portion of Greene Township in the Low Incidence zone. According to Pike County records, the most recent landslides occurred in the Townships of Shohola, Westfall, Dingman, and Delaware.

Figure 4.3.10-2. Landslide Hazard Area in Pike County





4.3.10.2 Range of Magnitude

Landslides have the potential to damage transportation routes, utilities, and buildings. They can also create travel delays and other side effects. Fortunately, 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. As residential and recreational development increases on and near steep mountain slopes, the hazards from these events will also increase (PEMA 2018).

According to DCNR, the Pennsylvania Department of Transportation and large municipalities incur substantial costs due to landslide damage and extra construction costs for new roads in known landslide-prone areas. One PA DOT 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 (DCNR 2014).

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

- 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 event (PEMA 2018).

Pike County's worst-case scenario is for a landslide to occur during or after a heavy rain event in the area of major transportation routes (Interstate 84, US Route 209, and US Route 6). A landslide on these roads could lead to road closures and damages and cut off access to emergency response vehicles.

4.3.10.3 Past Occurrence

Outside of impacts to important transportation routes, landslide history is not documented as completely (if at all) as other hazards, primarily because landslides are not always seen, and therefore historical landslide occurrences in Pike County are not well known. Information provided by Pike County Office of Community Planning identified the following geologic events:

- 2007 – State Route 1005 in Shohola Township - \$775,000 in damages
- 2009 – T397 in Shohola Township - \$500,000 in damages
- August and September 2011 – Intense rain from Hurricane Irene and Tropical Storm Lee led to numerous roadway washouts leading to long-term closures throughout the Delaware Water Gap National Recreation Area. This included roadways in portions of Pike County.
- 2014 – State Route 434 in Shohola Township - \$3 million in damages
- 2015 – State Route 1013 in Westfall Township - \$2 million in damages
- 2015 – State Route 2002 in Delaware Township - \$1.25 million in damages



Between 1954 and 2021, 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 did not include Pike County (FEMA 2021).

4.3.10.4 Future Occurrence

Based upon risk factors and past occurrences, it is likely that landslides will continue to occur in Pike County in the future. However, severity of the landslides can vary depending on type and location of event. Landslide probabilities are largely a function of surface geology, but are also influenced by both weather and human activities. Mismanaged, intense development in steeply sloped areas could increase the frequency of landslide occurrence. Periods of intense rain or snowmelt can also increase the risk of landslides.

For the 2022 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of landslide events for Pike County. Information provided by Pike County was used to identify the number of landslide events that occurred between 1950 and 2021. 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 8.3-percent chance of a landslide event occurring in any given year in Pike County.

Table 4.3.10-1. Probability of Future Landslide Events

Hazard Type	Number of Occurrences Between 1950 and 2021	Percent chance of occurrence in any given year
Landslide	6	8.3%

Sources: Pike County 2021

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

4.3.10.5 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 15 percent to delineate the landslide hazard area. Slope degrees greater than 15 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 4.3.10-2 summarizes the population located in the landslide-susceptible hazard area, or areas where slopes have degree angles greater than 15 percent. Lehman Township has the greatest number of persons located in the landslide-susceptible hazard area with 2,113 people, or 20.8 percent of its total population. Milford Township has the



greatest percentage of its population located in the landslide-susceptible hazard area (24.5-percent of its total population).

Table 4.3.10-2. Estimated Dauphin County Population Vulnerable to the Landslide Hazard Area

Municipality	Total Population (American Community Survey 2015-2019)	Estimated Population Located in the Steep Slope (>15% Grade) Hazard Area	
		Number of Persons	Percent of Total
Blooming Grove Township	4,645	428	9.2%
Delaware Township	7,063	565	8.0%
Dingman Township	11,619	824	7.1%
Greene Township	3,825	479	12.5%
Lackawaxen Township	5,020	724	14.4%
Lehman Township	10,183	2,113	20.8%
Matamoras Borough	2,336	12	0.5%
Milford Borough	1,172	97	8.2%
Milford Township	1,329	326	24.5%
Palmyra Township	3,215	621	19.3%
Porter Township	400	18	4.6%
Shohola Township	2,133	218	10.2%
Westfall Township	2,513	415	16.5%
Pike County (Total)	55,453	6,839	12.3%

Sources: American Community Survey 2019 5-year estimates; Pike County – n.d.

Note: The 2020 Census was not available during the planning process; therefore, the 2019 American Community Survey was used for population statistics.

Socially vulnerable populations (e.g., the elderly and low-income populations) are particularly vulnerable to a landslide event. There are approximately 12,152 persons over 65 and 5,268 persons living below the poverty level in Pike County (American Community Survey 2020). Dingman Township has the greatest elderly population (2,150 people) and the Lehman Township has the greatest low-income population (1,426 people). The jurisdiction with greatest number of exposed persons, Lehman Township, has 1,663 elderly persons and 1,426 low-income persons. The jurisdiction with the greatest percentage of its population located in the landslide-susceptible hazard area, Milford Township, has 322 elderly persons and 106 low-income persons. 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.

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.



Impact on Critical Facilities and the Economy

Landslides can also impact the critical facilities in Pike County. There are three critical facilities located in the identified landslide-susceptibility hazard area (Table 4.3.10-1). Cell towers and central water facilities are the types of critical facilities located in the landslide hazard area. Each of these facilities is also considered to be a lifeline facility. Section 2, County Profile, provides more information about these critical facilities and lifelines.

Table 4.3.10-1. Distribution of Critical Facilities in the Landslide-Susceptible Hazard Area (Slope Degrees >15 Percent) by Type and Jurisdiction

Municipality	Number of Critical Facilities Located on Steep Slopes (>15% Grade)	
	Cell Tower	Central Water Facility
Blooming Grove Township	1	0
Delaware Township	0	0
Dingman Township	0	0
Greene Township	0	0
Lackawaxen Township	0	0
Lehman Township	0	0
Matamoras Borough	0	0
Milford Borough	0	0
Milford Township	0	1
Palmyra Township	0	0
Porter Township	0	0
Shohola Township	0	0
Westfall Township	1	0
Pike County (Total)	2	1

Sources: Pike County 2021

In addition to critical facilities, a significant amount of infrastructure can be exposed to mass movements of geological material:

- **Roads** – Access to major roads is crucial to life-safety after a disaster event and to response and recovery operations. Landslides can block egress and ingress on roads, isolating neighborhoods, posing traffic problems, and causing delays of public and private transportation. This can result in economic losses for businesses.
- **Bridges** – Landslides can significantly impact road bridges. Mass movements can knock out bridge abutments or significantly weaken the soil supporting them, rendering them hazardous for use.
- **Power Lines** – Power lines are generally elevated above steep slopes but the towers supporting them can be subject to landslides. A landslide could trigger failure of the soil underneath a tower, causing it to collapse and ripping down the lines. Power and communication failures from landslides can create problems for vulnerable populations and businesses.
- **Rail Lines** – Similar to roads, rail lines are important for response and recovery operations after a disaster. Landslides can block travel along the rail lines, which would become especially troublesome, because it would not be as easy to detour a rail line as it would be to re-route a local road or highway.



Impact on the Economy

Geologic hazards can impose direct and indirect impacts on society. Direct costs include actual damage sustained by buildings, property, and infrastructure. Indirect costs, such as cleanup costs, business interruption, loss of tax revenues, reduced property values, and loss of productivity, are difficult to measure. Additionally, ground failure threatens transportation corridors, fuel and energy conduits, and communication lines (Spiker and Gori 2000).

Impact on the Environment

A landslide event alters the landscape. In addition to changes in topography, vegetation and wildlife habitats may be damaged or destroyed. Soil and sediment runoff will accumulate downslope, potentially blocking waterways and roadways and impacting quality of streams and other water bodies. Additional environmental impacts include loss of forest productivity.

Mudslides are a type of landslide that involve quick-moving debris rivers. These types of landslides can destroy natural and man-made objects, ultimately settling in a level location and gathering into thick deposits (PEMA 2018).

Cascading Impacts on Other Hazards

Landslide events can have cascading impacts on transportation accidents and utility interruption. As discussed in earlier sections, landslides may disturb roadways, railways, or other methods of transportation. Debris can intersect these lines, causing accidents and other disruptions to occur.

Landslides can also disrupt the functionality of utilities if the debris falls, topples, or spreads over the utilities providing services to the county. For example, electric utilities may become disconnected if power lines are broken from displaced geologic material. Water utilities may become breached with excess debris and/or contaminants carried by landslide events. More information about traffic accidents and utility interruptions is provided in Sections 4.3.16 and 4.3.18.

Future Growth and Development

Any sections of growth located in the landslide-susceptible hazard areas could be potentially impacted by the geologic ground movement caused by landslides. It is recommended that the county and jurisdictional partners implement design strategies that mitigate against the risk of landslides.

Areas targeted for potential future growth and development within the next five years have been identified across Pike County. Refer to Section 2.4 of this HMP for further details. New development within the High-Susceptibility/Moderate-Incidence landslide hazard areas are considered exposed to these risks.

Climate Change

A direct impact of climate change on landslides is difficult to determine. However, multiple secondary effects of climate change have the potential to increase the likelihood of landslides. Warming temperatures resulting in wildfires would reduce vegetative cover along steep slopes and destabilize the soils because of destruction of the root system. Additionally, increased intensity of rainfall events would increase saturation of soils on steep slopes. Under these **future conditions, the county's assets located on or at the base of these steep slopes will have an increased risk to landslides.**



Additional Data and Next Steps

Since the 2017 HMP analysis, population statistics have been updated using the 5-Year 2015-2019 American Community Survey Population Estimates. The general building stock was updated using 2018 RSMeans building valuations that estimated replacement cost value for each building in the inventory. Landslide susceptibility was considered to be a slope of 15 percent or greater. Overall, this vulnerability assessment provides more accurate exposure and potential loss estimates for Pike County. During the next update, the County use the 2020 Census to update this section.

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4.3.11 Nuclear Incidents

Nuclear hazards and incidents generally refer to incidents involving (1) a release of significant levels of radioactive materials or (2) exposure of workers or the general public to radiation. Primary concerns following a nuclear incident or accident are the impact on public health from direct exposure to a radioactive plume; inhalation of radioactive materials; ingestion of contaminated food, water, and milk; and long-term exposure to deposited radioactive materials in the environment that may lead to either acute (radiation sickness or death) or chronic (cancer) health effects.

The nuclear industry has adopted pre-determined, site-specific Emergency Action Levels (EAL). The EALs provide the framework and guidance for observing, addressing, and classifying the severity of site-specific incidents and conditions that are communicated to off-site emergency response organizations (Nuclear Regulatory Commission [NRC] 2008). Additional EALs specifically deal with issues of security, such as threats of airborne attack, hostile action within the facility, or attack on the facility. These EALs ensure that appropriate notifications of a security threat will occur in a timely manner.

The NRC encourages the use of Probabilistic Risk Assessments (PRA) to estimate quantitatively the potential risk to public health and safety considering the design, operations, and maintenance practices at nuclear power plants. PRAs typically focus on accidents that can severely damage the core and that may challenge containment. Federal Emergency Management Agency (FEMA), Pennsylvania Emergency Management Agency (PEMA), and county governments have formulated Radiological Emergency Response Plans to prepare for radiological emergencies at the five nuclear power-generating facilities in the Commonwealth of Pennsylvania. These plans include a Plume Exposure Pathway Emergency Planning Zone (EPZ) (an area with a radius of 10 miles from each nuclear power facility), and an Ingestion Exposure Pathway EPZ (an area with a radius of 50 miles from each facility).

4.3.11.1 Location and Extent

There are five nuclear power generation stations located in the Commonwealth; however, none are located within Pike County limits. The County is located within the 50-mile Ingestion Exposure Pathway EPZ of the Susquehanna Nuclear Power Plant located in Luzerne County and Indian Point Power Plant located in Buchanan, New York. Should an accident occur at either facility, the area within the Ingestion Exposure Pathway EPZ could receive some radioactive contamination. The Indian Power Plant closed in April 2021 and is currently being decommissioned. Figure 4.3.11-1 provides visual representation of where Pike County falls in the Plume Exposure Pathway EPZ and Ingestion Exposure Pathway EPZ of nuclear power plants.



Figure 4.3.11-1. Pike County Jurisdictions in the 50-Mile Ingestion Exposure Pathway Zone

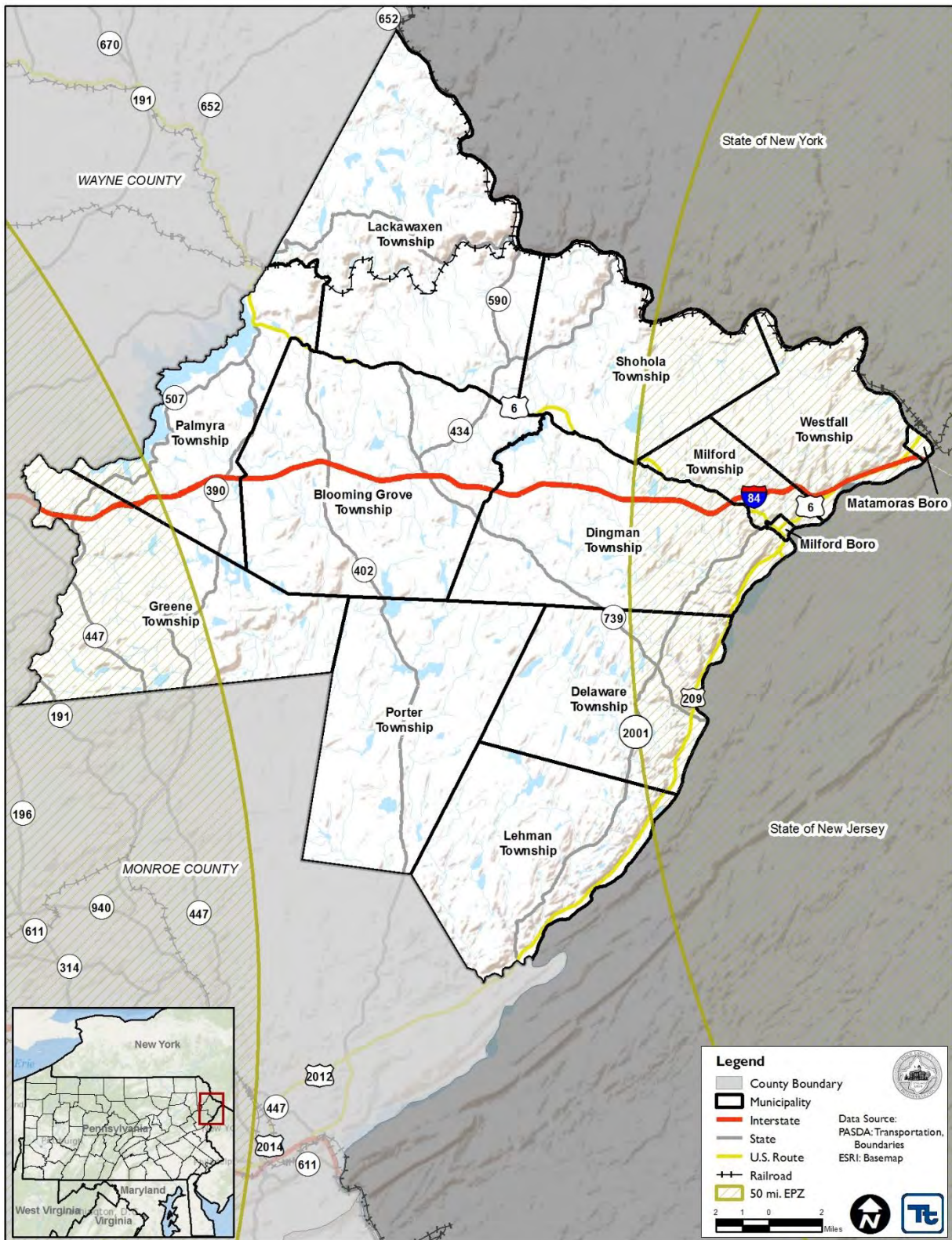




Table 4.3.11-1 lists the jurisdictions in Pike County that are located within the 50-mile EPZs for Susquehanna Steam Electric Station and Indian Point Power Plant.

Table 4.3.11-1. Pike County Jurisdictions in the 50-Mile Ingestion Exposure Pathway Zones

Jurisdiction	50-Mile Ingestion Exposure Pathway Zone – Susquehanna	50-Mile Ingestion Exposure Pathway Zone – Indian Point
Blooming Grove Township	No	No
Delaware Township	No	Yes
Dingman Township	No	Yes
Greene Township	Yes	No
Lackawaxen Township	No	No
Lehman Township	No	Yes
Matamoras Borough	No	Yes
Milford Borough	No	Yes
Milford Township	No	Yes
Palmyra Township	Yes	No
Porter Township	No	No
Shohola Township	No	Yes
Westfall Township	No	Yes

The U.S. Department of Energy transports used nuclear fuel to the repository by rail and road, inside sealed containers. The used fuel may be shipped along specified highway routes. Rail is used to transport nuclear waste as well (Nuclear Energy Institute 2016).

4.3.11.2 Range of Magnitude

Plume Exposure Pathway EPZ refers to whole-body external exposure to radiation from a radioactive plume and from deposited materials and inhalation exposure from the passing radioactive plume. The duration of primary exposures could range in length from hours to days. The Plume Exposure Pathway EPZ does not reach Pike County. The 50-mile Ingestion Exposure Pathway EPZ refers to exposure primarily from ingestion of water or foods such as milk and fresh vegetables that have been contaminated with radiation. This kind of exposure can stem from any of the three categories of nuclear accident. Although the 50-mile Ingestion EPZs include only portions of Pike County (refer to Figure 4.3.11-1 and Table 4.3.11-1), impacts are anticipated across the entire County.

Nuclear facility accidents are classified into three categories, and exposure to radiation can stem from any of the three:

- Criticality accidents: Involves loss of control of nuclear assemblies or power reactors.
- Loss-of-coolant accidents: Occurs whenever a reactor coolant system experiences a break or opening large enough so that the coolant inventory in the system cannot be maintained by the normally operating make-up system.



- Loss-of-containment accidents: Involves the release of radioactivity from materials such as tritium; fission products; plutonium; and natural, depleted, or enriched uranium. Points of release have been containment vessels at fixed facilities or damaged packages during transportation accidents.

In accordance with regulations specified by FEMA and NRC, each facility is required to notify jurisdictional agencies of an incident or occurrence within that facility. NRC uses four classification levels for nuclear incidents (NRC 2008). PEMA and facility owners with whom PEMA coordinates use the following notification levels based on an internal trigger:

- Unusual Event: Incidents are occurring or have occurred that indicate potential degradation in the level of safety of the plant. No release of radioactive material requiring off-site response or monitoring is expected unless further degradation occurs.
- Alert: Incidents are in process or have occurred that involve actual or potential substantial degradation in the level of safety of the plant. Any releases of radioactive material from the plant are expected to be limited to a small fraction of the U.S. Environmental Protection Agency (EPA) Protective Action Guides (PAG).
- Site Area Emergency: Incidents are in process or have occurred that resulted in actual or likely major failures of plant functions needed for protection of the public. Any releases of radioactive material are not expected to exceed EPA PAGs except near the site boundary.
- General Emergency: Incidents are in process or have occurred that have caused actual or imminent substantial core damage or melting of reactor fuel with potential for loss of containment integrity. Radioactive releases during a general emergency can reasonably be expected to exceed the EPA PAGs over more than the immediate site area.

After a nuclear incident, the primary concern is the effect on the health of the population near the incident. The duration of primary exposure could range in length from hours to months depending on the proximity to the point of radioactive release. External radiation and inhalation and ingestion of radioactive isotopes can cause acute health effects (e.g. death, severe health impairment), chronic health effects (e.g. cancers) and psychological effects.

Potential environmental impacts specific to the 50-mile Ingestion Exposure Pathway EPZ, and therefore of most concern to Pike County, include the long-term effects of radioactive contamination in the environment and in agricultural products. Pike County can expect some radioactive contamination in very small amounts in the case of a nuclear incident. This is not a significant concern in terms of external exposure and immediate health risks, but even a small amount of radiation will require the protection of the food chain, particularly milk supplies. Small amounts of radiation ingested over time could lead to future health issues. As a result, in the case of a nuclear incident, foodstuffs, crops, milk, livestock feed and forage, and farm water supplies will need to be protected from and tested for contamination. Additionally, spills and releases of radiologically active materials from accidents can result in the contamination of soil and public water supplies.

The worst-case scenario nuclear incidents for Pike County would be if a General Emergency occurred at Indian Point Power Plant that leaked sufficient radiation to create longer-term damage in the form of contaminated water, soil, and food supplies in the county. In addition, New York State residents may enter Pike County in search of a new residence or for medical care thus overwhelming existing community facilities and services.



4.3.11.3 Past Occurrence

Pennsylvania is home to the only recorded nuclear emergency in the United States. In 1979, the Three Mile Island Nuclear Generating Station declared a general emergency following an internal system failure. Repercussions from this event were swift, with sweeping changes to NRC oversight that included assignment of responsibility to FEMA for outside support. Growth in the nuclear power industry immediately slowed, with the number of facilities decreasing over the next decade. In addition, public confidence in the nuclear industry decreased considerably.

While reports show conflicting information regarding medical impacts on the residential population following the disaster, costs of the cleanup phase of this incident exceeded \$1 billion. No FEMA disaster declarations have since occurred regarding nuclear emergencies in Pennsylvania.

4.3.11.4 Future Occurrence

Pennsylvania is home to the only nuclear power plant General Emergency in the nation. Since the Three Mile Island incident, nuclear power has become significantly safer and is one of the most heavily regulated industries in the nation. Despite the knowledge gained since then, there is still the potential for a similar accident to occur again at one of the five nuclear generating facilities in the Commonwealth. The Nuclear Energy Agency of the Organization for Economic Co-Operation and Development notes that studies estimate the chance of protective barriers in a modern nuclear facility at less than one in 100,000 per year (Pike County HMP 2012).

Across the United States, a number of *Unusual Event* and *Alert* classification level events occur each year at the 100+ nuclear facilities that warrant notification of local emergency managers. Of these, *Alert* emergencies occur less frequently. For example, in 1997, there were forty notifications of *Unusual Events* and three *Alert* events nationwide. Based on historical events, *Site Area Emergency* and *General Emergency* incidents are very rare. Based on available historical data and the lack of nuclear incident events impacting Pike County, the future occurrence of nuclear incident events can be considered *unlikely* as defined by the Risk Factor Methodology probability criteria (refer to Section 4.4).

4.3.11.5 Vulnerability Assessment

To understand risk, a community must evaluate the assets that are exposed or vulnerable within the identified hazard area. This section evaluates and estimates the potential impact of the nuclear incident exposure hazard on Pike County. The 50-mile EPZ zone for nuclear facilities was compared to Census Block 2010 boundaries, the 2015-2019 American Community Survey population estimates, and the critical facilities supplied by Pike County. It should be noted that the 2020 Census was not available during the planning process; therefore, the 2019 American Community Survey was used for population statistics and the 2010 Census block boundaries were used.

Impact on Life, Health, and Safety

Effects from a radiological incident at a fixed facility would vary depending on the product released (type of radiation), amount of radiation released, current weather conditions, and time of day. The priority following an incident at any of the facilities within the Commonwealth of Pennsylvania is the life and safety of all individuals within the area impacted. Secondary to health and safety would be effects on critical infrastructure, environment, property, and the economy.



Impacts within the affected area can include loss of utility service, contamination of local crops and livestock, loss of residential property due to measurable quantities of nuclear materials, and increased risk to health and wellbeing of individuals within the area.

For the purposes of this plan, the population of the county located within the 50-mile EPZ zone is assumed to be exposed to the risk of nuclear incident exposure. Only portions of Pike County are located within the Ingestion Pathway EPZ of the Susquehanna Steam Electric Station or Indian Point Power Plant. It should be noted that the Indian Point Power Plant has begun decommissioning. During this process, Pike County is still vulnerable to any incidents associated with the decommissioning.

Table 4.3.11-2 shows the population located within the 50-mile EPZ of these facilities. Municipalities more vulnerable to the contamination, based on percent of population, effects of nuclear incidents include Greene Township (81.7%), Matamoras Borough (100%), Milford Borough (100%), Milford Township (100%), and Westfall Township (100%).

Table 4.3.11-2. Population within the 50-mile EPZ of Power Plants.

Municipality	Total Population (American Community Survey 2015-2019)	Estimated Population Located in the 50 Mile Nuclear Incident Hazard Area	
		Number of Persons	Percent of Total
Blooming Grove Township	4,645	0	0.0%
Delaware Township	7,063	1,627	23.0%
Dingman Township	11,619	4,058	34.9%
Greene Township	3,825	3,123	81.7%
Lackawaxen Township	5,020	0	0.0%
Lehman Township	10,183	1	0.0%
Matamoras Borough	2,336	2,336	100.0%
Milford Borough	1,172	1,172	100.0%
Milford Township	1,329	1,328	100.0%
Palmyra Township	3,215	643	20.0%
Porter Township	400	0	0.0%
Shohola Township	2,133	238	11.2%
Westfall Township	2,513	2,513	100.0%
Pike County (Total)	55,453	17,040	30.7%

Source: ACS 2020, Pike County 2021

Note: At the time of the HMP update, the 2020 Census data was unavailable. Therefore, the 2019 ACS data was used to complete the vulnerability assessment and presented in the table above.

Impact on General Building Stock and Critical Facilities

The general building stock located within the 50-mile EPZ in Pike County is exposed to nuclear incidents. The number of critical facilities and lifelines exposed are documented in Table 4.3.11-3 and Table 4.3.11-4.



Table 4.3.11-3. Critical Facilities within the 50 mile EPZ of Power Plants.

Municipality	Number of Critical Facilities Located Within 50 Miles of the Nuclear Incident Hazard Area											
	Cell Tower	Central Water Facility	County Bldg	Day Care	Fire	Medical	Municipal Building	Nursing Home	Police	School	Shelter	Wastewater
Blooming Grove Township	0	0	0	0	0	0	0	0	0	0	0	0
Delaware Township	0	0	0	1	2	0	0	0	0	0	0	0
Dingman Township	1	0	0	2	0	0	1	0	0	0	0	0
Greene Township	2	0	0	1	0	0	1	0	0	0	1	0
Lackawaxen Township	0	0	0	0	0	0	0	0	0	0	0	0
Lehman Township	0	0	0	0	0	0	0	0	0	0	0	0
Matamoras Borough	0	1	0	2	1	0	1	0	1	1	1	0
Milford Borough	0	0	2	3	1	1	1	1	2	0	1	0
Milford Township	1	1	0	1	0	0	1	0	0	0	1	0
Palmyra Township	0	0	0	0	0	0	0	0	0	0	0	0
Porter Township	0	0	0	0	0	0	0	0	0	0	0	0
Shohola Township	0	0	0	0	0	0	0	0	0	1	0	0
Westfall Township	1	0	0	0	2	0	1	4	0	4	3	1
Pike County (Total)	5	2	2	10	6	1	6	5	3	6	7	1

Source: Pike County 2021

Table 4.3.11-4. Lifeline Facilities within the 50-mile EPZ of Power Plants.

FEMA Lifeline Category	Number of Lifelines	Number of Lifelines Located in the 50 Mile Nuclear Incident Hazard Area
Communications	26	5
Food, Water, Shelter	28	10
Health and Medical	12	6
Safety and Security	57	23
Pike County (Total)	123	44

Source: Pike County 2021

It is important to note that the entire County, not just the areas in the EPZ may be impacted based on the flow of goods and services and where residents get their food supply. Water contamination is also a concern in nuclear incidents. **Public water suppliers that operate in or provide water to the County, coupled with the County's 4,530 domestic drinking water wells (PaGWIS), are all vulnerable to the effects of a nuclear incident.**

Impact on the Economy

Contamination of agriculture, livestock, and production can lead to loss of commerce with other regions of the State, country, and even the world. Recently, many countries halted imports of products from Japan for fear of



contamination following the tsunami-related nuclear incident at the Fukushima Power Plant. This loss in revenue compounded losses that Japan and its region were already encountering following the initial disaster.

The County's primary vulnerability to nuclear incidents comes in the form of food, soil, and water contamination. In terms of vulnerable land, the approximately 24,700 acres of farmland is vulnerable to radiological contamination in a nuclear incident. In 2017, the market value of all agricultural products of these farms totaled approximately \$900,000. While unlikely that all agricultural products would be lost in the event of a nuclear incident, the County can expect some portion to be lost. Time of year also impacts the vulnerability and losses estimated for a nuclear incident; an incident that occurs during the prime growing and harvesting season will have a larger impact on the County.

Impact on the Environment

Potential environmental impacts include the long-term effects of radioactive contamination in the environment and, particularly in Pennsylvania, in agricultural products. Spills and releases of radiologically active materials from accidents can result in the contamination of soil and water. Areas underlain by limestone and some types of glacial sediments are particularly susceptible to contamination (PA 2018 State HMP).

After a nuclear incident, another significant impact is the effect of radiation on the health of the population near the incident. The duration of primary exposure could range in length from hours to months depending on the proximity to the point of radioactive release. External radiation and inhalation and ingestion of radioactive isotopes can cause acute health effects (e.g. death, severe health impairment), chronic health effects (e.g. cancers) and psychological effects (PA 2018 State HMP).

Future Growth and Development

Any sections of growth located in the 50-mile EPZ of nuclear facilities could be potentially impacted by an incident. It is recommended that the County and jurisdictional partners implement safety precautions in the event of an incident.

Areas targeted for potential future growth and development within the next five years have been identified across Pike County. Refer to Section 2.4 of this HMP for further details. New development within the 50-mile EPZ of nuclear facilities are considered exposed and vulnerable to a nuclear incident.

Climate Change

Nuclear power facilities are exposed to potential risks from a changing climate. An increase in storm intensity and frequency, extreme temperature events, and rising sea levels can all increase the threat to structural and infrastructure damage to facilities and pose a risk to those living within the 50-mile EPZ.

Additional Data and Next Steps

Since the 2017 HMP analysis, population statistics have been updated using the 5-Year 2015-2019 American Community Survey Population Estimates. The 50-mile EPZ zone for nuclear facilities was compared to Census Block 2010 boundaries, the 2015-2019 American Community Survey population estimates, and the critical facilities supplied by Pike County. Overall, this vulnerability assessment provides more accurate exposure and potential loss estimates for Pike County. During the next update, the 2020 Census data will be used to determine the number of people living within the 50-mile EPZ zone for nuclear facilities.



4.3.12 Radon Exposure

Radon is a natural gas that cannot be seen, smelled, or tasted. It is a noble gas that originates from 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 occupation settings. According to the U.S. Environmental Protection Agency (EPA) (EPA 402-R-03-003: EPA Assessment), 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 2013). An estimated 40 percent of the homes in Pennsylvania are believed to have elevated radon levels (Pennsylvania Department of Environmental Protection [PADEP] 2019). This section provides a profile and vulnerability assessment of the radon exposure hazard.

4.3.12.1 Location and Extent

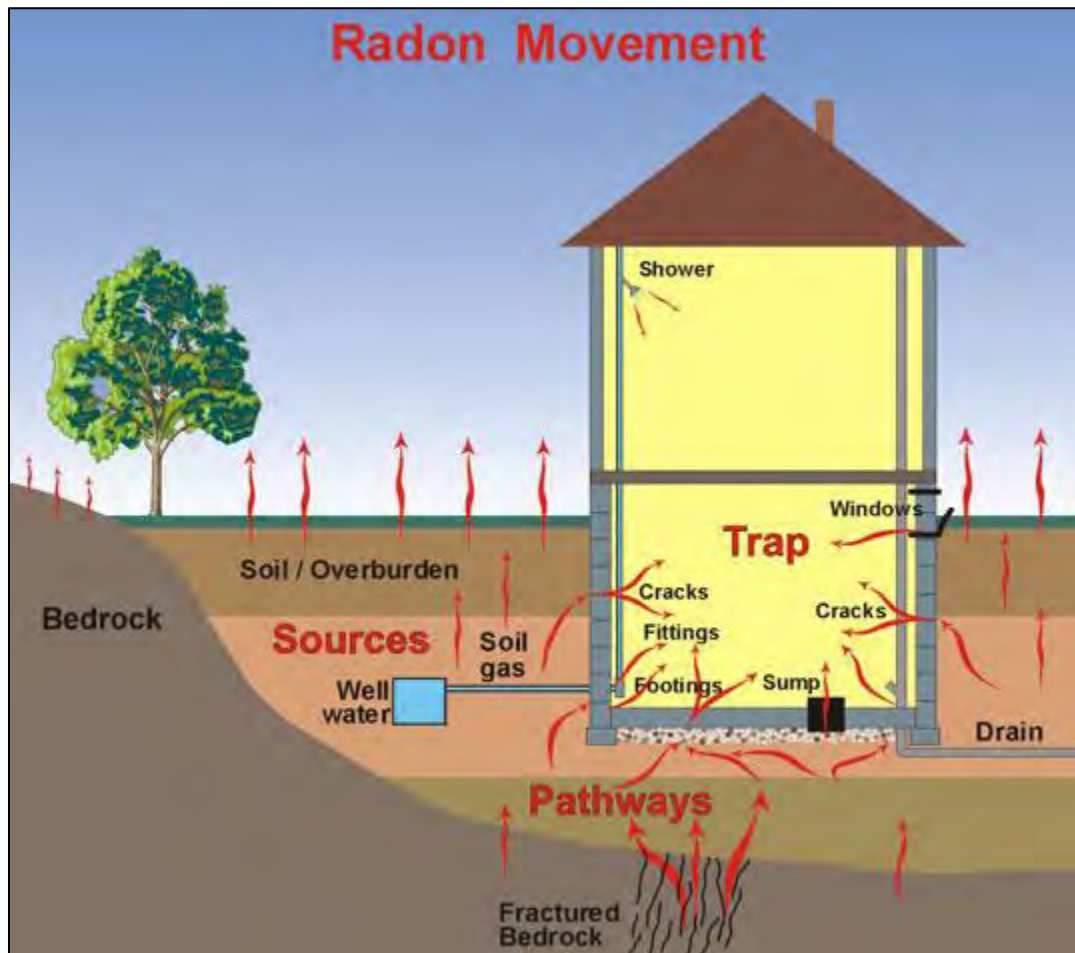
Radioactivity caused by airborne radon has been recognized for many years as an important component in the natural background radioactivity exposure of humans. However, it was not until the 1980s that the wide geographic distribution of elevated radon levels in houses was identified, and the possibility of extremely high radon concentrations in houses was recognized. In 1984, routine monitoring of employees leaving the Limerick nuclear power plant near Reading, Pennsylvania, showed that readings from one employee frequently exceeded expected radiation levels, yet only natural, nonfission-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, a physiographic province of Pennsylvania, where this person lived became the focus of the first large-scale radon scare in the world (PEMA 2018).

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. Figure 4.3.12-1 illustrates radon entry points into a home. Three sources of radon in houses are now recognized:

- Radon in soil air that flows into the house;
- Radon dissolved in water from private wells and exsolved during water usage; this is rarely a problem in Pennsylvania; and
- Radon emanating from uranium-rich building materials (e.g. concrete blocks or gypsum wallboard); this is not known to be a problem in Pennsylvania (PEMA 2018).



Figure 4.3.12-1. Sketch of Radon Entry Points into a House

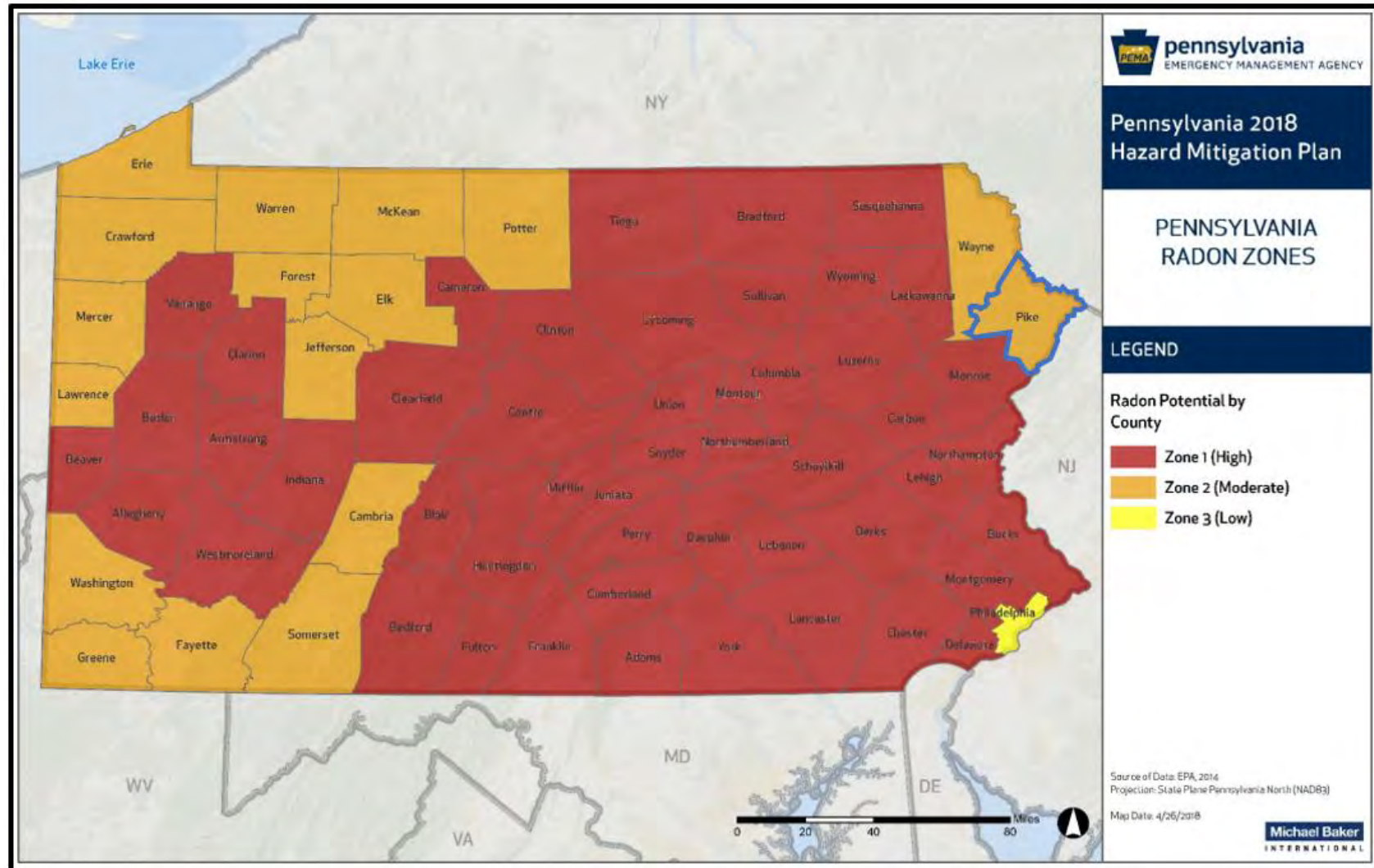


Sources: PEMA 2013

Each county in Pennsylvania is classified as having a low (Zone 3), moderate (Zone 2), or high (Zone 3) radon hazard potential (Refer to Figure 4.3.12-2). A majority of counties across the Commonwealth, particularly counties in eastern Pennsylvania, have a high hazard potential. According to the EPA map of radon zones, Pike County is located in Zone 2 (counties with predicted average indoor radon screening levels from 2 to 4 pCi/L).



Figure 4.3.12-2. EPA Radon Zones in Pennsylvania



Source: PEMA 2018

Note: Pike County is outlined in blue. The figure indicates that Pike County is located in EPA Radon Zone 2 (moderate).

4.3.12: RADON EXPOSURE





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, as well as 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** section of the house is sealed 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 2018).

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 in 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. For houses built on bedrock, fractured zones may supply air with radon concentrations similar to those in deep soil (PEMA 2018).

Areas where high levels of radon have been detected in homes can be divided into 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: Although very high levels of radon can occur in these areas, 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 rocks having higher than average uranium content (5 to 50 ppm): In Pennsylvania, these rock types include granitic and felsic alkali igneous rocks and black shales. 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 with normal uranium content but containing properties that promote high radon levels in houses: This group is 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 for 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 exceedance of 4 pCi/L in 93 percent of a sample of houses built on limestone-dolomite soils near State College, Centre County, and 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 5 ppm (PEMA 2018).



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 is radon in 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 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 2013).

4.3.12.2 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 20,000 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 (EPA 2013). The main hazard is actually from the radon daughter products (polonium-218, lead-214, and bismuth-214), which may become attached to lung tissue and induce lung cancer by their radioactive decay. Table 4.3.12-1 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 risks of dying from other hazards for smokers and non-smokers, and (3) action thresholds.

Table 4.3.12-1. Radon Risk for Smokers and Nonsmokers

Radon Level (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)	
NONSMOKERS			
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 2 pCi/L is difficult
0.4	-	(Average outdoor radon level)	

Source: EPA 2013

Note: Risk may be lower for former smokers.

* Lifetime risk of lung cancer deaths from U.S. Environmental Protection Agency (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 the EPA, the average radon concentration in the indoor air in homes in the United States is about 1.3 pCi/L. The EPA recommends that homes be repaired if the radon level is 4 pCi/L or more. However, the EPA also recommends that Americans consider repairing or renovating 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 4.3.12-1, a smoker exposed to radon has a much higher risk of lung cancer.

The worst-case scenario for radon exposure would be a large area of tightly sealed homes inducing high levels of exposure to residents over a prolonged period of time without awareness 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 2018). The most likely scenario, however, is a single household exposed to a very low concentration of radon, with no adverse health effects on residents.

4.3.12.3 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 2018). Pike 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 2016).

In 2015, a groundwater study was conducted by the USGS in collaboration with the Pike County Conservation District. The purpose of this study was to characterize the chemical quality of groundwater from shallow freshwater aquifers used by private residential homes and business supply wells in the County prior to gas drilling. As part of this study, 80 private wells were sampled in 2015 and analyzed for major ions, metals, dissolved gases, gross alpha- and gross-beta radioactivity, dissolved and suspended solids, oil and grease, total coliform, and determination of radon-222, dissolved nutrients, and additional major ions. As results become available from the Pike County Conservation District, they will be included in Pike County's HMP update.

The PADEP Bureau of Radiation Protection provides information for homeowners on how to test for radon in their houses. If a test results in radon concentrations over 4.0 pCi/L, then the Bureau works to help the homeowners make repairs to their houses to mitigate against high radon levels. The total number tests reported to the Bureau since 1990 **and their results are provided by zip code on the Bureau's website** and are summarized in Table 4.3.10-2 below for Pike County. However, this information is only provided if over 30 tests total were reported in order to best approximate the average for the area (PADEP 2016).

In Pike County, all zip codes had reported results from a sufficient number of tests to allow the Bureau to report the findings, which are shown in the table below. Please note that the PADEP does not post public results unless a zip code has had at least 30 tests conducted. The 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 test result within a zip code, many homes in that zip code may have elevated radon levels.



Table 4.3.12-2. Radon Level Tests and Results by Pike County Zip Codes

ZIP Code	Location	Area in Home	Number of Tests	Maximum Result (pCi/L)	Average Result (pCi/L)
18324	Bushkill	Basement	1639	251.0	5.4
		First Floor	645	73.2	2.5
18336	Matamoras	Basement	431	44.4	4.2
		First Floor	130	11.4	1.4
18337	Milford	Basement	3865	210.8	5.3
		First Floor	952	36.3	2.3
18428	Lords Valley (Blooming Grove Township)	Basement	2393	134.2	5.1
		First Floor	922	26.5	2.6
18328	Delaware Township	Basement	1995	209.0	4.7
		First Floor	901	23.1	1.9
18426	Greentown (Greene Township)	Basement	1113	131.2	5.3
		First Floor	286	12.8	1.9
18428	Hawley (Lackawaxen Township)	Basement	2393	134.2	5.1
		First Floor	922	26.5	2.6
18324	Bushkill (Lehman Township)	Basement	1639	251.0	5.4
		First Floor	645	73.2	2.5
18451	Paupack (Palmyra Township)	Basement	185	221.1	7.8
		First Floor	50	6.5	1.7
18458	Shohola Township	Basement	660	55.3	4.5
		First Floor	206	16.4	2.0

Source: PADEP 2021

Notes: pCi/L picoCuries per liter

4.3.12.4 Future Occurrence

Radon exposure is inevitable, given present soil, geologic, and geomorphic factors across Pennsylvania. Residents who live in developments within areas where radon levels previously have been found 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 2018).

As part of a 2014 initiative, EPA's "Test, Fix, Save a Life" radon action campaign strives to highlight radon testing and mitigation as a simple and affordable step to significantly reduce risk for 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:

- **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 action to fix radon levels at or above 4.0 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:** 21,000 Americans die from radon-related lung cancer each year. By decreasing elevated levels in a home, residents can help prevent lung cancer while creating a healthier home (EPA 2013).



Based on available data and the fact that radon is present across Pike County, future occurrences of radon exposure can be considered *likely* as defined by the Risk Factor Methodology probability criteria (further discussed in Section 4.4).

4.3.12.5 Vulnerability Assessment

To understand risk, a community must evaluate assets exposed or vulnerable within the identified hazard area. **Radon exposure is of particular concern in Pike County because of the County's location within EPA Radon Zone 2** (moderate potential). While structural factors (such as building construction and engineered mitigation measures) can influence the level of radon exposure, all residents and structures within Pike County are potentially vulnerable to radon. The following section discusses potential impacts of the radon exposure hazard on Pike County.

Impact on Life, Health, and Safety

For the purposes of this plan, the entire population of the County is assumed exposed to radon. Radon is responsible for approximately 21,000 lung cancer deaths every year, approximately 2,900 of which occur among people who have never smoked. 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 are adults (EPA 2013).

Impact on General Building Stock and Critical Facilities

While the entire general building stock and critical facility inventory in Pike County is exposed to the risk of radon, radon does not result in direct damage to structures and facilities. Rather, engineering methods used 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. 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 2013). Therefore, within Pike County, estimated radon mitigation costs for residential structures could exceed \$5.2 million. However, this costs 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) where the gas is released (PEMA 2018).

Future Changes that May Impact Vulnerability

Understanding future changes that impact vulnerability in the county can assist in planning for future development and ensuring that appropriate mitigation and preparedness measures are in place. The County considered the following factors to examine potential conditions that may affect the radon hazard vulnerability:

- Potential or projected development



- Projected changes in population
- Other identified conditions as relevant and appropriate, including the impacts of climate change

Project Development

Areas targeted for potential future growth and development within the next 5 years have been identified across the County (further discussed in Section 2.4 of this HMP). Any new land development will be exposed to this hazard. 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.

Project Changes in Development

Because the entire population in Pike County is exposed to the radon hazard, any increase in population will increase the number of people exposed. Any decrease in population would decrease exposure.

Climate Change

According to the EPA's *Climate Change and Indoor Air Quality* contractor report, 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. These factors can be affected by climate change to different degrees. Climate change 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 climate change. For example, the increased use of ceiling fans could increase deposition of radon decay products and reduce the delivered radon-related doses to the lungs (EPA 2010).

Change of Vulnerability Since 2017 HMP

Since the 2017 HMP analysis, population statistics have been updated using the 5-Year 2015-2019 American Community Survey Population Estimates. Since radon impacts the entire County, the overall vulnerability to this hazard remains the same. 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, EPA recommends consideration of radon exposure risk and installation of mitigation measures as appropriate during all new construction.



4.3.13 Terrorism

Terrorism is defined in the Code of Federal Regulations (CFR) as “the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives” (Title 28 CFR §0.85 2015). Terrorism is less about causing physical damage and injuries (and fatalities) as it is about creating and spreading fear. This fear may result in a change in key policy or business operations to cease. Terrorism may include the use of weapons of mass destruction (WMD), including chemical, biological, radiological, nuclear, and high-yield explosive weapons; armed attacks; industrial sabotage; cyber terrorism; and other means. These categories can be further subcategorized or attacks can involve multiple categories, especially when considering the means and purpose behind the event.

This section provides a profile and vulnerability assessment of the terrorism hazard.

4.3.13.1 Location and Extent

An important consideration in evaluating terrorism hazards is the existence of facilities, landmarks, or other buildings of international, national, or regional importance. While Pike County has many notable landmarks from a local historic perspective, there are no sites which are considered significant landmarks in terms of national or international importance.

Nonetheless, terrorism can take many forms and terrorists have a wide range of personal, political, or cultural agendas. Therefore, there is no location that is not a potential terrorist target. Two types of terrorist activity are particularly relevant to Pike County: agroterrorism and intentional hazardous material releases. Agroterrorism is the direct, intentional, generally covert contamination of food supplies or introduction of pests and/or disease agents to crops and livestock. Approximately 3-percent of **Pike County's** land area is dedicated to agriculture.

Several major transportation routes and two large gas transmission pipelines traverse the County; making intentional hazardous material releases a potential threat to citizens and the environment. This hazard is addressed in Section 4.3.5. In addition, there are several bridges that connect Pike County to the New York – New Jersey metropolitan area that could be considered potential targets.

Although Pike County does not have a large number of facilities that could be considered targets, it does have the type of facilities that are considered, including school complexes, shopping areas, government buildings, including jails, water distribution systems and dams, power plants and communications systems. A complete list of critical facilities is included in Appendix E. In addition, all bridges and railways (discussed in Section 4.3.16) across the County are considered potential targets.

Furthermore, the threat of a nuclear attack is rare but should not be eliminated. There are still several countries in the world with nuclear capability and other nations continue to try to obtain that capability. Any areas that are identified as high risk areas or target areas would experience the direct effects of the weapon, including blast, radiation, extreme temperatures, wind and light which is brighter than the sun. Depending on the size of the device, there could be total destruction within a 4-mile radius of the blast. Any survivors within a 20- mile radius can expect residual effects including fires, flooding, loss of power, fuel and water shortages, plus the release of other hazardous materials that



may be in the area. People close to the blast would be killed. As the distance increases, more people will survive, however, people that do survive the initial blast may die due to an increase in exposure to gamma rays.

Because of Pike County's location and proximity to the New York metropolitan area, should a major attack occur, Pike County should expect to receive some exposure from radioactive fallout. Pike County should also expect to see an influx of people from the New York metropolitan area seeking safety.

4.3.13.2 Range of Magnitude

Any acts of terrorism can occur anywhere, at any time of day. The National Terrorism Advisory System (NTAS) communicates information about terrorist threats by providing detailed information to the public, government agencies, first responders, airports and other transportation hubs, and the private sector. When a threat arises, the Secretary of Homeland Security announces an NTAS Alert and shares the news with the public. The alert may include specific information about the nature of the threat, including the geographic region, mode of transportation, or critical infrastructure potentially affected, as well as steps that individuals and communities can take to protect themselves and help prevent, mitigate, or respond to the threat. The alert indicates whether the threat is elevated or imminent. Elevated threats are those that include no specific information about the timing or location. Imminent threats are threats believed to be impending, or occurring very soon. The alerts will be posted on-line on multiple government websites (which websites may vary dependent on the threat) and released to the news media for distribution. U.S. Department of Homeland Security (DHS) will also distribute alerts through its social media channels (DHS 2015).

Terrorism refers to the use of WMDs, including biological, chemical, nuclear, and radiological weapons; arson, incendiary, explosive, and armed attacks; industrial sabotage and intentional hazardous materials releases; and **"cyber-terrorism."** Within these general categories, however, there are many variations. Particularly in the area of biological and chemical weapons, there are a wide variety of agents and ways for them to be disseminated. Terrorist methods can take many forms, including:

- Agri-terrorism
- Arson/incendiary attack
- Armed attack
- Biological agent
- Chemical agent
- Cyber-terrorism (or computer-based attacks)
- Conventional bomb or bomb threat
- Hazardous material release (intentional)
- Nuclear bomb
- Radiological agent

In Pike County, terrorist attacks could vary from a mere threat to an individual facility, to the use of a high-yield explosive or other device in a highly populated area.

4.3.13.3 Past Occurrence



Pike County has never suffered an international terrorist attack. However, Pike County has experienced domestic terrorism incidents. Table 4.3.15-1 displays terrorism incidents reported to PEIRS between 2002 and 2020. The most common terroristic threat was bomb threats.

Table 4.3.15-1. Terrorism Incidents/Suspicious Activity in Pike County from 2002 to 2020

Date	Location	Type
02/08/2002	Lehman Township	Bomb Threat
02/14/2003	Palmyra Township	Bomb Threat
06/11/2003	Palmyra Township	Bomb Threat
12/18/2003	Palmyra Township	Bomb Threat
10/28/2004	Palmyra Township	School Bomb Threat
03/29/2006	Lehman Township	School Bomb Threat
04/05/2006	Lehman Township	School Bomb Threat
05/10/2006	Westfall Township	Bomb Threat
05/30/2006	Palmyra Township	Suspicious Activity
09/11/2006	Lehman Township	School Bomb Threat
07/02/2007	Dingman Township	Suspicious Device
12/29/2007	Blooming Grove Township	Suspicious Device
02/21/2008	Lehman Township	Terroristic Threat
01/28/2019	Dingman Township	Terroristic Threat
11/18/2019	Lehman Township	Terrorism and Kidnapping
01/30/2020	Dingman Township	Terroristic Threat
08/25/2020	Dingman Township	Terroristic Threat

Source: PEIRS, 2002-09; Delaware Valley School District 2022

4.3.13.4 Future Occurrence

Based on historical events, Pike County can expect to experience several terrorist threats or suspicious activities each year; however, few will result in an actual terrorist incident. Previous events in the County have not resulted in what are considered significant terrorist attacks; the severity of a future incident cannot be predicted with a sufficient level of certainty. Based on the recent incident events, the future occurrence of terrorism in Pike County can be considered *possible* as defined by the Risk Factor Methodology probability criteria (refer to Section 4.4).

4.3.13.5 Vulnerability Assessment

To understand risk, a community must evaluate assets exposed or vulnerable within the identified hazard area. The following section discusses potential impacts of the terrorism hazard on Pike County, including:

- Impacts 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 in understanding this hazard over time.

Impact on Life, Health, and Safety

For the purposes of this HMP, the entire population in Pike County is exposed to terrorism events. However, because terrorists typically prefer to impact the greatest number of individuals in a given location, it can be inferred that



individuals living in highly populated areas, or mass transit systems with a large number of commuters will have a greater exposure to terrorist incidents than those living in rural areas. Refer to Section 2 for a summary of population statistics for the County. Large-scale incidents have the potential to kill or injury many residents in the immediate vicinity of the attack, and they may also affect people located a distance from the initial event.

Impact on General Building Stock and Critical Facilities

All of the building stock in the County is exposed to the terrorism hazard. Accessibility, design, availability to roof access, driveways underneath buildings, unmonitored areas, and the proximity of structures to transportation routes, underground pipelines, and the potential for a terrorist to strike any structure randomly, makes all buildings in the County exposed and vulnerable to this hazard. Terrorist groups would be likely target structures of significant cultural or financial value.

The entire general building stock and critical facility inventory in Pike County is exposed to the terrorism hazard. Like life, health and safety, impacts to the building stock and critical facilities will be based on the specific event.

Critical facilities are exposed to terrorist attacks, particularly because of the impact that an attack has on these types of facilities. Dams, power stations, and tunnels are all examples of critical infrastructure and facilities that are vulnerable. Additionally, communications systems, first-responder stations, and emergency operations centers are all vulnerable to terrorist attacks. Disrupting one of these facilities or destroying critical infrastructure would have devastating, cascading impacts on Pike County. All critical facilities in the County are exposed to the terrorism hazard. For a discussion of critical facilities and lifelines located in Pike County, refer to Section 2.

Impact on the Economy

Measuring the economic impact of a terrorist attack on Pike County is difficult. The initial impact can be measured in immediate costs such as costs related to responding to the event, and those associated with the immediate loss of productivity due to closed businesses. Should a terrorist event be of a significant magnitude, there could be ramifications in the financial markets which could affect a greater geographic extent compared to Pike County. The fuller economic impact includes long-term costs such as terrorism mitigation activities and likely heightened anti-terrorism activities.

Impact on the Environment

Terrorism events are usually focused on the population and built environment. However, terrorism events could focus on environmental assets (such as bodies of water that serve as drinking water supply resources). Indirect impacts of terrorism events such as fire or hazardous material releases could also damage the environment.

Future Growth and Development

Areas targeted for potential future growth and development in the next 5 to 10 years have been identified across Pike County (further discussed in Section 2 of this HMP). Any areas of growth could be potentially impacted by the terrorism hazard because the entire county is exposed and potentially vulnerable.

Climate Change

Because terrorism events are human-caused, no climate change impacts are associated with the hazard.



Additional Data and Next Steps

Overall, the County's vulnerability has not changed and the entire County will continue to be exposed and vulnerable to terrorism hazards. For future plan updates, Pike County can document the number and location of terrorism-related incidents to include in the next plan update.

DRAFT



4.3.14 Wind Events

This section provides a profile and vulnerability assessment of the severe weather hazard which includes tornadoes and windstorms. The wind hazard includes various types of wind events, including windstorms and tornados, which are defined below.

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 (Federal Emergency Management Agency [FEMA] 1997). Types of damaging winds include straight-line winds, downdrafts, downbursts, microbursts, gust fronts, derecho, bow echoes, and hook echoes, described as follows:

- 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 or 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 (National Severe Storms Laboratory [NSSL] Date Unknown).
- A Derecho is a widespread and long-lived windstorm associated with thunderstorms that are often curved (Johns and others 2011). The two major influences on the atmospheric circulation are differential heating between the equator and the poles, and rotation of the planet (Federal Emergency Management Agency [FEMA] 1997).
- 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 at the ground (NSSL Date Unknown).
- 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 (NSSL 2016).

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 4.3.14-1 lists wind classifications used by the National Weather Service (NWS).



Table 4.3.14-1. NWS Wind Descriptions

Descriptive Term	Sustained Wind Speed (mph)
Strong, dangerous, or damaging	≥40
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 2011

Notes:

mph Miles per hour

NWS National Weather Service

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 air. 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).

A derecho is a long-lived windstorm that is associated with a rapidly moving squall line of thunderstorms. It produces straight-line wind gusts of at least 58 mph and often has isolated gusts exceeding 75 mph. This means that trees generally fall and debris is blown in one direction. To be considered a derecho, these conditions must persist along a path of at least 240 miles. Derechos are more common in the Great Lakes and Midwest regions of the United States, though on occasion can persist into the Mid-Atlantic and Northeast (ONJSC 2021).

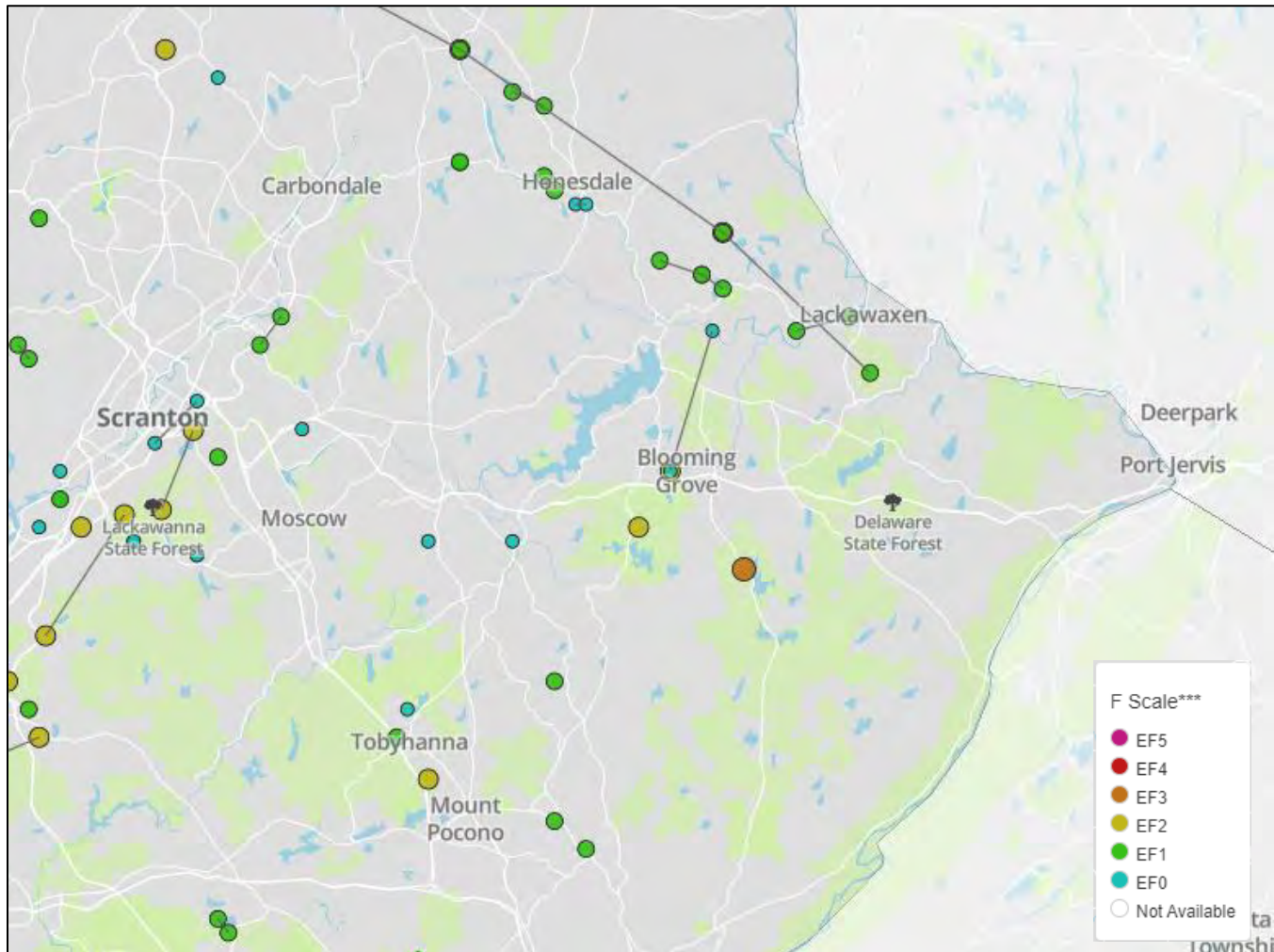
The following sections discuss location and extent, range of magnitude, past occurrences, future occurrences, and vulnerability assessment associated with the wind and tornado hazard within Pike County.

4.3.14.1 Location and Extent

Tornadoes and windstorms can occur throughout Pike County though events are usually localized. However, severe thunderstorms may result in conditions favorable to the formation of numerous or long-lived tornadoes. 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. The forward motion of the tornado 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 (Pennsylvania Emergency Management Agency [PEMA] 2018). Between 1950 and 2020, eight tornadoes touched down in Pike County.



Figure 4.3.14-1. Tornadoes in Pike County, 1950 to 2020



Source: (York Daily Record 2021)

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)

Straight-line winds and windstorms occur on a region-wide scale. While such winds usually accompany tornadoes, straight-lined 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 2018).

4.3.14.2 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.



Magnitude or severity of a tornado was originally categorized according to the Fujita Scale (F Scale) or the Pearson Fujita Scale introduced in 1971, based on a relationship between the Beaufort Wind Scales (B-Scales) (measure of wind intensity) and the Mach number scale (measure of relative speed). The F Scale is used to rate the intensity of a tornado by examining the damage caused by the tornado after it has passed over a man-made structure (Tornado Project Date Unknown). The F Scale categorizes each tornado by intensity and area, and is divided into six categories—F0 (Gale) to F5 (Incredible) (Edwards 2013).

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 tornadoes 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 (NWS 2016).

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 (NWS 2016). Table 4.3.14-2 details each of the six categories of the EF Scale.

Table 4.3.14-2. 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 2016

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 4.3.14-4 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.

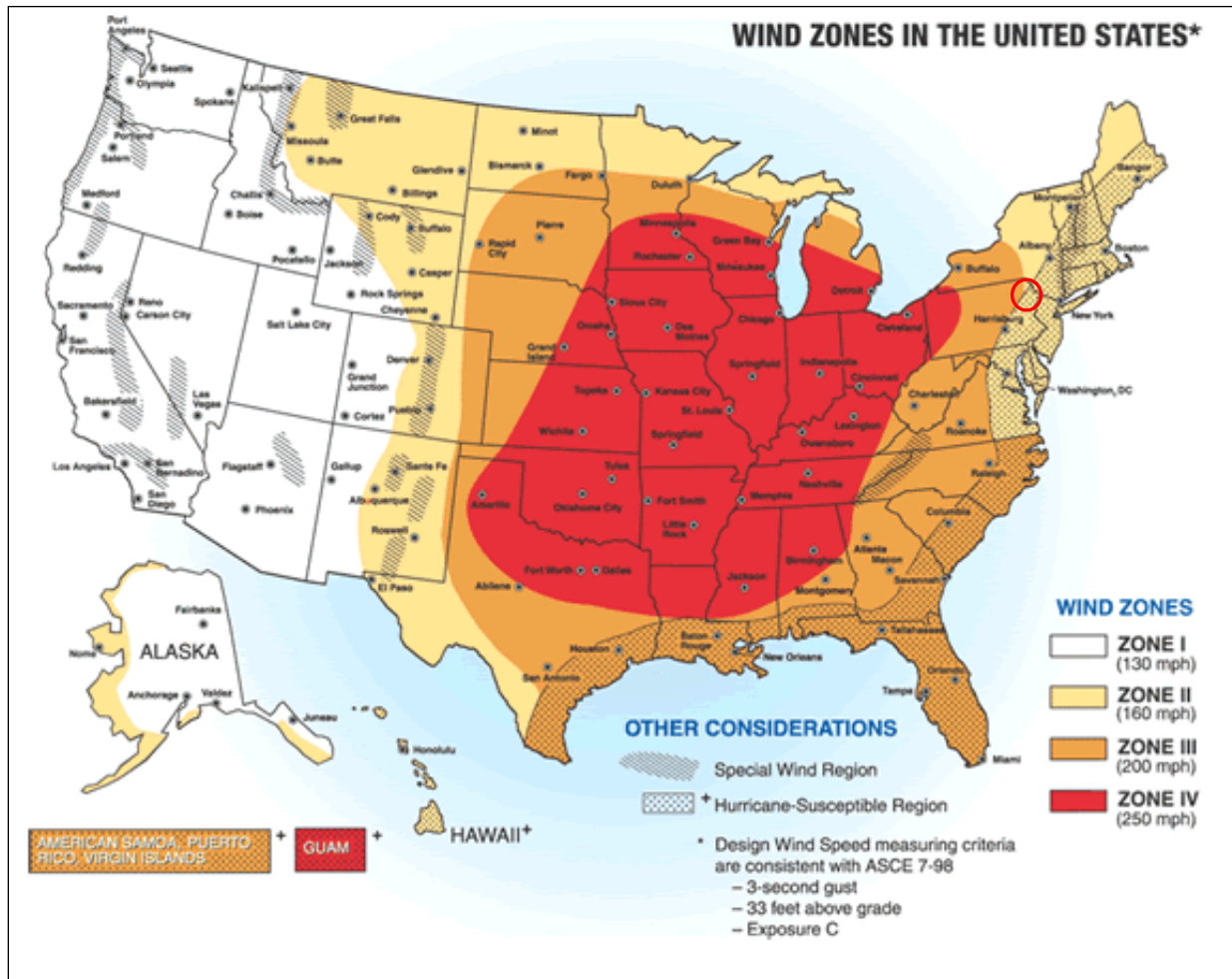
Table 4.3.14-3. EF Scale Damage Indicators

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
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: Storm Prediction Center (SPC) 2006

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 (Section 4.3.16.3), are classified based on the F Scale.

Figure 4.3.14-2. Wind Zones in the United States



Source: FEMA 2012

Note: The red circle indicates the approximate location of Pike County.

Figure 4.3.14-2, above, shows wind speed zones developed by the American Society of Civil Engineers based on information including 40 years of tornado history and over 100 years of hurricane history. It identifies 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, Pike 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 4.3.14-2 in order to prevent release of hazardous materials into the environment.



A worst-case scenario for tornados occurred on May 31, 1998 when within about a 3 hour stretch from 7 to 10 pm, four different tornadoes affected the County. Pike County was included in a Presidential Disaster Declaration for Individual Assistance for these tornadoes. These tornadoes included:

- An F1 tornado touched down on the border of Pike County and Wayne County in the Greene Township area. Damage was limited to numerous downed trees.
- An F2 tornado touched down in Blooming Grove Township in the Madden Road area. Damage included downed trees, blocked roads and severe structural damage to one house.
- An F2 tornado touched down in the Greene Township area of Promised Land State Park. Damage included thousands of downed trees, blocked roads and downed utility lines and poles. Many homes received minor damage. Numerous cabins within the state park were either damaged or destroyed.
- An F3 tornado touched down in Porter Township along Rt. 402 near Pecks Pond. This storm traveled the greatest distance and eventually ended in Delaware Township near Camp Speers. It downed thousands of trees and power lines, blocking numerous roads, damaged vehicles and damaged or destroyed numerous houses and buildings. Particularly hard hit was the Blue Heron Lake area, where thirteen homes were damaged with four being totally destroyed. Numerous houses in Marcel Lake Estates also received some type of damage. Estimated damage for this F3 tornado was \$1 million (NCEI 2021).

4.3.14.3 Past Occurrence

Tornadoes have occurred in all seasons and all regions of Pennsylvania, but the northern, western, and southeastern portions of the Commonwealth have been struck more frequently. A list of tornado events that have occurred in Pike County between 1950 and 2021 is shown in Table 4.3.16-4 with an associated Fujita Tornado Scale magnitude.

Table 4.3.14-4. Previous Tornado Events between 1950 and 2021 in Pike County

Location	Date	Estimated Length	Estimated Width	Magnitude	Estimated Property Damage (\$)**
*Sullivan County, NY	11/16/80	1.50 miles	200 yards	F1	\$25,000,000
Blooming Grove	05/31/98	2.00 miles	550 yards	F2	\$200,000
Blooming Grove	05/31/98	3.00 miles	200 yards	F2	\$400,000
Pecks Pond	05/31/98	20.00 miles	200 yards	F3	\$1,000,000
Greentown	05/31/98	0.30 miles	30 yards	F0	\$40,000
Kimbles	12/01/06	7.00 miles	100 yards	F0	\$20,000
Rowland	12/01/06	5.00 miles	200 yards	F1	\$20,000
*Wayne County	07/23/10	3.00 miles	100 yards	F1	\$50,000
*Wayne County	07/23/10	17.00 miles	400 yards	F2	\$100,000

Sources: NOAA-NCEI 2021; SPC 2021

*Tornado did not originate in Pike County but tracked into the County

**Estimated property damage totals represent the total as a result of the entire event and does not only represent Pike County loss if the tornado tracked into other counties.

Pike County also has record of a June 1999 storm that crossed Pike County producing a small tornado that downed trees and utility lines from Lake Wallenpaupack to Matamoras along Route 6. Structural damage occurred in Blooming Grove Township, Shohola Township, Dingman Township, Milford Borough and Matamoras. Information about the track, length, width, and property damage from the tornado is not available (Pike County HMP 2017).



Windstorm events may be the result of thunderstorms, hurricanes, tropical storms, winter storms, or nor'easters. There have been 17 high wind events (with wind speeds greater than 50 knots) recorded in Pike County since 1950. The highest wind speed recorded in the County occurred on June 21, 2007 producing 83 knot winds. A list of events greater than 50 knots that have occurred since 1950 is shown in Table 4.3.14-5.

Table 4.3.14-5. Previous Windstorm Events Greater than 50 knots in Pike County between 1950 and 2021

Location	Date	Estimated Wind Speed (knots)	Estimated Property Damage (\$)
Countywide	09/02/1990	53	N/A
Countywide	02/17/1998	55	30,000
Countywide	05/18/2000	60	N/A
Tafton	06/02/2000	55	N/A
Countywide	12/12/2000	52	450,000
Tamiment	04/09/2001	52	N/A
Rowland	08/03/2001	60	N/A
Lackawaxen	03/10/2002	60	N/A
Lackawaxen	06/26/2002	60	50,000
Milford	07/21/2003	55	20,000
Countywide	10/15/2003	60	700,000
Countywide	11/13/2003	58	190,000
Milford	05/27/2005	60	5,000
Dingmans Ferry	08/03/2006	60	6,000
Milford	08/03/2006	60	5,000
Paupack	06/21/2007	83	N/A
Lackawaxen	07/23/2010	70	50,000
Countywide	02/18/2011	50	100,000
Countywide	5/26/2011	50	N/A
Countywide	6/9/2011	50	N/A
Countywide	7/29/2011	50	N/A
Countywide	10/29/2011	65	100,000
Countywide	6/22/2012	50	N/A
Countywide	7/23/2012	50	N/A
Countywide	7/26/2012	50	N/A
Countywide	4/10/2013	50	N/A
Countywide	7/2/2014	50	N/A
Countywide	7/7/2014	50	N/A
Countywide	7/8/2014	50	N/A
Countywide	8/21/2014	50	N/A
Countywide	8/21/2014	50	N/A
Pecks Pond	07/25/2016	50	5,000
Lackawaxen	07/20/2017	60	8,000
Shohola	07/20/2017	50	5,000



Location	Date	Estimated Wind Speed (knots)	Estimated Property Damage (\$)
Rowland	05/18/2018	50	10,000
Lackawaxen, Shohola, Bushkill	05/15/2018	50	20,000
Countywide	02/25/2019	50	N/A
Lords Valley, Pecks Pond	07/22/2019	50	20,000
Millrift	07/20/2019	50	10,000
Paupack	06/03/2020	50	10,000
Shohola, Milford	07/06/2020	50	20,000
Dingmans Ferry	07/22/2020	50	25,000
Ledgerdale	08/04/2020	50	10,000
Blooming Grove	11/15/2020	50	5,000
Rowland	06/09/2021	83	150,000
Lackawaxen	06/09/2021	50	3,000
Paupack	06/09/2021	70	50,000
Tafton	06/09/2021	50	25,000

Source: NOAA-NCDC 2021; SPC 2021

N/A Not Available

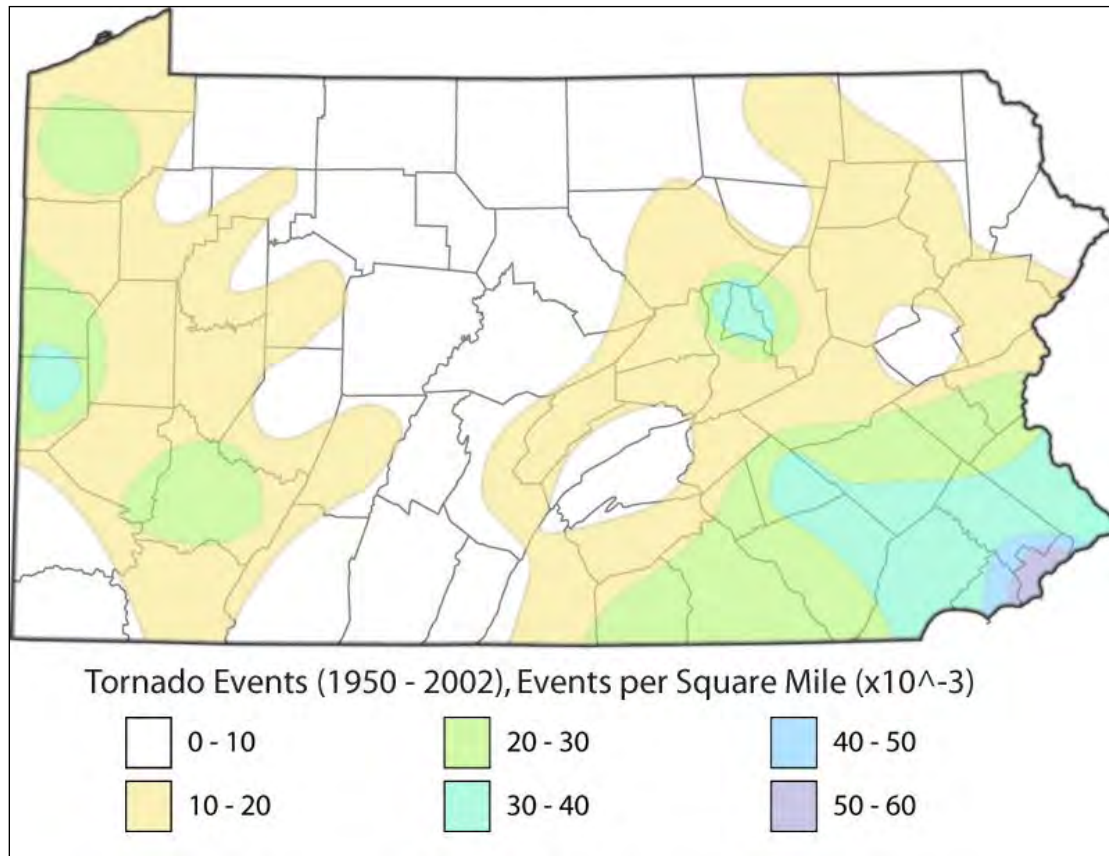
4.3.14.4 Future Occurrence

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 F4 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 events collected between 1950 and 2002, Figure 4.3.14-3 shows the number of total tornado events per square mile across Pennsylvania from the State Climatologist. The figure shows that a majority of Pike County experienced a lower frequency of tornado events than the southwest and southern portions.



Figure 4.3.14-3. Total Tornado Events Per Square Mile in Pennsylvania, 1950 to 2002

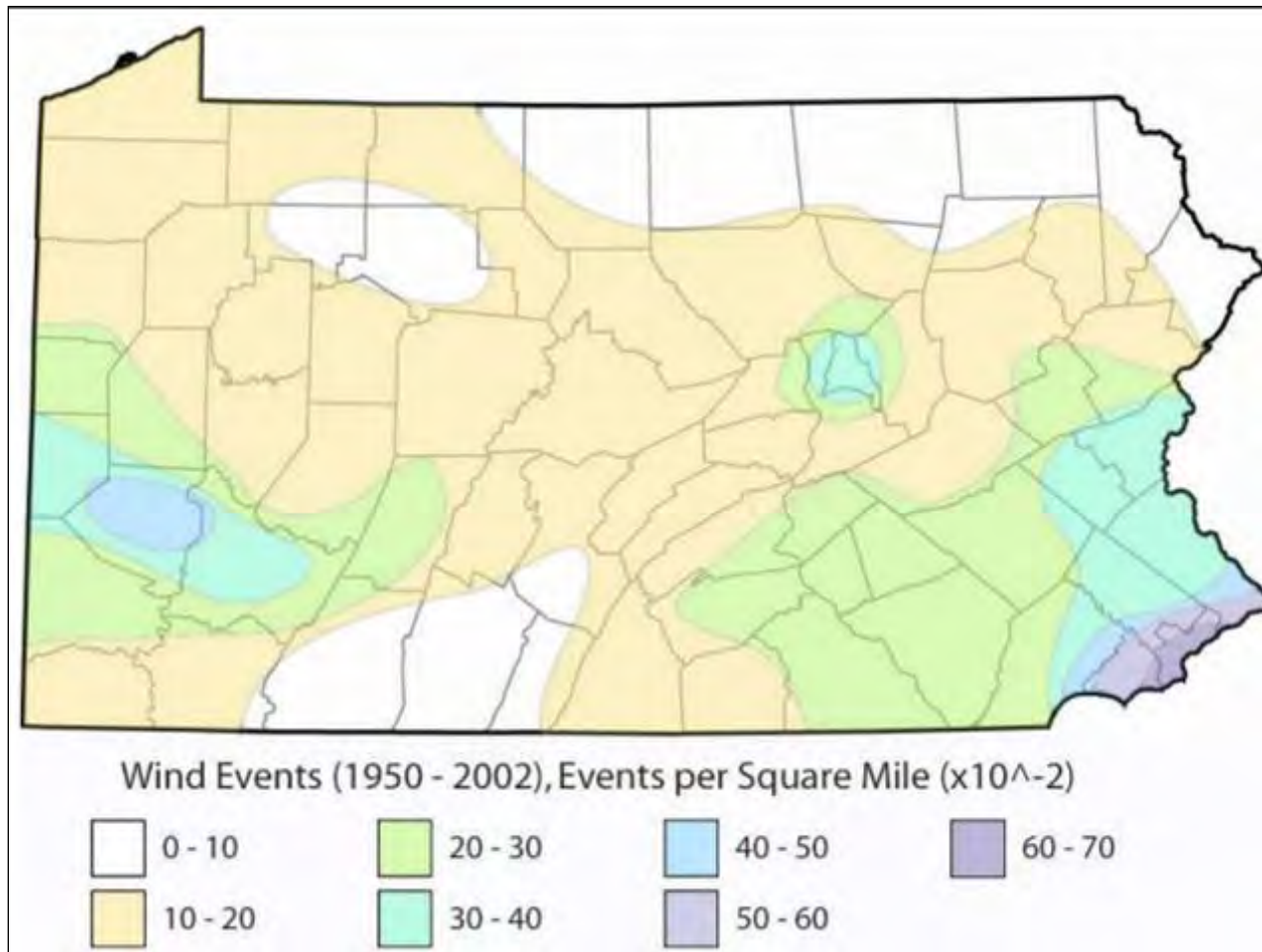


Source: Pennsylvania State Climatologist 2016

Similar to tornadoes, the Pennsylvania State Climatologist used historical data between 1950 and 2002 to show the number of wind events per square mile in the Commonwealth. The figure shows that a majority of Pike County experienced a lower frequency of events than the southwest and southern portions of the county.



Figure 4.3.14-4. Wind Events Per Square Mile in Pennsylvania



Source: Pennsylvania State HMP 2013

For the 2022 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of tornado and windstorm events for Pike County. Information from NOAA-NCEI storm events database, the Pennsylvania State Climatologist, and the Storm Prediction Center were used to identify the number of tornado and wind events that occurred between 1950 and 2021. 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 nearly 100-percent chance of a windstorm event occurring in any given year in Pike County.

Table 4.3.14-6. Probability of Future Tornado and Windstorm Events

Hazard Type	Number of Occurrences Between 1950 and 2021	Percent chance of occurrence in any given year
Tornado (all scales)	10	13.89%
Strom Wind, High Wind, and Thunderstorm Wind	90	100.00%

Sources: NOAA-NCEI 2021; SPC 2021; Pennsylvania State Climatologist 2021



Windstorms, straight line winds and winds associated with a severe thunderstorm occur on a more frequent basis. Based on available historical data, the future occurrence of tornadoes and windstorms can be considered *highly likely* as defined by the Risk Factor Methodology probability criteria (refer to Section 4.4).

4.3.14.5 Vulnerability Assessment

To understand risk, a community must evaluate which assets are exposed or vulnerable in the identified hazard area. The entire County has been identified as the hazard area for tornado and other windstorm events. Therefore, all assets in the County (population, structures, critical facilities, and lifelines), as described in the County Profile (Section 2), are vulnerable. The following text evaluates and estimates potential impacts of strong winds on the County, including:

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

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. **Assumedly, the entire County's population** (ACS 2015-2019 estimate of 57,453 people) is exposed to this 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. 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 are considered most vulnerable because they 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 (Community Profile) presents the statistical information regarding these populations in the County.

Impact on General Building Stock and Critical Facilities

The entire County's building stock and critical facilities are exposed to the tornado and windstorm hazard. Manufactured housing (i.e. mobile homes) is particularly vulnerable to high winds and tornadoes. The U.S. Census Bureau defines manufactured homes as "movable dwellings, 8 feet or more wide and 40 feet or more long, design 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 (Census 2010)." They can include multi-wides and expandable manufactured homes but exclude travel trailers, motor homes, and modular housing. Due to their light-weight and often unanchored design, manufactured housing is extremely vulnerable to high winds and will generally sustain the most damage.



Table 4.3.14-8 displays the number of manufactured housing units per municipality in Pike County. As noted, Dingman and Greene Townships have the greatest number of manufactured homes.

Table 4.3.14-7. Manufactured Housing Units per Municipality in Pike County

Municipality	Number of Manufactured Homes
Blooming Grove Township	123
Delaware Township	94
Dingman Township	397
Greene Township	442
Lackawaxen Township	205
Lehman Township	17
Matamoras Borough	0
Milford Borough	0
Milford Township	11
Palmyra Township	266
Porter Township	16
Shohola Township	241
Westfall Township	123
Pike County (Total)	1,935

Source: HAZUS-MH v3.1

Impact on Economy

Tornados and windstorms 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 can 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, and illustrated in Section 2.4, areas targeted for future growth and development have been identified across Pike 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, particularly when associated with severe storms.



Effect of Climate Change on Vulnerability

Climate is defined not just as average temperature and precipitation but also by type, frequency, and intensity of weather events. Both globally and at the local scale, climate change could alter prevalence and severity of events such as hurricanes. While predicting changes in prevalence or intensity of hurricanes and in effects of events under a changing climate is difficult, understanding vulnerabilities to potential changes is a critical part of estimating impacts of future climate change on human health, society, and the environment (U.S. Environmental Protection Agency [EPA] 2006).

Additional Data and Next Steps

As updated data and resources become available, that information can be used to enhance the vulnerability assessment for the wind events hazard.

DRAFT



4.3.15 Winter Storm

This section provides a profile and vulnerability assessment of the winter storm hazard in Pike County. Winter storms occur, on average, approximately five times each year in Pennsylvania. From November through March, the State is exposed to winter storms that move up the Atlantic coast or sweep in from the west. Every county in the Commonwealth is subject to severe winter storms; however, the northern tier, western counties, and mountainous regions tend to undergo winter weather more frequently and with greater severity.

Winter storms can produce more damage than any other severe weather event, including tornados. Complications caused by winter storms can lead to road closures, especially of secondary and farm roads; business losses to commercial centers built in outlying areas because of supply interruption and loss of customers; property losses and roof damages from snow and ice loading and fallen trees; utility interruptions; and loss of water supplies. Flooding can result from winter storm events as well.

Most severe winter storm hazards include heavy snow (snowstorms), blizzards, sleet or freezing rain, ice storms, and **Nor'easters**. Because most extra-tropical cyclones (mid-Atlantic cyclones locally known as Northeasters or **Nor'Easters** generally occur during winter weather months, these hazards have also been grouped as a type of severe winter weather storm. Types of severe winter weather events or conditions are further defined as follows:

- **Heavy Snow:** According to the National Weather Service (NWS), heavy snow is generally considered snowfall accumulating to depths of 4 inches or more within 12 hours or less; or snowfall accumulating to depths of 6 inches or more within 24 hours or less. A snow squall is an intense but limited-duration period of moderate to heavy snowfall, also known as a snowstorm, accompanied by strong, gusty surface winds and possibly lightning (generally moderate to heavy snow showers) (NWS 2009). Snowstorms are complex phenomena involving **heavy snow and winds, whose impact can be affected by a great many factors, including a region's** climatological susceptibility to snowstorms, snowfall amounts, snowfall rates, wind speeds, temperatures, visibility, storm duration, topography, and occurrence during the course of the day, weekday versus weekend, and time of season (Kocin and Uccellini 2013).
- **Blizzard:** 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 an extended period of time (3 or more hours) (NWS 2009). A severe blizzard is defined as an event with wind velocity of 45 mph, temperatures of 10 degrees Fahrenheit (°F) or lower, and a high density of blowing snow with visibility frequently measured in feet over an extended period of time.
- **Sleet or Freezing Rain:** Sleet is defined as pellets of ice composed of frozen or mostly frozen raindrops or refrozen, partially-melted snowflakes. These pellets of ice usually bounce after hitting the ground or other hard surfaces. Freezing rain is rain that falls as a liquid but freezes into glaze upon contact with the ground. Both types of precipitation, even in small accumulations, can cause significant hazards to a community (NWS 2009).

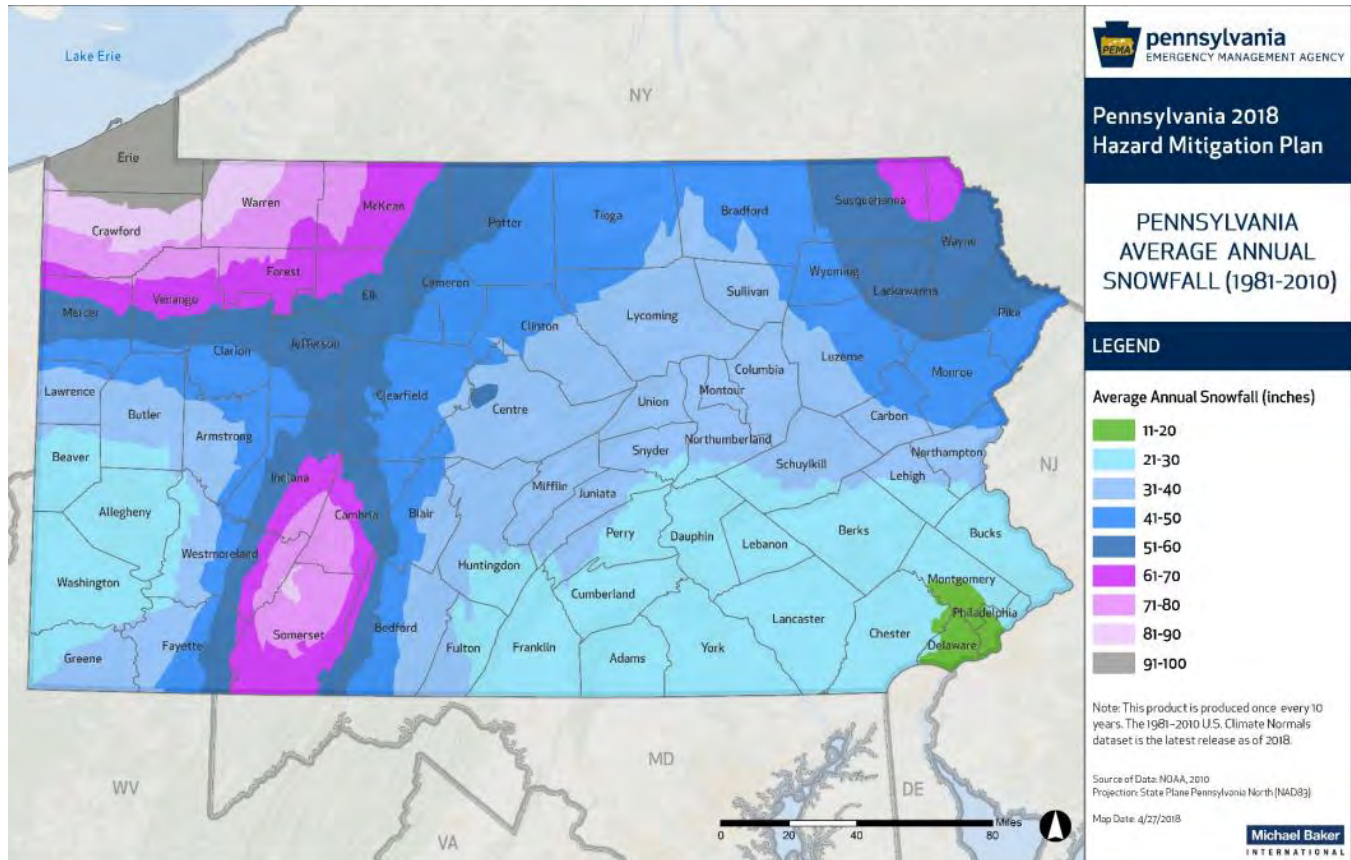
4.3.15.1 Location and Extent

Winter storms can consist of cold temperatures and heavy snow or ice. Major winter storms occur in Pennsylvania several times annually and are regional events. Every county in the Commonwealth, including Pike, is subject to severe winter storms.



Within Pike County there are variations in the average amount of snowfall that is received throughout different parts of the County because of terrain differences; higher elevations experience greater snowfalls than lower-lying areas. Generally, the average annual snowfall in the County increases from the southeast to northwest as shown in Figure 4.3.15-1.

Figure 4.3.15-1. Average Annual Snowfall (1981-2020) for Pennsylvania



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.

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 Climatic Data Center (NCDC) 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. 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 NCDC has analyzed and assigned RSI values to over 500 storms since 1900 (NOAA 2021).



Table 4.3.15-1. 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: NOAA 2021

4.3.15.2 Range of Magnitude

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. Being located in the northeast portion of Pennsylvania, Pike County **often experiences the effects of Nor'Easter** storms – low pressure fronts that move northward along the Atlantic coastline, pulling large amounts of moisture off of the Atlantic Ocean.

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, business activities, and can cause frostbite or loss of life. These storms may include one or more of the following weather events:

- Heavy Snowstorm: Accumulations of four inches or more in a six-hour period, or six inches or more in a twelve-hour period.
- Sleet Storm: Significant accumulations of solid pellets which form from the freezing of raindrops or partially melted snowflakes causing slippery surfaces posing hazards to pedestrians and motorists.
- Ice Storm: Significant accumulations of rain or drizzle freezing on objects (trees, power lines, roadways, etc.) as it strikes them, causing slippery surfaces and damage from the sheer weight of ice accumulation.
- Blizzard: Wind velocity of 35 miles per hour or more, temperatures below freezing, considerable blowing snow with visibility frequently below one-quarter mile prevailing over an extended period of time.
- Severe Blizzard: Wind velocity of 45 miles per hour, temperatures of 10 degrees Fahrenheit or lower, a high density of blowing snow with visibility frequently measured in feet prevailing over an extended period time.

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.

Figure 4.3.15-1 shows mean annual snowfall in Pike County to be 41 to 50 inches in the southeastern part of the County and 51 to 60 inches in the northwest. Two of the twelve Presidential Disaster and Emergency Declarations



affecting Pike County have been in response to hazard events related to winter storms (see Table 4.3.15-2). Other reported winter storm events since 2016 are listed in Table 4.3.15-3.

A worst-case scenario for winter storms occurred in March 1997. An isolated snowstorm which affected only the northeast portion of Pennsylvania dumped up to 30 inches of very wet snow in Pike County. This storm caught everyone by surprise, stranding thousands of travelers along Interstate 84. This storm also brought down hundreds of trees throughout the county, dropping power and telephone lines, leaving large portions of the county without electricity and/or telephone service for up to five days. Highway departments and emergency responders struggled to cope with the multiple problems this storm caused. Eventually, with the help of the National Guard, over 1,200 people were brought off the highways and placed in shelters.

4.3.15.3 Past Occurrence

Between 1954 and 2021, FEMA issued a major disaster (DR) or emergency (EM) declaration for the Commonwealth of Pennsylvania for eight winter storm-related events, classified as one or a combination of the following disaster types: severe winter storm, snowstorm, blizzard, winter storm, severe storm, and snowfall. Generally, 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. Of those events, Pike County has been included in two winter storm-related declarations during this time period (FEMA 2021).

Table 4.3.15-2. FEMA DR and EM Declarations for Winter Storm Events in Pike County

FEMA Declaration Number	Date(s) of Event	Event Type	Location
EM-3105	March 13-17, 1993	Severe Snowfall and Winter Storm	67 counties including Pike County
DR-1085	January 6-12, 1996	Blizzard of 96	51 counties including Pike County

Source: FEMA 2021

For this 2022 HMP update, known severe winter weather events that have impacted Pike County between 2016 and 2021 are identified in Table 4.3.15-3. For events prior to 2016, refer to the 2017 Pike County HMP. With winter weather documentation being so extensive for Pennsylvania and Pike 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 4.3.15-3. Severe Winter Weather Events in Pike County, 2016 to 2021

Date(s) of Event	Event Type	FEMA Declaration Number (if applicable)	Location	Description
January 23, 2016	Blizzard	N/A	Countywide	This blizzard brought record-breaking snow across southern Pennsylvania but just clipped Luzerne, Pike and Lackawanna Counties. Snowfall totals ranged from six to eight inches in southern Pike and Lackawanna Counties. Up to 15.5 inches of snow fell in the Hazelton area with much less snow falling in the north. In Pike County, snowfall totals ranged from a few inches in the far northern section of the county to between six and seven inches in the Borough of Milford and Greentown (Greene Township).



Date(s) of Event	Event Type	FEMA Declaration Number (if applicable)	Location	Description
March 3-5, 2018	Winter Storm Riley	N/A	Countywide	A Nor'easter formed and slowly moved up the eastern US coast late March 1 through March 4, 2018. Rain spread over parts of central New York and Pennsylvania late on March 1st. Colder air spread across the area and the rain turned over to snow early on March 2nd across most of central New York and northeast Pennsylvania. Snow became heavy at times, especially across parts of the eastern New York and Pennsylvania. In Pike County, 20 inches of snow was reported. The County experienced power outages, closed roads, sheltering residents, and activated the EOC. The County had approximately \$400,000 in property damage from this event.
January 31-February 2, 2021	Winter Storm	N/A	Countywide	A winter storm system hit Pike County, bringing snowfall totals of up to 35 inches in the County.

4.3.15.4 Future Occurrence

Severe winter weather is a common occurrence each winter season in Pike County. The late fall (November and December) and winter months (January through March) are typically when the County experiences measurable snow. It is estimated that Pike County will continue to experience the direct and indirect impacts of winter weather events each year and may induce secondary hazards such as: structural damage (snow and ice load), wind damage, impact to life safety, disruption of traffic, loss of productivity, economic impact, loss of ability to evacuate, taxing first-responder capabilities, service disruption (power, water, etc.), and communication disruption.

For the 2022 HMP 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 Pike County. Information from the NOAA-NCEI storm events database was used to identify the number of winter storm events that occurred between 1950 and 2021. 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 Pike County.

Table 4.3.15-4. Probability of Future Winter Storm Events

Hazard Type	Number of Occurrences Between 1950 and 2021	Percent chance of occurrence in any given year
Winter Weather	73	100%

Sources: NOAA-NCEI 2021; FEMA 2021

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, the future occurrence of winter storm events can be considered highly likely as defined by the Risk Factor Methodology probability criteria (refer to Section 4.4).



4.3.15.5 Vulnerability Assessment

To understand risk, a community must evaluate what assets are exposed or vulnerable in the identified hazard area. For winter storm events, all of Pike County has been identified as the hazard area. Therefore, all assets (population, structures, critical facilities and lifelines), as described in the County Profile (Section 2), are vulnerable. This section includes an evaluation and estimation of potential impacts of winter storm events on the County, including:

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

Impact on Life, Health, and Safety

According to the NOAA National Severe Storms Laboratory (NSSL), winter weather indirectly 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 storms. People can die in traffic accidents on icy roads, of heart attacks while shoveling snow, or of hypothermia from prolonged exposure to cold.

Heavy snow can immobilize a region and paralyze a city, shutting down air and rail transportation, stopping flow of supplies, and disrupting medical and emergency services. Accumulations of snow can collapse buildings and knock down trees and power lines. In rural areas, homes and farms may be isolated for days, and unprotected livestock may be lost. In the mountains, heavy snow can lead to avalanches (NSSL 2006).

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 2006).

For the purposes of this Plan, the entire population of Pike County is considered exposed to winter storm events. 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 County Profile (Section 2) of this Plan provides population statistics for each participating municipality and a summary of the more vulnerable populations (over the age of 65 and individuals living below the U.S. Census poverty threshold).

Impact on General Building Stock

The entire general building stock inventory in Pike County is exposed and vulnerable to the winter storm hazard. Snow accumulation in excess of building design conditions may be vulnerable to structure failure and possible



collapse. In general, structural impacts include damage to roofs and building frames, rather than to building content. Structural failure due to roof snow loads can be linked to several different causes, including but not limited to:

- Actual snow load significantly exceeds design snow load
- Drifting and sliding snow conditions
- Deficient workmanship
- Insufficient operation and maintenance
- Improper design
- Inadequate drainage design
- Insufficient design; in older buildings, insufficient design is often related to inadequate snow load design criteria in the building code in effect when the building was designed (FEMA 2013)

Current modeling tools are not available to estimate specific losses from this hazard. As an alternate approach, this Plan considers percentage damages that could result from winter storm conditions. Table 4.3.15-5. General Building Stock Exposure (Structure Only) and Estimated Losses from Winter Storm Events in Pike County below summarizes **percent damages to Pike County's** total general building stock (structure only) that could result from winter storm conditions. Considering professional knowledge and currently available information, potential losses from this hazard are considered overestimated; hence, values in Table 4.3.15-5. General Building Stock Exposure (Structure Only) and Estimated Losses from Winter Storm Events in Pike County are conservative estimates of losses associated with severe winter storm events.

Table 4.3.15-5. General Building Stock Exposure (Structure Only) and Estimated Losses from Winter Storm Events in Pike County

Municipality	Total GBS (Structure Only)	1% of Total	5% of Total	10% of Total
Blooming Grove Township	\$768,042,000	\$7,680,420	\$38,402,100	\$76,804,200
Delaware Township	\$973,607,000	\$9,736,070	\$48,680,350	\$97,360,700
Dingman Township	\$1,287,496,000	\$12,874,960	\$64,374,800	\$128,749,600
Greene Township	\$624,259,000	\$6,242,590	\$31,212,950	\$62,425,900
Lackawaxen Township	\$816,292,000	\$8,162,920	\$40,814,600	\$81,629,200
Lehman Township	\$1,303,700,000	\$13,037,000	\$65,185,000	\$130,370,000
Matamoras Borough	\$237,231,000	\$2,372,310	\$11,861,550	\$23,723,100
Milford Borough	\$224,907,000	\$2,249,070	\$11,245,350	\$22,490,700
Milford Township	\$414,595,000	\$4,145,950	\$20,729,750	\$41,459,500
Palmyra Township	\$824,628,000	\$8,246,280	\$41,231,400	\$82,462,800
Porter Township	\$255,805,000	\$2,558,050	\$12,790,250	\$25,580,500
Shohola Township	\$488,962,000	\$4,889,620	\$24,448,100	\$48,896,200
Westfall Township	\$238,350,000	\$2,383,500	\$11,917,500	\$23,835,000
Pike County (Total)	\$8,457,874,000	\$84,578,740	\$422,893,700	\$845,787,400

Source: HAZUS-MH 3.1

Note: GBS General building stock



An area especially vulnerable to the winter storm hazard is the floodplain. At-risk building stock and infrastructure in floodplains are addressed in the flood hazard profile (Section 4.3.7). Generally, losses from flooding associated with winter storms should be less than those associated with a 1-percent or 0.2-percent flood. In summary, snow and ice melt can cause both riverine and urban flooding. Estimated losses from riverine flooding in the County are discussed in Section 4.3.7.

Impact on Critical Facilities

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

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 removal and repair of roads damaged by the freeze/thaw cycle can drain local financial resources. Potential secondary impacts from winter storms also affect the local economy, 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 buildup, and/or high winds, which can break limbs and down large trees. An indirect effect of winter storms is impairment of surface and groundwater adjacent to roadway surfaces treated with salt, chemicals, and other de-icing materials (PEMA 2013).

Winter storms have a positive environmental impact: gradual melting of snow and ice provides groundwater recharge. However, abrupt high temperatures following a heavy snowfall can cause accelerated snowmelt, rapid surface water runoff, and severe flooding (PEMA 2013).

Future Growth and Development

Areas targeted for potential future growth and development within the next 5 years have been identified across the County at the municipal level, and are further discussed in Section 2.4 of this Plan. For the winter storm hazard, Pike County in its entirety has been identified as the hazard area. Therefore, any new development will be exposed to such risks.

Effect of Climate Change on Vulnerability

Climate is defined not just as average temperature and precipitation, but also by type, frequency, and intensity of weather events. Both globally and at the local level, climate change can alter prevalence and severity of weather extremes such as winter storms. While predicting changes in winter storm events under conditions of a changing climate is difficult, understanding vulnerabilities to potential changes is a critical part of estimating future impacts of climate change on human health, society, and the environment (U.S. Environmental Protection Agency [EPA] 2006).



The climate of Pennsylvania has changed in several ways. Over the past 100 years, annual average temperatures have been rising across the State. Warmer winters have led to decrease in snow cover and earlier arrival of spring. Recent analyses based on the Intergovernmental Panel on Climate Change 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 increase in rain during winter months. Projections of future occurrences of extra-tropical cyclones in Pennsylvania are 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 the ways the changing climate will alter temperature, precipitation, and storm events in Pennsylvania (Shortle and others 2009).

Additional Data and Next Steps

The assessment above identifies vulnerable populations and economic losses associated with the winter storm hazard. 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 2004)**. Acquisition of additional/actual data regarding (1) valuations of general building stock and (2) critical infrastructure losses would further support future estimates of potential exposure and damage to the general building stock inventory.



4.3.16 Transportation Accidents

Transportation hazards include hazardous materials (HazMat) in transit, vehicular accidents, aviation accidents, at-grade railroad crossings, and roadways vulnerable to floods. In 2020, the National Transportation Safety Board (NTSB) reported 40,732 transportation-related fatalities across the United States. Of those 40,732 fatalities, 38,680 were highway incidents, 752 were rail incidents, 349 were aviation incidents, 15 were pipeline incidents, and 851 were marine incidents (Transportation 2021). For the purpose of this plan update, transportation accidents are defined as incidents involving highway, air, and rail travel, resulting in death, serious injury, extensive property loss or damage or situations that cause delay or closure. Accidents related to hazardous materials are discussed in the environmental hazards profile in Section 4.3.5.

A transportation hazard may be defined as a condition created by movement of anything by common carrier. Transportation hazards can be divided into two categories: hazards created by the material being transported, and hazards created by the transportation medium. Transportation systems available in Pike County include roadways, rail lines, and airports. Major road accidents in the County are probable, and major rail and aviation accidents are possible. All County systems and supporting transportation resources provide services locally, regionally, and nationally. Vehicular, aviation, and railway accidents 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 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 operation of an aircraft that affects or could affect the safety of operation (International Civil Aviation Organization 1994). Airport accidents and incidents have the potential to occur while the plane is over County airspace; not only directly on airport property.
- Railway Accidents: Railway accidents involve one or more trains. They can involve a train derailment or one train impacting another train, vehicle, or pedestrian.

This section provides a profile and vulnerability assessment of the transportation accident hazard for Pike County.

4.3.16.1 Location and Extent

Vehicular Accidents

Within Pike County, there are a total of 645 miles of developed state and municipal roads. State highways account for 392 miles of this total while 252 miles are local municipal roads. The primary road corridors within the County, other than I-84, are Route 6, Route 209, Route 6/209, Route 739, SR 2001, Route 507, Route 402, Route 390, as well as Route 191, Route 447, Route 590, Route 434, SR 1005 (Twin Lakes Road), SR 2004 (Silver Lake Road), SR 2006 (Log Tavern Road), and SR 2003 (Bushkill Falls Road). As these are all State roads (Planning 2006). Accidents



can occur at any point along the roadways in the County. Figure 4.3.16-1 illustrates major transportation routes in the County. Figure 4.3.16-2 shows the traffic volume on key roadways.

There is no warning time for vehicular accidents. Factors contributing to these accidents are typically associated with the driver, vehicle, and environment. Factors associated with the driver include error, speeding, 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 of vehicular accidents may include severe traffic delays, lost sales to businesses, delayed commodity shipments, and increased insurance costs (Cova and Conger 2003).

Railway Accidents

There are two railroad lines operating in the County which transport passengers and freight of all types, including hazardous materials. One rail line is owned by Norfolk Southern Railway and is leased by the Central New York Railroad and its parent company, the New York, Susquehanna, and Western Railroad (NYSW). All dispatching is now done by the NYSW. The second line in operation is the Stourbridge Railroad, a local shortline operation that is owned by the Lackawaxen-Honesdale Shippers Association. It directly interchanges at Lackawaxen, PA with the Norfolk Southern Railway that owns the mainline route between Binghamton and Port Jervis. The same line of railroad is, through trackage rights, also run regularly by the New York Susquehanna and Western Railway, a subsidiary of CSX. Therefore rail users have their choice of shipping via Norfolk Southern or CSX. The Stourbridge Railroad is also used by the Wayne County Chamber of Commerce for passenger excursions, an important component of the local tourist economy. These services are carefully coordinated with freight deliveries to ensure that freight services always enjoy preference.

Aviation Accidents

There are three private airports in Pike County for private aircraft: Myer Airfield (Dingman Twp); Mountain Bay Air Park (Palmyra Twp); and Boehm Airfield (Lackawaxen Twp). In addition, there is an abundance of air traffic from airports in neighboring municipalities and states. Although not located within Pike County, Stewart International Airport in Newburgh, NY; Lehigh Valley International Airport in Allentown, PA; Wilkes-Barre/Scranton International Airport in Avoca, PA; and numerous airports in the New York City, NY region provide service to destinations throughout the United States and worldwide (Planning 2006).



Figure 4.3.16-1. Pike County Transportation Systems

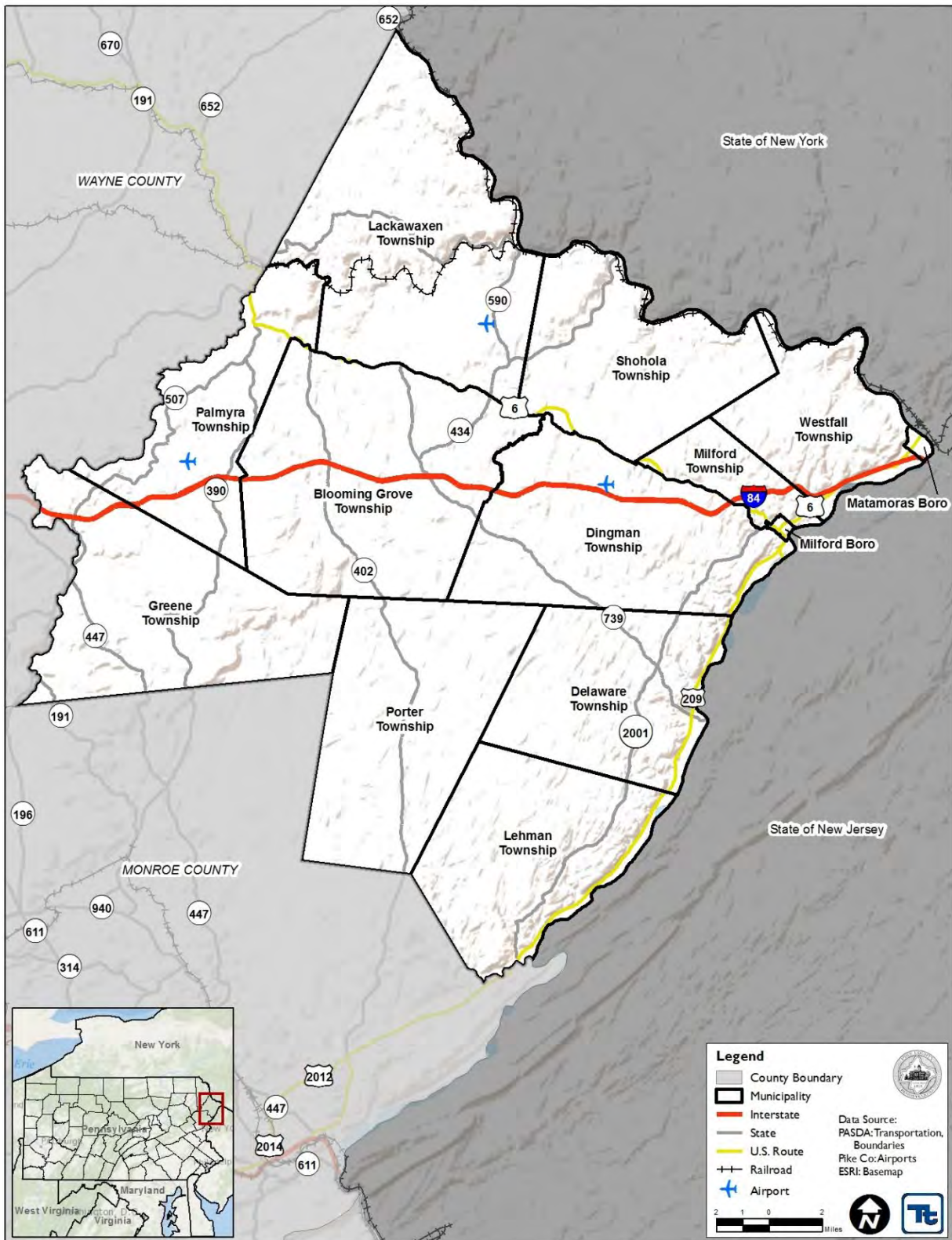
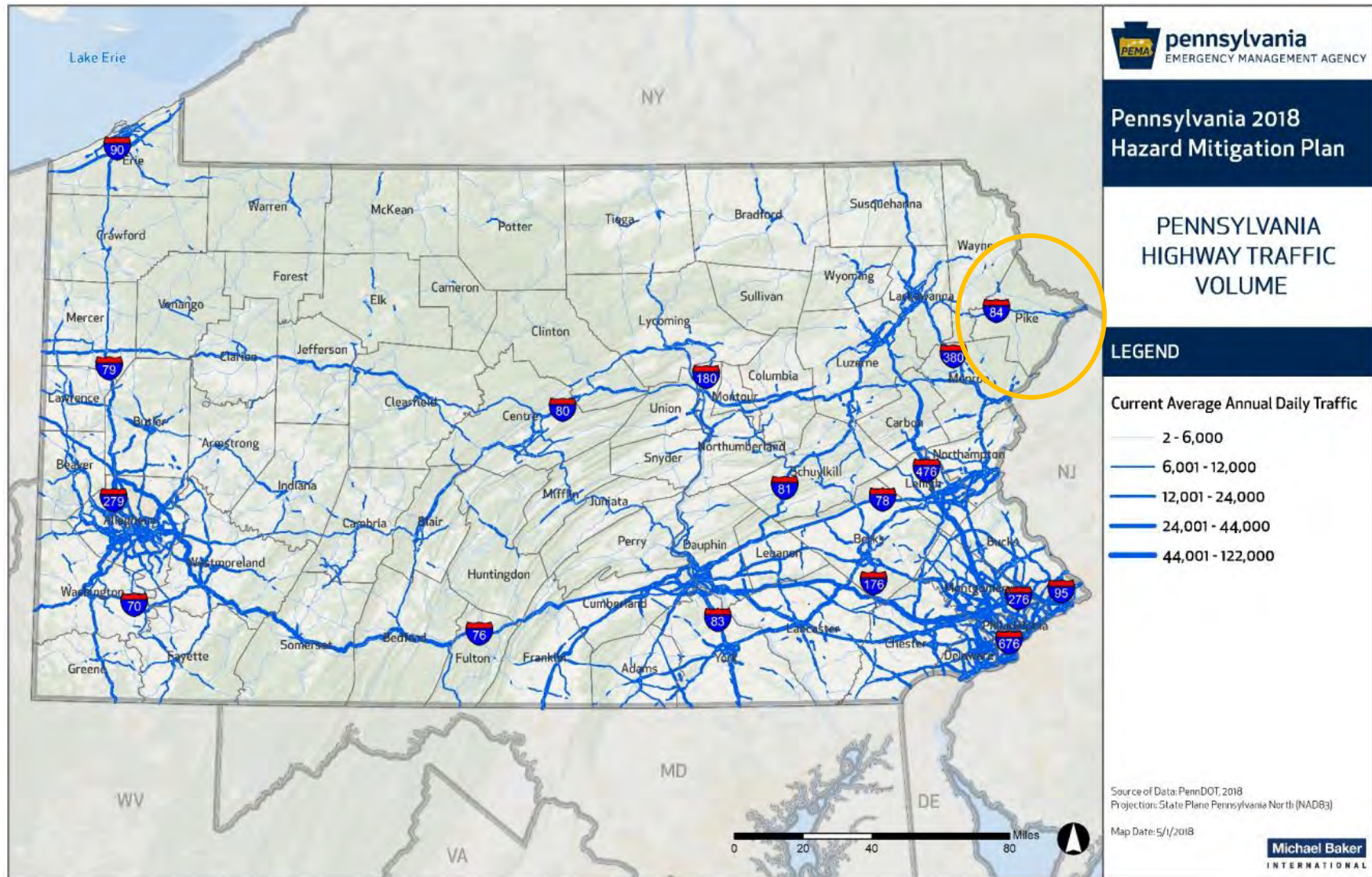




Figure 4.3.16-2. Average Annual Daily Traffic on PennDOT Highway System



Source: PEMA 2018

4.3.16 TRANSPORTATION ACCIDENTS





4.3.16.2 Range of Magnitude

Significant passenger vehicle, air, and rail transportation accidents can result in a wide range of outcomes from damage solely to property to serious injury or death. Most air incidents are nonfatal and cause minor injuries or property damage. The majority of motor vehicle crashes are non-fatal in Pennsylvania, but PennDOT estimates that every hour ten people are injured in a car crash, and every seven hours someone dies as a result of a car crash. Most fatal crashes occur in the summer months of July, and August, and September (PA HMP 2013).

Roadway accidents in Pike County range from minor crashes to more serious incidents that involve injuries or fatalities, or result in a release of hazardous materials (see Section 4.3.4). Information for this plan regarding fatalities associated with automobile crashes (Table 4.3.16-1) and fatalities of pedestrians involved in transportation incidents (Table 4.3.16-2) was drawn from the National Highway Traffic Safety Administration (NHTSA) Fatality Analysis Reporting System (FARS) 2020 data.

Table 4.3.16-1. Fatalities from Automobile Crashes

Year	Pennsylvania	Pike County
2016	1,088	6
2017	1,083	4
2018	1,103	10
2019	990	17
2020	1,060	6
Total	5,324	43

Source: NHTSA 2021

Table 4.3.16-2. Fatalities of Pedestrians

Year	Pennsylvania	Pike County
2016	170	-
2017	147	-
2018	197	-
2019	147	1
2020	143	-
Total	803	1

Source: NHTSA 2021

Rail accidents can vary widely in terms of injuries, fatalities, property damage, and interruption of service, depending on the nature and severity of the accident. Local residents may also be involved in rail accidents while traveling outside the County.

Aircraft accidents can vary from a single-engine aircraft having a “hard landing” and causing damage to the aircraft, to a crash of a small turboprop or jet aircraft, to a crash of a large jet aircraft (such as a Boeing 727). Other aircraft accidents could include helicopter or experimental aircraft crashes. Aviation accidents also can involve radio-controlled or drone aircraft devices, many of which are experimental and not subject to defined regulatory oversight, potentially complicating issues with and for the public that could arise if one of these devices crashes.



A worst case scenario within Pike County would involve an accident where a tanker truck hauling hazardous materials has an accident on Interstate 84, resulting in a release of its cargo on the major roadway. This incident would block traffic on **Pike 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 critical facilities in the County. The worst-case scenario for a railroad accident would be similar to that described for a roadway accident (i.e., a train carrying a hazardous substance crashing along the rail line). The worst-case scenario for an aviation accident would be a major plane crash into a residential or industrial area, causing mass fatalities and property destruction. The most likely transportation accident in the County would involve a single vehicle hitting an object and sustaining minimal damage.

4.3.16.3 Past Occurrence

Vehicular transportation accidents are a daily occurrence across the Commonwealth of Pennsylvania and in Pike County. According to PennDOT, in 2020, Pike County had 512 vehicular crashes that led to six fatalities. The **County's most serious transportation concerns involve Interstate 84 and US 209.** These routes have the highest annual average traffic counts, the most truck traffic, and have illustrated the most potential for disaster in the past. Additionally, there is a temporal aspect to highway transportation accidents; in the spring and early summer, when construction and narrowed lanes are commonplace, the incidence of large-scale transportation accidents increases. Table 4.3.16-3 summarizes the overall vehicular crash data, as reported by PennDOT, for Pike County from 2010 through 2020.

Table 4.3.16-3. Total Number of Crashes, Traffic Deaths, and Pedestrian Deaths for Pike County, 2010 to 2020

Year	Total Crashes	Total Traffic Deaths	Total Pedestrian Deaths
2010	667	7	0
2011	633	8	0
2012	593	6	1
2013	579	8	1
2014	591	9	0
2015	604	7	0
2016	583	5	0
2017	621	4	0
2018	574	8	0
2019	562	16	1
2020	512	6	0
TOTAL	6,519	84	3

Sources: Pike County HMP 2017; PennDOT 2021

Aviation accidents are the least frequent type of transportation accident. The National Transportation Safety Board (NTSB), the federal agency responsible for aviation accident information, indicates that from January 1982 to March 2022, there were 1,676 air transportation accidents in Pennsylvania. Of those 1,676 accidents, 15 occurred in Pike County. Details regarding some of the aviation accident events that occurred in Pike County are described below.

- 1992 - a small single seat plane crashed into the Delaware River in Westfall Township, killing the pilot
- 1994 - a small plane crashed in Blooming Grove Township resulting in minor injuries
- 1995 - a small plane crashed near Mountain Bay Airpark in Palmyra Township



- 1996 - a small plane crashed off of Shiny Mountain Road in Palmyra Township, and in the same year, a small plane crashed in Lehman Township, killing two and injuring two
- 2006 - three people died from a small aircraft crash in Palmyra Township
- May 2009 - a small plane crashed into a group of trees in Dingman Township; no fatalities or injuries were reported
- August 7, 2009 – Milford/Shohola – as a plane was taking off, it became airborne early due to a dip in the runway and the plane drifted with its left wing hitting a tree. There were four people onboard and minor injuries were reported.
- March 27, 2016 – A helicopter crashed in Greene Township, killing one person. The crash occurred in a heavily wooded area north of Skytop Lodge, off Route 390 and south of Promised Land State Park.
- May 2, 2018 – A minor incident occurred in Palmyra Township at Reigle Field during landing. No injuries or fatalities were reported.

Due to a decrease in rail traffic since 1976 with the formation of Conrail, there have been few railway accidents. Rail incidents include: the 1978 derailment north of Mill Rift, the 1995 derailment north of Pond Eddy, and a 2001 car-train collision in Lackawaxen that resulted in one death. The USDOT Rail Equipment Accident/Incident Data was filtered to identify railroad incidents occurring in Pike County. According to this dataset, four incidents were reported in Pike County:

- 1975 – details not available
- 1978 – details not available
- 2003 - In 2003, a New York Susquehanna & Western train derailed four cars on the Norfolk Southern line.
- 2005 - The 2005 rail incident involved train cars derailing on the New York Susquehanna and Western rail line in Shohola Township (USDOT 2002).

4.3.16.4 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 2022 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of transportation accident events for Pike County. Information from PennDOT, NTSB, FRA and Pike County were used to identify the number of transportation accident events that occurred between 2001 and 2021. 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) event occurring in any given year in Pike County.



Table 4.3.16-4. Probability of Future Transportation Accident Events

Hazard Type	Number of Occurrences Between 2001 and 2021	Percent chance of occurrence in any given year
Vehicular	12,126	100%
Railway	2	9.5%
Aviation	7	33.3%
TOTAL	12,135	100%

Sources: NTSB 2021; PennDOT 2021

Therefore, based on this and past occurrences, the probability of transportation accidents is characterized as *highly likely* as defined by the Risk Factor Methodology probability criteria (see Table 4.4-1). 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.

4.3.16.5 Vulnerability Assessment

The entire County has been identified as the hazard area for transportation accidents. The following subsections evaluate and provide estimates for the potential impacts of transportation hazards on Pike County, including:

- Impacts on: (1) life, health, and safety of residents; (2) general building stock; (3) critical facilities; (4) economy; and (5) environment
- Future changes that may impact vulnerability
- Change of vulnerability since the 2017 HMP

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 depends on population density, time of exposure (day or night), and proportions of the population located indoors and outdoors.

Vehicular accidents are not the only transportation incidents that can impact human health and life, property, and natural resources; rail accidents can also impact those living near surrounding rail lines. Residents in Lackawaxen, Shohola, and Westfall Townships are vulnerable to such incidents. Two nearby airports also increase the risk of airplane accidents for most of the County.

The County and its municipalities are prepared to manage and respond to transportation hazards. Refer to Section 5 (Capability Assessment) for further information regarding Pike County emergency response capabilities.

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 the modes of transportation in use in Pike County can lead to congestion of another, and affect both the County and the region as a whole.



Table 4.3.16-5 shows the vulnerability of addressable structures and critical facilities for each kind of transportation accident. For this analysis, the hazard area for highway accidents was defined as locations within a ¼ mile of Interstate, US highways, and State roads; jurisdictions within a 5 mile radius of an airport are vulnerable to airplane accidents. Similar to highway accidents, the hazard area for rail accidents is a ¼ mile buffer around the rail lines. Using these definitions, all jurisdictions are vulnerable to at least one type of transportation accident.

Each municipality has addressable structures located within ¼ mile of major highways; Palmyra Township has the greatest number of structures (2,143) located within ¼ mile of major highways. Each municipality also has critical facilities within ¼ mile of major highways; of these, Milford Borough has the greatest number (13).

Lackawaxen Township has the greatest number of addressable structures (394), while Shohola Township has the most critical facilities (2) vulnerable to rail accidents. Greene Township is the only municipality with structures located within a 5-mile radius of an airport (the Spring Hill airport); however, structures throughout the County are vulnerable to airplane accidents as planes fly over.

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Table 4.3.16-5. Addressable structures and critical facilities vulnerable to railroad, highway, and airport accidents.

Municipality	Total Addressable Structures	Addressable Structures within ¼ mi. of railroad	Critical Facilities within ¼ mi. of railroad	Addressable Structures within ¼ mi. of Major Highway*	Critical Facilities within ¼ mi. of Major Highway*	Addressable Structures within 5 mi. Radius of Airport	Critical Facilities within 5 mi. Radius of Airport
Blooming Grove Township	3,998	0	0	452	8	0	0
Delaware Township	4,253	0	0	611	4	0	0
Dingman Township	5,480	0	0	603	9	0	0
Greene Township	3,275	0	0	836	3	413	0
Lackawaxen Township	4,562	394	1	409	7	0	0
Lehman Township	5,995	0	0	303	3	0	0
Matamoras Borough	972	85	0	751	5	0	0
Milford Borough	718	0	0	707	13	0	0
Milford Township	784	0	0	431	5	0	0
Palmyra Township	3,981	27	0	2,143	5	0	0
Porter Township	912	0	0	258	2	0	0
Shohola Township	2,311	181	2	470	3	0	0
Westfall Township	1,175	107	1	551	11	0	0
TOTAL	38,416	794	4	8,525	78	413	0

Source: HAZUS-MH 3.1; Pike County; PennDOT

*Major Highways include Interstates, US Highways and State Highways.



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 (PEMA 2018).

Future Growth and Development

Areas targeted for potential future growth and development in the next 5 to 10 years have been identified across Pike County (further discussed in Section 2 of this HMP). Any areas of growth could be potentially impacted by the transportation hazard because the entire county is exposed and potentially vulnerable. An increase in development and population will increase the number of vehicles on the road which can lead to an increase risk in transportation incidents in the County.

Effect of Climate Change on Vulnerability

Because transportation incidents are human-caused, no climate change impacts are associated with the hazard.

Additional Data and Next Steps

For future plan updates, Pike County can document the number of transportation incidents, where they occur, and what type of incidents. This data will help to identify any concerns or trends for which mitigation measures should be developed or refined.



4.3.17 Structural Fires and Explosions

Structural and urban fire and explosion hazards incorporate vehicle and building/structure fires as well as overpressure rupture, overheating, or other explosions that do not ignite. This hazard occurs in denser, more urbanized areas statewide and most often occurs in residential structures. Structural fires and explosions often begin as a result of other hazards, particularly storms, lightning strikes, drought, transportation accidents, hazardous materials releases, criminal activity (arson), and terrorism (PA HMP 2019). This section provides a hazard profile and vulnerability assessment of the structural fire and explosions hazard for Pike County.

4.3.17.1 Location and Extent

Structural fires and explosions within Pike County have had a detrimental impact on life, property, and the local economy over the past decade. The age of many residential structures within the region combined with changes in building construction and materials has increased the threat of fire loss that is occurring on a regular basis.

As defined by the National Fire Protection Agency (NFPA) in the *NFPA 901: Standard Classifications for Incident Reporting and Fire Protection Data*, a **structure fire** is defined as “Any fire inside, on, under, or touching a structure.” This definition includes any mobile residential structure such as a mobile or modular home but does not include roadworthy vehicles such as recreation vehicles (NFPA 2011). Significant urban fires are limited to densely populated areas of the County that contain large and/or multiple buildings. Urban fires may start in single structure but spread to nearby buildings or throughout a large building if adequate fire control measures are not in place.

Significant explosions are most common in densely populated areas and at industrial facilities that utilize combustible hazardous materials. Explosions can also occur in conjunction with automobile, boat, and rail accidents. All such explosions can turn into fires, spreading to nearby structures.

4.3.17.2 Range of Magnitude

The severity of structural fires and explosions is measured according to the losses associated with the incident. The impact to the local economy is minimal with the loss of a residential structure, but effects of the loss of a large manufacturing facility or business that employs a large number of people can be extensive. Likewise, the impact to the local environment from a single residential fire is minimal, while the impact from an industrial or commercial fire can take years to measure. Finally, the loss of life caused by urban fires appears to be opposite of the previous two impacts. The loss of life is more likely to be associated with a residential fire than an industrial or commercial building fire. Building compositions combined with the time of day of the incident are risk factors that can increase the chance for the loss of life during a residential-type fire.

Although most instances of fire do not reach disaster proportions, the sum of the impact of all small fires is often much greater than the impact of the few major fire and explosion hazards that occur. There are additional economic consequences related to this hazard. Structural fires and explosions may result in lost wages due to temporarily or permanently closed businesses, destruction and damage involving business and personal assets, loss of tax base, recovery costs, and lost investments on destroyed property. The secondary effects of urban fire and explosion events relate to the ability of public, private, and non-profit entities to provide post-incident relief. Human services agencies (community support programs, health and medical services, public assistance programs and social services) can be



affected by urban fire and explosion events as well. Effects may consist of physical damage to facilities and equipment, disruption of emergency communications, loss of health and medical facilities and supplies, and an overwhelming load of victims who are suffering from the effects of the urban fire, including loss of their home or place of business.

A worst-case urban fire event in Pike County occurred in 1998 when the largest fire ever recorded in Pike County occurred at the Altec-Lansing warehouse in Milford Township. The fire burned through the 80,000 square foot space and resulted in \$6 million in damages.

4.3.17.3 Past Occurrence

Pike County experiences a number of structural fire and explosion events each year, most of which are small and affect a limited number of structures. According to the Pike County Department of Public Safety, from January 1, 2017 to December 31, 2021, there have been 1,920 structural fire events (see Table 4.3.17-1). Of the municipalities in Pike County, Dingman Township had the highest number of structural fires in the last 5 years.

Table 4.3.17-1. Structural Fire Events in Pike County, January 1, 2017 to December 31, 2021

Community	Number of Structural Fires
Blooming Grove Township	247
Delaware Township	192
Dingman Township	353
Greene Township	102
Lackawaxen Township	136
Lehman Township	122
Matamoras Borough	59
Milford Borough	55
Milford Township	64
Palmyra Township	208
Porter Township	24
Shohola Township	163
Westfall Township	195
Pike County (Total)	1,920

Sources: Pike County Department of Public Safety 2022

4.3.17.4 Future Occurrence

Many factors contribute to the cause of structural fires and explosions. Due to the various factors, urban areas in Pennsylvania are considered at risk to one degree or another. Minor urban fires can be expected every day in Pennsylvania. Major fires will continue to occur several times a year, particularly in dense, urban areas with aging building stock. However, the probability of future occurrences may decrease with the construction of new buildings to building codes that address fire prevention, detection, and extinguishments. Also, continued efforts to increase public awareness of the dangers of urban fires will help to mitigate injury, death, and property loss. The probability of future occurrence may increase in communities whose populations are growing and where new areas are developed (PA HMP 2018).



For the 2022 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of urban fire and explosion events for Pike County. Information from the Pike County Department of Public Safety was used to identify the number of structural fire and explosion events that occurred between 2017 and 2021. Using this source ensures the most accurate probability estimates possible. Information on occurrence for previous years using the same methodology was not available, resulting in less reliable statistical analysis. Therefore, the probability of occurrence was calculated using 2017 to 2021 as it was the best available information. The table below shows these statistics 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 an urban fire or explosion event occurring in any given year in Pike County.

Table 4.3.17-2. Probability of Future Structural Fire Events

Hazard Type	Number of Occurrences Between 2017 and 2021	Percent chance of occurrence in any given year
Structural Fires	1,920	100%

Sources: Pike County 2022

Based on available historical data, the future occurrence of structural fire and explosion events can be considered *possible* as defined by the Risk Factor Methodology probability criteria (refer to Section 4.4) with minor events happening more frequently than major fires or explosions in the future.

4.3.17.5 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 structural fire hazard on Pike County in the following subsections:

- Impact on (1) life, health, and safety; (2) general building stock; (3) economy; (4) 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

Impact on Life, Health, and Safety

The entire population is exposed and vulnerable to the structural fire hazard.

Impact on General Building Stock and Critical Facilities

All buildings and infrastructure in Pike County is exposed and vulnerable to the structural fire hazard.

Impact on the Economy

There are economic consequences related to this hazard. Structural fires and explosions may result in lost wages due to temporarily or permanently closed businesses, destruction and damage involving business and personal assets, loss of tax base, recovery costs, and lost investments in destroyed property (PEMA 2018).



Impact on the Environment

The impact of structural fires and explosions vary based on the size of the incident and the population and structure density where it occurs. There may be environmental impacts related to hazardous materials when a fire event or explosion releases dangerous materials (PEMA 2018).

Future Growth and Development

As the population increases, the County will experience an increase in new construction. The increase in population and structures will expose more to the structural fire and explosion hazard.

Effect of Climate Change on Vulnerability

Structural fires can be the result of a lightning strike. Climate change may lead to an increase in the number of lightning strikes and lightning-producing storms. Major clusters of summertime thunderstorms in North America will grow larger, more intense, and more frequent later this century in a changing climate, leading to increased rainfall and posing a greater threat of flooding across wide areas (University Corporation for Atmospheric Research [UCAR] 2017). The changing climate may also increase the frequency of lightning flashes could rise by an estimated 50-percent across the continental United States over the next century. A warmer atmosphere can hold more moisture and moisture is one of the key ingredients for triggering a lightning strike (Lee 2014).

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 stated earlier, 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.



4.3.18 Utility Interruptions

A utility interruption, or power failure, is defined as any interruption or loss of fuel service from disruption of power transmission caused by accident, sabotage, natural hazards, or equipment failure (also referred to as a loss of power or power outage). A significant power failure is defined as any incident of a long duration that would require the involvement of the local or State emergency management organizations to coordinate provision of food, water, heating, cooling, and shelter.

This section provides a profile and vulnerability assessment of the utility interruption hazard for Pike County.

4.3.18.1 Location and Extent

Utility interruptions in Pike County include disruptions in water, fuel, electric and telecommunications capabilities. In Pike County the focus is primarily on power failures which are often a secondary impact of another hazard event. For example, severe thunderstorms or winter storms could bring down power lines and cause widespread disruptions in electricity service. Strong heat waves may result in rolling blackouts where power may not be available for an extended period of time. Local outages may be caused by traffic accidents or wind damage. Utility interruptions and power failures can take place throughout the County.

Utility interruptions can also be caused by disruptions in service to pipeline transmission lines. Columbia Gas and Tennessee Gas have pipelines that bisect the County. In addition, there are countless miles of residential connections to larger water, gas, and liquid pipelines. Lines can become damaged by cold temperatures thus causing cracks and disruptions in service. Public water service can also be impacted by dam failures which would cause a break in water service.

4.3.18.2 Range of Magnitude

Generally speaking, the most severe utility interruptions are regional power outages. Regional loss of power affects lighting; heating, ventilation, and air conditioning (HVAC) and other support equipment; communications; fire and security systems; and refrigerators, which can in turn cause loss of water and sewer service, and food spoilage. These effects are especially severe for individuals with functional needs and the elderly.

At a minimum, power outages can cause short-term disruption in the orderly functioning of businesses, government operations, and private citizen functions and activities. Examples of everyday functions that would be affected by power outages include traffic signals, elevators, and retail sales. A worst case scenario for utility interruption in Pike County occurred in January 2005 when an ice storm caused major power outages effecting thousands of customers in Monroe, Carbon, Lackawanna, Wayne and Pike Counties. Because of the amount of equipment damage caused by the ice, some areas did not have power restored for over a week. Fortunately, Pike County did not have damage to the extent of its neighbors to the southwest.

Sabotage also plays a role in some utility outages. Sabotage may be the direct result of a malicious attack against utilities, or may be the secondary effect of the theft of copper wiring. In report published in October 2010 titled "An Updated Assessment of Copper Wire Theft from Electric Utilities," the U.S. Department of Energy's (DOE) Office of Electricity Delivery and Energy Reliability reported that United States-based utilities suffer several million dollars'



worth of copper thefts annually (DOE 2010). The estimated minutes of outages experienced by utilities nationwide as a result of copper theft were 456,000 or about 7,600 hours (American Public Power Association [APPA] 2012).

4.3.18.3 Past Occurrence

The following sections provides information regarding past occurrences of utility outages in Pike County. For the 2022 HMP update, events that occurred between 2016 and 2021 are presented in Table 4.3.18-1. For events prior to 2016, please refer to the 2017 Pike County HMP.

Table 4.3.18-1. Utility Interruption at Pike County from 2016 to 2021

Date	Location	Event Type	Losses/Damages
August 15, 2016	Countywide	Mechanical Issues	Thousands of customers were without power for a few hours in Pike County as a result of equipment problems at a substation. At the peak of the outage, approximately 9,000 customers were impacted. Power was restored by the early evening (Over 2016).
March 2, 2018	Countywide	Blizzard	Up to 20 inches of snow fell and 35 mph winds impacted Pike County. This led to downed trees, power outages, and drifting snow. Thousands of residents were without power. Estimated property damages was \$400,000.
July 30, 2019	Westfall Township	Thunderstorm	Strong thunderstorm winds downed trees and powerlines in Westfall Township.
July 6, 2020	Millford Township	Thunderstorm	Strong thunderstorm winds downed trees and powerlines in Millford Township.
March 26, 2021	Countywide	High Winds	More than 32,000 NE PA residents were without power after high winds throughout the region. Most counties in the NE part of the state experienced outages: thousands of residents in Monroe, Pike, Wayne, Carbon, and Lackawanna Counties were impacted (Pocono Record 2021).
July 7, 2021	Countywide	Thunderstorm	Severe thunderstorms knocked out power to thousands in Monroe, Pike, Northampton, and Wayne Counties (Pocono Record 2021).

Source: NOAA NCEI 2022, Pocono Record 2021, Over 2016

4.3.18.4 Future Occurrence

Minor power failure events (i.e. short outage) events may occur several times a year for any given area in the County, while major (i.e. widespread, long outage) events take place once every few years. Power failures are often occurrences during severe weather and therefore, should be expected during those events. For the 2022 HMP update, the most up-to-date data was collected to calculate the probability of future occurrence of utility interruption events for Pike County. Information from the 2017 Pike County HMP, the NOAA NCEI Storm Events Database, the Pennsylvania Bureau of Technical Utility Services, input from Pike County, and local newspapers were used to identify the number of utility interruption events that occurred between 1950 and 2021. 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 utility interruption event occurring in any given year in Pike County.

Table 4.3.18-2. Probability of Future Utility Interruption Events

Hazard Type	Number of Occurrences Between 1950 and 2021	Percent chance of occurrence in any given year
Utility Interruption	1,408	100%

Sources: Pike County HMP 2012; Pike County 2016; Pike County 2022; Pennsylvania Bureau of Technical Utility Services 2012 and 2013, NOAA NCEI 2022

Note: Information on events for 2016 to 2021 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 *highly 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.

4.3.18.5 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 Pike County in the following subsections:

- Impact on (1) life, health, and safety; (2) general building stock; (3) economy; (4) 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

Impact on Life, Health, and Safety

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. The population under the age of 5 and 65 years and over have increased, as shown in Table 4.3.18-3. Data on individuals with special medical needs were not available.

Table 4.3.18-3. Demographic Trends for Vulnerable Populations

Vulnerable Population	2010 Census	2019 Census Estimate
Children under 5 years	2,823	1,894
65 years and over	9,303	12,152
Population with a disability	N/A	9,490

Source: U.S. Census Bureau 2010/2019

Note: The 2020 Census was not available during the planning process; therefore, the 2019 American Community Survey was used for the population.

N/A Not available

Impact on General Building Stock and Critical Facilities

All facility infrastructure considered critical 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 Pike **County's population**. As stated earlier, the March 2018 blizzard left many areas in the County without power for several days. Any critical facilities within these areas without emergency back-up power would have been unable to provide assistance to the community for an extended period of time. The impact the March 2018 blizzard had on the County illustrates the importance of critical facilities installing emergency generators to ensure adequate emergency response in all situations.



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 Pike 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.5.3.0 has standard values based on the daily cost per rate-paying connection. The daily cost per value is shown in Table 4.3.18-4.

Table 4.3.18-4. FEMA BCA Toolkit v5.3.0 Daily Standard Values of Utility Services

Utility	Daily Value (per connection/per day)
Electric	\$148.00
Potable Water	\$105.00
Wastewater	\$49.00

Source: FEMA 2009

Impact on the Environment

The most significant impact associated with utility interruptions occurs when the interruption involves a release of hazardous materials. This hazardous material may be released in a pipeline accident or when material is in transit. Section 4.3.5 (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 (Pennsylvania Emergency Management Agency [PEMA] 2018).

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 can also reduce the efficient and effective communication 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 2018).



Future Growth and Development

Areas targeted for potential future growth and development in the next 5 to 10 years have been identified across Pike County (further discussed in Section 2 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.

Effect of Climate Change on Vulnerability

According to the Fourth National Climate Assessment, two climate change scenarios were modeled, and temperature change in the northeastern United States is estimated to increase between 3.98 - 5.09°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 2018).

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. While some research supports this concept, others do not and the impact of climate change on cold weather events is not fully understood (Climate Central 2013). 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.

Additional Data and Next Steps

For future plan updates, Pike 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. This 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.



4.3.19 Wildfire

This section provides a profile of and vulnerability assessment for the wildfire hazard. A wildfire is an uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures. Wildfires often begin unnoticed and can spread quickly, creating dense smoke that can be seen for miles. A wildland fire is a wildfire in an area where development is essentially nonexistent, except for roads, railroads, power lines, and similar facilities. A wildland-urban interface (WUI) fire is a wildfire in a geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels.

4.3.19.1 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 Pike 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.

Because a majority (an estimated 78.9-percent) of Pike County's land cover is forest, the potential geographic extent of wildfires is quite large (USGS 2011). Under dry conditions or droughts, wildfires have the potential to burn forests as well as croplands. The greatest potential for wildfires is in the spring months of March, April, and May, and the autumn months of October and November; 83-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.

Table 4.3.19-1. Land Use Summary for Pike County

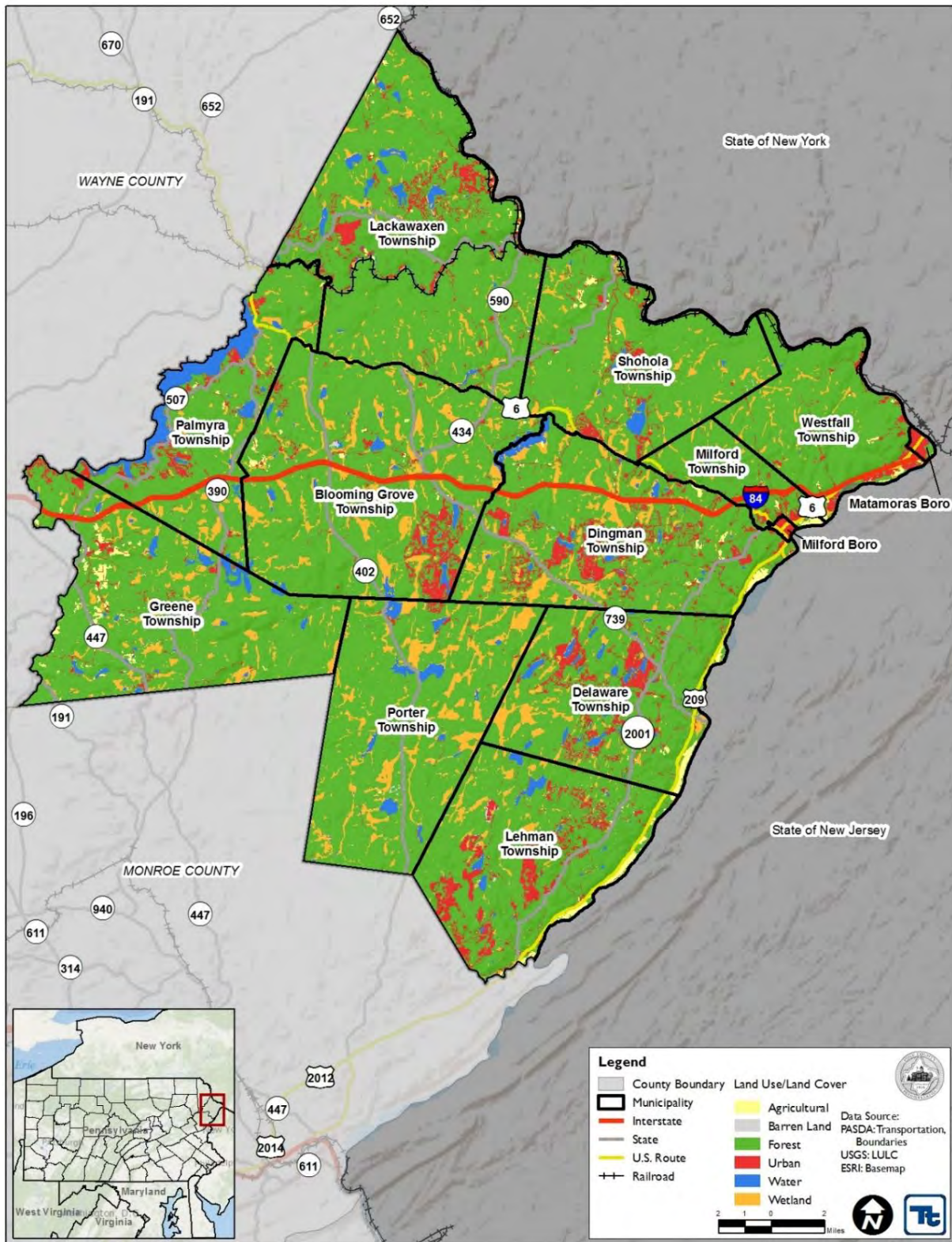
Land Use Category	Total Area (square miles)	Percent of Total
Agricultural	0.2	<1%
Barren Land	2.9	<1%
Forest	447.3	78.9%
Rangeland	2.5	<1%
Urban Built Up	46.2	8.1%
Water	20.7	3.6%
Wetland	47.3	8.3%
Total	567.2	100%

Source: USGS 2011

Figure 4.3.19-1 illustrates the land cover across Pike County. As the figure shows, a majority of Pike County is forested. Figure 4.3.19-2 shows the locations of wildfires throughout Pennsylvania from 1992 to 2015, as presented in the 2019 Pennsylvania State HMP. Wildfires are known to be an underreported event. Many wildfires occur every year and are suppressed by volunteer fire departments without any response or assistance from BOF.



Figure 4.3.19-1. Land Cover in Pike County



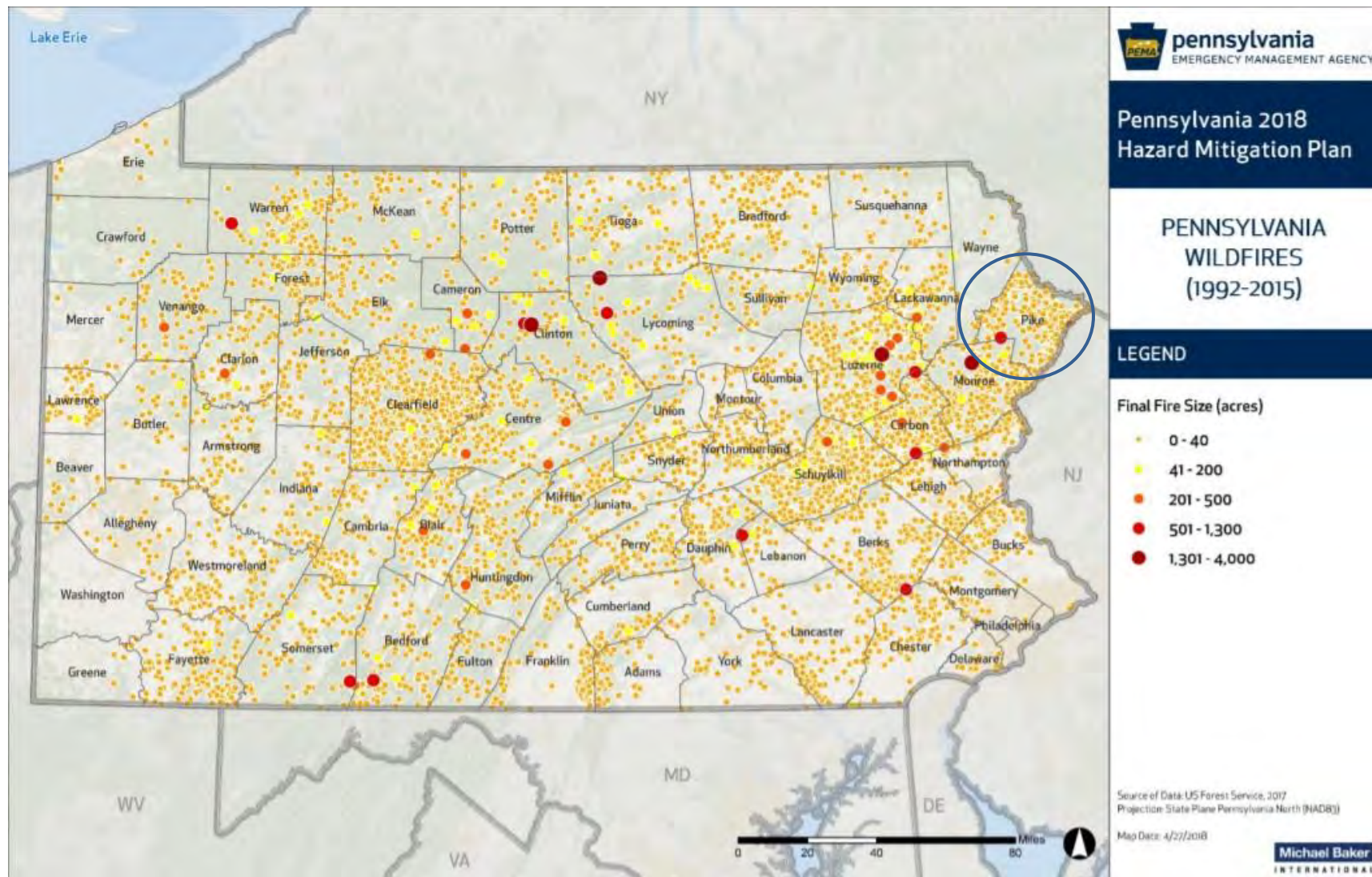
Source: USGS – National Land Cover Database (NLCD) 2011

4.3.19: WILDFIRE





Figure 4.3.19-2. Location of Wildfire Events responded to by BOF from 1992-2015



Source: PEMA 2018

Note: Blue circle was added to highlight Pike County's location within Pennsylvania.

4.3.19: WILDFIRE





According to the Pennsylvania 2019 Standard State All-Hazard Mitigation Plan, 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 wildfires. This area has large home developments built in volatile fuel types including scrub oak, mountain laurel, blueberry, and huckleberry. If spring weather conditions were perfect for a fire (i.e. clear sky, high winds, low relative humidity, and a prolonged period of dry weather), it is possible that 10,000 acres could burn in areas of Monroe or Pike Counties (PEMA 2018).

Several tools are available to estimate fire potential location and extent, including (but not limited to) the Wildland/Urban Interface, 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 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 et al. 2005).

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 et al. 2005).

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. Pike 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 et al. 2005). Figure 4.3.19-3 depicts the WUI for Pennsylvania in 2010, and Figure 4.3.19-4 illustrates the WUI for Pike County. Concentrations of WUI areas greater than 50 percent are classified as WUI (intermix or interface) in the County.



Figure 4.3.19-3. 2010 WUI for Pennsylvania

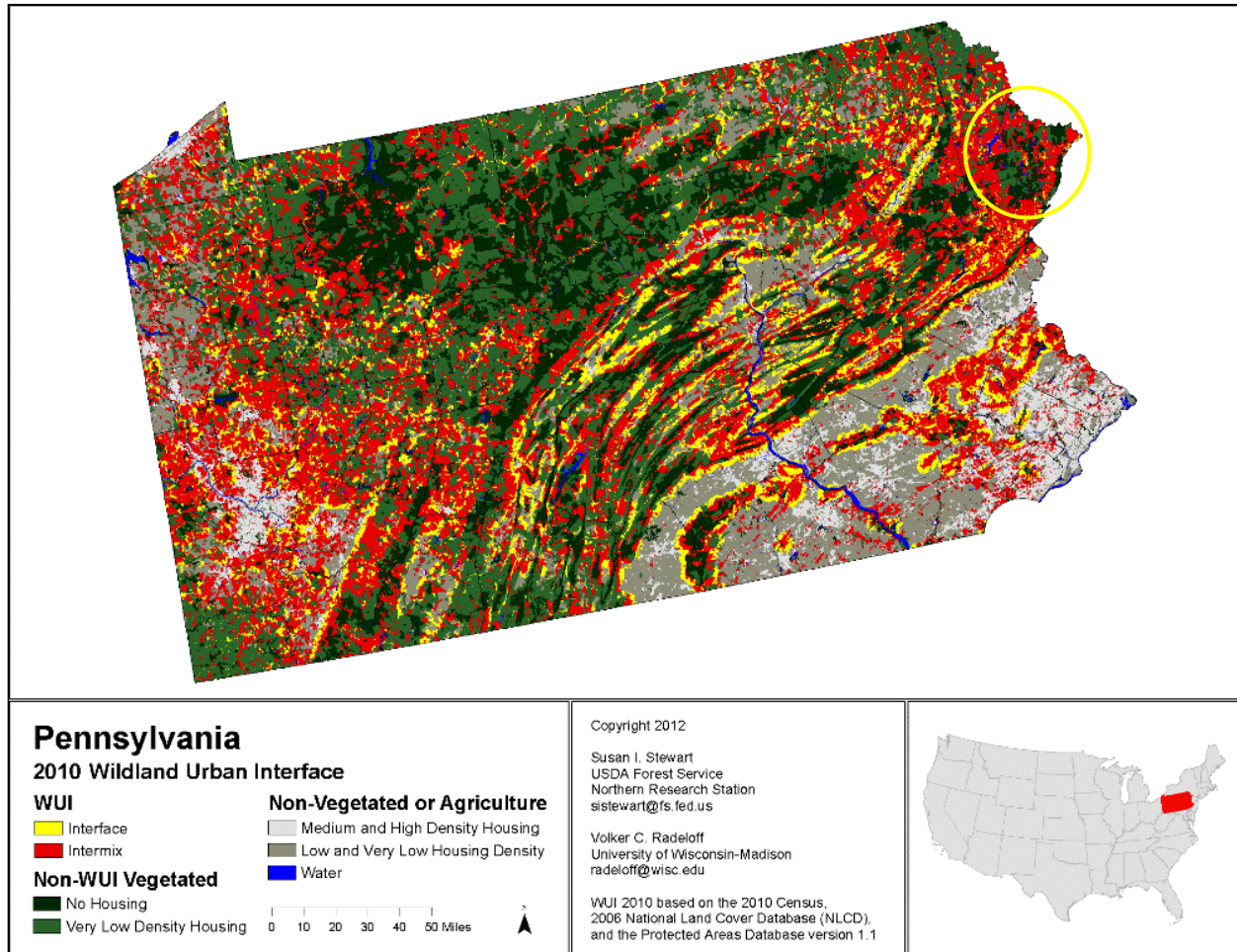
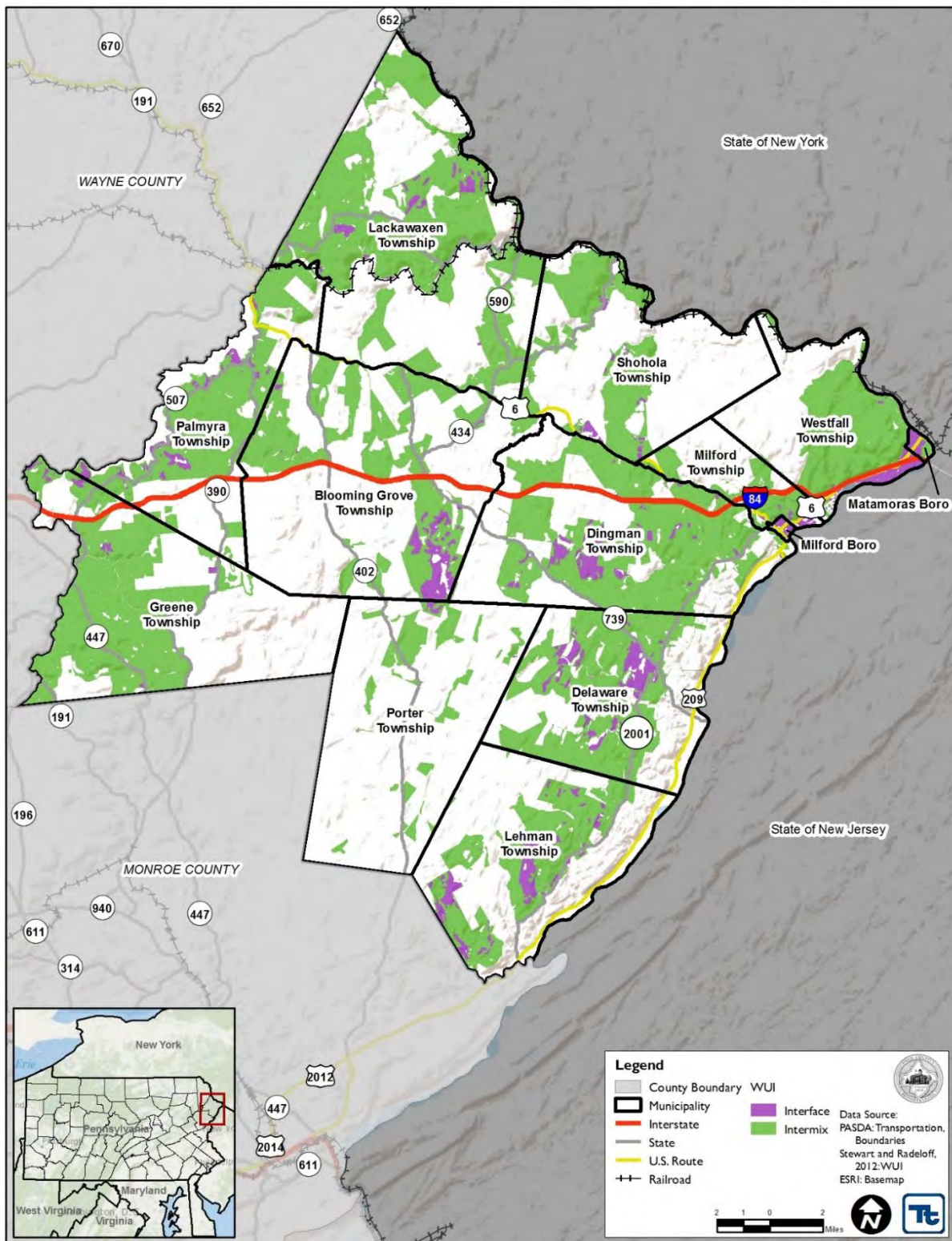




Figure 4.3.19-4. WUI for Pike County



Source: Stewart and Radeloff 2012



Wildland Fire Assessment System (WFAS)

The Wildland Fire Assessment System (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 fires danger, weather maps and satellite-derived “Greenness” maps (U.S. Forestry Service [USFS] 2016). 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 WFAS (USFS WFAS 2012). The Fire Danger Rating level, described in Table 4.3.19-2 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 WFAS 2012).

Table 4.3.19-2. 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 tree tops) 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. The following five datasets were used for this analysis:

- 2002 WUI
- 2006 LANDFIRE
- 2002 – 2008 Pennsylvania Wildfire Point Origin Occurrences
- Percent Slope

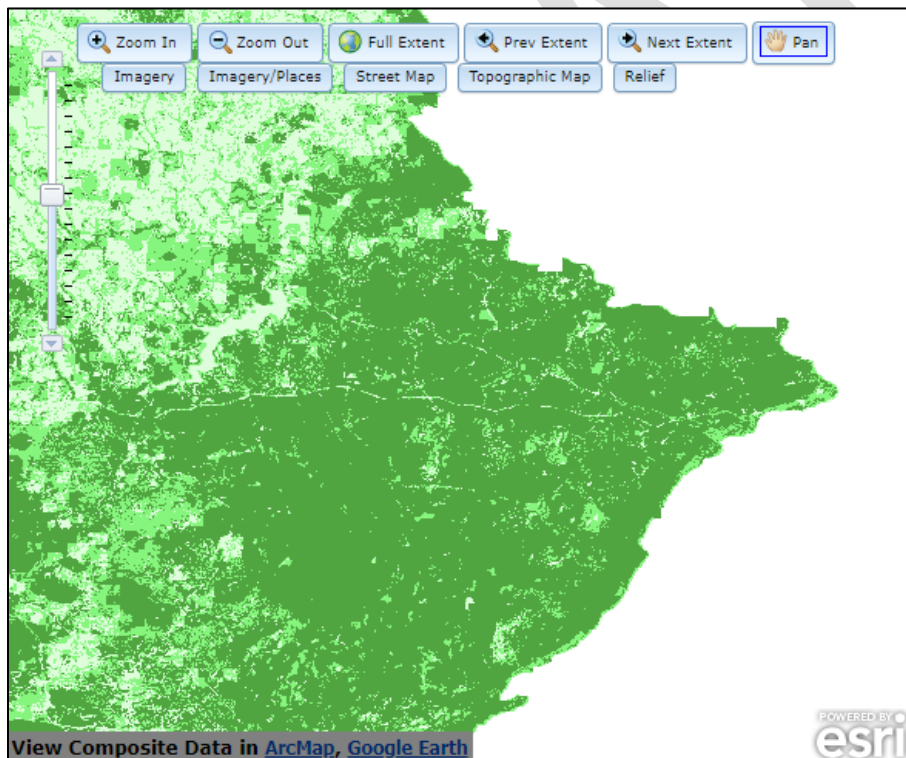


- 2009 Local Assessment of Values, Risks, Hazards.

The WUI classifies areas where homes and other human development meet or intermingle with undeveloped land. **LANDFIRE characterizes the land's vegetation into fuel models that predict various fire behavior intensities.** The Pennsylvania wildfire Point Origin Occurrences are records of wildland fire origins that have been reported. Percent slope aids in predicting fire behavior from the terrain. The local assessment of values, risks, and hazards is a municipality-based rating system; this assessment has been made by local wildland fire managers (PA DCNR 2021). Figure 4.3.19-5 illustrates the output for the wildfire priority landscapes model for Pike County.

The greatest potential for wildfires is in the spring months of March, April, and May, and the autumn months of October and November. These months generally bring clear skies, high winds, low relative humidity, and prolonged periods of dry weather. In the spring, bare trees allow sunlight to reach the forest floor, drying fallen leaves and other ground debris. The same theory applies for the fall; however, the drier conditions are a more crucial factor. People cause **most wildfires in Pennsylvania, often by burning debris. Several fires have started in a person's backyard and traveled** through dead grasses and weeds into bordering woodlands. According to the Pennsylvania Emergency Management Agency (PEMA) Standard All-Hazard Mitigation Plan, 92 percent of Pennsylvania wildfires burn less than 10 acres and are suppressed within the first burning period (PEMA 2013).

Figure 4.3.19-5. Wildfire Priority Landscapes in Pike County



Source: PA DCNR 2021

Notes: Low Priority = 0–0.21 (light green); Medium Priority = 0.21–0.35 (medium green); High Priority = 0.35–1 (dark green)
Pike County location within yellow circle

4.3.19.2 Range of Magnitude



Wildfire events in Pike 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 pine cones and other seed pods.

The worst-case scenario for Pike County occurred in **April 2016 known as the “16-Mile Fire”**. **More than 100** firefighters from local and out-of-state fire companies were deployed to battle a large wildfire near the border of Pike and Monroe Counties. Two cabins, three seasonal homes and six outbuildings were destroyed by the fire. More than 8,000 acres burned in state-owned forest and private property.

4.3.19.3 Past Occurrence

Wildfires are a constant threat in Pike County. According to the Pike County Department of Public Safety, there have been 724 wildfire events in Pike County between January 1, 2017 and December 31, 2021. Table 4.3.19-3 shows the number of wildfire events per municipality for this time period. **Of all of Pike County’s jurisdictions**, Lackawaxen Township had the most wildfires between 2017 and 2021.

Table 4.3.19-3. Wildfire Events in Pike County, January 1, 2017 to December 31, 2021

Community	Number of Structural Fires
Blooming Grove Township	62
Delaware Township	83
Dingman Township	147
Greene Township	28
Lackawaxen Township	174
Lehman Township	40
Matamoras Borough	0
Milford Borough	4
Milford Township	25
Palmyra Township	61



Community	Number of Structural Fires
Porter Township	13
Shohola Township	24
Westfall Township	63
Pike County (Total)	724

Source: Pike County Department of Public Safety 2022

In addition to the events identified above, the following provides details regarding several severe events that impacted Pike County:

- April 1990 – a large wildfire burned approximately 200 acres of woodlands located at the end of Firetower Road in Westfall and Shohola Townships.
- March 1999 - a controlled burn performed by the National Park Service accidentally spread due to rapid changes in weather conditions. The wildfire burned close to 500 acres and required several days and resources and manpower from several states to extinguish.
- April 2016 – 16-Mile Fire – More than 100 firefighters from local and out-of-state fire companies were deployed to battle a large wildfire near the border of Pike and Monroe Counties. Two cabins, three seasonal homes and six outbuildings were destroyed by the fire. More than 8,000 acres burned in state-owned forest and private property.

4.3.19.4 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 (Pennsylvania HMP 2018).

For the 2022 HMP update, the most up-to-date data was provided by the Pike County Department of Public Safety to calculate the probability of future occurrence of wildfire events for Pike County. This information was used to identify the number of wildfire events that occurred between January 1, 2017 and December 31, 2021. Using this source ensures the most accurate probability estimates possible. Information on occurrence for previous years using the same methodology was not available, resulting in less reliable statistical analysis. Therefore, the probability of occurrence was calculated using 2017 to 2021 as it was the best available information. 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 wildfire event occurring in any given year in Pike County.



Table 4.3.19-4. Probability of Future Wildfire Events

Hazard Type	Number of Occurrences Between 2017 and 2021	Percent chance of occurrence in any given year
Wildfires	724	100%

Sources: Pike County Department of Public Safety 2022

Based on available historical data, the future occurrence of wildfires in Pike 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 fire-fighters, forestry personnel, or visitors to the forest, has the potential to become a wildfire.

4.3.19.5 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:

- Overview of vulnerability
- Data and methodology used for the evaluation
- Impact on (1) life, health and safety; (2) general building stock; (3) critical facilities; (4) economy; and (5) future growth and development
- Effects of climate change on vulnerability
- Further data collections that will assist understanding this hazard over time.

Impact on Life, Health, and Safety

As demonstrated by historical wildfire events, potential losses include human health and life of residents and responders. The most vulnerable populations include emergency responders and those within a short distance of the interface between the built environment and the wildland environment.

The County land within the WUI data was overlaid on the 2010 U.S. Census population data to estimate the Pike County population vulnerable to the wildfire hazard (U.S. Census 2010). The census blocks with their center within the hazard area were used to calculate the estimated population exposed to the wildfire hazard. Table 4.3.19-5 summarizes the estimated population exposed by municipality.



Table 4.3.19-5. Estimated Population Located within the WUI in Pike County

Municipality	Total Population (American Community Survey 2015-2019)	Number of Persons Located in the Wildland-Urban Interface Wildfire Hazard Area	Percent of Total	Number of Persons Located in the Wildland-Urban Intermix Wildfire Hazard Area	Percent of Total	Estimated Population Located Within the Wildland-Urban Interface/Intermix Wildfire Fuel Hazard Area	
						TOTAL Number of People (Interface and Intermix)	Percent of Total
Blooming Grove Township	4,645	1,636	35.2%	2,393	51.5%	4,030	86.7%
Delaware Township	7,063	2,637	37.3%	3,859	54.6%	6,496	92.0%
Dingman Township	11,619	2,756	23.7%	8,064	69.4%	10,820	93.1%
Greene Township	3,825	763	20.0%	2,522	65.9%	3,286	85.9%
Lackawaxen Township	5,020	688	13.7%	3,998	79.6%	4,686	93.3%
Lehman Township	10,183	3,385	33.2%	6,376	62.6%	9,761	95.9%
Matamoras Borough	2,336	2,208	94.5%	126	5.4%	2,334	99.9%
Milford Borough	1,172	1,155	98.5%	0	0.0%	1,155	98.5%
Milford Township	1,329	289	21.7%	916	68.9%	1,205	90.7%
Palmyra Township	3,215	920	28.6%	1,897	59.0%	2,817	87.6%
Porter Township	400	54	13.6%	172	42.9%	226	56.5%
Shohola Township	2,133	743	34.8%	1,168	54.7%	1,911	89.6%
Westfall Township	2,513	1,251	49.8%	1,060	42.2%	2,311	92.0%
Pike County (Total)	55,453	18,486	33.3%	32,550	58.7%	51,036	92.0%

Source: U.S. Census 2010, Stewart and Radeloff 2012

Notes: The 2020 Census was not available during the planning process; therefore, the 2019 American Community Survey was used for the total population.

WUI Wildland-Urban Interface



Impact on General Building Stock

The most vulnerable structures to wildfire events are those within the WUI. 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 WUI was overlaid on the default building inventory in Hazards U.S. – Multi-Hazard (HAZUS-MH) to estimate the replacement cost of buildings and on the County provided spatial layer of buildings to estimate number of structures exposed to the wildfire hazard in Pike County. The replacement cost value (RCV) of the census blocks with their center in the WUI was totaled. Table 4.3.19-6 summarizes the estimated building stock inventory exposed by municipality.

Table 4.3.19-6. Building Stock Replacement Value and Structures Located within the WUI in Pike County

Municipality	Total GBS RCV	Estimated GBS RCV Exposed	Percent of Total	Total Number of Structures	Number of Structures in Hazard Area	Percent of Total
Blooming Grove Township	\$1,160,095,000	\$952,006,000	82.1%	3,998	3,343	83.6%
Delaware Township	\$1,496,677,000	\$1,370,343,000	91.6%	4,253	3,895	91.6%
Dingman Township	\$1,984,820,000	\$1,837,445,000	92.6%	5,480	4,997	91.2%
Greene Township	\$956,640,000	\$795,710,000	83.2%	3,275	2,929	89.4%
Lackawaxen Township	\$1,231,170,000	\$1,117,412,000	90.8%	4,562	4,069	89.2%
Lehman Township	\$1,992,003,000	\$1,887,895,000	94.8%	5,995	5,775	96.3%
Matamoras Borough	\$377,318,000	\$377,318,000	100.0%	972	972	100.0%
Milford Borough	\$413,430,000	\$357,170,000	86.4%	718	670	93.3%
Milford Township	\$670,787,000	\$336,893,000	50.2%	784	609	77.7%
Palmyra Township	\$1,244,483,000	\$1,155,235,000	92.8%	3,981	3,700	92.9%
Porter Township	\$388,599,000	\$252,871,000	65.1%	912	583	63.9%
Shohola Township	\$759,299,000	\$680,794,000	89.7%	2,311	2,101	90.9%
Westfall Township	\$383,781,000	\$295,530,000	77.0%	1,175	977	83.1%
Pike County (Total)	\$13,059,102,000	\$11,416,622,000	87.4%	38,416	34,620	90.1%

Source: HAZUS-MH v3.1; Stewart and Radeloff 2012

Notes:

GBS General Building Stock

RCV Replacement cost value

WUI Wildland-Urban Interface

Impact on Critical Facilities

A number of critical facilities are located in the wildfire hazard area. Many of these facilities are the locations for vulnerable populations (schools) and responding agencies to wildfire events (fire and police). Table 4.3.19-7 summarizes the number of critical facilities identified by the County plan participants that are located within the Wildland-Urban Interface Wildfire Hazard Area. Table 4.3.19-8 summarizes the number of critical facilities located within the Wildland-Urban Intermix Wildfire Hazard Area. Table 4.3.19-9 summarizes the number of critical facilities located in the Wildland-Urban Intermix Hazard Area. Table 4.3.19-9 summarizes the number of lifeline facilities located in the Wildland-Urban Interface and Intermix Hazard Areas.



Table 4.3.19-7. Number of Critical Facilities in the Wildland-Urban Interface Wildfire Hazard Area in Pike County

Municipality	Number of Critical Facilities Located in the Wildland-Urban Interface Wildfire Hazard Area										
	Cell Tower	Central Water Facility	Day Care	Fire	Medical	Municipal Building	Nursing Home	Police	School	Shelter	Wastewater
Blooming Grove Township	0	0	0	1	0	0	0	0	0	0	0
Delaware Township	0	0	2	0	1	0	0	0	0	0	0
Dingman Township	0	0	2	0	0	0	0	0	0	0	0
Greene Township	0	0	0	0	0	0	0	0	0	0	0
Lackawaxen Township	0	0	0	1	0	0	0	0	0	1	0
Lehman Township	0	1	1	0	0	0	0	0	0	0	0
Matamoras Borough	0	1	2	0	0	1	0	1	0	1	0
Milford Borough	0	0	3	1	0	1	0	1	0	0	0
Milford Township	0	0	0	0	0	1	0	0	0	0	0
Palmyra Township	1	0	0	1	0	0	0	0	0	0	0
Porter Township	0	0	0	0	0	0	0	0	0	0	0
Shohola Township	0	0	0	0	0	0	0	0	0	0	0
Westfall Township	1	0	0	1	0	0	4	0	4	3	1
Pike County (Total)	2	2	10	5	1	3	4	2	4	5	1



Table 4.3.19-8. Number of Critical Facilities in the Wildland-Urban Intermix Wildfire Hazard Area in Pike County

Municipality	Number of Critical Facilities Located in the Wildland-Urban Intermix Wildfire Hazard Area											
	Cell Tower	Correctional	County Bldg	Day Care	EMS	EOC	Fire	Medical	Municipal Building	Police	School	Shelter
Blooming Grove Township	3	1	2	0	0	1	1	1	1	1	0	0
Delaware Township	1	0	0	1	1	0	1	0	1	0	0	1
Dingman Township	3	0	0	1	0	0	1	0	0	0	0	1
Greene Township	1	0	0	0	0	0	1	0	1	0	0	1
Lackawaxen Township	1	0	0	0	2	0	3	0	1	0	0	2
Lehman Township	1	0	0	2	0	0	1	0	1	0	0	2
Matamoras Borough	0	0	0	0	0	0	1	0	0	0	1	1
Milford Borough	0	0	0	0	0	0	0	0	0	0	0	0
Milford Township	1	0	0	1	0	0	0	0	0	0	0	1
Palmyra Township	2	0	0	0	0	0	0	0	1	0	3	4
Porter Township	0	0	0	0	0	0	0	0	0	0	0	0
Shohola Township	0	0	1	1	0	0	2	0	1	0	0	0
Westfall Township	0	0	0	0	0	0	0	0	1	0	0	0
Pike County (Total)	13	1	3	6	3	1	11	1	8	1	4	13



Table 4.3.19-9. Number of Lifelines in the Wildland-Urban Intermix Wildfire Hazard Area in Pike County

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	26	2	13
Food, Water, Shelter	28	8	13
Health and Medical	12	5	4
Safety and Security	57	14	29
Pike County (Total)	123	29	59

Source: Stewart and Radeloff 2012; Pike County 2021
WUI Wildland-Urban Interface

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-84, US Routes US-6 and US-209, and multiple State Routes including, PA-434, PA-2001, PA-402, and PA-390 run through WUI areas. This factor should be considered to determine evacuation routes for Pike 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 (Teclé A., Neary D. 2015). Studies show that urban fires, in particular, are more harmful to the environment than forest fires (Radeloff et al., 2018). The age and density of infrastructure within Pike 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.

Future Growth and Development

Areas targeted for potential future growth and development in the next 5 years have been identified across the County at the municipal level. It is anticipated that any new development and new residents in the WUI will be exposed to the wildfire hazard.

Effect of Climate Change on Vulnerability

According to USFS, climate change 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. Climate change 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 interactions is essential for addressing issues associated with climate change 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 high fire risk by 10 to 30-percent. Fire occurrence and area 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 and 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 climate change on the Commonwealth. The June 2009 Pennsylvania Climate Impact Assessment's main findings indicate Pennsylvania may be at increased risk for wildfires, but it is unclear how large the increase in risk will be (Shortle and others 2009).

Future changes in fire frequency and severity are difficult to predict. Global and regional climate changes 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).

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 stated earlier, 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.**



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. Results of the risk assessment 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 – geographic area most affected by the hazard
 - Extent – 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 that are likely to experience a hazard event if it occurs 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 cost that can 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

Pike County assets were identified to assess potential exposure and loss associated with the hazards of concern. For the Hazard Mitigation Plan (HMP) update, Pike County assessed the vulnerability of the following types of assets: population, buildings and 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 2015-2019 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 2010 U.S. Census block** estimates. Borough and township populations were extracted directly from ACS. Population counts at the jurisdictional



level were averaged among the estimated number of residential structures across the 2010 Census Block boundaries in the County. The number of residential structures was adjusted based on the percent of area coverage each block **has within Pike County's jurisdictional boundaries**. The **adjusted number of residential structures** was used to estimate the population at the Census Block level. 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 Pike County included in the risk assessment are children, elderly, and people living in low-income households.

Buildings

The default general building stock in Hazus was used to estimate losses for Pike County's risk assessment. Hazus calculates replacement cost value using 2018 RS Means values based on the specific occupancy classes of structures in the dasymetric blocks within the flood analysis and the census tracts within the earthquake and hurricane wind analyses. Replacement cost value is the current cost of returning an asset to its pre-damaged condition using present-day cost of labor and materials. Total replacement cost value consists of both the structural cost to replace a building and the estimated 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 critical facility inventory, which includes essential facilities, utilities, transportation features, and user-defined facilities as outlined in Section 2, was updated beginning with all GIS data provided by Pike County. To protect individual privacy and the security of assets, information is presented in aggregate, without details about specific individual properties or facilities.

4.4.1.2 Methodology

To address the requirements of the DMA 2000 and better understand potential vulnerability and losses associated with hazards of concern, Pike 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.

1. *Historical Occurrences and Qualitative Analysis – This analysis includes an examination of historical 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 judgment.*
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 located in the impact area of the hazard. The analysis highlights which assets might be affected by the hazard. If the center of each asset is located in the hazard area, it is deemed exposed and potentially vulnerable to the hazard.*



3. Loss estimation – The FEMA Hazus modeling software was used to estimate potential losses for the following hazards: Flood, Earthquake, Hurricane (Wind). In addition, an examination of historical 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
Disease Outbreak	Q	Q	Q	Q
Drought	Q	Q	Q	Q
Drowning	Q	Q	Q	Q
Earthquake	H	H	H	Q
Environmental Hazard Hazardous Materials Release	Q	Q	Q	Q
Extreme Temperature	Q	Q	Q	Q
Flood	E, H	E, H	E, H	E
Hurricane, Tropical Storm, Nor'Easter	E, H	E, H	E, H	Q
Invasive and Nuisance Species	Q	Q	Q	Q
Landslide	E	E	E	Q
Nuclear Incidents	Q	Q	Q	Q
Radon Exposure	Q	Q	Q	Q
Terrorism	Q	Q	Q	Q
Severe Weather	Q	Q	Q	Q
Severe Winter Weather	Q	Q	Q	Q
Transportation Accidents	Q	Q	Q	Q
Urban Fire	Q	Q	Q	Q
Utility Failure	Q	Q	Q	Q
Wildfire	E	E	E	Q

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 for identification of 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 (severe storms) 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 damage reports, 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 Hazus provided 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, 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, probabilistic analyses were performed to develop expected and estimated distribution of losses (mean return period losses) for the flood and wind hazards. The probabilistic model generates estimated damages and losses for specified return periods (e.g., 100- and 500-year). For annualized losses, Hazus calculates the maximum potential annual dollar loss resulting from various return periods averaged on a per year basis. The model sums all Hazus-supplied return periods (e.g., 10, 50, 100, 200, 500) multiplied by the return period probability (as a weighted calculation) to calculate the estimated cost of a hazard each 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-MH Analysis Levels	
Level 1	Hazus-MH provided hazard and inventory data with minimal outside data collection or mapping.
Level 2	Analysis involves augmenting the Hazus-MH 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 and is typically done in conjunction with the use of local data.

Source: FEMA 2019

Quantitative Analyses

Earthquake

To assess the vulnerability of Pike County to earthquakes, a damage analysis was conducted in Hazus. A probabilistic assessment was conducted for Pike County for the 500-year and 2,500-year mean return periods (MRPs) through a Level 2 analysis in Hazus to analyze the earthquake hazard and provide a range of loss estimates. The probabilistic method uses information from historic earthquakes and inferred faults, locations and magnitudes, and computes the probable ground shaking levels that may be experienced during a recurrence period by Census tract.

As noted in the Hazus Earthquake User Manual, “Although the software offers users the opportunity to prepare comprehensive loss estimates, it should be recognized that uncertainties are inherent in any estimation methodology, even with state-of-the-art techniques. Any region or city studied will have an enormous variety of buildings and facilities of different sizes, shapes, and structural systems that have been constructed over a range of years under diverse seismic design codes. There are a variety of components that contribute to transportation and utility system damage estimations. These components can have differing seismic resistance.” However, Hazus’ potential loss estimates are acceptable for the purposes of this HMP.

Groundwater was set at a depth of five (5) feet (default setting). The default assumption is a magnitude 7.0 earthquake for all return periods. Damage estimates were calculated for structural, non-structural, and content losses to the Hazus default aggregate building stock and user-defined critical facilities; structural losses include load carrying components of the structure, and non-structural losses include those to architectural, mechanical, and electrical



components of the structure, such as nonbearing walls, veneer and finishes, HVAC systems, boilers, etc. Although damages are estimated at the Census tract level, results were presented at the municipal level. Since there are multiple Census tracts that contain more than one jurisdiction, an area analysis was conducted to determine the percent coverage each tract has within each jurisdiction. The percentage was multiplied against the results calculated for each tract and summed for each jurisdiction.

Environmental Hazard – Hazardous Material Release

Overall, potential losses from hazardous materials incidents are difficult to quantify due to the many variables and human elements. Data regarding this hazard were obtained from Pike County and the Planning Partnership as well as appropriate state and federal resources.

Flood

The 1-percent and 0.2-percent annual chance flood events were examined to evaluate the county's risk from the flood hazard. These flood events are generally those considered by planners and evaluated under federal programs such as NFIP.

The following data was used to evaluate exposure and determine potential future losses for this plan update:

- The effective Pike County FEMA Digital Flood Insurance Rate Maps (DFIRMs) dated October 2000.
- The 1 percent annual chance flood depth grid generated using the 2000 FEMA DFIRM and Pike County Digital Elevation Model (DEM).

The effective Pike County FEMA DFIRM published in 2000 was used to evaluate exposure and determine potential future losses. The depth grid was integrated into the Hazus riverine flood model used to estimate potential losses for the 1-percent annual chance flood event.

To estimate exposure to the 1-percent and 0.2-percent annual chance flood events, the DFIRM flood boundaries were overlaid on the centroids of updated assets (population and critical facilities). The estimated population located in the flood hazard areas was determined using the percentage area each block has within the flood hazard areas. **This percentage was multiplied against the block's total population to estimate the number of persons within the flood hazard area.** Critical facility centroids that intersected the flood boundaries were totaled to estimate the facilities vulnerable to the flood inundation areas. HAZUS-MH 3.1 was used to develop the depth grid for the 1-percent annual chance flood depth grid using the FEMA DFIRM data and the 1/3 Arc Second elevation model from U.S. Geological Survey (USGS). The depth grid was integrated into HAZUS-MH 3.1 and the model was run to estimate potential losses using the dasymetric census blocks.

Hurricane, Tropical Storm, Nor'Easter

A Hazus probabilistic analysis was performed to analyze the wind hazard losses for Pike County for the 100-year and 500-year mean return period (MRP) events. A HAZUS-MH 3.1 probabilistic analysis was performed for the 100- and 500-year MRP events to analyze the wind hazard losses for Pike County. The probabilistic hurricane hazard contains data on historic hurricane events and wind speeds; the model activates a database of thousands of potential storms with tracks and intensities reflecting the full spectrum of Atlantic hurricanes observed since 1886, and then identifies those storms with tracks associated with the County. It also includes surface roughness and vegetation (tree coverage) maps for the County. Surface roughness and vegetation data support the modeling of wind force across



various types of land surfaces. Default demographic and aggregated building inventory and user defined 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. Since there are multiple Census tracts that contain more than one jurisdiction, an area analysis was conducted to determine the percent coverage each tract has within each jurisdiction. The percentage was multiplied against the results calculated for each tract and summed for each jurisdiction.

Geologic

To assess the vulnerability of Pike County to landslides, an exposure analysis was conducted. The steep slope hazard area was generated for the County where the landscape has a slope greater than 15-percent. This steep slope hazard area was created using the 2014 USGS 1-meter Digital Elevation Model (DEM). The estimated population located in the steep slope hazard area was determined using the percentage area each block has within the steep slope hazard area. This percentage was **multiplied against the block's total population to estimate the number of persons within the steep slope hazard area**. Critical facility centroids that intersected the steep slope boundary were totaled to estimate the facilities vulnerable to steep slope.

Nuclear Incidents

To assess the vulnerability of Pike County to nuclear incidents, an exposure analysis was conducted. The nuclear incident hazard area was generated for the County referencing the area within 50 miles of the Plume Exposure Pathway EPZ and Ingestion Exposure Pathway EPZ. The estimated population within 50 miles of the nuclear incidents hazard area was determined using the percentage area each block has within the nuclear incidents hazard area. This percentage was multiplied against the block's total population to estimate the number of persons within the nuclear incidents hazard area. **Critical facility centroids that are within 50 miles of the nuclear incident's boundaries were totaled to estimate the facilities vulnerable to nuclear incidents.**

Wildfire

The Wildfire-Urban Interface (Interface and Intermix) obtained through the SILVIS Laboratory, Department of Forest Ecology and Management, University of Wisconsin – Madison, was referenced to delineate wildfire hazard areas. The University of Wisconsin – Madison wildland fire hazard areas are based on the 2010 Census and 2006 National Land Cover Dataset and the Protected Areas Database. 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 and critical facilities) presented in the County Profile (Section 2) were used to support an evaluation of assets 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. The estimated population located in the wildland-urban interface and intermix wildfire hazard areas was determined using the **percentage area each block has within each wildfire hazard area. This percentage was multiplied against the block's total population to estimate the number of persons within the wildfire hazard area.** Critical facility centroids that intersected the wildland-urban interface and intermix wildfire boundaries were totaled to estimate the facilities vulnerable to wildfires.



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, a qualitative analysis was conducted for the following hazards using the best available data and professional judgment. Multiple federal, Commonwealth, and academic sources were used to evaluate these hazards:

- Disease Outbreak
- Drought
- Drowning
- Extreme Temperatures
- Invasive and Nuisance Species
- Radon Exposure
- Terrorism
- Severe Weather
- Severe Winter Weather
- Structural Fires
- Transportation Accidents
- Utility Failure

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	2010; 2015-2019	Digital (GIS) format
Critical facilities	Pike Planning Partnership and County Jurisdictions	2021	Digital (GIS) format
Digitized Effective FIRM maps	FEMA	2000	Digital (GIS) format
Digital Elevation Model	USGS	2014	Digital (GIS) format
Road Network	PASDA	2011/2016	Digital (GIS) format
Rail Network	PASDA	2011/2016	Digital (GIS) format
Nuclear Incidents	Pike County	2017	Digital (GIS) format
Wildfire Fuel Hazard	University of Wisconsin	2010	Digital (GIS) format
Landslide (Steep Slope >15% Grade)	Tetra Tech	2021	Digital (GIS) format

4.4.1.3 Limitations

For this risk assessment, the 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, Pike County will collect additional data to 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 utilizing best available data. The county acknowledges significant impacts could 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 industries 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 Pike County were selected and considered in this plan. However, the communities in Pike 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 manage risk effectively and efficiently.

To this end, a relative hazard risk ranking process was conducted for the county using the Risk Factor (RF) methodology identified in Section 5 and Appendix 9 of Pennsylvania Emergency Management Agency's (PEMA) All-Hazard Planning Standard Operating Guide (PEMA 2020). 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

$$\text{RF Value} = [(\text{Probability} \times .30) + (\text{Impact} \times .30) + (\text{Spatial Extent} \times .20) + (\text{Warning Time} \times .10) + (\text{Duration} \times .10)]$$

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. Summary of Risk Factor (RF) Approach

Summary of Risk Factor (RF) Methodology				
Risk Assessment Category	Degree of Risk			Weight Value
	Level	Criteria	Index	
PROBABILITY <i>What is the likelihood of a hazard event occurring in a given year?</i>	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 PROBABILITY	4	
IMPACT <i>In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?</i>	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 <i>How large of an area could be impacted by a hazard event? Are impacts localized or regional?</i>	NEGLECTIBLE	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 <i>Is there usually some lead time associated with the hazard event? Have warning measures been implemented?</i>	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 <i>How long does the hazard event usually last?</i>	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	

Source: PEMA 2020



Table 4.4-5. Risk Ranking for Pike County

Hazard Risk	Hazards	Risk Assessment Category					Risk Factor (RF)
		Probability	Impact	Spatial Extent	Warning Time	Duration	
High	Flood	4	3	3	2	3	3.2
	Severe Weather	4	2	4	3	2	3.1
	Environmental Hazards	4	2	3	4	2	3
	Severe Winter Weather	4	2	4	2	2	3
	Utility	4	2	2	4	4	3
	Extreme Temperatures	3	2	4	2	3	2.8
	Invasive Species	4	1	4	1	4	2.8
	Disease Outbreak	2	3	3	1	4	2.6
	Hurricane/Nor'Easter	3	2	3	1	3	2.5
	Transportation	4	2	1	4	1	2.5
	Drought	2	2	3	1	4	2.3
Moderate	Radon	3	1	3	1	4	2.3
	Drowning	4	1	1	4	1	2.2
	Terrorism	2	1	2	4	4	2.1
	Wildfire	3	1	1	4	3	2.1
	Nuclear Incidents	1	1	3	4	4	2
	Urban Fire	2	2	1	4	2	2
Low	Earthquake	1	1	4	4	1	1.9
	Geologic	2	1	1	4	1	1.6

Based on these results, there are 10 high-risk hazards, 7 moderate-risk hazards, and 2 low-risk hazards in Pike County. Mitigation actions were developed for all high-risk, moderate-risk, and low-risk 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. Mitigation actions related to future public outreach and emergency service activities are identified to address low-risk hazard incidents.

A risk assessment result for the entire county does not mean that each municipality is at the same amount of risk from each hazard. Table 4.4 5 shows the different municipalities in Pike County and the perception of whether their risk is greater than (>), less than (<), or equal to (=) the RF assigned to the county as a whole, based on feedback from county and municipal officials. Municipal officials' responses were then reviewed and updated (as appropriate) by the Planning Team.



Table 4.4-6. Jurisdictional Risk by Municipality

Municipality	Disease Outbreak	Drought	Drowning	Earthquake	Environmental Hazards	Extreme Temperatures	Flood	Geologic	Hurricane, Nor'Easter	Invasive Species	Nuclear Incidents	Radon	Severe Weather	Severe Winter Weather	Terrorism	Transportation	Structural Fire	Utility	Wildfire
	2.6	2.8	2.2	1.9	3	2.8	3.2	1.6	2.2	2.8	2	3.1	3.1	3	2.1	2.5	2	3	2.8
Blooming Grove Township	=	=	=	=	=	=	<	=	=	=	=	=	=	=	<	=	=	=	=
Delaware Township	=	=	>	=	=	=	=	=	=	=	<	=	=	=	<	<	<	=	>
Dingman Township	=	=	=	=	=	=	>	=	<	=	=	=	=	<	=	=	=	<	=
Greene Township	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Lackawaxen Township	=	<	=	=	=	=	=	=	=	=	<	=	=	=	<	=	=	>	=
Lehman Township	=	=	=	=	=	=	=	=	>	=	=	<	=	=	=	=	=	>	<
Matamoras Borough	=	>	>	<	=	=	>	<	>	>	<	<	>	>	<	<	=	>	=
Milford Borough	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Milford Township	=	=	=	=	>	=	<	=	=	=	=	=	=	=	=	=	<	=	=
Palmyra Township	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Porter Township	=	=	<	=	<	=	<	=	=	>	<	=	=	>	<	>	<	=	>
Shohola Township	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Westfall Township	=	=	=	=	=	=	>	=	=	=	=	=	=	=	=	=	=	=	=



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 2019 U.S. Census demographic data, HAZUS v3.1 default building inventory and its associated replacement cost value of the structures and contents, and the comprehensive critical facility inventory update in HAZUS v3.1 were used for Pike 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 v3.1 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-made 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 main indicators of vulnerability change in Pike County.

Although Pike County experienced a 2.0-percent increase in population from 2010 to 2020, as summarized in Section 2, according to the Pennsylvania Population Projections from the Center for Rural Pennsylvania, the population in Pike County is projected to decrease over the coming decades. Unfortunately, the population projections are not available at the municipal-level.

Continued analysis of the age structure in Pike County will provide deeper understanding on future vulnerability to at-risk populations. **Approximately 22.6-percent of Pike County's population is age 65 or older. As these residents continue to age in the County, they may have increased special needs. For example, many residents in this age bracket may be unable to drive; therefore, development of special evacuation plans for them may be necessary. They may 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. Pike County's combined under-5-years-of-age and over-65 populations constitute approximately 25.3-percent of its population.**



Less than 1 percent of Pike County's population lives in "group quarters" - 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 its own emergency plan to account for the unique needs of its residents during a hazard event.

Approximately 3 percent of Pike 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 also face higher vulnerability to hazards because they do not have as easy access to care facilities or response personnel. For instance, the sparsely populated municipalities such as Porter Township face increased vulnerability to winter storms and urban fire and explosion due to isolation, access issues, and longer emergency response times.

The aging housing stock in Pike County is another source of current and future vulnerability in many hazard events. According to the American Community Survey Estimate (2015-2019), there are 38,940 housing units in Pike County, with 2,815 built earlier than 1940 (7.2-percent of the housing units). As discussed throughout the risk assessment (Section 4), Pike County can experience strong gusts of wind during windstorms, tornadoes, hurricane, tropical storms, or Nor'Easters. **The structure of these older houses may be more at risk of destruction under these strong wind conditions.** These structures may 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. In addition, there is a very large number of second homes in Pike County with residential properties vacant for months at a time. This also presents challenges in terms of communication to owners during times of emergency.

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. All 13 municipalities in Pike County have an adopted Subdivision & Land Development Ordinance (SALDO) and 12 of the 13 municipalities have adopted local zoning ordinances. The Pike County Office of Community Planning reviews subdivisions and land developments based upon the municipality's SALDO, zoning regulations, and other land use regulations. Land developments and subdivisions are also reviewed for their consistency with the goals and objectives identified in the County's Comprehensive Plan and also for appropriate 'best management practices'.

Pike County and its municipalities did not identify areas of potential new urban growth. For any areas of potential growth, the County should compare it with identified hazard areas to determine hazard vulnerability.



SECTION 5. CAPABILITY ASSESSMENT

The **capability assessment evaluates Pike County'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.

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 approaches 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 is developed and buildings are constructed.
- **Structure and Infrastructure** – These actions involve modifying existing structures and infrastructure or constructing new structures to reduce hazard vulnerability.
- **Natural Systems Protection** – These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.
- **Education and Awareness** – These are actions taken to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. Education and awareness actions may also include 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 actions related to hazard mitigation and planning. Informational 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 risk in Pike County.

5.1 Update Process Summary

During the plan update process, Pike 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. Completed Capability Assessment Surveys, whether completed by hand, electronically, or filled in working alongside the county Office of Community Planning staff or planning consultant, are provided in Appendix D.

Pike 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 Pike County municipalities.

This section describes and summarizes the federal, state, county, and local capabilities to address hazard risk in Pike 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 Pike County's municipalities have a direct effect on establishing new capability functions in the community or strengthening existing capabilities.

Pike County and all municipalities updated and completed the Capability Assessment Survey (Appendix D). Based on the capability assessment results and information from the Pike County Office of Community Planning, all of Pike County's jurisdictions have local land use controls. In the past, to address previous growth pressures, the municipalities took a more pro-active role in updating their comprehensive plans and land use ordinances. However, some of these have not been updated recently. When updating their ordinances, local governments can go farther to use land use regulations to direct development away from hazard-prone areas, including utilizing the HMP update as part of that process. The updated mitigation strategy reflects new county and municipal-level actions to integrate the HMP into future plan updates and to strengthen local ordinances.

All municipalities participate in the National Flood Insurance Program (NFIP) however, no communities in Pike County participate in the Community Rating System (CRS). All municipalities in the County have been designated as floodprone. Community participation in CRS can provide premium reductions for properties located outside of Special Flood Hazard Areas of up to 10 percent and reductions for properties located in Special Flood Hazard Areas of up to 45 percent. These discounts can be obtained by undertaking public information, mapping and regulations, flood damage reduction and flood preparedness activities (FEMA 2021).



Numerous roads and intersections exist in the County where flooding issues repeatedly occur. Some of these roads and intersections are state routes. The County and local municipalities face challenges in mitigating flood events on state routes because these roads are owned and maintained by the Commonwealth of Pennsylvania. Local municipalities do not have the authority to independently carry out a mitigation project to directly address these problems. In these situations, the Pennsylvania Department of Transportation must decide to undertake the project. Since the Pennsylvania Department of Transportation is often most concerned with larger, critical transportation routes, smaller state roads and intersections which significantly affect a local community may not get the attention they need for the Commonwealth to take on as a mitigation project.

Finally, limited funding is a critical barrier to the implementation of hazard mitigation activities in Pike County. The County will need to rely on regional, state, and federal partnerships for financial assistance. Pike 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. These Series can be found on Pennsylvania Department of Community and Economic Development Library under Local Government – Handbooks and Guides – Community Planning.

For example, the adoption of the National Flood Insurance Program (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.

5.2.1.1 County and Municipal Planning Capabilities

Pike County Planning Commission

Created by resolution of the Pike County Board of Commissioners in August 1965, the Pike County Planning Commission has served as an Advisory Board to the Pike County Board of Commissioners on matters of future growth and development over its 45-year history. Many of the Planning Commission's efforts focus on aiding the County's 13 municipalities. The following duties summarize the functions and activities of the Planning Commission in Pike County:



- To provide for the active participation of all local governments and public and private agencies in a review of the needs, requirements, and goals of the County
- To establish a continuing program of public education aimed at creating an awareness and understanding among the people of the County of their common interest in the sound development of the county as a whole.
- To undertake research and surveys of existing conditions and future prospects of the physical, economic, social, and governmental resources of the County.
- To prepare and keep updated a long range comprehensive plan of development that will provide for the best future growth of the County in terms of its specific needs, requirements and goals; present the Comprehensive Plan for the consideration of the governing body; and promote public interest in, and the understanding of, the comprehensive plan and planning.
- To assist local planning agencies by providing information on matters of county and regional significance.
- To provide technical planning assistance to local municipalities.
- To encourage cooperation among local governments and regional authorities and to encourage and assist with the development of multi-municipal planning efforts.

Authorization for the establishment of a Planning Commission is set forth under Article II, Section 201 of the Pennsylvania Municipalities Planning Code, Act 247, as enacted and amended. The Pike County Planning Commission, as per the Municipalities Planning Code (MPC), includes nine members who are residents of the County and provide a broad geographic representation of the county. Members are appointed by the Board of Commissioners for a term of four years.

Pike County Office of Community Planning

Pike County Office of Community Planning is the County department that comprehensively addresses county-wide planning issues and initiatives. The Community Planning Office responsibilities include development, management and implementation of County planning initiatives and coordination and implementation of the Pike County Comprehensive Plan. Other core responsibilities of the Office of Community Planning are to provide professional technical planning assistance to municipal governments in such areas as municipal comprehensive planning, zoning, subdivision, and land development, and to support and help facilitate local municipal and multi-municipal planning initiatives.

The Pike County Office of Community Planning was designated as the official county planning department by Ordinance of the Pike County Board of Commissioners. Authorization for this official designation falls under Section 201 of the PA Municipalities Planning Code (MPC).

In the Commonwealth of Pennsylvania, the State grants the power to govern and regulate local land-use and subdivision to the municipalities. Pike County has 13 municipalities in total, 11 of these are townships and 2 are boroughs. The County acts as an advisor to these municipalities on all submitted subdivision and land development plans.

All 13 municipalities in Pike County have an adopted Subdivision & Land Development Ordinance (SALDO) and 12 of the 13 municipalities have adopted local zoning ordinances. The Pike County Office of Community Planning reviews subdivisions and land developments based upon the municipality's SALDO, zoning regulations, and other



land use regulations. Land developments and subdivisions are also reviewed for their consistency with the goals and objectives identified in the County's Comprehensive Plan and also for appropriate 'best management practices'.

Pike County Conservation District

The Conservation District is a legal subdivision of state government, responsible under state law for conservation work within county boundaries.

Pike County Conservation District was established in 1956 by the County Commissioners to provide for the conservation of soil and water resources and for the control and prevention of soil erosion, thereby to preserve natural resources; assist in the control of floods; prevent impairment of dams and reservoirs; preserve wildlife; preserve the tax base; protect public lands; and protect the health and welfare of the people of Pike County. PA DEP, through the State Conservation Commission, cost shares a portion of the District's operating budget. Pike Conservation District, in turn, administers certain state regulatory and technical programs within the county. The remainder of the District's budget comes from county appropriations, fees, and grants. The District is governed by a Board of volunteer directors who meet monthly to plan programs, guide professional staff, and coordinate efforts of other agencies in providing conservation assistance in Pike County.

The Pike County Conservation District is committed to the long-term protection **and sustainable use of Pike County's** natural resources. We accomplish this through partnership, education, technical assistance, planning, enforcement, and leadership.

Strategic Plan 2020 - In 2019, the Pike County Conservation District surveyed the community asking what natural resource concerns they have and how the District can help address those concerns. The strategic plan identifies priorities, goals, and objectives to address those many concerns. This fluid plan is reviewed on a regular basis by the District Board and staff to provide direction for accomplishing its mission. The following are the critical resource issues that have been identified by Pike County residents during Plan development:

- Surface water quality and quantity
- Safe drinking water
- Soil health
- Lack of understanding of personal role in land use protection
- Conservation of large tract forestland
- Land development pressures
- Communications regarding natural resource issues
- Infrastructure improvements-roads and bridges
- Stormwater management
- Wetlands
- Wastewater management

Pike County Road Task Force

The Pike County Road Task Force (RTF) is organized as an appointed committee by the Commissioners of Pike County, for advice on highway and Bridge matters as they affect Pike County. The Task Force meets monthly to discuss transportation issues and address needs. The RTF is formed for the following purposes:

- To act as a referral group between the Pike County Board Commissioners and the Pennsylvania Department of Transportation for matters relating to highway/bridge needs of Pike County.



- To act as a conduit for citizen and business input, to and from PennDOT, on matters relating to highway/bridge needs and construction projects.
- To monitor, report and advise PennDOT on highway/bridge maintenance and conditions within Pike County.

The Lackawaxen River Conservancy

The Lackawaxen River Conservancy is a cohesive group of local residents who have joined together and are committed to a common purpose. TLRC was formed in summer 2001 by residents living in the Pike County portion of the Lackawaxen River drainage area. The goals of the Conservancy are as follows:

- **Promote community awareness and understanding of the ecological importance of the Lackawaxen River's natural environment.**
- Encourage an enlightened stewardship to preserve, protect, and improve the natural beauty, the healthy ecosystem, and the human quality of life throughout the Lackawaxen River Watershed for today and the future.
- Provide a proactive community voice and actively participate as partners with other organizations, government entities and local residents in regional affairs, legislation, and planning issues that affect the river and the watershed.

Scenic Rural Character Preservation

The Pike County Scenic Rural Character Preservation Program is now in its 16th year of funding. Its mission is to provide for the protection of drinking water; wildlife habitat; preservation of scenic ridges and critical open space; protection of water quality of rivers, lakes and streams; parks and recreational areas; improved county and municipal planning; and related acquisitions of real property or interests therein from willing sellers on a voluntary basis and to provide education, outreach and the provision of funds for such purposes.

In Fall 2006, the Commissioners approved the Municipal Planning Initiatives manual and it was distributed to the thirteen municipalities in the county. The Manual contained the guidelines for Pike County municipalities to access Scenic Rural Character Preservation Program funds for the purposes of "municipal planning." Grant funds under this aspect of the program were provided for municipalities to undertake the development or update of Municipal Comprehensive and/or Open Space Plans or the update of land use ordinances such as Subdivision and Land Development (SALDO), Zoning, Stormwater or Floodplain Ordinances.

With the Municipal Planning Initiatives Manual effectively in use, the Scenic Rural Character Preservation Board created a secondary manual, the Scenic Rural Character Preservation Program Manual, which provides funding guidelines for Conservation Easements and Acquisitions as well as the continuation of the Municipal Planning Initiatives. This Pike County Scenic Rural Character Preservation Program Manual was completed in October 2007.

Pike County Comprehensive Plan

The purpose of the Pike County Comprehensive Plan, last updated in 2006, is to set countywide planning goals and priorities, develop partnerships, and enhance the quality of life for residents in the County. The Comprehensive Plan is a non-regulatory document that provides statistical information and existing conditions to support future goals of a county or municipality. It establishes a vision for future growth and development and provides an implementation strategy to reach that identified vision.



The Pennsylvania Municipalities Planning Code (MPC) (Act 247 of 1968, PL 805 as amended) requires counties to create and adopt a plan and update the plan as needed every ten years. The Pike County Planning Commission and the Pike County Office of Community Planning developed the first plan in 1993 and recently developed and adopted an extensive update to the County's plan in 2006. The plan is prepared with a broad range of subjects including housing, land use, economic development, transportation, infrastructure, community facilities, scenic and natural resources, historical resources, open space, greenways, and trail planning. The MPC also provides an opportunity to be proactive in identifying Conceptual Growth Areas (Chapter 5) and identifying opportunities for Multi-Municipal Partnerships (Chapter 11). This plan provides an invaluable tool for municipal and County officials to guide the overall development of the County. Specific planning goals and recommendations are outlined in Chapter 9 - Actions to Address Major Issues in the County

Many levels of government and numerous agencies are responsible for implementing the recommendations identified in the adopted Comprehensive Plan. Both the Planning Commission and the Office of Community Planning are ultimately responsible for the coordination of the implementation of the plan.

The plan is prepared with a broad range of subjects including housing, land use, economic development, transportation, infrastructure, community facilities, scenic and natural resources, historical resources, open space, greenways, and trail planning. This plan provides an invaluable tool for municipal and county officials to guide the overall development of the County.

The Pike County Open Space, Greenways and Recreation Plan was adopted by the Pike County Board of Commissioners in August 2008 as an official component of the Pike County Comprehensive Plan.

The Pike County 'Planning for the Future' full-color map/brochure describes and depicts the benefits of best planning practices. The project entails educational materials and guides that assist in implementation of the Pike County Comprehensive Plan. The informational project supports the improved ability of municipal governmental in local land use planning; strives to protect the County's natural resources; identifies threats to the Upper Delaware Corridor and the County as a whole in regard to gas drilling operations and assists in enhancing social and economic vitality of the County and the region.

The Pike County Comprehensive Plan was reviewed to ensure the plan goals were considered and aligned with the update of the HMP goals.

The County has posted an RFP for updating the 2006 Comprehensive Plan with responses due February 25, 2022. The County is in transition and has been experiencing commercial growth in addition to infill residential development, **severely impacting the county's limited infrastructure. The county** will update its plan and prepare for the future, addressing infrastructure needs and protecting the natural environment that supports their tourism economy.

Pike County – Growing...Naturally, Open Space Plan - 2008

"Growing...Naturally", the Pike County Open Space, Greenways and Recreation Plan, is a component of the Pike County Comprehensive Plan. It identifies the resources that define Pike County's exceptional quality and unique experiences and recommends strategies for coordinating open space and natural resource protection and facilitating the development of recreational facilities as an integral part of its community and economic development.



“Growing...Naturally” is not a regulatory document and does not have the power of law. Rather, it provides a planning framework for Pike County and its municipalities. “Growing...Naturally” suggests management strategies and policies to protect our natural resources and provide quality recreation opportunities for people who live, work, and visit in Pike County. The plan should serve as a guide to decision making and investment and offer direction to help the County achieve a healthy balance between preservation and development. This Plan should also serve as a reference for the County’s municipalities and a foundation for their own planning initiatives.

Sawkill Creek and Vandermark Creek Watershed – A Rivers Conservation Plan

Pike County was awarded a grant from the Pennsylvania Department of Conservation and Natural Resources (DCNR) to develop a comprehensive management plan for the Sawkill-Vandermark Creeks Watershed. The Sawkill-Vandermark Creeks Watershed is recognized locally and regionally for its important natural, recreational, and economic resources. The purpose of the grant was to work with local residents to **develop a “Rivers Conservation / Watershed Management Plan” by identifying significant natural, recreational and cultural resources; determining the issues, concerns and threats to river/watershed resources and values; and recommending methods to conserve, enhance and restore the watershed’s streams and waterways.**

The headwaters of Sawkill Creek and Vandermark Creek originate north and west of Milford Township, with both streams eventually discharging into the Delaware River. Together, the Sawkill Creek and Vandermark Creeks watersheds span approximately 30 square miles across 5 municipalities (Milford Borough and Dingman, Milford, Shohola, and Westfall Townships) in Pike County, Pennsylvania. **The combined area (referred to here as the “Sawkill-Vandermark Creeks Watershed”) is recognized locally and regionally for its important natural, recreational, and economic resources.** Its varied landscapes include state and federal recreational land, habitat for threatened and endangered plant and animal species and several National Historic Landmarks. A significant portion of the watershed still contains untouched groundwater recharge areas. In addition, the lower reaches of the watershed have been **designated as “Outstanding Basin Waters.”**

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.

Pike County completed Phase I of its Act 167 planning and in 2010 completed Phase II through to a Final Draft of a County-wide Act 167 Plan and a Model Ordinance for Municipalities. Per the Act, once the Act 167 Plan is adopted



by the County and approved by the PA DEP, each municipality must adopt and implement ordinances needed to regulate development in a manner consistent with the Act 167 Plan. The new ordinance then replaces any previously adopted stormwater management ordinances. Four municipalities within the County are current with their (Act 167) Stormwater Management Planning.

Although **Pike's Countywide Stormwater Management Plan and Model Ordinance were drafted in 2010, final adoption** by the County did not take place. While state legislation requires completion and adoption of these Act 167 plans, state support such as personnel to assist municipalities with planning and ordinance implementation and funding for rural communities to implement such ordinances has been very limited or non-existent through the years. In this current climate, Pike County has chosen to put this Act 167 process on hold. Despite this, Pike County and Pike County Conservation District (PCCD) have been using the elements of the drafted Act 167 plan and are working with local communities to provide critical education and outreach on the benefits of stormwater management to flood mitigation, surface and groundwater quality protection and protection of the natural drainage regime of our waterways. PCCD is moving forward on priority watershed planning to focus outreach efforts in problem areas and to work with communities interested in trying to retrofit or address stormwater issues to reduce flooding issues.

Additionally, with the changes in PA Code 25, Chapter 102 Erosion and Sediment Control state regulations in 2010, PCCD works with PADEP to address stormwater management requirements included in most land development projects throughout all municipalities in the County. Although Pike County currently has no MS4s (Municipal Separate Storm Sewer Systems) as classified by EPA and PADEP, PCCD has been in discussion with local entities which may be designated as MS4s in the future to work towards the requirements for public education, participation and mapping of systems.

As noted in the Plan Integration section below, the problem areas and potential solutions to flooding and drainage **issues identified in Pike County's Stormwater Management Plan were considered, and where still appropriate**, were included in this updated mitigation strategy.

Comprehensive Plans, Zoning, and Subdivision Regulations

As noted earlier, Comprehensive Plans promote sound land use and regional cooperation among local governments to address planning issues. These plans serve as the official policy guide for influencing the location, type, and extent of future development by establishing the basis for decision-making and review processes on zoning matters, subdivision and land development, land uses, public facilities, and housing needs over time. County governments are required by law to adopt a comprehensive plan, while local municipalities may do so at their option. Future comprehensive plan updates and improvements will consider 2022 HMP findings. Several municipalities have joined to develop multi-municipal comprehensive planning efforts in the County (e.g., Westfall Township and Matamoras Borough; and Lackawaxen and Shohola Townships). Milford Township will be preparing an update to their comprehensive plan in 2022 as well. All municipal comprehensive plans pre-date the 2013 HMP.

Building codes regulate construction standards for new construction and substantially renovated buildings. Standards can be adopted that require resistant or resilient building design practices to address hazard impacts common to a given community. In 2003, the Commonwealth of Pennsylvania implemented Act 45 of 1999, the Uniform Construction Code (UCC), a comprehensive building code that establishes minimum regulations for most new



construction, including additions and renovations to existing structures. All 13 municipalities in Pike County are required to adhere to the Pennsylvania UCC.

The UCC Administration and Enforcement regulation has adopted the following codes for use throughout the Commonwealth of Pennsylvania, effective 10/1/2018.

International Building Code 2015 (code for all buildings and structures not regulated by the International Residential Code:

- Chapter 1 is not adopted (most of its requirements are incorporated in Chapter 403 of the UCC regulation)
- Chapter 27 (Electrical) requires that all electrical components, equipment and systems in buildings and structures covered by the IBC comply with the requirements of NFPA 70-2014, National Electric Code.
- Chapter 11, International Building Code 2018 Accessibility Requirements
- International Energy Conservation Code 2015
- International Existing Building Code 2015
- International Fire Code 2015
- Adopted only to the extent referenced in Chapter 35 of the International Building Code 2015.
- International Fuel Gas Code 2015
- Any LPG requirements are superseded **by the requirements of Pennsylvania's Propane and Liquefied Petroleum Gas Act** (and regulations)
- International Mechanical Code 2015
- International Performance Code for Buildings and Facilities 2009 (provides alternative compliance approach)
- International Plumbing Code 2015
- International Residential Code 2015 (code for one- and two-family dwellings no more than 3 stories in height)
- International Wildland-Urban Interface Code 2015 (supplementary requirements that may be used to mitigate fire- and life-safety hazards in unique wildland areas)

Through administration of floodplain ordinances, municipalities can ensure that all new construction or substantial improvements to existing structures located in the floodplain are flood-proofed, dry-proofed, or built above anticipated flood elevations. Floodplain ordinances may also prohibit development in certain areas altogether. The NFIP establishes minimum ordinance requirements which must be met for that community to participate in the program. However, a community is permitted and in fact, encouraged, to adopt standards which exceed NFIP requirements. Through participation in the NFIP, all municipalities within the County have floodplain regulations in place.

As noted earlier, SALDOs are intended to regulate the development of housing, commercial, industrial, or other uses, including associated public infrastructure, as land is subdivided into buildable lots for sale or future development. Within these ordinances, guidelines on how land will be divided, the placement and size of roads and the location of infrastructure can reduce exposure of development to hazard events. All jurisdictions within Pike County have adopted and enforce a subdivision and land development ordinance.

Zoning ordinances allow for local communities to regulate the use of land to protect the interested and safety of the general public. Zoning ordinances can be designed to address unique conditions or concerns within a given community. They may be used to create buffers between structures and high-risk areas, limit the type or density of



development and/or require land development to consider specific hazard vulnerabilities. Twelve of the 13 municipalities in Pike County have zoning regulations; Greene Township does not have zoning.

The local Comprehensive Plans were also reviewed to ensure their plan goals were considered and aligned with the update of the HMP goals.

Pike County Emergency Management

The County's Emergency Management Agency and its municipalities have been active in growing their capabilities since the 2013 HMP with a 2014 Continuity of Operations Plan, a 2015 Emergency Operations Plan and becoming a StormReady county in 2016. The Pike County Emergency Management Agency has also assisted Hemlock Farms and Masthope (private developments in Blooming Grove and Lackawaxen Townships, respectively) to become Firewise communities.

The Pike County Office of Emergency Management is dedicated to the development, establishment and maintenance of programs and procedures which will provide for the protection of lives and property of Pike County residents from the effects of natural or man-made disasters which the county is subject to, including floods, major fires, storms, radiological or hazardous material incidents, aircraft accidents, mass casualty incidents and any related function that supports other Pike County First Responders. The Office of Emergency Management is responsible for planning, training, assignment, and coordination of all available resources in an integrated program of mitigation, preparedness, response, and recovery for emergencies of any kind. The agency continues to support private communities with yearly training and all the necessary paperwork to maintain their status. The Office is also responsible for organizing all locally available manpower, supplies, equipment, and services necessary for disaster emergency readiness, response, and recovery.

Emergency Operations Plan (EOP)

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 Emergency Operations Center (EOC).

The Pike County EOP, updated in 2021, is an all-hazards plan that complies with the National Incident Management System and basis for coordinated and effective response to any disaster in Pike County. The EOP is reviewed on an annual basis. The EOP was utilized when updating the HMP; for example, the list of designated shelters was used to assist with updating the critical facility inventory for the HMP risk assessment. The EOP and the HMP are compatible plans in that they both identify known areas of concern and use their resource annexes to mitigate the hazard and associated risk.

The Emergency Management Services Code (PA Title 35) requires that all municipalities in the Commonwealth have a local EOP which is updated every two years. All 13 jurisdictions in the County have a local EOP. The intent of the Pike County EOP update is for all of the municipalities to sign onto the plan. Then they will be responsible for maintaining their individual resource listings and contact information moving forward.



Continuity of Operations Plan

Continuity of Operations Planning is the process of developing advance arrangements and procedures that enable an organization to continue its essential functions despite events that disrupt them. The initial plan was developed in 2014 and is reviewed on a yearly basis. The update process involves using all the County plans such as the County EOP and HMP to ensure best practices are being used and that County entities are still be able operate in a time of emergency. In October 2021, the County updated the COP.

Local Emergency Management Capabilities

Each municipality has a designated local emergency management coordinator who possesses a unique knowledge of the impact hazard events have on their community. A significant amount of information used to develop the HMP update was obtained from the emergency management coordinators, many of whom participated as part of the HMP update as primary points of contact for their municipality.

According to Pennsylvania Title 35 (Emergency Management Services Code), Chapter 7500, the following stipulations apply:

- Each political subdivision of Pennsylvania 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 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 the furnishing of aid and assistance.
- Each local organization of emergency management shall have a coordinator who shall be 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 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 the agency.
 - 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 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.

A summary of existing federal, State, regional, and County programs (regulatory and otherwise) to manage specific hazard risks may be found in the hazard profiles in Section 4.3 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.

5.2.1.2 Participation in the National Flood Insurance Program

According to FEMA's 2002 National Flood Insurance Program (NFIP) program description, the U.S. Congress established the NFIP with the passage of the National Flood Insurance Act of 1968 (FEMA 2002). The NFIP is a federal program 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.

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 to reduce the escalating costs of repairing damage to buildings and their contents caused by floods (FEMA 2002).

All jurisdictions in Pike County participate in the NFIP. **FIRMs for Pike County's municipalities were made effective in October 2000.** All Pike County municipalities have adopted floodplain ordinances and/or provisions within their



zoning ordinance to implement standards consistent with the updated FIRM mapping. However, few of the ordinances go beyond these minimum requirements, and those that do only do so in prohibiting new construction or development in the 1-percent annual chance floodplain (Table 5-1). Flood maps and flood data are accessible to residents at municipal offices, the Pike County Office of Community Planning, and the Pike County Conservation District, and online at msc.fema.gov.

Table 5-1. Results of Analysis of Standards in Municipal Floodplain Ordinances

Jurisdiction	Meets NFIP Standards*	Exceeds NFIP Standards*	Provisions that Exceed NFIP Standards *
Blooming Grove Township	X		
Delaware Township	X		
Dingman Township		X	Prohibit new construction/development in 1-percent annual chance floodplain
Greene Township	X		
Lackawaxen Township	X		
Lehman Township	X		
Matamoras Borough	X		
Milford Borough	X		
Milford Township		X	Prohibit new construction/development in 1-percent annual chance floodplain
Palmyra Township		X	Prohibit new construction/development in 1-percent annual chance floodplain
Porter Township	X		
Shohola Township	X		
Westfall Township	X		

Additional information on the NFIP program and its implementation within Pike County may be found in the flood hazard profile in Section 4.3.7.

5.2.1.3 Community Rating System (CRS)

In the 1990s, the Flood Insurance Administration (FIA) established the Community Rating System (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 above and beyond the minimum required in order to:

- Reduce losses from floods
- Facilitate accurate insurance ratings
- Promote public awareness of the availability of flood insurance

The 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 the CRS, municipalities can leverage greater flood protection while receiving flood insurance discounts. Currently, no municipalities in Pike County participate in the CRS.

There are 10 CRS classes that provide varied 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.

Increased participation will be supported by the county and will be promoted through the local emergency management coordinators, as identified in the updated mitigation strategies.

5.2.1.4 Municipal Capabilities

Participating municipalities in this planning effort were provided with 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 Pike County **municipalities' planning and regulatory capabilities can be found in the municipal survey responses provided in Appendix D.**



Table 5-2. Planning and Regulatory Capability

Jurisdiction	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
Blooming Grove Township	X	X	-	X	X	X	-	X	-	X	X	X	X	X	-	-	-	-	-	-	X	-
Delaware Township	X	X	X	X	X	X	-	X	NA	X	X	X	X	X	X	X	-	X	X	X	X	-
Dingman Township	X	X	-	-	X	X	-	X	-	X	X	X	-	X	-	-	-	-		X	X	-
Greene Township	X	X	-	X	X	X	-	X	-	-	X	X	X	X	-	-	-	-	X	X	-	-
Lackawaxen Township	X	X	X	X	X	X		X	-	X	X	X	X	-	X	X	X	X	X	X	X	-
Lehman Township	X	X	X	X	X	X	-	X	X	X	X	X	X	X	-	-	-	-		X	-	-
Matamoras Borough	X	X	UD	UD	UD	X	-	X	-	X	X	X	X	-	-	-	-	-		X	X	-
Milford Borough	X	X	X	X	X	X	-	X	-	X	X	X	-	-	-	-	-	-	-	X	-	X
Milford Township	X	X	-	-	-	X	-	X	-	X	X	X	X	-	-	-	X	-	X	X	X	X
Palmyra Township	X	X	-	-	-	X	-	X	-	X	X	X	-	X	-	-	-	-	X	X	X	-
Porter Township	X	X	-	X	X	X		X	X	X	X	X	X	X	X	-	-	-	-	X	X	-
Shohola Township	X	X	-	-	-	X	-	X	-	X	X	X	X	X	-	-	-	-	-	X	-	-
Westfall Township	X	X	-	X	-	X	-	X	X	X	X	X	X	X	-	X	-	-	-	X	-	-
Pike County	X	X	X	X	X	-	-	-	-	-	-	X	X	-	X	X	X	X	X	-	-	-

Source: HMP Capability Assessment Surveys, 2021

"X" indicates that the jurisdiction currently has this capability in place.

"UD" indicates this capability is under development.

"-" indicates no capability is currently in place.

A blank space indicates no response was received from the jurisdiction.



"* Milford Borough has a historic preservation ordinance.

COOP Continuity of Operations Plan
EOP Emergency Operations Plan

CRS Community Rating System
NFIP National Flood Insurance Program



5.2.2 Administrative and Technical Capability

Administrative capability is described by an 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 in order to effectively execute mitigation activities. Common examples of skill sets 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, 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, the majority of support agencies and resources have been identified and referenced throughout this plan update.

Pike County and its municipalities have identified specific mitigation initiatives described in Section 6 which will help build and enhance mitigation-related administrative and technical capabilities.

5.2.2.1 Federal and Commonwealth Capabilities

Federal agencies which 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 which can provide technical assistance for mitigation activities include, but are not limited:

- Pennsylvania Department of Community and Economic Development
- Pennsylvania Department of Conservation and Natural Resources
- Pennsylvania Department of Environmental Protection
- Pennsylvania Emergency Management Agency
- Pennsylvania Silver Jackets

The Pennsylvania Silver Jackets Team is an interagency (federal, regional, profession and Commonwealth agencies) team dedicated to working collaboratively with the Commonwealth and appropriate stakeholders in developing and implementing solutions to flood hazards by combining available agency resources, which include funding, programs, and technical expertise. The goal of the Silver Jackets program is to promote interagency collaboration and to



leverage available national, regional, and local resources. The team provides a variety of flood risk management resources available to the public and can found here: <http://www.nab.usace.army.mil/Home/Silver-Jackets/>

5.2.2.2 County Capabilities

Commissioners Office

Under Pennsylvania County Code, the Board of Commissioners is responsible for implementing the County's budget as well as overseeing contracts and expenditures. The Commissioners are the executive governing body for the administration of County programs, personnel, property, and facilities in order to provide the highest level of service to the citizens of the County, while also maintaining vigilance with taxpayer dollars. The three County Commissioners constitute the chief governing body of the County. The Commissioners are vested with the policy-making authority to provide certain local services and facilities on a county-wide basis.

Administrative powers and duties of the County Commissioners encompass registration and elections, assessment of property, human services, veterans' affairs, 911, emergency services, operation of a county prison, personnel management, operation and maintenance of county bridges, appointment of county personnel, and budget and finance management. The commissioners are the sole contractors for the county; as such, they make contracts and purchases for all purposes expressly or implicitly authorized by law. The position of commissioner is a county-wide elected office with a term of four years. The County Commissioners sit jointly as members of the Retirement Board, Salary Board, Board of Assessment and Revision of Taxes, Election Board, and the Prison Board.

Pike County Office of Community Planning

As noted earlier in this section, the Pike County Office of Community Planning comprehensively addresses county-wide planning issues and initiatives. Pike County Office of Community Planning initiatives include:

- Tick Borne Disease Task Force - Pike County Tick Borne Disease Task Force and the Pike County Commissioners have joined forces to help prevent the spread of tick borne diseases. The Task Force will work to educate the public about the prevalence and dangers of tick borne diseases, how to protect yourself from becoming infected, and how to enjoy your time outside. The Pike County Tick Borne Disease Task Force is focused on decreasing the number of tick borne illnesses by building community awareness through education, support, and advocacy.
- Agricultural Land Preservation Program - The purpose of the Pike County Agricultural Land Preservation Program is to protect and promote the continued agricultural use of valuable agricultural lands by acquiring agricultural conservation easements on actively farmed lands within Ag Security Areas (ASA's). The purchase of these easements from willing and interested landowners will provide these landowners with a more viable option for retaining the small farm operations and our local **communities' rural character**.
- Planning Commission - Created by Resolution of the Pike County Board of Commissioners in August 1965, the Pike County Planning Commission has served as an Advisory Board to the Pike County Board of Commissioners on matters of future growth and development over its forty-five year history. Many of the Planning Commission's efforts are focused on providing assistance to the County's thirteen municipalities.



- Scenic Rural Character Preservation – The program's mission is to protect the County's natural resources, preserve sensitive natural areas and critical open space, and provide parks and recreation areas and improving planning efforts at both the County and municipal levels.
- Marcellus Shale Task Force – The task force is a Commissioner-appointed standing committee established in October 2010 to build capacity for addressing current and future issues and opportunities related to Marcellus Shale activity in Pike County. Gas development of the Marcellus and Utica shales are currently on hold in the Delaware River Basin, which includes Pike County, until the Delaware River Basin Commission passes regulations that can responsibly manage water use. Once the DRBC issues these regulations and natural gas development becomes a possibility in Pike County, the Pike County Commissioners want residents and visitors to know that they will make every attempt to balance development with the continued protection and conservation of our exceptional water resources.

5.2.2.3 Municipal Capabilities

Participating municipalities in this planning effort were provided with a capabilities survey. Table 5-3 summarizes the responses of the municipalities and County based on administrative and technical capability. Copies of the individual responses are found in Appendix D.

Table 5-3. Administrative and Technical Capability

Jurisdiction	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 Manager	NFIP Floodplain Administrator	Land surveyors	Scientists or staff familiar with the hazards of the community	Personnel skilled in GIS and/or FEMA's HAZUS program	Grant writers or fiscal staff to handle large/complex grants	Staff with expertise or training in benefit-cost analysis	Other
Blooming Grove Township	X	-	X	X	X	X	X	X	X	X	-
Delaware Township	X	X	X	X	X	-	-	-	-	-	-
Dingman Township	X	X	X	X	X	-	-	-	X	-	-
Greene Township	X	X	X	X	X	-	-	-	-	-	-
Lackawaxen Township	X	X	X	X	X	X	X	X	X	X	-
Lehman Township	X	X	X	X	X	-	X	-	-	X	-
Matamoras Borough			X	X	X	-	-	-	-	-	-
Milford Borough	X	X	X	X	X	-	-	-	-	-	-
Milford Township	X	X	X	X	X	-	-	-	-	-	-
Palmyra Township	X	X	X	X	X	-	-	-	-	-	-
Porter Township	-	-	X	X	X	-	-	-	-	-	-
Shohola Township	X	-	X	X	X	-	-	-	X	-	-



Jurisdiction	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 Manager	NFIP Floodplain Administrator	Land surveyors	Scientists or staff familiar with the hazards of the community	Personnel skilled in GIS and/or FEMA's HAZUS program	Grant writers or fiscal staff to handle large/complex grants	Staff with expertise or training in benefit-cost analysis	Other
Westfall Township	X	X	X	X	X	X	X	X	X	X	-
Pike County	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.

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 through 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.

5.2.3.1 Federal Hazard Mitigation Funding Opportunities

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 that projects to reduce the likely damage from future disasters. Examples of projects include acquisition and demolition of structures in hazard-prone areas, flood proofing, 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 actually damaged by a disaster, and the mitigation measures that provide protection from subsequent events.

Building Resilient Infrastructure and Communities (BRIC) Program

Building Resilient Infrastructure and Communities (BRIC) will support states, local communities, tribes, and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. BRIC is a new FEMA pre-disaster hazard mitigation program that replaces the former Pre-Disaster Mitigation (PDM) program.

The BRIC program guiding principles are supporting communities through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency.

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.

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.

High Hazard Potential Dam (HHPD) Program

Pike County could apply for the FEMA Rehabilitation of HHPD grant program, should any high hazard dams be located within the county. **“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 2020). New guidance for the HHPD grant program was provided in July 2020.**

In order 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 page 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). It is not necessary for an emergency 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 of floodplain easements. The program is designed for installation of recovery measures.

5.2.3.2 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 development, rehabilitation and improvements to 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 Pike 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 money is available locally to implement policies and projects. Financial resources are particularly important if jurisdictions are trying to take advantage of state or federal mitigation grant funding opportunities that require local-match contributions. Based on survey results and municipal feedback, most municipalities within the County perceive fiscal capability to be limited.



Municipalities participating in this planning effort were provided with a capabilities survey. Table 5-4 summarizes the responses of the County and municipalities based on fiscal capabilities. Copies of the individual municipal responses are found in Appendix D.

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.

Community Development Block Grants (CDBG)

The Community Development Block Grant (CDBG) is authorized under Title I of the Housing and Community Development Act of 1974, as amended to meet three national objectives:

- Benefit low- to moderate-income persons.
- Eliminate slums and blight; and
- Meet urgent needs

Pike County is an entitlement community through the Commonwealth of Pennsylvania, Department of Community and Economic Development, and municipalities within the County may apply to the County for eligible programs and 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.

Water/Sewer 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 the related 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. Pike 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

Table 5-4. Fiscal Capabilities

Jurisdiction	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
Blooming Grove Township	-	X	X	-	-	-	-	-	-	-
Delaware Township	X	X	X	-	-	-	-	X	X	-
Dingman Township		X	X	-	-	-	-	X	-	-
Greene Township	X	X	X	-	-	-	-	X	X	-
Lackawaxen Township	X	X	-	-	-	-	-	-	-	-
Lehman Township	X	X	X	-	-	-	-	X	X	-
Matamoras Borough	-	X	X	-	-	-	-	X	X	-



Jurisdiction	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
Milford Borough		X	X							-
Milford Township	-	X	-	-	-	-	-	X	X	-
Palmyra Township	-	X	-	-	-	-	-	-	X	-
Porter Township	-	X	-	-	-	-	-	-	-	-
Shohola Township	-	X	-	-	-	-	X	-	X	-
Westfall Township	NA	X	NA	NA	-	-	-	-	X	-
Pike County	X	X	X	-	-	-	-	X	X	-

Notes:

"X" indicates that the jurisdiction currently has this capability in place.

"-" indicates no capability is currently in place.

DK indicates "don't know."

NA indicates the jurisdiction noted not applicable.

Blank space indicates no response was received from the jurisdiction.

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.

5.2.4.1 Public Information Programs

Flood Maps

Flood maps and flood data, including the most current digital maps for Pike County, are available on FEMA's Map Service Center website as well as at the County's website. County and municipality maps, tax maps, and property assessment records are available at the Assessment Office and the GIS Office and deeds are available at the Register and Recorder Office.



Library Education Tools

Libraries have educational materials, available upon request, which are used at public speaking events or county meetings, when appropriate. Educational materials include 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 DES to local coordinators and elected officials, including Basic Orientation, Duties and Responsibilities of the Local Emergency Management Coordinator (LEMC), and Damage Assessment.

5.2.4.2 County Public Outreach Capabilities

Pike County has many informational resources available to the public. Planning documents, guides, and education and outreach publications discussed previously are available for review by the public on the Pike County Office of Community Planning website: <https://www.pikepa.org/planning.html>. For example, the Pike County Tick Borne Diseases Task Force has brochures, handbooks and fact sheets posted on their website: <https://www.pikepa.org/tick.html>

Pike County Resource Guide

The Pike County Community Resource Guide was originally created in 2013 by the Pike County Community Partnership (PCCP) so that members of our community have easy access to resources they may need to live high quality lives. In 2019 The Pike County Health Department took the print version and transferred it online. With this new online Community Resource Guide users can easily find more information regarding the resources listed by clicking on the links provided.

The PCCP is a collaborative of organizations and community partnerships in Pike County. PCCP strives to achieve the vision of Pike County as a prosperous, welcoming community where all people are valued and have the opportunity to work together to achieve common goals. The Pike County community has a commitment to ensure that its children are prepared for a bright future through strong parental involvement and support. PCCP is also the organizer for the annual Back to School Fair held each year. It can be followed on Facebook to stay up to date.



Pike County Conservation District

The Pike County Conservation District places great emphasis on education and outreach efforts through the following:

- Classroom and community education programs
- Municipal workshops and outreach
- Environmental Education Project grants
- Pike/Wayne Envirothon
- Workshops, technical assistance and outreach to residents and businesses on environmental permitting
- Regular communication with local, state, and federal legislators regarding conservation issues.

The Pike County Conservation District provides outreach on groundwater and surface water quality, quantity, and protection to schools in the county. They have also been requested in the past to provide informational sessions on stormwater management.

In 2016, the Conservation District added an education/outreach coordinator to their staff who provides monthly newsletters, media releases, website updates, and information on social media on water/soil resource protection, stormwater mitigation, flooding, invasive species, etc. The District plans to hold at least three outreach efforts specifically for municipalities in 2017; one of which was held in February. In addition, the Conservation District has developed a user-friendly small projects guide to ensure anyone planning a construction project or any earth disturbance in the County is meeting all regulations.

The Pike County Conservation District works with PA DEP and USDA Natural Resources Conservation Service as well as private landowners on emergency permitting after disasters. The Conservation partnership covers Wayne and Pike County and includes government, non-profit organizations, and others. They meet regularly to coordinate all outreach efforts and have actively pursued topics such as flooding, stormwater control, best management practices, and similar.

Pike County Emergency Management Agency

The Pike County Emergency Management Agency maintains Pike County's StormReady certification. Pike County made the strong commitment to implement measures to save lives and protect property when severe weather strikes. The program helps local leaders and residents better prepare for hazardous weather conditions. The Pike County Emergency Management Agency reaches out to residents to obtain assistance in monitoring the weather. Further, NOAA classes have been hosted by the county agency to teach residents how to properly monitor the weather and become more prepared in the future.

The Pike County Emergency Management Agency assisted Masthope and Hemlock Farms (private developments) to become Firewise communities. They continue to serve as the bridge between the PA Department of Conservation and Natural Resources and both Firewise communities and provide yearly training and assistance with necessary paperwork to Masthope and Hemlock Farms. In addition, the Pike County Emergency Management Agency works with the three school districts to review their emergency action plans and disaster response plans. Further, audits are conducted to ensure adequate backup power and water contingencies are in place so schools may serve as shelters. The agency is also involved in the three schools assisting with the emergency responder clubs and material development for classes.



Pike County Road Task Force

The Pike County Road Task Force continues to coordinate winter operations with State, municipal and school district officials. They meet monthly and include County, municipalities, PennDOT, Conservation District as regular attendees. The task force also has a committee which meets yearly and brings in the school district representatives from throughout the county to prepare and address potential issues related to winter storms.

5.2.4.3 Municipal Public Outreach Capabilities

At the municipal level, education and outreach capabilities vary. Some municipalities have the capability to handle outreach initiatives while others rely on County resources. The following are some examples of public outreach during the planning process:

- July 2021 – the County developed an HMP website (<https://www.pikecountypahmp.com/>) to use as a tool for public outreach and provide updates and meeting information throughout the planning process. The County also deployed a public survey to collect input on hazards in Pike County.
- July 7, 2021 – Pike County Courier posted an article about the HMP update with links to the HMP website.
- July 8, 2021 – Delaware Township posted a link to the HMP website on their Facebook page, inviting residents to go to the website and complete the public survey.
- July 9, 2021 – Wayne Pike News had a write-up on their website about the HMP and inviting residents to participate by attending meetings and completing the public survey.
- July 22, 2021 – PA Environment Digest Blog included a post about the HMP update and invited people to complete the public survey.
- July 23, 2021 – Pike County Emergency Management posted a link to the HMP website on their Facebook page.
- July 23, 2021 – Dingman Township posted on their Facebook page about the HMP update and provided links to **the County's website and the HMP website**.
- July 23, 2021 – Westfall Township posted on their Facebook page about the HMP update and included a link to the HMP website.
- July 26, 2021 – Lackawaxen Township posted on their Facebook page a copy of the press release about the HMP process. They included a link to the HMP website and public survey.
- **In October 2021, the County presented at the municipal supervisor's meeting** to discuss the HMP process and expectations of each participant.

All municipalities have a municipal website. Most municipal websites post local plans and ordinances. Many post hazard information regarding hazard-related topics including, but not limited to, the following: preparedness, fire protection, invasive species, tick-bite prevention, hazardous materials disposal and how to register for the County's Code Red notification system. The local fire departments and local 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.

As noted earlier, watershed associations and other environmental advocacy groups can provide support such as the National Park Service, Lackawaxen River Conservancy, the Twin and Walker Creek Watershed Conservancy, the Twin Lakes Conservancy, the Delaware Highlands Conservancy, the Lake Wallenpaupack Watershed Management District, Pocono Source Water Protection Collaborative and Common Waters. These organizations can assist with education and outreach on important issues. Common Waters is an informal consortium that covers New York, New



Jersey, and Pennsylvania in the Upper Delaware Region. They have conducted education and outreach on forest habitats and the connection to water sources.

Table 5-5 summarizes the responses of the municipalities based on their education and outreach capabilities. Copies of the individual responses are found in Appendix D.

Table 5-5. Education and Outreach Capabilities

Jurisdiction	Firewise 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 non-profit organizations (focused on environmental protection, emergency preparedness, access, and functional needs populations, etc.)	Other (website with mitigation information posted)
Blooming Grove Township	X	-	-	X	.*	X	X
Delaware Township	-	-	X	X	X	X	X
Dingman Township	-	-	X	X	.*		X
Greene Township	-	-	X	-	X	-	-
Lackawaxen Township	X	-	-	X	-	-	X
Lehman Township	-	-	-	X	-	-	X
Matamoras Borough	-	-	X	X	.*	X	X
Milford Borough	-	-	X	X	.*	-	X
Milford Township	-	-	-	X	-	-	X
Palmyra Township	-	-	X	X	X	X	X
Porter Township	-	-	-	X	X	-	X
Shohola Township	-	-	X	X	-	-	X
Westfall Township	-	-	-	X	-	-	X
Pike County	X	X	X	X	X	X	X

Notes:

"X" indicates that the jurisdiction currently has this capability in place.

DK indicates "don't know."

Pike County is recognized by the National Weather Service as a StormReady county inclusive of all municipalities

* No formal partnership but the Borough works well with local businesses.

.-" indicates not is currently in place.

NA indicates the jurisdiction noted not applicable.

5.2.5 Self-Assessment

Through the capability assessment surveys, all participating jurisdictions were further asked to provide a self-assessment of their jurisdiction's capability in the areas of planning and regulatory, administrative, and technical, fiscal, community/political, and community resilience. Respondents evaluated their degree of capability in these areas



as “Limited”, “Moderate,” or “High.” Table 5-6 summarizes the results from municipalities within Pike County that completed capability self-assessment worksheets.

Table 5-6. *Capability Self-Assessment Matrix*

Municipality	Capability Category			
	Planning and Regulatory Capability	Administrative and Technical Capability	Fiscal Capability	Education And Outreach
Blooming Grove Township	High	Moderate	Moderate	Limited
Delaware Township	Moderate	Limited	Moderate	Limited
Dingman Township	High	Moderate	Moderate	Moderate
Greene Township	Limited	Limited	Limited	Limited
Lackawaxen Township	Moderate	Moderate	Moderate	Moderate
Lehman Township	High	High	High	High
Matamoras Borough	Moderate	Moderate	Moderate	Moderate
Milford Borough	Moderate	Moderate	Moderate	Moderate
Milford Township	Moderate	Moderate	Moderate	Moderate
Palmyra Township	Moderate	Moderate	Moderate	Moderate
Porter Township	Limited	Limited	Limited	Limited
Shohola Township	Moderate	Moderate	Moderate	Moderate
Westfall Township	Limited	Limited	Limited	Limited
Pike County	Moderate	Moderate	Moderate	High

Notes:

“-” indicates no capability is currently in place.

Blank space indicates no response was received from the jurisdiction.

Detailed information regarding the municipalities’ capabilities self-assessments can be found in the survey responses provided in Appendix D.

5.2.6 Plan Integration

According to FEMA, plan integration is a process where communities look critically at their existing planning framework and align 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 Pike County there are many existing plans and programs that support hazard risk management, and thus it is critical that this hazard mitigation plan integrate and coordinate with, and complement, those mechanisms.

The intention of the Planning Team and participating jurisdictions is to incorporate mitigation planning as an integral component of daily government operations. Planning Team 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 Planning Team anticipates the following:



- Hazard mitigation planning will be formally recognized as an integral part of overall emergency management efforts.
- Hazard mitigation planning will be formally recognized as an integral part of land use policies and mechanisms.
- The HMP, the county and municipal 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.
- Duplication of effort can be minimized.

As noted in Section 6 of this plan, Pike 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 Pike County HMP was last updated in 2017. 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 comprehensive plans 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. Existing processes and programs through which the HMP should be implemented are described below.

It is the intention of Pike County and all municipalities to continue to incorporate mitigation planning into its planning tools through the HMP update goals, mitigation actions identified in this update, and utilization of the risk assessment results to support hazard awareness and risk management approaches. During the planning process of this HMP update, the Planning Team members discussed how they 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 (Section 8) includes a resolution item stating the intent of the County and local governing body to adopt the Pike County Hazard Mitigation Plan as part of the Pike County Comprehensive Plan.



Plan participants will make every effort to implement the relevant sections and or data contained in the HMP utilizing administrative, budgetary, and regulatory processes as well as partnerships to the maximum extent, as described below.

5.2.6.1 Administrative

Administrative processes include departmental or organizational work plans, policies, or procedural changes that can be addressed by county departments.

The Pike County Emergency Management Agency utilized county and local emergency plans to compile information and update the HMP. For example, the evacuation plan was used to identify shelters for the critical facility inventory. According to the Pike County Emergency Management Director, all County plans are reviewed and updated on an annual basis. The HMP update will be utilized to update County emergency plans in the future.

During the Act 167 planning process in Pike County, Pike County Conservation District staff worked with municipal officials to identify problem areas and types. Eight (8) of the thirteen (13) municipalities in Pike County reported problem areas through a questionnaire distributed during Phase I planning and reviewed during Phase II of the Act 167 planning process. Field reconnaissance of the problem areas completed by the Conservation District staff occurred during Phase II to document existing conditions, assess problem locations, identify the general contributory drainage patterns, and determine watershed divides. As part of the HMP update, municipalities utilized the results of the Act 167 planning process to identify unresolved problem areas and potential mitigation solutions; many of which included roadway flooding and insufficient drainage. Refer to Section 6 (Mitigation Strategy) which outlines the updated mitigation strategy for all plan participants.

The administrative practices described above will continue through the development of subsequent Pike County comprehensive plan updates using the information in this updated HMP. In return, the Pike County comprehensive plan, located on the Pike County Office of Community Planning 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 Pike County.

5.2.6.2 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.

5.2.6.3 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
- 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 floodplain) 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 participation in this program and explore participation in CRS Program.
- Stormwater Management – Continue to implement stormwater management plans and ordinances. Stormwater management plans/ordinances have been developed for nine municipalities with another currently under development.
- HMP Plan Coordination – Prior to formal changes (amendments) to master plans, zoning, ordinances, capital improvement plans, or other mechanisms that control development, all above-mentioned plans must be reviewed to ensure they are consistent with the HMP.

5.2.6.4 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 Community and Economic Development (DCED) PA Small Water and Sewer
 - Pennsylvania Department of Transportation (PennDOT) Pennsylvania Infrastructure Bank
 - Act 13 of Marcellus Shale Legacy Funds – Flood Mitigation Program
 - Growing Greener
- Regional
 - Appalachian Regional Commission
 - Southwestern Pennsylvania 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

5.2.6.5 Partnerships

The following opportunities for partnerships will be encouraged to provide broader support and understanding of hazard mitigation:

Existing Committees and Councils

- Local Government Committees:
 - Pike County Chamber of Commerce (<https://www.pikechamber.com>)
 - The Chamber of the Northern Poconos (<https://northernpoconoschamber.com>)
 - Economic Development Authority (<https://www.pikepa.org>)
 - Agricultural Land Preservation Board (<https://www.pikepa.org>)
 - Planning Commission (<https://www.pikepa.org>)
 - Pike County Road Task Force (<https://www.pikepa.org>)
 - The Preservation Board (<https://www.pikepa.org>)
 - Tick Borne Diseases Task Force (<https://www.pikepa.org>)
 - Pike County Conservation District (<https://pikeconservation.org>)
 - PennState extension (<https://extension.psu.edu/pike-county>)

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)
- Department of Homeland Security (DHS)
- Federal Emergency Management Agency (FEMA)
- National Oceanic and Atmosphere Administration (NOAA)
- National Weather Service (NWS)
- United States Department of Agriculture (USDA)
- United States Department of Transportation (USDOT)
- United States Geological Service (USGS)
- Pennsylvania Department of Transportation (PennDOT)
- Pennsylvania Department of Environmental Protection (PADEP)
- PEMA
- Pennsylvania State Police (PSP)
- American Red Cross



Watershed Associations

- Pike County Conservation District (PCCD) (<https://pikeconservation.org>)

DRAFT



SECTION 6. MITIGATION STRATEGY

This section describes the process by which the Pike 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 Pike County's population, economy, and general building stock.

This section provides a summary of the 2022 HMP update process, outlines the mitigation goals and objectives set forth in the 2022 HMP update, describes the process for identifying and analyzing mitigation techniques, and provides the mitigation action plan.

6.1 Update Process Summary

The goals listed in the Pike 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, Planning Team members were afforded the opportunity to comment on the goals 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 2020), and (2) the Pennsylvania Emergency Management Agency (PEMA) 2020 Hazard Mitigation Planning Standard Operating Guide (SOG) (PEMA 2020). Specific elements employed in this HMP are summarized below:

1. **Review of Existing Mitigation Plan Goals, Objectives, and Mitigation Action Plan:** Existing mitigation goals and the Pike County 2017 HMP mitigation actions were first examined at the Kickoff Meeting and revisited during the Mitigation Solutions Workshop. All these meetings were open to members of the Planning Team and stakeholders. The Steering Committee thoroughly reviewed and updated the mitigation goals utilizing the latest information gathered through the hazard profiles, vulnerability assessments, and the risk assessment; the mitigation goals were also compared to the Commonwealth HMP goals and objectives. The updated goals and new objectives were then presented at the Mitigation Solutions Workshop and Mitigation Strategy Review Meeting for final review and approval. Throughout the planning process, plan participants continued to review and provide progress updates on mitigation actions described in the 2017 HMP.
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 2017 HMP are listed below:

- Goal 1: Provide for properly managed and environmentally sound growth and disaster-resistant development.
- Goal 2: Reduce the potential impact of natural and human made hazards on property.
- Goal 3: Enhance and improve emergency services provided to the growing population of Pike County.
- Goal 4: Reduce vulnerability including loss of life and damage to assets and the environment from natural and human-made hazards.
- Goal 5: Conserve, protect, restore, and enhance existing natural systems and water resources that serve a natural hazard mitigation function.
- Goal 6: Increase awareness, understanding, and preparedness across all sectors by encouraging hazard risk, preparedness, and mitigation related education, training, and outreach activities.

The 2017 HMP mitigation goals were reviewed at the Planning Team Kickoff Meeting conducted on June 28, 2021. Table 6-1 shows the results of the Planning Team review of the 2017 goals.

Table 6-1. Planning Team Evaluation of 2017 HMP Goals

2017 Pike County Hazard Mitigation Plan Goals and Objectives		Evaluation
Goal 1	Provide for properly managed and environmentally sound growth and disaster-resistant development.	Keep as-is; still applies
Objective 1.1	Provide for better stormwater and floodplain management planning and implementation.	Keep as-is; still applies
Objective 1.2	Encourage and facilitate the development or revision of comprehensive plans and zoning/land-use ordinances to consider limiting development in high-hazard areas and reducing its impact.	Keep as-is; still applies
Goal 2	Reduce the potential impact of natural and human made hazards on property.	Keep as-is; still applies
Objective 2.1	Identify and implement cost-effective structural and property protection projects to reduce the impacts from flooding including acquisition, elevation, and relocation projects.	Keep as-is; still applies
Objective 2.2	Ensure that existing drainage systems such as pipes, culverts and channels are adequate and functioning properly.	Keep as-is; still applies
Objective 2.3	Maintain and enhance local regulatory standards with new hazard and risk information including full and effective building code enforcement, floodplain management, land use planning mechanisms and other natural hazard vulnerability-reducing regulations.	Keep as-is; still applies
Goal 3	Enhance and improve emergency services provided to the growing population of Pike County.	Keep as-is; still applies
Objective 3.1	Enhance early notification systems and communication infrastructure to provide residents with adequate warning and information regarding all hazards.	Keep as-is; still applies
Objective 3.2	Ensure continuity of operations and adequate supplies for emergency response services, critical facilities, and infrastructure.	Keep as-is; still applies
Goal 4	Reduce vulnerability including loss of life and damage to assets and the environment from natural and human-made hazards.	Keep as-is; still applies
Objective 4.1	Identify and implement cost-effective mitigation projects to reduce flooding, reduce/eliminate sewage leakage and inflow/infiltration problems.	Keep as-is; still applies
Objective 4.2	Identify and evaluate the need for warning systems and storm shelters.	Keep as-is; still applies
Objective 4.3	Identify and implement initiatives to address existing and/or emerging public health and wellness concerns.	Keep as-is; still applies
Objective 4.4	Increase local government official awareness regarding mitigation funding opportunities to reduce vulnerability.	Keep as-is; still applies
Goal 5	Conserve, protect, restore, and enhance existing natural systems and water resources that serve a natural hazard mitigation function.	Keep as-is; still applies



2017 Pike County Hazard Mitigation Plan Goals and Objectives		Evaluation
Objective 5.1	Provide appropriate safeguards for the preservation of the quality of water resources, stream corridors, watershed areas, and floodplains.	Keep as-is; still applies
Objective 5.2	Ensure and maintain the natural drainage patterns and stream and waterway corridors to the greatest extent practicable to provide for properly functioning systems that assist with the reduction of flooding.	Keep as-is; still applies
Objective 5.3	Increase coordination with owners of upstream water control structures to ensure life and property protection in Pike County.	Keep as-is; still applies
Goal 6	Increase awareness, understanding, and preparedness across all sectors by encouraging hazard risk, preparedness, and mitigation related education, training, and outreach activities.	Keep as-is; still applies
Objective 6.1	Develop partnerships both at the local, state, and federal government level as well as with local business, private communities, civic and volunteer organizations and other appropriate non-traditional partners to continue to develop a County-wide approach to identifying and implementing mitigation actions.	Keep as-is; still applies
Objective 6.2	Develop and distribute public awareness materials about natural hazard risks, preparedness, and mitigation.	Keep as-is; still applies
Goal 7 (New)	New goal	New goal to align with Pike County priorities: <i>Address long-term vulnerabilities from high hazard dams.</i>
Objective 7.1	New objective	New objective to align with Pike County priorities: <i>Ensure dam infrastructure is routinely inspected and maintained.</i>
Objective 7.2	New objective	New objective to align with Pike County priorities: <i>Ensure Emergency Action Plans are developed and updated.</i>
Objective 7.3	New objective	New objective to align with Pike County priorities: <i>Support the identification and access to funding to repair, replace, or decommission dams.</i>

6.1.2 Past Mitigation Action Status and Update of Mitigation Strategies

In the 2017 HMP, Pike County identified 121 actions and initiatives to support an improved understanding of hazard risk and vulnerability, to enhance mitigation capabilities, and to reduce vulnerability of infrastructure. Progress on the 2017 mitigation actions was evaluated during the 2022 update process.

Various representatives of Pike County on the Steering Committee and Planning Team were provided with a Mitigation Review Worksheet identifying all the county and municipal actions and initiatives from the 2017 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.

Feedback compiled from the completed Mitigation Action Plan Review Worksheets is summarized 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 through Table 6-17 (unless otherwise determined by the county to be discontinued).** Actions from the 2017 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

Description	Jurisdiction	Status	Review Comments
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials	Blooming Grove	Continuous	-
Repair and increase the level of protection of Hemlock Dam on Hemlock Lake in Hemlock (increase to protect to the 500-year flood event as per communication from the State).	Blooming Grove	No Progress / Unknown	Township is working on obtaining funding
Madden Road Bridge that crosses York Creek requires work to ensure safety: <ul style="list-style-type: none">• Provide approach guide-rails and transitions• Remove debris and sediment from stream bed• Relocate beaver• Repair two areas of spalling under the bridge at each abutment	Blooming Grove	In Progress / Not Yet Complete	Project is out for bids
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	Blooming Grove	No Progress / Unknown	-
Enhance the capacity of the current stormwater system in the Hemlock Farms Community Association to reduce flooding.	Blooming Grove	Continuous	-
Township building (a designated Red-Cross shelter) needs to be upgraded to include handicap bathrooms, showers, kitchen, technology upgrades to digitize records, and build a separate barn for storage of mechanical equipment and supplies (e.g., cots, blankets, MREs). Purchase additional property to accommodate parking for Township personnel, first-responders reporting to the Volunteer Fire Department next to the Township building (also a designated shelter) and sheltering residents.	Blooming Grove	Completed	-
Identify mechanisms to educate and inform Township residents regarding CodeRED for example newsletters, link of Township website to the County Emergency page, social media, and other methods of public communication.	Blooming Grove	Continuous	Township website and social media
Utilize the Hazard Mitigation Plan (HMP) when updating the Comprehensive Master Plan; consider including hazard identification, hazard zones risk assessment information, and hazard mitigation goals as identified in the HMP.	Blooming Grove	No Progress / Unknown	-
Conduct a feasibility study to size and correctly design a backup-power system for the two buildings at Camp Akenac Recreation Hall and Maintenance building (Township-owned).	Delaware	Completed	Study completed project tabled for further consideration
Identify locations in the Township where emergency sirens should be staged for all hazard emergency notification to residents and responders.	Delaware	In Progress / Not Yet Complete	Population influx changing demographics may increase priority- cost benefit analysis needed



Description	Jurisdiction	Status	Review Comments
Roads used to be interconnected but are no longer due to maintenance and right of ways. Conduct a geospatial study to identify roads that used to be connected that are needed to facilitate emergency service access to communities; and prioritize rehabilitation of these roads.	Delaware	In Progress / Not Yet Complete / Continuous	Subsequent to Severe Winter Weathers Riley/Quinn some alternative access points were re-established. Others still need review
Assess the bridge on Log and Twig Road's current status; determine if bridge can be mitigated to clear dam failure; and determine alternate route for emergency access, rehabilitate the dam headwalls.	Delaware	Completed	Repaired to meet current standards
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials	Delaware	Continuous	Resource allocation from state level for local support during weather events not consistent with change in population of the area
Ensure the continuity of operations at critical facilities. This may include backup power or staging equipment in the Township to respond/recover more quickly.	Delaware	Continuous	Due to limited resources/staffing assessment is done prior to and throughout events to achieve best allocation. Many needs are unmet within existing plans
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	Delaware	Continuous	Included in normal permit or comprehensive planning process where applicable
Tunnel Road height and width restrictions prevent emergency vehicles and plows to utilize the road. This road is also subject to flooding. The elevation of Interstate-84 would alleviate the access issues. Work with PennDOT to address.	Dingman	In Progress / Not Yet Complete	Tunnel to be enlarged during next phase of i-84 reconstruction
Rattlesnake Bridge on Spring Brook Road, a single-lane bridge (County-owned), with weight limit; 50 houses may have limited access to emergency services due to the weight restrictions causing an isolated population. Stormwater runoff on both sides have caused the abutments to the bridge to move on the sandy soils. Work with County Engineering to replace the bridge as a two-lane and realign as needed.	Dingman	In Progress / Not Yet Complete	Design/permit work progressing per County Engineer
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	Dingman	Continuous	-
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials	Dingman	Discontinue	Most other entities have discontinued participation; no longer worthwhile investment of time.
Expand the Dingman Township Volunteer Fire Department which is the Township's designated shelter and EMC office to include showers that are ADA-compliant to take in more people during emergencies.	Dingman	No Progress / Unknown	-
Ensure continuity of operations at Township critical facilities:	Dingman	Completed	-

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Description	Jurisdiction	Status	Review Comments
<ul style="list-style-type: none"> • Township Garage by installing a permanent generator, • Municipal Office generator is old and requires an update; • Fire House may need an upgrade 			
Ensure the continuity of operations at critical facilities in the Township. Purchase and install a generator at the Hemlock Road Church which serves as the Township shelter.	Greene	No Progress / Unknown	-
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials	Greene	No Progress / Unknown	-
Investigate ways to mitigate flooding on Township roadways including Mountain View Road	Greene	No Progress / Unknown	-
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	Greene	No Progress / Unknown	-
Increase the capacity of pipes in the Township to reduce flooding	Greene	No Progress / Unknown	-
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials	Lackawaxen	Continuous	Ongoing capability – Township participates on the task force and attends meetings
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	Lackawaxen	Continuous	Ongoing capability
Stabler Road entrance needs to be widened and engineering design is required to ensure the safety of vehicles. Currently the road is too narrow and requires a 180-degree turn and with growing traffic this is a safety concern. If the road is closed due to downed trees or vehicular accidents, there is no alternate route for emergency services, and this creates an isolated and vulnerable population.	Lackawaxen	Completed	Stabler Road entrance is complete; road is a dead end street Renewable bond with PennDOT – if the road is good in 5 years, then don't need to pay the bond
Improvements to Case Bridge to ensure it can handle flood waters: paving, rails, wing-walls, new bridge span and decking, beams,	Lackawaxen	Completed	-
Ensure the continuity of operations at critical facilities in the Township.	Lackawaxen	Continuous	Ongoing capability
Identify mechanisms to educate and inform Township residents regarding CodeRED for example newsletters, link of Township website to the County Emergency page, social media, and other methods of public communication.	Lackawaxen	Continuous	Ongoing capability – the Township provided outreach to residents to sign up

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Description	Jurisdiction	Status	Review Comments
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials	Lehman	Continuous	-
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	Lehman	No Progress / Unknown	-
Increase the capacity of the existing culverts along Broadhead Road in Lehman Township which regularly floods due to rain events and further harden the road embankments there are vulnerable to landslides.	Lehman	Completed	-
Raspberry Run Road is an emergency route for responders and a secondary route to evacuate camps and three private communities. If Minks Pond Road is not accessible (main road), this road needs to be used and more direct route. The Township would like to have Raspberry Run Road drivable during times of disaster as an emergency access route and requires subsurface stone and tar and chip to keep the road in useable shape.	Lehman	In Progress / Not Yet Complete	DCNR owns to the gate of the Lehman Lake Rod & Gun Club from the Bushkill Falls Road. Lehman Lake owns the rest.
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	Matamoras	Completed	-
Develop a public phone, web, media dialer, email notification system for all hazard communications Borough-wide.	Matamoras	No Progress / Unknown	-
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials	Matamoras	Continuous	-
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials	Milford (B)	Continuous	-
Work with the Pike County Office of Community Planning to map and/or update maps/plans for stormwater conveyance systems including pipe sizes, inlets, outlets, and integrate into GIS system	Milford (B)	Continuous	-
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	Milford (B)	No Progress / Unknown	-
The Borough will continue to monitor and track rain events to determine if the stormwater system capacities are sufficient or if upgrades are needed to handle storm events.	Milford (B)	Continuous	-



Description	Jurisdiction	Status	Review Comments
Work to identify emergency shelters that could be utilized in times of weather event and natural disasters; obtain emergency backup power and supplies if so needed.	Milford (B)	Continuous	-
Identify mechanisms to educate and inform Borough residents regarding hazards events which could potentially impact the health and safety for example newsletters, social media, and other methods of public communication.	Milford (B)	Continuous	-
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials	Milford (Twp)	Continuous	-
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	Milford (Twp)	Continuous	-
Work with the gas company (formerly Columbia Gas) to develop an evacuation plan to address emergencies related to the compressor station or the pipeline itself.	Milford (Twp)	In Progress / Not Yet Complete	-
Purchase a storage unit and shelter supplies including cots, blankets, MREs for the Township municipal hall that serves as a shelter	Milford (Twp)	Discontinued	The Firehouse, located in Milford Borough, serves as a shelter and indications are that the municipal building is inadequate for this use and unnecessary.
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials	Palmyra	Continuous	Maintenance staff attends all meetings related to this. This is an ongoing action that the township does on a day-to-day basis
Township to facilitate outreach to private communities to obtain access rights to connecting roads for emergency services. This would provide increased access to both communities during hazard events such as storms that cause downed trees to provide multiple access points to populations and avoid isolated population. Construct gate with lock for Township and emergency services use only.	Palmyra	Continuous	Ongoing action – the Township is in communication with the communities; many roads are not gated anymore and provide access if needed
Enhance education and awareness to seasonal population (lakeside communities) which increases population by greater than 50% on all hazards including the following: 1- Emergency communication systems (e.g., CodeRED) 2. Invasive species 3. Radon exposure	Palmyra	In Progress / Not Yet Complete	Difficulty reaching out to the part time population
Increase capacity of the existing stormwater system to include the following areas: • Old Route 402 – subject to flooding and erosion • Snow Hill Road • Whittaker Road	Porter	In Progress / Not Yet Complete	-



Description	Jurisdiction	Status	Review Comments
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	Porter	No Progress / Unknown	-
Develop a customized communication plan for Porter Township to convey risk in multiple formats due unique conditions in Porter Township (e.g., poor cell phone coverage, several small private communities and properties without electricity), increase usage of social media, leverage County communication system (CodeRED and reverse 911) and regularly update points of in the Township's Emergency Plan (primary and secondary points of contact) to distribute information.	Porter	In Progress / Not Yet Complete	-
Bushkill Bridge (steel bridge) is Township owned and gets inspected by the County. This bridge gets washed out at both ends and water goes over the bridge deck; major scouring has occurred and damage of guiderails. Ice has also damaged the bridge. Elevate the bridge or investigate other methods to ensure flood waters can pass.	Porter	Continuous	Problems will be picked up with inspections
Ensure continuity of operations at Township critical facilities such as: 1) Township building does not have back-up power 2) Township-designated shelter (General Store - Pickerall Inn) needs to be replaced	Porter	In Progress / Not Yet Complete	-
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials	Porter	In Progress / Not Yet Complete	-
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials	Shohola	Continuous	The Township participates in the task force meetings
Ensure continuity of operations at Township buildings. The Town Barn that houses all equipment and vehicles (dump trucks, snow removal equipment, tractors) is in need of a backup generator to ensure continuity of operations during hazard events.	Shohola	Continuous / Completed	Ongoing capability; the town barn did install a backup generator
Sheltering: During Hurricane Irene, Twin Cedars (senior home) was evacuated to the Fire Department but it is not a suitable shelter; inadequate space; no handicap bathrooms and no shelter supplies. Construct an extension on the Fire Department to become a suitable shelter. Update the Township EOP to have the Township Building be primary shelter. It has larger rooms and handicap-accessible bathrooms. Purchase a storage unit and shelter supplies including cots, blankets, MREs for the Township to access when shelters open.	Shohola	In Progress / Not Yet Complete / continuous	Keep in the plan - Include both fire stations (one station will house the ambulance) – outfit the two stations to be able to be used as shelters – there is already backup power but will need items for accommodations
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	Shohola	Continuous	Ongoing capability that the township will address as needed
Reduce flood impacts to critical facilities and emergency access roads.	Westfall	Continuous	-

SECTION 6: MITIGATION STRATEGY





Description	Jurisdiction	Status	Review Comments
1. Relocate the Township Highway Department 2. Relocate the Eastern Pike Regional Police Department 3. Emergency access road LaBar Lane and Decker Drive. 4. Westfall Township Fire Department			
Conduct a feasibility study to evaluate mitigation alternatives to reduce flood impacts in Westfall Township and Matamoras Borough along the Route 6 corridor.	Westfall	No Progress / Unknown	-
Conduct education and outreach to Township residents regarding the option of purchasing NFIP flood insurance.	Westfall	In Progress / Not Yet Complete	-
The access road (Riverview Terrace) to the Milford Senior Care & Rehabilitation Center, located between Route 6/209 and the Delaware River, floods causing ingress/egress challenges for the vulnerable population. Increase the capacity of the existing concrete pipes and culverts and explore connecting the driveway to the Delaware Valley School next door.	Westfall	In Progress / Not Yet Complete	-
Purchase portable/deployable flood walls to mitigate flooding at the Township Municipal Building and the Westfall Fire Department located in the floodplain.	Westfall	In Progress / Not Yet Complete	-
Westfall Sewage Treatment Plant is located in the floodplain; electrical equipment is high enough but need to explore options to flood-proof the doors.	Westfall	In Progress / Not Yet Complete	-
Install backflow prevention or water-tight door or flap at the southerly side of the pedestrian crossing. The water pressure from the flood water would seal the opening and alleviate flooding in the Township of Matamoras.	Westfall	Discontinued	-
Install backflow prevention valves on remaining pipes to reduce flooding along the Route 209 Commercial Area.	Westfall	No Progress / Unknown	-
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	Westfall	No Progress / Unknown	-
Construct an emergency access road at the end of the cul-de-sac at the end of Mountain Avenue to access I-84 (westbound) to provide increased access/egress in emergencies.	Westfall	No Progress / Unknown	-
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials	Westfall	Continuous	-
Promote or adopt higher regulatory and zoning standards to manage hazard risk; specifically, through updates to the building codes, flood ordinances, and subdivision and	Westfall	No Progress / Unknown	-



Description	Jurisdiction	Status	Review Comments
land development ordinances. Goals of increased standards are to ensure new buildings and infrastructure are discouraged or prohibited in high-hazard areas in their jurisdiction.			
The Bush Kill Creek traverses under Bluestone Boulevard. The channel runs very close to the edge of the road and is eroding the slope. There is debris in the channel backing up. Review the study currently being conducted to determine best mitigation action to implement.	Westfall	No Progress / Unknown	-
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties should be a priority, when applicable.	Pike County	Continuous	-
Work with partner organizations to develop informational releases about hazard mitigation for newspapers, websites, circulars, and property owners' association newsletters and attend Association of Community Associations meetings to discuss hazard mitigation, targeting all residents (full-time, seasonal, renters).	Pike County	Continuous	-
Maintain compliance with and good standing in the NFIP, including adoption and enforcement of floodplain management requirements (e.g., regulating all new and substantially improved construction in special-hazard flood areas), floodplain identification and mapping, and flood insurance outreach to the community. Further meet and/or exceed the minimum NFIP standards and criteria through the following NFIP-related continued compliance actions identified in subsequent initiatives.	Pike County	No Progress / Unknown	-
Promote or adopt higher regulatory and zoning standards to manage hazard risk; specifically, through updates to the building codes, flood ordinances, and subdivision and land development ordinances. Goals of increased standards are to ensure new buildings and infrastructure are discouraged or prohibited in high-hazard areas in their jurisdiction.	Pike County	Continuous	Municipal level
Increase awareness of and participation in FEMA's Community Rating System (CRS) Program.	Pike County	No Progress / Unknown	-
Pike County EMA will work with electric distribution companies to implement an annual tree-trimming program to minimize storm damage.	Pike County	Continuous	Municipal level
Explore the creation of a Pike County Health Department	Pike County	In Progress / Not Yet Complete	Met with Northwell Health
Assess and update emergency operations center equipment to improve communication. Targeted needs include: <ul style="list-style-type: none">• Generators,• Training Apparatus• Communications	Pike County	No Progress / Unknown	-



Description	Jurisdiction	Status	Review Comments
Ensure continuity of operations at critical facilities and infrastructure. Options may include purchase and install generators.	Pike County	Continuous	-
Work with County and power companies to identify roads within the municipality considered “critical;” these would be the first priority for clearing after an event involving downed power lines.	Pike County	Completed	Road priority list
Work with PEMA and PA DEP to obtain an updated list of dams and ownership; work with Silver Jackets to assist private dam owners and the financial hardship of maintenance.	Pike County	In Progress / Not Yet Complete	-
Install dry hydrants	Pike County	In Progress / Not Yet Complete	Municipal level
Identify and monitor transportation routes of hazardous materials. Establish a communication chain between rail and Fire Departments regarding transport of spent fuel rods. Interstate 84 and rail lines	Pike County	Continuous	-
Work with PennDOT to implement transportation upgrades to roads with high flooding vulnerability. Projects could include culvert enhancement, culvert replacement, and road elevation.	Pike County	In Progress / Not Yet Complete	-
Work with PennDOT and the National Park Service to utilize beet juice to supplement brine/salt to treat roads during winter conditions	Pike County	In Progress / Not Yet Complete	-
Purchase Radiac Meters (e.g., UltraRadiac – Personal Radiation Monitor) and thermal detectors for when FD responds to rail incidents	Pike County	No Progress / Unknown	-
Implement debris-flow projects, including slope stabilization, energy dissipation, or vegetative plantings.	Pike County	No Progress / Unknown	-
Implement stormwater management projects to facilitate stormwater flow during Severe Weathers.	Pike County	In Progress / Not Yet Complete	-
Pike County to work with the National Park Service to discuss areas that are in need of stream clearing	Pike County	No Progress / Unknown	-
Continue to use and improve GIS capability to identify and prioritize hazards and critical infrastructure for mitigation, as well as areas targeted for potential new development.	Pike County	No Progress / Unknown	-
Explore development of an outreach effort which includes a model ordinance to require boat washing to prevent the spread of aquatic invasive species	Pike County	No Progress / Unknown	-
Purchase and install boat washing stations to help prevent the spread of aquatic invasive species	Pike County	No Progress / Unknown	-

SECTION 6: MITIGATION STRATEGY





Description	Jurisdiction	Status	Review Comments
Provide training to local NFIP Floodplain Administrators to potentially include Certified Floodplain Manager (CFM) course.	Pike County	No Progress / Unknown	-
Pike County EMA to continue working with Pocono Environmental Education Center and municipalities to participate in Firewise.	Pike County	Continuous	-
Continue groundwater level monitoring through at least 2018 to assess potable groundwater levels providing 10 years of data for drought trigger analysis.	Pike County	In Progress / Not Yet Complete	-
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials	Pike County	Continuous	-
Utilize the County's Marcellus Shale task force to prepare for and educate municipalities about updating ordinances and proper permitting for Marcellus Shale gas wells	Pike County	Discontinue	-
Coordinate with the National Weather Service to hold an educational seminar regarding Severe Weather safety	Pike County	No Progress / Unknown	-
Develop a County Task Force to identify ways to incentivize volunteer fire fighting, address equipment and facility upgrades, provide training opportunities for emergency service providers, and upgrade EMS service in eastern and central areas of Pike County	Pike County	Continuous	County EMS Plan; municipalities meet monthly
Work with watershed associations and municipal officials to coordinate water conservation and sewage management programs in local communities.	Pike County	No Progress / Unknown	-
Work recreation amenities to develop educational materials regarding the risk of drowning to distribute to resorts, hotels, and other vacation areas	Pike County	Continuous	Large visitor population
Pike County to continue working with USDA Natural Resources Conservation Service to design and rehabilitate Kintz Creek Dam.	Pike County	In Progress / Not Yet Complete	-
Pike County EMA to continue to work with the three school districts on the following: 1. Annual review of emergency action plans and disaster response plans 2. Conduct audits and ensure adequate back-power and water contingencies are in place so they may serve as shelters	Pike County	Continuous	-
County to work with municipalities to develop databases to track development in the Special Flood Hazard Area (SFHA).	Pike County	No Progress / Unknown	-
Hold a workshop to educate and train municipalities about annual FEMA funding sources and the grant application process.	Pike County	Continuous / Completed	-



Description	Jurisdiction	Status	Review Comments
Work with Westfall Township, Matamoras Borough and Milford Borough to map stormwater facilities, infrastructure, and conveyance systems including pipe sizes, inlets, outlets, and integrate into GIS system.	Pike County	No Progress / Unknown	-
Conduct education/outreach among local officials as to the benefits of stormwater management, hazard mitigation and implementation of the Phase II Countywide Stormwater Management Plan. (Act 167 Plan)	Pike County	No Progress / Unknown	-
Identify and coordinate with appropriate partners and agencies to arrange for data collection of flood and structure data necessary to perform a level 2 HAZUS analysis for the next hazard mitigation plan update. Building data may be collected as part of reassessment of Pike County properties. (i.e. Building Value, Lowest Floor Elevation, Building Type, Occupancy Type, Foundation Type, Number of Stories and Square Footage).	Pike County	No Progress / Unknown	-
Conduct education and outreach on municipal stormwater systems and potential impact to flooding/water quality.	Pike County	In Progress / Not Yet Complete	-
Participate in emergency planning for applicable hazard and emergency response events. Specific types of planning relevant to the County and its municipalities include EAPs for dams, radiological emergency plans for nuclear incidents, winter preparedness plans, evacuation signage plans, Phase II Act 167 Stormwater Management Plan, and commodity flow studies. Additionally, other plans should be reviewed to ensure coordination with hazard mitigation planning techniques.	Pike County	No Progress / Unknown	-
Pike County Office of Community Planning and applicable municipal offices will review their comprehensive plans to ensure that designated growth areas are not within high-hazard areas identified in the HMP.	Pike County	Continuous	-
Encourage all critical government facilities to have COOP and COG plans and to begin implementing appropriate backup systems.	Pike County	Continuous	-
Hold annual meetings to ensure that mitigation, planning, preparedness, and response personnel are (1) cross-trained in each other's area of expertise, (2) aware of ongoing activities, and (3) fostering increased communication.	Pike County	No Progress / Unknown	-
Hold an education seminar and develop educational materials regarding radon exposure	Pike County	No Progress / Unknown	-
Purchase and install weather station to capture meteorological data and communicate to smart phones to utilize information during response/recovery	Pike County	No Progress / Unknown	-
Pike County EMA to work with PennDOT to purchase and install cameras on I-84 at the Greentown and Milford exits	Pike County	No Progress / Unknown	-

SECTION 6: MITIGATION STRATEGY





6.1.3 Additional Past Mitigation Accomplishments

Pike County and its municipalities have performed ongoing maintenance projects to reduce the impacts of natural hazards. The county has not identified specific mitigation projects or activities that have been completed that were not identified in the previous mitigation strategy in the 2017 HMP.

6.2 Mitigation Goals and Objectives

This section describes the mitigation goals and objectives set forth in the 2022 HMP update.

6.2.1 2022 Mitigation Goals

After reviewing the mitigation goals set forth in 2017 HMP to determine **their continuing applicability to the county's** mitigation needs, the Steering Committee decided to update them. The updated goals were distributed to the Planning Team at the Mitigation Solutions Workshop, wherein the Planning Team reviewed and approved the updated goals for the 2022 HMP. The 2022 HMP goals for Pike County are in line with State 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 2022 Pike County HMP goals are listed below:

1. Goal 1: Provide for properly managed and environmentally sound growth and disaster-resistant development.
2. Goal 2: Reduce the potential impact of natural and human made hazards on property.
3. Goal 3: Enhance and improve emergency services provided to the growing population of Pike County.
4. Goal 4: Protect lives, property, environmental quality, and resources of Pike County from natural and human-made hazards.
5. Goal 5: Conserve, protect, restore, and enhance existing natural systems and water resources that serve a natural hazard mitigation function.
6. Goal 6: Increase awareness, understanding, and preparedness across all sectors by encouraging hazard risk, preparedness, and mitigation related education, training, and outreach activities.
7. Goal 7: Address long-term vulnerabilities from high hazard dams.

6.2.2 2022 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 identifying existing limitations in available data and information. The objectives reviewed and/or identified during the 2017 HMP process were reviewed by the Steering Committee and updated during the June 2021 meeting to reflect changes in County priorities and capabilities since the last plan update. The revised and updated objectives were presented to the Planning Team and finalized at the January 2022 Mitigation Strategy Workshop. Objectives related to each of the goals are listed below and Table 6-2 summarizes the evaluation of all goals and objectives.



Goal 1: Provide for properly managed and environmentally sound growth and disaster-resistant development.

Objective 1.1: Provide for better stormwater and floodplain management planning and implementation

Objective 1.2: Encourage and facilitate the development or revision of comprehensive plans and zoning/land-use ordinances to consider limiting development in high-hazard areas and reducing its impact.

Goal 2: Reduce the potential impact of natural and human made hazards on property.

Objective 2.1: Identify and implement cost-effective structural and property protection projects to reduce the impacts from flooding including acquisition, elevation, and relocation projects.

Objective 2.2: Ensure that existing drainage systems such as pipes, culverts and channels are adequate and functioning properly.

Objective 2.3: Maintain and enhance local regulatory standards with new hazard and risk information including full and effective building code enforcement, floodplain management, land use planning mechanisms and other natural hazard vulnerability-reducing regulations.

Goal 3: Enhance and improve emergency services provided to the growing population of Pike County.

Objective 3.1: Enhance early notification systems and communication infrastructure to provide residents with adequate warning and information regarding all hazards.

Objective 3.2: Ensure continuity of operations and adequate supplies for emergency response services, critical facilities, and infrastructure.

Goal 4: Protect lives, property, environmental quality, and resources of Pike County from natural and human-made hazards.

Objective 4.1: Identify and implement cost-effective mitigation projects to reduce flooding, reduce/eliminate sewage leakage and inflow/infiltration problems.

Objective 4.2: Identify and evaluate the need for warning systems and storm shelters.

Objective 4.3: Identify and implement initiatives to address existing and/or emerging Disease Outbreak and wellness concerns.

Objective 4.4: Increase local government official awareness regarding mitigation funding opportunities to reduce vulnerability.

Goal 5: Conserve, protect, restore, and enhance existing natural systems and water resources that serve a natural hazard mitigation function.

Objective 5.1: Provide appropriate safeguards for the preservation of the quality of water resources, stream corridors, watershed areas, and floodplains.



Objective 5.2: Ensure and maintain the natural drainage patterns and stream and waterway corridors to the greatest extent practicable to provide for properly functioning systems that assist with the reduction of flooding.

Objective 5.3: Increase coordination with owners of upstream water control structures to ensure life and property protection in Pike County.

Goal 6: Increase awareness, understanding, and preparedness across all sectors by encouraging hazard risk, preparedness, and mitigation related education, training, and outreach activities.

Objective 6.1: Develop partnerships both at the local, state, and federal government level as well as with local business, private communities, civic and volunteer organizations and other appropriate non-traditional partners to continue to develop a County-wide approach to identifying and implementing mitigation actions.

Objective 6.2: Develop and distribute public awareness materials about natural hazard risks, preparedness, and mitigation.

Goal 7: Address long-term vulnerabilities from high hazard dams.

Objective 7.1: Ensure dam infrastructure is routinely inspected and maintained.

Objective 7.2: Ensure Emergency Action Plans are developed and updated.

Objective 7.3: Support the identification and access to funding to repair, replace, or decommission dams.

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 the **recent FEMA planning guidance, “Local Mitigation Planning Handbook” (FEMA 2020)**. **Mitigation action types listed in the FEMA guidance include the following:**

1. **Local Plans and Regulations (LPR):** These actions include government authorities, policies, or codes that influence the way land is being developed and buildings are being constructed.
2. **Structure and Infrastructure Projects (SIP):** 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. These actions also involve projects to construct manmade structures to reduce the impact of hazards.
3. **Natural Systems Protection (NSP):** These include actions that minimize damage and losses and preserve or restore the functions of natural systems.
4. **Education and Awareness Programs (EAP):** 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 the National Flood Insurance Program (NFIP) and



Community Rating System (CRS), StormReady (National Oceanic and Atmospheric Administration [NOAA]), and Firewise (National Fire Protection Association [NFPA]) Communities (FEMA 2020).

The participants of the Mitigation Strategy Workshop and the Planning Team identified actions that relate to the categories listed above. Table 6-3 identifies which mitigation action types are applicable for the hazards included in the 2021 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
Disease Outbreak	X	X		X
Drought	X	X	X	X
Drowning	X	X		X
Earthquake	X	X	X	X
Environmental Hazards	X	X	X	X
Extreme Temperatures	X	X		X
Flood	X	X	X	X
Geologic	X	X	X	X
Hurricane/Nor'Easter	X	X	X	X
Invasive Species	X	X	X	X
Nuclear Incidents	X	X		X
Radon	X	X		X
Severe Weather	X	X	X	X
Severe Winter Weather	X	X	X	X
Structural Fire	X	X		X
Terrorism	X	X		X
Transportation	X	X		X
Utility Interruption	X	X	X	X
Wildfire	X	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. The updated action list also includes some actions identified during the 2017 HMP



update that are still relevant or in progress. This section describes 2022 mitigation initiatives, mitigation strategy prioritization and implementation, and prioritization of mitigation actions.

6.4.1 2022 Mitigation Initiatives

Table 6-4 through Table 6-17 summarize 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. Appendix G includes a blank version of the Mitigation Action Worksheet, and Appendix H includes copies of the completed worksheets. Specific mitigation actions were identified to prevent future losses; however, current funding is not identified for all these actions at present. Potential funding sources (Section 5) are indicated to support future implementation. 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 should 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, PEMA, and FEMA as the plan update is implemented.



Table 6-4. Hazard Mitigation Strategy – Pike County

Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
2022-Pike County-001	Support the Mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition to protect them from future damage; repetitive loss and severe repetitive loss properties should be a priority, when applicable.	Existing	Flood	1, 2, 4	County/Municipal Engineering	PEMA and FEMA	High	High	FEMA HMA and local budget (or property owner) for cost share	Ongoing support; Long-term DOF (specific project application and implantation)	High	SIP
2022-Pike County-002	Work with partner organizations to develop informational releases about hazard mitigation for newspapers, websites, circulars, and property owners' association newsletters and attend Association of Community Associations meetings to discuss hazard mitigation, targeting all residents (full-time, seasonal, renters).	Existing	All Hazards	2, 3, 6	Pike County Office of Community Planning	Pike County Emergency Services and Pike County Commissioners	Medium	Low	Local budget; HMA programs with local or County match	OG – DOF	Low	EAP
2022-Pike County-003	Support the compliance with and good standing in the NFIP, including adoption and enforcement of floodplain management requirements (e.g., regulating all new and substantially improved construction in special-hazard flood areas), floodplain identification and mapping, and flood insurance outreach to the community. Further supporting the municipalities in meeting and/or exceeding the minimum NFIP standards and criteria through the following NFIP-related continued compliance actions identified in subsequent initiatives.	New and Existing	Flood	1, 2, 4	NFIP Floodplain Administrators/Municipalities	PEMA, ISO, FEMA	Medium	Low-Medium	Local Budget	Ongoing	High	LPR
2022-Pike County-004	Promote/support the adoption of higher regulatory and zoning standards to manage hazard risk; specifically, through updates to the building codes, flood ordinances, and subdivision and land development ordinances. Goals of increased standards	New	Flood	1, 2, 4	Municipal NFIP FPA	PEMA, Pike County Conservation District, Pike County office of	Medium	Low	Local Budget	Short (DOF)	Medium	LPR



Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	are to ensure new buildings and infrastructure are discouraged or prohibited in high-hazard areas in their jurisdiction.					Community Planning						
2022-Pike County-005	Increase awareness of and participation in FEMA's Community Rating System (CRS) Program.	N/A	Flood	1, 2, 4	Pike County Office of Community Planning	Pike County Conservation District, Pike County EMA	Medium	Medium	Local Budget	Short (DOF)	Medium	LPR
2022-Pike County-006	Pike County EMA will work with electric distribution companies to implement an annual tree-trimming program to minimize storm damage.	New and Existing	Utility Interruption; Hurricane/Nor' Easter, Severe Winter Weather, Severe Weather	1, 2, 4, 5	Pike County EMA	County/Municipal Elected Officials, Electric Companies, Pike County Office of Community Planning	High	Low	Local Budget	Short (DOF)	High	LPR SIP
2022-Pike County-007	Explore the creation of a Pike County Health Department	N/A	Disease Outbreak	3, 4	Pike County Office of Community Planning	Pike County EMA, Pike County Commissioners	High	Low-Medium	Local Budget	Short (DOF)	Medium-High	LPR
2022-Pike County-008	Assess and update the emergency operations center equipment to improve communication. Targeted needs include: Generators, Training Apparatus, Communications, etc.	Existing	All Hazards	3,4	Pike County EMA	PEMA	High	Medium	Local Budget, FEMA HMGP, and PDM	Ongoing	High	EAP SIP
2022-Pike County-009	Ensure continuity of operations at critical facilities and infrastructure. Options may include purchase and install generators.	Existing	All Hazards	All	Municipality, Pike County EMA	Pike County Office of Community Planning	High	Medium-High	Local Budgets, Emergency Management grants as available	Ongoing	High	SIP
2022-Pike County-010	Work with power companies to identify roads within the municipality considered "critical" ; these would be the first priority for clearing after an event involving downed power lines.	Existing	Hurricane/Nor' Easter, Severe Weather, Severe Winter Weather, Flood, Utility Interruption	3,4	Pike County Office of Community Planning	Pike County EMA, Pike County Road Task Force, Municipal Public Works Departments; Local Power Companies	High	Medium	Local Budget	Ongoing	High	SIP



Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
2022-Pike County-011	Work with PEMA and PA DEP to obtain an updated list of dams and ownership; work with Silver Jackets to assist private dam owners with the financial hardship of maintenance.	Existing	Hurricane/Nor Easter, Severe Weather, Severe Winter Weather, Flood	All	Pike County Office of Community Planning	Pike County EMA, Pike County Conservation District	Medium	Medium-Low	Local Budget	Short (DOF)	High	LPR SIP
2022-Pike County-012	Install dry hydrants	New	All	All	Pike County EMA	Municipalities	Medium	Low-Medium	Local Budget	Short (DOF)	High	SIP
2022-Pike County-013	Identify and monitor transportation routes of hazardous materials. Establish a communication chain between rail and Fire Departments regarding transport of spent fuel rods.	Existing	Environmental Hazards	3, 4, 6	Pike County EMA	Municipalities, PennDOT	High	High	Local Budget, Emergency Management grants as available	Ongoing	High	SIP, LPR
2022-Pike County-014	Work with PennDOT to implement transportation upgrades to roads and bridges with high flooding vulnerability. Projects could include bridge/culvert enhancement, bridge/culvert replacement, and road/bridge elevation.	Existing	Flood	1, 2, 3, 4,	Pike County Office of Community Planning	Municipality, PennDOT, Pike County Road Task Force, Pike County Conservation District	High	High	Local Budget; State; FEMA HMA and BRIC	Ongoing	High	SIP
2022-Pike County-015	Work with PennDOT and the National Park Service to utilize beet juice to supplement brine/salt to treat roads during winter conditions.	N/A	Environmental Hazards, Severe Winter Weather	3,4,6	Pike County Office of Community Planning	Pike County Road Task Force, Municipalities, PennDOT, National Park Service	Medium	Medium	Local Budget, State	Long (DOF)	Medium	NSP
2022-Pike County-016	Purchase Radiac Meters (e.g., UltraRadiac – Personal Radiation Monitor) and thermal detectors for when FD responds to rail incidents	Existing	Environmental Hazards	3,4	Pike County EMA	Municipalities	High	High	Local Budget, Emergency Management grants as available	Long (DOF)	Low	SIP
2022-Pike County-017	Implement debris-flow projects, including slope stabilization, energy dissipation, or vegetative planting.	Existing	Geologic, Earthquake, Flooding	1,2,4,5	Pike County Conservation District	Pike County Office of Community Planning, Municipality,	High	High-Medium	Local Budget; FEMA HMA and BRIC	Ongoing	High	NSP SIP



Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
						PennDOT, National Park Service						
2022-Pike County-018	Implement stormwater management projects to facilitate stormwater flow during Severe Weathers.	New	Flood	1,2,4,5	Pike County Conservation District	Pike County Office of Community Planning, Municipalities, PennDOT	High	High	Local Budget; State; FEMA	Ongoing	High	SIP NSP
2022-Pike County-019	Work with National Park Service to discuss areas that are in need of stream clearing.	Existing	Flood	1,2,4,5	Pike County Conservation District	Pike County Office of Community Planning, National Park Service, Municipalities	High	Medium	Local Budget	Ongoing	High	EAP NSP SIP
2022-Pike County-020	Continue to use and improve GIS capability to identify and prioritize hazards and critical infrastructure for mitigation, as well as areas targeted for potential new development.	New and Existing	All	All	Pike County Office of Community Planning	Pike County EMA	High	Medium	Local Budget; Emergency Management grants as available	Ongoing	Medium	EAP LPR
2022-Pike County-021	Explore development of an outreach effort which includes a model ordinance to require boat washing to prevent the spread of aquatic invasive species.	N/A	Invasive Species	5	Pike County Conservation District	Pike County Office of Community Planning, Municipalities	Medium	Medium	Local Budget	Long (DOF)	Low	LPR NSP EAP
2022-Pike County-022	Purchase and install boat washing stations to help prevent the spread of aquatic invasive species.	N/A	Invasive Species	5	Pike County Conservation District	Wallenpaupack Watershed Management District, National Park Service, PA Fish and Boat Commission	Medium	Medium	Local Budget	Long (DOF)	Low	NSP
2022-Pike County-023	Provide training to local NFIP Floodplain Administrators to potentially include Certified Floodplain Manager (CFM) course.	N/A	Flood	2,3,4,6	Pike County Office of Community Planning	Pike County Conservation District	Medium	Low	Local Budget	Short (DOF)	High	LPR EAP
2022-Pike	Pike County EMA to continue working with Pocono Environmental Education Center and	N/A	Wildfire	1,2,4,5	Pike County EMA	-	Medium	Low	Local Budget	Short (DOF)	High	EAP LPR NSP

SECTION 6: MITIGATION STRATEGY





Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
County-024	municipalities to encourage participation in Firewise.											
2022-Pike County-025	Continue groundwater level monitoring through at least 2028 to assess potable groundwater levels providing 20 years of data for drought trigger analysis.	Existing	Drought	1,4,5	Pike County Conservation District	Pike County Office of Community Planning	High	High	Local Budget	Ongoing (DOF)	High	LPR EAP NSP
2022-Pike County-026	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.	N/A	All	All	Pike County Office of Community Planning	Pike County Commissioner, Municipal Elected Officials, School Districts, NEPA Alliance	Medium	Low	Local Budget	Ongoing	High	LPR EAP
2022-Pike County-027	Coordinate with the National Weather Service to hold an educational seminar regarding Severe Weather safety.	N/A	Severe Weather	1,2,5	Pike County EMA	National Weather Service	Medium	Low	Local Budget	Short (DOF)	Medium	EAP
2022-Pike County-028	Develop a County Task Force to identify ways to incentivize volunteer fire fighting, address equipment and facility upgrades, provide training opportunities for emergency service providers, and upgrade EMS service in Pike County.	N/A	All	All	Pike County EMA	Municipalities	Medium	Low	Local Budget	Short (DOF)	High	EAP LPR
2022-Pike County-029	Work with watershed associations and municipal officials to coordinate water conservation and sewage management programs in local communities.	N/A	Drought	1,2,3,4,5,6	Pike County Conservation District	Pike County Office of Community Planning	Medium	Low	Local Budget	Ongoing	Medium	EAP LPR
2022-Pike County-030	Work with recreation amenities to develop educational materials regarding the risk of drowning to distribute to resorts, hotels, and other vacation areas.	Existing	Drowning	3,4	Pike County Office of Community Planning	Pike County EMA, PA Fish & Boat Commission, National Park Service	Medium	Low	Local Budget	Short (DOF)	High	EAP
2022-Pike County-031	Continue working with USDA Natural Resources Conservation Service to design and rehabilitate Kintz Creek Dam.	Existing	Dam Failure, Flood	All	Pike County Office of Community Planning	-	High	High	Federal	Ongoing	Medium	SIP
2022-Pike	Pike County EMA to continue to work with the three school districts on the following: 1.	Existing	All	All	Pike County EMA	School Districts	Medium	Low	Local Budget	Ongoing	High	LPR

SECTION 6: MITIGATION STRATEGY





Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
County-032	Annual review of emergency action plans and disaster response plans. 2. Conduct audits and ensure adequate back-up power and water contingencies are in place so they may serve as shelters											
2022-Pike County-033	County to work with municipalities to develop databases to track development in the Special Flood Hazard Area (SFHA).	New & Existing	Flood, Severe Weather, Hurricane/Nor' Easter	1,2,4,5	Pike County Office of Community Planning	Municipalities	Medium	Low	Local Budget	Long (DOF)	Medium	LPR
2022-Pike County-034	Hold a workshop to educate and train municipalities about annual FEMA funding sources and the grant application process.	N/A	All	All	Pike County Office of Community Planning	-	Medium	Low	Local Budget	Short (DOF)	Medium	EAP
2022-Pike County-035	Work with Westfall Township, Matamoras Borough and Milford Borough to map stormwater facilities, infrastructure, and conveyance systems including pipe sizes, inlets, outlets, and integrate into GIS system.	New & Existing	Flood, Severe Weather, Hurricane/Nor' Easter	1,2,4,5	Pike County Office of Community Planning	Pike County Conservation District, Westfall Township, Matamoras Borough and Milford Borough	Medium	Low	FEMA, PEMA, State, Local Budget	Short (DOF)	High	LPR
2022-Pike County-036	Conduct education/outreach among local officials as to the benefits of stormwater management, hazard mitigation and implementation of the Phase II Countywide Stormwater Management Plan (Act 167 Plan).	N/A	Flood, Severe Weather, Hurricane/Nor' Easter	1,2,3,4,5	Pike County Conservation District	Pike County Office of Community Planning	Medium	Low	Local Budget	Ongoing	Medium	LPR
2022-Pike County-037	Identify and coordinate with appropriate partners and agencies to arrange for data collection of flood and structure data necessary to perform a level 2 HAZUS analysis for the next hazard mitigation plan update. Building data may be collected as part of a reassessment of Pike County flood prone properties. (i.e. Building value, Lowest Floor Elevation, Building Type, Occupancy Type, Foundation Type, Number of Stories, and square Footage).	Existing	All	All	Pike County Office of Community Planning	-	High	High	FEMA PDM	Long (DOF)	Medium	LPR



Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
2022-Pike County-038	Conduct education and outreach on municipal stormwater systems and potential impact to flooding/water quality.	N/A	Flood, Severe Weather, Hurricane/Nor' Easter	1,2,3,4,5	Pike County Conservation District	Pike County Office of Community Planning	Medium	Low	Local Budget	Short (DOF)	Medium	EAP
2022-Pike County-039	Participate in emergency planning for applicable hazard and emergency response events. Specific types of planning relevant to the County and its municipalities include EAP's for dams, radiological emergency plans for nuclear incidents, winter preparedness plans, evacuation signage plans, Phase II Act 167 Stormwater Management Plan, and commodity flow studies. Additionally, other plans should be reviewed to ensure coordination with hazard mitigation planning techniques.	N/A	All	All	Pike County EMA	Municipalities	Medium	Low	Local Budget	Ongoing	Medium	LPR
2022-Pike County-040	Pike County Office of Community Planning and applicable municipal office will review their comprehensive plans to ensure that designated growth areas are not within high-hazard areas identified in the HMP.	New & Existing	All	All	Pike County Office of Community Planning	Municipalities	Medium	Low	Local Budget	Ongoing	Low	LPR
2022-Pike County-041	Encourage all critical government facilities to have COOP and COG plans and to begin implementing appropriate backup systems.	N/A	All	All	Pike County Office of Community Planning	Pike County EMA	Medium	Low	Local Budget	Ongoing	High	LPR
2022-Pike County-042	Hold annual meetings to ensure that mitigation, planning, preparedness, and response personnel are (1) cross-trained in each other's area of expertise , (2) aware of ongoing activities, and (3) fostering increased communication.	N/A	All	All	Pike County EMA	Municipalities	Medium	Low	Local Budget	Ongoing	Medium	LPR
2022-Pike County-043	Hold an education seminar and develop educational materials regarding radon exposure.	N/A	Radon Exposure	3,6	Pike County EMA	-	Medium	Low	Local Budget	Short (DOF)	Medium	LPR



Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
2022-Pike County-044	Purchase and install weather station to capture meteorological data and communicate to smart phones to utilize information during response/recovery.	N/A	All	All	Pike County Office of Community Planning	Pike County Conservation District, Pike County EMA	Medium	Low	National Weather Service, State, Local Budget	Short (DOF)	Medium	LPR
2022-Pike County-045	Work with PennDOT to purchase and install cameras on I-84 at the Greentown and Milford exits.	N/A	All	All	Pike County Office of Community Planning	PennDOT, Pike County EMA, Pike County Road Task Force	High	Medium	State Budget	Short (DOF)	High	LPR
2022-Pike County-046	Work with Milford Township to address several locations of stream bank erosion along Vandermark Creek and Moon Valley Road between Deep Brook Road and Constitution Ave.	Existing	Flood, Severe Weather, Hurricane/Nor' Easter	1,2,3,4,5	Pike County Office of Community Planning	Milford Township, Pike County Conservation District	High	High	FEMA, PEMA, State, Local Budget	Short (DOF)	High	SIP NSP
2022-Pike County-047	Development of source water protection plans throughout the county	New	Drought, Environmental Hazards	1,2,4,5	Pike County Conservation District	Pike County Office of Community Planning	High	High	Local Budget, Grant Funding	Ongoing	High	LPR NSP EAP
2022-Pike County-048	Address the following County owner High Hazard dams: Taylor Pond Dam (PA-446) & Sky View Lake Dam (PA-440). These projects will include dam safety inspections, engineering reports, preliminary engineering, final design, and construction of dam improvements.	Existing	Dam Failure, Flood	1,2,4,5,7	Pike County Office of Community Planning	Pike County Commissioners, Municipalities, Pike County Conservation District	High	High	FEMA, PEMA, Federal, State, Local Budget	Long (DOF)	High	SIP
2022-Pike County-049	Work with Community Associations, Water & Sewer Authorities to develop mapping of areas serviced by community/public water & sewer systems.	Existing	Drought, Utility Interruption	1,2,4,5	Pike County Office of Community Planning	Municipalities, Municipal Authorities, Community Associations	High	Medium	State, Local Budget	Long (DOF)	High	LPR
2022-Pike County-050	Work with municipalities and PennDOT to map/document stormwater flooding events and issues on all publicly owned roads in Pike County.	Existing	Flood, Severe Weather, Hurricane/Nor' Easter	1,2,4,5,6	Pike County Office of Community Planning	Pike County Conservation District, Pike County Road Task Force, Municipalities, PennDOT	High	Medium	FEMA, PEMA, State, Local Budget	Short (DOF)	High	LPR SIP NSP



Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
2022-Pike County-051	Work with utilities, municipalities and PennDOT to implement a (hazardous tree removal/ Day lighting) program on State owned roads in the County.	New	Severe Weather, Hurricane/Nor' Easter, Utility Interruptions	1,2,4,5,6	Pike County Office of Community Planning	Pike County Conservation District, Pike County Road Task Force, Municipalities, PennDOT, Utility Companies	High	High	FEMA, PEMA, State, Private (Utility Companies), Local budget	Short (DOF)	High	LPR SIP NSP

Table 6-5. Hazard Mitigation Strategy – Blooming Grove Township

Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
2022-Blooming Grove Twp-001	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.	Existing	All	All	Township Supervisor	Roadmaster, Pike County Road Task Force	Medium	Low	Local Budget	Short	High	LPR
2022-Blooming Grove Twp -002	Repair and increase the level of protection of Hemlock Dam on Hemlock Lake in Hemlock Farms (increase to protect to the 500-year flood event as per communication from the State).	Existing	Flood, Severe Weather, Nor'easter , Severe Winter	1,2,4,5,7	Hemlock Farms Community Association	Township Supervisors	High	High	Federal, State	Short (DOF)	High	SIP
2022-Blooming Grove Twp -003	Madden Road Bridge that crosses York Creek requires work to ensure safety: Provide approach guide-rails and transitions, Remove debris and sediment from stream bed, Relocate beaver, Repair two areas of spalling at each abutment	Existing	All	All	Township Roadmaster	Township Supervisors, Township Engineer	High	Medium	Federal, State	Ongoing	High	SIP
2022-Blooming Grove Twp -004	Support the mitigation of vulnerable structures via retrofit (e.g elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and	Existing	Flood, Hurricane/Nor'Easter	1,2,4,5	Township Supervisors	Township EMA	High	High	FEMA HMA, PEMA	Short (DOF)	High	SIP



Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	severe repetitive loss properties will be a priority, when applicable.											
2022-Blooming Grove Twp - 005	Enhance the capacity of the current stormwater system in Hemlock Farms Community Association to reduce flooding.	Existing	Flood, Hurricane/Nor'Easter	1,2,4,5	Township Supervisors	Hemlock Farms Community Association	High	High	FEMA HMA, PEMA	Short (DOF)	High	SIP
2022-Blooming Grove Twp - 006	Township building (a Red-Cross shelter) needs technology upgrades to digitize records, upgrades to storage capacity and build a separate barn for storage of mechanical equipment and supplies (e.g. cots, blankets, MREs). The Volunteer Fire Department next to the Township building (also a designated shelter) needs improvements to its property for parking and storage of equipment, renovations to building are needed for sheltering residents.	Existing	All	All	Township Supervisors	-	High	High	FEMA, PEMA, State, Local Budget	Ongoing	High	SIP
2022-Blooming Grove Twp - 007	Identify mechanisms to educate and inform Township residents regarding CodeRED for example newsletters, link of Township website to the County Emergency page, social media, and other methods of public communication.	New & Existing	All	All	Township Supervisors	Township EMA	High	High	Local Budget	Short (DOF)	High	EAP
2022-Blooming Grove Twp - 008	Utilize the Hazard Mitigation Plan (HMP) when updating the comprehensive Master Plan; consider including hazard zones risk assessment information, and hazard mitigation goals as identified in the HMP.	N/A	All	All	Township Supervisors	Contracted Planning Firm	Medium	Low	Local Budget	Short (DOF)	High	LPR



Table 6-6. Hazard Mitigation Strategy – Delaware Township

Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
2022-Delaware Twp-001	Debris Clearing and Bridge repair on waterways throughout the township to prevent ice jams and flooding over roadways; further damage to critical throughways.	Existing	Flood	1,2,4,5	Township Engineering	PEMA, FEMA	High	Medium	FEMA	Ongoing support; Short-Term DOF (Specific project application and implementation)	High	SIP
2022-Delaware Twp-002	Provide enhanced disinfection/decontamination capability for municipal building in consideration of Covid-19	Existing	Disease Outbreak	2,4	Township Engineering	PEMA, FEMA	Medium	Medium	FEMA HMA, Local Budget	Ongoing support; Short-Term DOF (Specific project application and implementation)	Medium	LPR
2022-Delaware Twp-003	Improve cell phone and internet capability and access throughout township to insure critical communications reliability during emergencies. Engage in study with county and providers for expanded improved service; consider study for feasibility of communications infrastructure for the addition of a cell tower or repeater located on township/fire/ems property.	N/A	All Hazards	2,4	Township Engineering	PEMA, FEMA	Medium	Medium	FEMA HMA, Local Budget	Ongoing support; Long-Term DOF (Specific project application and implementation)	Medium	LPR
2022-Delaware Twp-004	Enhance/ develop relationships with private HOA within township to improve response and communication during emergencies by seeking funding and support from county or state level for establishment of CERT and FIREWISE community programs.	N/A	All Hazards	2,3,4,5	Township Planning	PEMA, FEMA	Medium	Low	FEMA HMA, Local Budget	Ongoing support; Long-Term DOF (Specific project application and implementation)	Low	EAP
2022-Delaware Twp-005	Improve emergency services provided to the growing population of Pike County. Would need a study conducted of the population increases of the township and implement better trained and equipped facilities for faster response times.	N/A	All Hazards	2,3,4,5	Township Planning	PEMA, FEMA	High	High	FEMA HMA, Local Budget	Ongoing support; Long-Term DOF (Specific project application and implementation)	High	SIP



Table 6-7. Hazard Mitigation Strategy – Dingman Township

Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
2022-Dingman Twp-001	The Township will develop a tree maintenance program that will include routine inspections of trees located in the municipal right-of-way. During the inspection, the municipality will identify trees that are in need of trimming or removal. Once identified, a schedule of maintenance and/or removal will be developed, and the municipality will begin work. This will help reduce tree damage, road closures, utility outages, and reduce/eliminate damage to structures and infrastructure	Existing	Transportation	2,4	Township Road Department	Township Board	Medium	Medium	Township Budget	Ongoing	Medium	SIP
2022-Dingman Twp-002	The Township will develop and implement a multi-hazard public awareness program that will focus on the Township's high-ranked hazards. Information will be distributed to residents through mailers, social media, and the municipal website.	N/A	All Hazards	All Goals	Township Board	-	Medium	Low	Township Budget	Ongoing	Medium	EAP

Table 6-8. Hazard Mitigation Strategy – Greene Township

Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
2022-Greene Twp-001	Ensure the continuity of operations at critical facilities in the Township. Purchase and install a generator at the Hemlock Road Church which serves as the Township shelter.	Existing	All	All	Emergency Management Coordinator	-	High	Medium	FEMA HMA, Local Match	Short (depends on funding)	High	SIP



Table 6-9. Hazard Mitigation Strategy – Lackawaxen Township

Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
2022-Lackawaxen Twp-001	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.	Existing	All	All	Township Supervisors	Township Roadmaster, Pike County Road Task Force	Medium	Low	Local Budget	Ongoing	Medium	LPR
2022-Lackawaxen Twp-002	Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	Existing	Flood, Hurricane/Nor'Easter	1,2,4,5	Township Supervisors	Township EMA Coordinator	High	High	FEMA HMA	Short (DOF)	High	SIP
2022-Lackawaxen Twp-003	Ensure the continuity of operations at critical facilities in the Township.	Existing	All	All	Township Supervisors	Township EMA Coordinator	High	Medium	Federal, State, Local	Short (DOF)	High	LPR
2022-Lackawaxen Twp-004	Identify mechanisms to educate and inform Township residents regarding CodeRED for example newsletters, link to Township website to the County Emergency page, social media, and other methods of public communication.	N/A	All	All	Township Supervisors	Township EMA Coordinator	Medium	Low	Local Budget	Short	High	EAP

Table 6-10. Hazard Mitigation Strategy – Lehman Township

Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
2022-Lehman Twp-001	Replace existing failing 7' diameter CMP with a 7' diameter aluminized CMP. Remove & resetting existing guiderail. Remove & reconstruct stone headwalls & wingwalls.	Existing	Severe Weather, Severe Winter Weather, Flood		Lehman Township	National Park Service	High	High	Municipal Budget, National Park	Short	High	SIP



Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	Roadway reconstruction. Design life +/- 50-75 years.								Service (Possible)			
2022-Lehman Twp -002	Install two (2) electronic signs at the municipal building, and at the EMS headquarters located on Winona Falls Road. Signs will be used by Lehman Township EMS to relay emergency notifications to the public, including safety messages for the different seasons. Information will continue to be included on the municipality's website and face book page. Information will be included in the municipality's newsletter when published.	New	All	All	Lehman Township	Bushkill Fire Company	Medium	Medium	Municipal Budget	Short	Medium	EAP

Table 6-11. Hazard Mitigation Strategy – Matamoras Borough

Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
2022-Matamoras Borough-001	Enhance public notifications with AM radio station improvements and add web/internet based interactive web-page and social media pages	Existing	All	All	EMA Coordinator	Borough Secretary	Medium	Medium	Municipal Budget	Short	High	EAP
2022-Matamoras Borough-002	Improve public access to borough office and annex. Provide ADA compliant bathroom facilities and 2 nd floor office access for ADA	Existing	All	All	Borough General Government	Borough Secretary	High	High	Municipal Budget	Long	Medium	SIP



Table 6-12. Hazard Mitigation Strategy – Milford Borough

Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
2022-Milford Borough-001	Work with the Pike County Office of Community Planning to map and/or update maps/plans for stormwater conveyance systems including pipe sizes, inlets, outlets, and integrate into GIS system.	Existing	Hurricane/Nor'Easter, Severe Winter Weather	1,2,4,5,6	Borough Council	Pike County Office of Community Planning, Borough Street Department	Medium	Medium-Low	Local	Short	Medium	LPR
2022-Milford Borough-002	The Borough will continue to monitor and track rain events to determine if the stormwater system capacities are sufficient or if upgrades are needed to handle storm events.	Existing	Hurricane/Nor'Easter, Severe Winter Weather	1,2,4,5	Borough Council	Borough Street Department	Medium	Medium	Local	Short	Medium	LPR
2022-Milford Borough-003	Support the mitigation of properties. Conduct outreach to floodprone property owners and provide information on mitigation alternatives. After preferred mitigation measures are identified, collect required property-owner information, and develop a FEMA grant application and BCA to obtain funding to implement acquisition/purchase/moving/elevating residential homes that experience frequent flooding (high risk areas).	Existing	Flood, Hurricane/Nor'Easter, Severe Winter Weather	1,2,4,5,6	Borough Council	-	High	Medium	Local	Short	Medium	SIP
2022-Milford Borough-004	Work to identify emergency shelters that could be utilized in times of weather event and natural disasters; obtain emergency backup power and supplies if so needed.	Existing	All	All	Borough Council	-	High	Low	Local	Short	Medium	SIP
2022-Milford Borough-005	Identify mechanisms to educate and inform Borough residents regarding hazards events which could potentially impact the health and safety for example newsletters, social media, and other methods of public communication.	N/A	All	All	Borough Council	-	Medium	Medium-Low	Local, County, State	Short	High	EAP
2022-Milford Borough-006	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and	N/A	All	All	Borough Council	-	Medium	Low	Local	Short	High	LPR



Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
	coordination of winter operations with school district officials.											

Table 6-13. Hazard Mitigation Strategy – Milford Township

Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
2022-Milford Twp-001	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.	Existing	Severe Winter Weather, Transportation Accidents, Utility Interruptions	1,2,3,4,6	Pike County	Municipalities	Medium	Low	Township, County	Ongoing	Medium	LPR
2022-Milford Twp-002	Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage, repetitive loss and severe repetitive loss properties will be a priority, when applicable.	Existing	Flood, Erosion	1,2,4,5,6	Pike County Planning	Pike County EMA, FEMA, PEMA	High	High	FEMA, PEMA	DOF	Low	SIP
2022-Milford Twp-003	Work with the gas company (formerly Columbia Gas) to develop an evacuation plan to address emergencies related to the compressor station or the pipeline itself.	Existing	Urban Fire & Explosion, Environmental Hazards, Terrorism	2,3,4,6	Milford Township Emergency Manager	Milford Township Planning, Pike EMA	Medium	Low		Ongoing	Medium	LPR
2022-Milford Twp-004	Include risk assessment and hazard mitigation principles into comprehensive planning efforts as Milford Township updates its Comprehensive Plan	New	All	All	Milford Township Planning Commission	Milford Township Board of Supervisors	Medium	Medium	Pike County Scenic Rural Character Preservation Program,	Short	Medium	LPR



Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
									Milford Township			
2022-Milford Twp-005	Develop and implement a multi-hazard public awareness program	N/A	All	All	Milford Township Planning Commission	Milford Township Board of Supervisors; Pike County EMA; Milford Fire Department; Delaware Valley School District	Medium	Low	Milford Township	Ongoing	Low	EAP
2022-Milford Twp-006	Install, re-route, and increase the capacity of storm drainage infrastructure for Vandermark Drive, may require purchase of easement(s) for privately owned land for water retention and drainage	New	Erosion, Flood, Utility Interruptions, Landslides	1,2,4,5	Milford Township	Pike County Conservation District; Pike County Planning	High	High	Milford Township; ARP, Water & Environmental Programs, Emergency Management Performance Grant Program; Flood Mitigation Assistance Program	Short	High	SIP
2022-Milford Twp-007	Work with Pike County Agencies to create a database of vulnerable persons for priority outreach during emergencies that affect their home or property	New	All	All	Milford Township	Pike County Area Agency on Aging; Pike County EMA, Milford Fire Department	Medium	Low	Municipal Budget	Short	Low	EAP
2022-Milford Twp-008	Purchase a UTV for quick access to remote locations	New	Wildfire, Environmental Hazards, Severe	2,3,4	Milford Fire Department	Milford Township, Milford Borough, NPS	Medium	Medium	Municipal Budget	DOF	Medium	NSP

SECTION 6: MITIGATION STRATEGY





Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
2022-Milford Twp-009	Purchase an additional ambulance to ensure continuity of operations and increase capacity	New	Winter Weather Multiple Hazards including Disease Outbreak, Drowning, Transportation Accidents, Urban Fire & Explosion	2,3,4,6	Milford Fire Department	Milford Township, Milford Borough, Pike County EMA	High	High	Local Share Account Program, Milford Borough and Township	Short	Medium	LPR
2022-Milford Twp-010	Work with utilities and property owners to implement a hazardous tree removal program on Township roads.	Existing	Severe Weather, Hurricane/No r'Easter, Flood, Utility Interruptions	1,2,4,5	Milford Township	Pike County Planning, Pike County Conservation District, Pike County Road Task Force, Utility companies	High	High	FEMA, PEMA, State, Private (Utility Companies, property owners), Local budget	DOF, will follow development of the County-wide program	High	LPR, SIP, NSP
2022-Milford Twp-011	Install appropriate infrastructure to protect homes from stream bank erosion along the Vandermark Creek, where previous supports have become less effective over time	New	Severe Weather, Hurricane/No r'Easter, Geologic	1,2,4,5	Pike County Conservation District	Pike County Planning, Milford Township	High	High	FEMA, PEMA, State, Private (property owners)	DOF	Medium	NSP, SIP



Table 6-14. Hazard Mitigation Strategy – Palmyra Township

Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
2022-Palmyra Twp-001	The stormwater systems in the Township are inadequately sized and due to the age of some of the communities, the systems do not have the capacity to carry the stormwater. The Township will perform an assessment of the stormwater system to identify projects to increase the capacity and improve the stormwater systems. Once projects are identified, the Township will seek funding to implement the projects.	New and Existing	Severe Weather, Flood, Geologic	All	Public Works	Township Board	Medium to High	Medium to High	EPA Section 319 Grants, PENNVEST, Growing Greener, Municipal Budget	Short Term	Medium	LPR, SIP, NSP
2022-Palmyra Twp-002	Stormwater erosion and stormwater management issues are a major source of nutrient pollution into the lakes, leading to Harmful Algal Bloom (HAB) growth in the lakes. The Township will identify different measures to reduce runoff and potential HABs in the lakes. This includes planting vegetation in areas adjacent to surface waters to serve as a buffer between the water and pollution sources (e.g. stormwater runoff).	Existing	Invasive Species – Harmful Algal Bloom, Flood, Severe Weather	All	Township Board	Pike County Conservation District, PA DEP	Medium to High	Medium	319 Nonpoint Source Grant, PA DEP Growing Greener, Township Budget	Short Term	Medium	NSP, SIP
2022-Palmyra Twp-003	The Tanglewood Lake Dam is classified as a high hazard dam located on Lake Tanglewood. It is privately owned, and the Township does not have jurisdiction over it. The Township will work with the dam owner to complete a survey to determine structural and engineering deficiencies and identify corrective measures. Once identified, the Township will work with the dam owner to implement the corrective measures.	Existing	Flood, Dam Failure, Severe Weather	All	Township Board	Pike County and PA DEP	Medium to High	Medium to High	USACE Small Flood Control, National Dam Safety Program, PA Private Dam Financial Assurance Program, H2O PA, FEMA HHPD	Short Term (depends on funding)	Medium	SIP and NSP



Table 6-15. Hazard Mitigation Strategy – Porter Township

Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
2022-Porter Twp-001	Increase capacity of the existing stormwater system to include the following areas: <ul style="list-style-type: none"> Snow Hill Road Whittaker Road 	Existing	All	All	Porter Township Supervisors	Pike County Office of Community Planning	High	High	FEMA, PEMA	Short (DOF)/In-progress	High	SIP
2022-Porter Twp-002	Support mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	Existing	Flood, Hurricane, Tropical Storm, Nor'Easter	1,2,4,5	Porter Township Supervisors	-	High	High	FEMA, PEMA	Short (DOF)	High	SIP
2022-Porter Twp-003	Develop a customized communication plan for Porter Township to convey risk in multiple formats due to unique conditions in Porter Township (e.g. poor cell phone coverage, several small private communities and properties without electricity), increase usage of social media, leverage County communication system (CodeRED and reverse 911) and regularly update points of contact in the Township's Emergency Plan to distribute information.	N/A	All	All	Porter Township Supervisors	-	Medium	Low-Medium	FEMA, PEMA	Short (DOF)	High	SIP
2022-Porter Twp-004	Bushkill Bridge (steel bridge) is Township owned and gets inspected by the County. This bridge gets washed out at both ends and water goes over the bridge deck, Ice has also damaged the bridge. A study needs to be completed to determine the best solution to prevent the bridge from flooding during heavy rain events. The bridge needs to be replaced/elevated. This bridge is the primary road during road closers and serves as an evacuation route.	Existing	All	All	Porter Township Supervisors	-	High	High	FEMA, PEMA, State	Short (DOF)/In-progress	High	SIP
2022-Porter Twp-005	Ensure continuity of operations at Township critical facilities such as: <ul style="list-style-type: none"> Township building does not have back-up power 	Existing	All	All	Porter Township Supervisors	-	High	High	FEMA, PEMA, State	Short(DOF)/In-progress	High	SIP



Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
2022-Porter Twp-006	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.	N/A	All	All	Porter Township Supervisors	Pike County Road Task Force	Medium	Low	Local Budget	Ongoing	High	LPR

Table 6-16. Hazard Mitigation Strategy – Shohola Township

Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
2022-Shohola Twp-001	Develop a plan between Emergency Management and Fire & Rescue Department to provide education and awareness to citizens of the Township, through the use of StormReady and Firewise programs.	New and Existing	All	All	Emergency Management; Fire & Rescue	Township Board	Medium	Low	Municipal Budget	Short Term	High	EAP
2022-Shohola Twp-002	Address the need of an emergency shelter, via upgrade to the Shohola Fire Station, to be able to provide for food, shelter, and comfort during emergencies or natural disasters in the Township.	Existing	All	All	Fire & Rescue	-	Medium	Medium	Municipal Budget, FEMA Fire Grants	Short Term	Medium	SIP



Table 6-17. Hazard Mitigation Strategy – Westfall Township

Initiative	Mitigation Initiative	Applies to New and/or Existing Structures	Hazard(s) Mitigated	Goals Met	Lead Agency	Support Agencies	Estimated Benefits	Estimated Cost	Sources of Funding	Timeline	Priority	Mitigation Category
2022- Westfall Twp-001	Installation of two mechanical warning sirens for use for severe weather events, flooding, any other widespread hazard that poses a great risk to the health and safety of individuals in the township.	New	Flooding, Severe Weather	1,2,3,4,6	Westfall EMA	-	Medium	Low	General Fund, (potential) FEMA grant	Short	Medium	SIP



6.4.2 Prioritization of Mitigation Actions

Actions that are deemed feasible (i.e., receive a positive evaluation score) were then compared and prioritized using the set of criteria outlined below (PEMA 2020).

- Effectiveness (20 percent of score) – The extent to which an action reduces the vulnerability of people and property.
- Efficiency (30 percent 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 percent of score) – The action reduces vulnerability for more than one hazard.
- Addresses High-Risk Hazard (15 percent of score) – The action reduces vulnerability for people and property from a hazard(s) identified as high-risk.
- Addresses Critical Communications/Critical Infrastructure (15 percent 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 also range from 0 to 3. 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 6-18 shows the prioritization scores for the identified, feasible mitigation actions. Municipal officials reviewed and updated the prioritization values based on local needs.



Table 6-18. Prioritization Scoring of Mitigation Actions

Initiative	Mitigation Initiative	Effectiveness (20%)	Efficiency (30%)	Multi-Hazard (20%)	Address High Hazards (15%)	Addresses CFs (15%)	Total Score
2022-Pike County-001	Support the Mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition to protect them from future damage; repetitive loss and severe repetitive loss properties should be a priority, when applicable.	3	3	0.5	3	3	2.5
2022-Pike County-002	Work with partner organizations to develop informational releases about hazard mitigation for newspapers, websites, circulars, and property owners' association newsletters and attend Association of Community Associations meetings to discuss hazard mitigation, targeting all residents (full-time, seasonal, renters).	1.5	1.5	3	3	0	1.8
2022-Pike County-003	Support the compliance with and good standing in the NFIP, including adoption and enforcement of floodplain management requirements (e.g., regulating all new and substantially improved construction in special-hazard flood areas), floodplain identification and mapping, and flood insurance outreach to the community. Further supporting the municipalities in meeting and/or exceeding the minimum NFIP standards and criteria through the following NFIP-related continued compliance actions identified in subsequent initiatives.	2	2	1.5	2	1	1.8
2022-Pike County-004	Promote/support the adoption of higher regulatory and zoning standards to manage hazard risk: specifically, through updates to the building codes, flood ordinances, and subdivision and land development ordinances. Goals of increased standards are to ensure new buildings and infrastructure are discouraged or prohibited in high-hazard areas in their jurisdiction.	2.5	2.5	1	2	1	1.9
2022-Pike County-005	Increase awareness of and participation in FEMA's Community Rating System (CRS) Program.	2.5	2.5	1	2	1	1.9
2022-Pike County-006	Pike County EMA will work with electric distribution companies to implement an annual tree-trimming program to minimize storm damage.	2	3	2	3	2	2.5
2022-Pike County-007	Explore the creation of a Pike County Health Department	2	3	0.5	2	1	1.9
2022-Pike County-008	Assess and update the emergency operations center equipment to improve communication. Targeted needs include: Generators, Training Apparatus, Communications, etc.	2	3	3	3	3	2.8
2022-Pike County-009	Ensure continuity of operations at critical facilities and infrastructure. Options may include purchase and install generators.	2	3	3	3	3	2.8
2022-Pike County-010	Work with power companies to identify roads within the municipality considered "critical"; these would be the first priority for clearing after an event involving downed power lines.	2	3	2	3	3	2.6
2022-Pike County-011	Work with PEMA and PA DEP to obtain an updated list of dams and ownership; work with Silver Jackets to assist private dam owners with the financial hardship of maintenance.	2	3	2	3	2	2.5
2022-Pike County-012	Install dry hydrants	2.5	2.5	3	3	1	2.5
2022-Pike County-013	Identify and monitor transportation routes of hazardous materials. Establish a communication chain between rail and Fire Departments regarding transport of spent fuel rods.	3	3	1	2.5	2.5	2.5
2022-Pike County-014	Work with PennDOT to implement transportation upgrades to roads and bridges with high flooding vulnerability. Projects could include bridge/culvert enhancement, bridge/culvert replacement, and road/bridge elevation.	3	3	1.5	2	2.5	2.5
2022-Pike County-015	Work with PennDOT and the National Park Service to utilize beet juice to supplement brine/salt to treat roads during winter conditions.	2.5	2.5	1	2	1	1.9
2022-Pike County-016	Purchase Radiac Meters (e.g., UltraRadiac – Personal Radiation Monitor) and thermal detectors for when FD responds to rail incidents	2	3	0.5	2	0	1.7
2022-Pike County-017	Implement debris-flow projects, including slope stabilization, energy dissipation, or vegetative planting.	3	3	2	2.5	1.5	2.5
2022-Pike County-018	Implement stormwater management projects to facilitate stormwater flow during severe storms.	3	3	2	2.5	1.5	2.5
2022-Pike County-019	Work with National Park Service to discuss areas that are in need of stream clearing.	3	3	2	2.5	1.5	2.5



Initiative	Mitigation Initiative	Effectiveness (20%)	Efficiency (30%)	Multi-Hazard (20%)	Address High Hazards (15%)	Addresses CFs (15%)	Total Score
2022-Pike County-020	Continue to use and improve GIS capability to identify and prioritize hazards and critical infrastructure for mitigation, as well as areas targeted for potential new development.	2	3	3	3	0	2.4
2022-Pike County-021	Explore development of an outreach effort which includes a model ordinance to require boat washing to prevent the spread of aquatic invasive species.	2	2	0.5	2	0	1.4
2022-Pike County-022	Purchase and install boat washing stations to help prevent the spread of aquatic invasive species.	2	2	0.5	2	0	1.4
2022-Pike County-023	Provide training to local NFIP Floodplain Administrators to potentially include Certified Floodplain Manager (CFM) course.	3	3	2	2	1.5	2.5
2022-Pike County-024	Pike County EMA to continue working with Pocono Environmental Education Center and municipalities to encourage participation in Firewise.	3	3	2	2	1.5	2.5
2022-Pike County-025	Continue groundwater level monitoring through at least 2028 to assess potable groundwater levels providing 20 years of data for drought trigger analysis.	3	3	1.5	2.5	2	2.5
2022-Pike County-026	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.	2	2	3	3	3	2.5
2022-Pike County-027	Coordinate with the National Weather Service to hold an educational seminar regarding lightning safety.	2.5	2.5	1	2	1	1.9
2022-Pike County-028	Develop a County Task Force to identify ways to incentivize volunteer fire fighting, address equipment and facility upgrades, provide training opportunities for emergency service providers, and upgrade EMS service in Pike County.	2.5	2.5	3	3	2	2.6
2022-Pike County-029	Work with watershed associations and municipal officials to coordinate water conservation and sewage management programs in local communities.	2.5	2.5	1	2	1	1.9
2022-Pike County-030	Work with recreation amenities to develop educational materials regarding the risk of drowning to distribute to resorts, hotels, and other vacation areas.	3	3	1	3	1	2.3
2022-Pike County-031	Continue working with USDA Natural Resources Conservation Service to design and rehabilitate Kintz Creek Dam.	2	3	1	2	2	2.1
2022-Pike County-032	Pike County EMA to continue to work with the three school districts on the following: 1. Annual review of emergency action plans and disaster response plans. 2. Conduct audits and ensure adequate back-up power and water contingencies are in place so they may serve as shelters	2.5	2	3	3	2	2.5
2022-Pike County-033	County to work with municipalities to develop databases to track development in the Special Flood Hazard Area (SFHA).	2	2	2	3	1	2.0
2022-Pike County-034	Hold a workshop to educate and train municipalities about annual FEMA funding sources and the grant application process.	2	2	3	3	1	2.2
2022-Pike County-035	Work with Westfall Township, Matamoras Borough and Milford Borough to map stormwater facilities, infrastructure, and conveyance systems including pipe sizes, inlets, outlets, and integrate into GIS system.	2.5	2	2.5	3	2.5	2.5
2022-Pike County-036	Conduct education/outreach among local officials as to the benefits of stormwater management, hazard mitigation and implementation of the Phase II Countywide Stormwater Management Plan (Act 167 Plan).	2	2	2	3	1	2.0
2022-Pike County-037	Identify and coordinate with appropriate partners and agencies to arrange for data collection of flood and structure data necessary to perform a level 2 HAZUS analysis for the next hazard mitigation plan update. Building data may be collected as part of a reassessment of Pike County flood prone properties. (i.e. Building value, Lowest Floor Elevation, Building Type, Occupancy Type, Foundation Type, Number of Stories, and square Footage).	2	2	3	3	2	2.4
2022-Pike County-038	Conduct education and outreach on municipal stormwater systems and potential impact to flooding/water quality.	2	2	2	3	2	2.2
2022-Pike County-039	Participate in emergency planning for applicable hazard and emergency response events. Specific types of planning relevant to the County and its municipalities include EAP's for dams, radiological emergency plans for nuclear incidents, winter preparedness plans, evacuation signage plans, Phase II Act 167 Stormwater Management Plan, and commodity flow studies. Additionally, other plans should be reviewed to ensure coordination with hazard mitigation planning techniques.	1.5	1.5	3	3	3	2.3



Initiative	Mitigation Initiative	Effectiveness (20%)	Efficiency (30%)	Multi-Hazard (20%)	Address High Hazards (15%)	Addresses CFs (15%)	Total Score
2022-Pike County-040	Pike County Office of Community Planning and applicable municipal office will review their comprehensive plans to ensure that designated growth areas are not within high-hazard areas identified in the HMP.	1	1	3	3	1	1.7
2022-Pike County-041	Encourage all critical government facilities to have COOP and COG plans and to begin implementing appropriate backup systems.	2	2	3	3	3	2.5
2022-Pike County-042	Hold annual meetings to ensure that mitigation, planning, preparedness, and response personnel are (1) cross-trained in each other's area of expertise, (2) aware of ongoing activities, and (3) fostering increased communication.	2	2	3	3	1	2.2
2022-Pike County-043	Hold an education seminar and develop educational materials regarding radon exposure.	2.5	2.5	1	2	1	1.9
2022-Pike County-044	Purchase and install weather station to capture meteorological data and communicate to smart phones to utilize information during response/recovery.	2	2	3	3	1	2.2
2022-Pike County-045	Work with PennDOT to purchase and install cameras on I-84 at the Greentown and Milford exits.	2	3	3	3	2	2.7
2022-Pike County-046	Work with Milford Township to address several locations of stream bank erosion along Vandermark Creek and Moon Valley Road between Deep Brook Road and Constitution Ave.	2	3	2	3	2	2.5
2022-Pike County-047	Development of source water protection plans throughout the county	2.5	3	2	2.5	2	2.5
2022-Pike County-048	Address the following County owner High Hazard dams: Taylor Pond Dam (PA-446) & Sky View Lake Dam (PA-440). These projects will include dam safety inspections, engineering reports, preliminary engineering, final design, and construction of dam improvements.	2.5	3	1.5	2	3	2.5
2022-Pike County-049	Work with Community Associations, Water & Sewer Authorities to develop mapping of areas serviced by community/public water & sewer systems.	2.5	2.5	2	2.5	3	2.5
2022-Pike County-050	Work with municipalities and PennDOT to map/document stormwater flooding events and issues on all publicly owned roads in Pike County.	2	3	2	3	2	2.5
2022-Pike County-051	Work with utilities, municipalities and PennDOT to implement a (hazardous tree removal/ Day lighting) program on State owned roads in the County.	2	3	2	3	2	2.5
2022-Blooming Grove Township-001	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.	2.5	2.5	3	3	2	2.6
2022-Blooming Grove Township-002	Repair and increase the level of protection of Hemlock Dam on Hemlock Lake in Hemlock Farms (increase to protect to the 500-year flood event as per communication from the State).	2.5	2.5	2.5	2.5	2	2.5
2022-Blooming Grove Township-003	Madden Road Bridge that crosses York Creek requires work to ensure safety: Provide approach guide-rails and transitions, Remove debris and sediment from stream bed, Relocate beaver, Repair two areas of spalling at each abutment	2.5	2.5	3	3	2	2.6
2022-Blooming Grove Township-004	Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	2.5	2.5	2.5	2.5	2	2.5
2022-Blooming Grove Township-005	Enhance the capacity of the current stormwater system in Hemlock Farms Community Association to reduce flooding.	2.5	2.5	2.5	2.5	2	2.5
2022-Blooming Grove Township-006	Township building (a Red-Cross shelter) needs technology upgrades to digitize records, upgrades to storage capacity and build a separate barn for storage of mechanical equipment and supplies (e.g. cots, blankets, MREs). The Volunteer Fire Department next to the Township building (also a designated shelter) needs improvements to its property for parking and storage of equipment, renovations to building are needed for sheltering residents.	2.5	2.5	3	3	3	2.8
2022-Blooming Grove Township-007	Identify mechanisms to educate and inform Township residents regarding CodeRED for example newsletters, link of Township website to the County Emergency page, social media, and other methods of public communication.	2.5	2.5	3	3	1	2.5
2022-Blooming Grove Township-008	Utilize the Hazard Mitigation Plan (HMP) when updating the comprehensive Master Plan; consider including hazard zones risk assessment information, and hazard mitigation goals as identified in the HMP.	2.5	2.5	3	3	1	2.5

SECTION 6: MITIGATION STRATEGY





Initiative	Mitigation Initiative	Effectiveness (20%)	Efficiency (30%)	Multi-Hazard (20%)	Address High Hazards (15%)	Addresses CFs (15%)	Total Score
2022-Delaware Twp.-001	Debris Clearing and Bridge repair on waterways throughout the township to prevent ice jams and flooding over roadways; further damage to critical thoroughways.	2.5	2.5	2.5	3	2	2.5
2022-Delaware Twp-002	Provide enhanced disinfection/decontamination capability for municipal building in consideration of Covid 19 pandemic	2	2	2	2.5	1	2.0
2022-Delaware Twp-003	Improve cell phone and internet capability and access throughout township to insure critical communications reliability during emergencies. Engage in study with county and providers for expanded improved service; consider study for feasibility of communications infrastructure for the addition of a cell tower or repeater located on township/fire/ems property.	2	2	2	2.5	2	2.1
2022-Delaware Twp-004	Enhance/ develop relationships with private HOA within township to improve response and communication during emergencies by seeking funding and support from county or state level for establishment of CERT and FIREWISE community programs.	1.5	1.5	2	2.5	1	1.7
2022-Delaware Twp-005	Improve emergency services provided to the growing population of Pike County. Would need a study conducted of the population increases of the township and implement better trained and equipped facilities for faster response times.	2.5	2.5	2.5	2.5	2	2.5
2022-Dingman Twp-001	The Township will develop a tree maintenance program that will include routine inspections of trees located in the municipal right-of-way. During the inspection, the municipality will identify trees that are in need of trimming or removal. Once identified, a schedule of maintenance and/or removal will be developed, and the municipality will begin work. This will help reduce tree damage, road closures, utility outages, and reduce/eliminate damage to structures and infrastructure	2	2	1	3	2	2.0
2022-Dingman Twp-002	The Township will develop and implement a multi-hazard public awareness program that will focus on the Township's high-ranked hazards. Information will be distributed to residents through mailers, social media, and the municipal website.	2	2	3	3	2	2.4
2022-Greene Twp-001	Ensure the continuity of operations at critical facilities in the Township. Purchase and install a generator at the Hemlock Road Church which serves as the Township shelter.	2.5	2.5	3	3	3	2.8
2022-Lackawaxen-001	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.	2	2	3	3	2	2.4
2022-Lackawaxen-002	Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	2.5	2.5	2	3	2.5	2.5
2022-Lackawaxen-003	Ensure the continuity of operations at critical facilities in the Township.	2.5	2.5	3	3	3	2.8
2022-Lackawaxen-004	Identify mechanisms to educate and inform Township residents regarding CodeRED for example newsletters, link to Township website to the County Emergency page, social media, and other methods of public communication.	2.5	2.5	3	3	1	2.5
2022-Lehman Twp -001	Replace existing failing 7' diameter CMP with a 7' diameter aluminized CMP. Remove & resetting existing guiderail. Remove & reconstruct stone headwalls & wingwalls. Roadway reconstruction. Design life +/- 50-75 years.	2.5	2.5	2.5	2.5	2	2.5
2022-Lehman Twp -002	Install two (2) electronic signs at the municipal building, and at the EMS headquarters located on Winona Falls Road. Signs will be used by Lehman Township EMS to relay emergency notifications to the public, including safety messages for the different seasons. Information will continue to be included on the municipality's website and face book page. Information will be included in the municipality's newsletter when published.	2	2	3	3	2	2.4
2022-Matamoras Borough-001	Enhance public notifications with AM radio station improvements and add web/internet based interactive web-page and social media pages	2.5	2.5	3	3	1	2.5
2022-Matamoras Borough-002	Improve public access to borough office and annex. Provide ADA compliant bathroom facilities and 2nd floor office access for ADA	1.5	1.5	3	3	2.5	2.2
2022-Milford Borough-001	Work with the Pike County Office of Community Planning to map and/or update maps/plans for stormwater conveyance systems including pipe sizes, inlets, outlets, and integrate into GIS system.	2	2	2.5	2.5	1	2.1
2022-Milford Borough-002	The Borough will continue to monitor and track rain events to determine if the stormwater system capacities are sufficient or if upgrades are needed to handle storm events.	2	2	2.5	2.5	1.5	2.1

SECTION 6: MITIGATION STRATEGY





Initiative	Mitigation Initiative	Effectiveness (20%)	Efficiency (30%)	Multi-Hazard (20%)	Address High Hazards (15%)	Addresses CFs (15%)	Total Score
2022-Milford Borough-003	Support the mitigation of properties. Conduct outreach to floodprone property owners and provide information on mitigation alternatives. After preferred mitigation measures are identified, collect required property-owner information, and develop a FEMA grant application and BCA to obtain funding to implement acquisition/purchase/moving/elevating residential homes that experience frequent flooding (high risk areas).	2	2	2.5	2.5	2	2.2
2022-Milford Borough-004	Work to identify emergency shelters that could be utilized in times of weather event and natural disasters; obtain emergency backup power and supplies if so needed.	1.5	1.5	3	3	2.5	2.2
2022-Milford Borough-005	Identify mechanisms to educate and inform Borough residents regarding hazards events which could potentially impact the health and safety for example newsletters, social media, and other methods of public communication.	2.5	2.5	3	3	1	2.5
2022-Milford Borough-006	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.	2.5	2.5	3	3	1	2.5
2022-Milford Twp-001	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.	2	2	2.5	2.5	1	2.1
2022-Milford Twp-002	Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage, repetitive loss and severe repetitive loss properties will be a priority, when applicable.	1.5	1.5	2	2	2	1.8
2022-Milford Twp-003	Work with the gas company (formerly Columbia Gas) to develop an evacuation plan to address emergencies related to the compressor station or the pipeline itself.	2	2	2.5	2.5	2.5	2.3
2022-Milford Twp-004	Include risk assessment and hazard mitigation principles into comprehensive planning efforts as Milford Township updates its Comprehensive Plan	2	2	3	3	1.5	2.3
2022-Milford Twp-005	Develop and implement a multi-hazard public awareness program	1.5	1.5	3	2	1	1.8
2022-Milford Twp-006	Install, re-route, and increase the capacity of storm drainage infrastructure for Vandermark Drive, may require purchase of easement(s) for privately owned land for water retention and drainage	2.5	2.5	2.5	2.5	2	2.5
2022-Milford Twp-007	Work with Pike County Agencies to create a database of vulnerable persons for priority outreach during emergencies that affect their home or property	1.5	1.5	3	3	0	1.8
2022-Milford Twp-008	Purchase a UTV for quick access to remote locations	1.5	1.5	2.5	2.5	1	1.8
2022-Milford Twp-009	Purchase an additional ambulance to ensure continuity of operations and increase capacity	2	2	2.5	2.5	1	2.1
2022-Milford Twp-010	Work with utilities and property owners to implement a hazardous tree removal program on Township roads.	2.5	2.5	2.5	2.5	2	2.5
2022-Milford Twp-011	Install appropriate infrastructure to protect homes from stream bank erosion along the Vandermark Creek, where previous supports have become less effective over time	2	2	2.5	2.5	1	2.1
2022-Palmyra Twp-001	The stormwater systems in the Township are inadequately sized and due to the age of some of the communities, the systems do not have the capacity to carry the stormwater. The Township will perform an assessment of the stormwater system to identify projects to increase the capacity and improve the stormwater systems. Once projects are identified, the Township will seek funding to implement the projects.	2.5	2.5	2.5	2.5	1	2.3
2022-Palmyra Twp-002	Stormwater erosion and stormwater management issues are a major source of nutrient pollution into the lakes, leading to Harmful Algal Bloom (HAB) growth in the lakes. The Township will identify different measures to reduce runoff and potential HABs in the lakes. This includes planting vegetation in areas adjacent to surface waters to serve as a buffer between the water and pollution sources (e.g. stormwater runoff).	2.5	2.5	2.5	2.5	1	2.3
2022-Palmyra Twp-003	The Tanglewood Lake Dam is classified as a high hazard dam located on Lake Tanglewood. It is privately owned, and the Township does not have jurisdiction over it. The Township will work with the dam owner to complete a survey to determine structural and engineering deficiencies and identify corrective measures. Once identified, the Township will work with the dam owner to implement the corrective measures.	2.5	2.5	2	2	2	2.3



Initiative	Mitigation Initiative	Effectiveness (20%)	Efficiency (30%)	Multi-Hazard (20%)	Address High Hazards (15%)	Addresses CFs (15%)	Total Score
2022-Porter Twp-001	Increase capacity of the existing stormwater system to include the following areas: <ul style="list-style-type: none"> Snow Hill Road Whittaker Road 	2.5	2.5	3	3	2	2.6
2022-Porter Twp-002	Support mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	2.5	2.5	2.5	2.5	2	2.5
2022-Porter Twp-003	Develop a customized communication plan for Porter Township to convey risk in multiple formats due to unique conditions in Porter Township (e.g. poor cell phone coverage, several small private communities and properties without electricity), increase usage of social media, leverage County communication system (CodeRED and reverse 911) and regularly update points of contact in the Township's Emergency Plan to distribute information.	2.5	2.5	3	3	2	2.6
2022-Porter Twp-004	Bushkill Bridge (steel bridge) is Township owned and gets inspected by the County. This bridge gets washed out at both ends and water goes over the bridge deck, Ice has also damaged the bridge. A study needs to be completed to determine the best solution to prevent the bridge from flooding during heavy rain events. The bridge needs to be replaced/elevated. This bridge is the primary road during road closers and serves as an evacuation route.	2.5	2.5	3	3	2	2.6
2022-Porter Twp-005	Ensure continuity of operations at Township critical facilities such as: <ul style="list-style-type: none"> Township building does not have back-up power 	2.5	2.5	3	3	3	2.8
2022-Porter Twp-006	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.	2.5	2.5	3	3	1	2.5
2022-Shohola Twp-001	Develop a plan between Emergency Management and Fire & Rescue Department to provide education and awareness to citizens of the Township, through the use of StormReady and Firewise programs.	2.5	2.5	3	3	2	2.6
2022-Shohola Twp-002	Address the need of an emergency shelter, via upgrade to the Shohola Fire Station, to be able to provide for food, shelter, and comfort during emergencies or natural disasters in the Township.	2	2	3	3	2	2.4
2022-WestfallTwp-001	Installation of two mechanical warning sirens for use for severe weather events, flooding, any other widespread hazard that poses a great risk to the health and safety of individuals in the township.	2	2	2	2	2	2.0



The actions in Table 6-19 are listed in order of priority, with the high-priority actions presented first. This list of actions is the result of the planning effort led by the Planning Team and represents the actions 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 and the completed action worksheets are included in Appendix G.

Table 6-19. Prioritized Mitigation Actions

Initiative	Mitigation Initiative	Total Score
High Priority		
2022-Blooming Grove Twp-006	Township building (a Red-Cross shelter) needs technology upgrades to digitize records, upgrades to storage capacity and build a separate barn for storage of mechanical equipment and supplies (e.g. cots, blankets, MREs). The Volunteer Fire Department next to the Township building (also a designated shelter) needs improvements to its property for parking and storage of equipment, renovations to building are needed for sheltering residents.	2.8
2022-Greene Twp-001	Ensure the continuity of operations at critical facilities in the Township. Purchase and install a generator at the Hemlock Road Church which serves as the Township shelter.	2.8
2022-Lackawaxen-003	Ensure the continuity of operations at critical facilities in the Township.	2.8
2022-Porter Twp-005	Ensure continuity of operations at Township critical facilities such as: <ul style="list-style-type: none"> Township building does not have back-up power 	2.8
2022-Pike County-008	Assess and update the emergency operations center equipment to improve communication. Targeted needs include: Generators, Training Apparatus, Communications, etc.	2.8
2022-Pike County-009	Ensure continuity of operations at critical facilities and infrastructure. Options may include purchase and install generators.	2.8
2022-Pike County-045	Work with PennDOT to purchase and install cameras on I-84 at the Greentown and Milford exits.	2.7
2022-Pike County-010	Work with power companies to identify roads within the municipality considered "critical"; these would be the first priority for clearing after an event involving downed power lines.	2.6
2022-Pike County-028	Develop a County Task Force to identify ways to incentivize volunteer fire fighting, address equipment and facility upgrades, provide training opportunities for emergency service providers, and upgrade EMS service in Pike County.	2.6
2022-Blooming Grove Twp-001	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.	2.6
2022-Blooming Grove Twp-003	Madden Road Bridge that crosses York Creek requires work to ensure safety: Provide approach guide-rails and transitions, Remove debris and sediment from stream bed, Relocate beaver, Repair two areas of spalling at each abutment	2.6
2022-Porter Twp-001	Increase capacity of the existing stormwater system to include the following areas: <ul style="list-style-type: none"> Snow Hill Road Whittaker Road 	2.6
2022-Porter Twp-003	Develop a customized communication plan for Porter Township to convey risk in multiple formats due to unique conditions in Porter Township (e.g. poor cell phone coverage, several small private communities and properties without electricity), increase usage of social media, leverage County communication system (CodeRED and reverse 911) and regularly update points of contact in the Township's Emergency Plan to distribute information.	2.6
2022-Porter Twp-004	Bushkill Bridge (steel bridge) is Township owned and gets inspected by the County. This bridge gets washed out at both ends and water goes over the bridge deck, Ice has also damaged the bridge. A study needs to be completed to determine the best solution to prevent the bridge from flooding during heavy rain events. The bridge needs to be replaced/elevated. This bridge is the primary road during road closers and serves as an evacuation route.	2.6
2022-Shohola Twp-001	Develop a plan between Emergency Management and Fire & Rescue Department to provide education and awareness to citizens of the Township, through the use of StormReady and Firewise programs.	2.6
2022-Pike County-001	Support the Mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition to protect them from future damage; repetitive loss and severe repetitive loss properties should be a priority, when applicable.	2.5
2022-Pike County-006	Pike County EMA will work with electric distribution companies to implement an annual tree-trimming program to minimize storm damage.	2.5
2022-Pike County-011	Work with PEMA and PA DEP to obtain an updated list of dams and ownership; work with Silver Jackets to assist private dam owners with the financial hardship of maintenance.	2.5
2022-Pike County-012	Install dry hydrants	2.5
2022-Pike County-013	Identify and monitor transportation routes of hazardous materials. Establish a communication chain between rail and Fire Departments regarding transport of spent fuel rods.	2.5
2022-Pike County-014	Work with PennDOT to implement transportation upgrades to roads and bridges with high flooding vulnerability. Projects could include bridge/culvert enhancement, bridge/culvert replacement, and road/bridge elevation.	2.5



Initiative	Mitigation Initiative	Total Score
2022-Pike County-017	Implement debris-flow projects, including slope stabilization, energy dissipation, or vegetative planting.	2.5
2022-Pike County-018	Implement stormwater management projects to facilitate stormwater flow during severe storms.	2.5
2022-Pike County-019	Work with National Park Service to discuss areas that are in need of stream clearing.	2.5
2022-Pike County-023	Provide training to local NFIP Floodplain Administrators to potentially include Certified Floodplain Manager (CFM) course.	2.5
2022-Pike County-024	Pike County EMA to continue working with Pocono Environmental Education Center and municipalities to encourage participation in Firewise.	2.5
2022-Pike County-025	Continue groundwater level monitoring through at least 2028 to assess potable groundwater levels providing 20 years of data for drought trigger analysis.	2.5
2022-Pike County-026	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.	2.5
2022-Pike County-032	Pike County EMA to continue to work with the three school districts on the following: 1. Annual review of emergency action plans and disaster response plans. 2. Conduct audits and ensure adequate back-up power and water contingencies are in place so they may serve as shelters	2.5
2022-Pike County-035	Work with Westfall Township, Matamoras Borough and Milford Borough to map stormwater facilities, infrastructure, and conveyance systems including pipe sizes, inlets, outlets, and integrate into GIS system.	2.5
2022-Pike County-041	Encourage all critical government facilities to have COOP and COG plans and to begin implementing appropriate backup systems.	2.5
2022-Pike County-046	Work with Milford Township to address several locations of stream bank erosion along Vandermark Creek and Moon Valley Road between Deep Brook Road and Constitution Ave.	2.5
2022-Pike County-047	Development of source water protection plans throughout the county	2.5
2022-Pike County-048	Address the following County owner High Hazard dams: Taylor Pond Dam (PA-446) & Sky View Lake Dam (PA-440). These projects will include dam safety inspections, engineering reports, preliminary engineering, final design, and construction of dam improvements.	2.5
2022-Pike County-049	Work with Community Associations, Water & Sewer Authorities to develop mapping of areas serviced by community/public water & sewer systems.	2.5
2022-Pike County-050	Work with municipalities and PennDOT to map/document stormwater flooding events and issues on all publicly owned roads in Pike County.	2.5
2022-Pike County-051	Work with utilities, municipalities and PennDOT to implement a (hazardous tree removal/ Day lighting) program on State owned roads in the County.	2.5
2022-Blooming Grove Twp-002	Repair and increase the level of protection of Hemlock Dam on Hemlock Lake in Hemlock Farms (increase to protect to the 500-year flood event as per communication from the State).	2.5
2022-Blooming Grove Twp-004	Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	2.5
2022-Blooming Grove Twp-005	Enhance the capacity of the current stormwater system in Hemlock Farms Community Association to reduce flooding.	2.5
2022-Blooming Grove Twp-007	Identify mechanisms to educate and inform Township residents regarding CodeRED for example newsletters, link of Township website to the County Emergency page, social media, and other methods of public communication.	2.5
2022-Blooming Grove Twp-008	Utilize the Hazard Mitigation Plan (HMP) when updating the comprehensive Master Plan; consider including hazard zones risk assessment information, and hazard mitigation goals as identified in the HMP.	2.5
2022-Delaware Twp.-001	Debris Clearing and Bridge repair on waterways throughout the township to prevent ice jams and flooding over roadways; further damage to critical thoroughways.	2.5
2022-Delaware Twp-005	Improve emergency services provided to the growing population of Pike County. Would need a study conducted of the population increases of the township and implement better trained and equipped facilities for faster response times.	2.5
2022-Lackawaxen-002	Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	2.5
2022-Lackawaxen-004	Identify mechanisms to educate and inform Township residents regarding CodeRED for example newsletters, link to Township website to the County Emergency page, social media, and other methods of public communication.	2.5
2022-Lehman Twp-001	Replace existing failing 7' diameter CMP with a 7' diameter aluminized CMP. Remove & resetting existing guiderail. Remove & reconstruct stone headwalls & wingwalls. Roadway reconstruction. Design life +/- 50-75 years.	2.5
2022-Matamoras Borough-001	Enhance public notifications with AM radio station improvements and add web/internet based interactive web-page and social media pages	2.5
2022-Milford Borough-005	Identify mechanisms to educate and inform Borough residents regarding hazards events which could potentially impact the health and safety for example newsletters, social media, and other methods of public communication.	2.5
2022-Milford Borough-006	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.	2.5
2022-Milford Twp-006	Install, re-route, and increase the capacity of storm drainage infrastructure for Vandermark Drive, may require purchase of easement(s) for privately owned land for water retention and drainage	2.5



Initiative	Mitigation Initiative	Total Score
2022-Milford Twp-010	Work with utilities and property owners to implement a hazardous tree removal program on Township roads.	2.5
2022-Porter Twp-002	Support mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	2.5
2022-Porter Twp-006	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.	2.5
Medium Priority		
2022-Pike County-020	Continue to use and improve GIS capability to identify and prioritize hazards and critical infrastructure for mitigation, as well as areas targeted for potential new development.	2.4
2022-Pike County-037	Identify and coordinate with appropriate partners and agencies to arrange for data collection of flood and structure data necessary to perform a level 2 HAZUS analysis for the next hazard mitigation plan update. Building data may be collected as part of a reassessment of Pike County flood prone properties. (i.e. Building value, Lowest Floor Elevation, Building Type, Occupancy Type, Foundation Type, Number of Stories, and square Footage).	2.4
2022-Dingman Twp-002	The Township will develop and implement a multi-hazard public awareness program that will focus on the Township's high-ranked hazards. Information will be distributed to residents through mailers, social media, and the municipal website.	2.4
2022-Lackawaxen-001	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.	2.4
2022-Lehman Twp-002	Install two (2) electronic signs at the municipal building, and at the EMS headquarters located on Winona Falls Road. Signs will be used by Lehman Township EMS to relay emergency notifications to the public, including safety messages for the different seasons. Information will continue to be included on the municipality's website and face book page. Information will be included in the municipality's newsletter when published.	2.4
2022-Shohola Twp-002	Address the need of an emergency shelter, via upgrade to the Shohola Fire Station, to be able to provide for food, shelter, and comfort during emergencies or natural disasters in the Township.	2.4
2022-Pike County-039	Participate in emergency planning for applicable hazard and emergency response events. Specific types of planning relevant to the County and its municipalities include EAP's for dams, radiological emergency plans for nuclear incidents, winter preparedness plans, evacuation signage plans, Phase II Act 167 Stormwater Management Plan, and commodity flow studies. Additionally, other plans should be reviewed to ensure coordination with hazard mitigation planning techniques.	2.3
2022-Milford Twp-003	Work with the gas company (formerly Columbia Gas) to develop an evacuation plan to address emergencies related to the compressor station or the pipeline itself.	2.3
2022-Milford Twp-004	Include risk assessment and hazard mitigation principles into comprehensive planning efforts as Milford Township updates its Comprehensive Plan	2.3
2022-Palmyra Twp-001	The stormwater systems in the Township are inadequately sized and due to the age of some of the communities, the systems do not have the capacity to carry the stormwater. The Township will perform an assessment of the stormwater system to identify projects to increase the capacity and improve the stormwater systems. Once projects are identified, the Township will seek funding to implement the projects.	2.3
2022-Palmyra Twp-002	Stormwater erosion and stormwater management issues are a major source of nutrient pollution into the lakes, leading to Harmful Algal Bloom (HAB) growth in the lakes. The Township will identify different measures to reduce runoff and potential HABs in the lakes. This includes planting vegetation in areas adjacent to surface waters to serve as a buffer between the water and pollution sources (e.g. stormwater runoff).	2.3
2022-Palmyra Twp-003	The Tanglewood Lake Dam is classified as a high hazard dam located on Lake Tanglewood. It is privately owned, and the Township does not have jurisdiction over it. The Township will work with the dam owner to complete a survey to determine structural and engineering deficiencies and identify corrective measures. Once identified, the Township will work with the dam owner to implement the corrective measures.	2.3
2022-Pike County-030	Work with recreation amenities to develop educational materials regarding the risk of drowning to distribute to resorts, hotels, and other vacation areas.	2.3
2022-Pike County-034	Hold a workshop to educate and train municipalities about annual FEMA funding sources and the grant application process.	2.2
2022-Pike County-038	Conduct education and outreach on municipal stormwater systems and potential impact to flooding/water quality.	2.2
2022-Pike County-042	Hold annual meetings to ensure that mitigation, planning, preparedness, and response personnel are (1) cross-trained in each other's area of expertise, (2) aware of ongoing activities, and (3) fostering increased communication.	2.2
2022-Pike County-044	Purchase and install weather station to capture meteorological data and communicate to smart phones to utilize information during response/recovery.	2.2
2022-Matamoras Borough-002	Improve public access to borough office and annex. Provide ADA compliant bathroom facilities and 2nd floor office access for ADA	2.2
2022-Milford Borough-003	Support the mitigation of properties. Conduct outreach to floodprone property owners and provide information on mitigation alternatives. After preferred mitigation measures are identified, collect required property-owner information, and develop a FEMA grant application and BCA to obtain funding to implement acquisition/purchase/moving/elevating residential homes that experience frequent flooding (high risk areas).	2.2
2022-Milford Borough-004	Work to identify emergency shelters that could be utilized in times of weather event and natural disasters; obtain emergency backup power and supplies if so needed.	2.2



Initiative	Mitigation Initiative	Total Score
2022-Pike County-031	Continue working with USDA Natural Resources Conservation Service to design and rehabilitate Kintz Creek Dam.	2.1
2022-Delaware Twp-003	Improve cell phone and internet capability and access throughout township to insure critical communications reliability during emergencies. Engage in study with county and providers for expanded improved service; consider study for feasibility of communications infrastructure for the addition of a cell tower or repeater located on township/fire/ems property.	2.1
2022-Milford Borough-001	Work with the Pike County Office of Community Planning to map and/or update maps/plans for stormwater conveyance systems including pipe sizes, inlets, outlets, and integrate into GIS system.	2.1
2022-Milford Borough-002	The Borough will continue to monitor and track rain events to determine if the stormwater system capacities are sufficient or if upgrades are needed to handle storm events.	2.1
2022-Milford Twp-001	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.	2.1
2022-Milford Twp-009	Purchase an additional ambulance to ensure continuity of operations and increase capacity	2.1
2022-Milford Twp-011	Install appropriate infrastructure to protect homes from stream bank erosion along the Vandermark Creek, where previous supports have become less effective over time	2.1
2022-Pike County-033	County to work with municipalities to develop databases to track development in the Special Flood Hazard Area (SFHA).	2.0
2022-Pike County-036	Conduct education/outreach among local officials as to the benefits of stormwater management, hazard mitigation and implementation of the Phase II Countywide Stormwater Management Plan (Act 167 Plan).	2.0
2022-Delaware Twp-002	Provide enhanced disinfection/decontamination capability for municipal building in consideration of covid 19 pandemic	2.0
2022-Dingman Twp-001	The Township will develop a tree maintenance program that will include routine inspections of trees located in the municipal right-of-way. During the inspection, the municipality will identify trees that are in need of trimming or removal. Once identified, a schedule of maintenance and/or removal will be developed, and the municipality will begin work. This will help reduce tree damage, road closures, utility outages, and reduce/eliminate damage to structures and infrastructure	2.0
2022-Westfall Twp-001	Installation of two mechanical warning sirens for use for severe weather events, flooding, any other widespread hazard that poses a great risk to the health and safety of individuals in the township.	2.0
2022-Pike County-007	Explore the creation of a Pike County Health Department	1.9
2022-Pike County-004	Promote/support the adoption of higher regulatory and zoning standards to manage hazard risk; specifically, through updates to the building codes, flood ordinances, and subdivision and land development ordinances. Goals of increased standards are to ensure new buildings and infrastructure are discouraged or prohibited in high-hazard areas in their jurisdiction.	1.9
2022-Pike County-005	Increase awareness of and participation in FEMA's Community Rating System (CRS) Program.	1.9
2022-Pike County-015	Work with PennDOT and the National Park Service to utilize beet juice to supplement brine/salt to treat roads during winter conditions.	1.9
2022-Pike County-027	Coordinate with the National Weather Service to hold an educational seminar regarding lightning safety.	1.9
2022-Pike County-029	Work with watershed associations and municipal officials to coordinate water conservation and sewage management programs in local communities.	1.9
2022-Pike County-043	Hold an education seminar and develop educational materials regarding radon exposure.	1.9
Low Priority		
2022-Pike County-002	Work with partner organizations to develop informational releases about hazard mitigation for newspapers, websites, circulars, and property owners' association newsletters and attend Association of Community Associations meetings to discuss hazard mitigation, targeting all residents (full-time, seasonal, renters).	1.8
2022-Pike County-003	Support the compliance with and good standing in the NFIP, including adoption and enforcement of floodplain management requirements (e.g., regulating all new and substantially improved construction in special-hazard flood areas), floodplain identification and mapping, and flood insurance outreach to the community. Further supporting the municipalities in meeting and/or exceeding the minimum NFIP standards and criteria through the following NFIP-related continued compliance actions identified in subsequent initiatives.	1.8
2022-Milford Twp-002	Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage, repetitive loss and severe repetitive loss properties will be a priority, when applicable.	1.8
2022-Milford Twp-005	Develop and implement a multi-hazard public awareness program	1.8
2022-Milford Twp-007	Work with Pike County Agencies to create a database of vulnerable persons for priority outreach during emergencies that affect their home or property	1.8
2022-Milford Twp-008	Purchase a UTV for quick access to remote locations	1.8
2022-Delaware Twp-004	Enhance/ develop relationships with private HOA within township to improve response and communication during emergencies by seeking funding and support from county or state level for establishment of CERT and FIREWISE community programs.	1.7
2022-Pike County-016	Purchase Radiac Meters (e.g., UltraRadiac – Personal Radiation Monitor) and thermal detectors for when FD responds to rail incidents	1.7



Initiative	Mitigation Initiative	Total Score
2022-Pike County-040	Pike County Office of Community Planning and applicable municipal office will review their comprehensive plans to ensure that designated growth areas are not within high-hazard areas identified in the HMP.	1.7
2022-Pike County-021	Explore development of an outreach effort which includes a model ordinance to require boat washing to prevent the spread of aquatic invasive species.	1.4
2022-Pike County-022	Purchase and install boat washing stations to help prevent the spread of aquatic invasive species.	1.4

DRAFT



SECTION 7. PLAN MAINTENANCE

This section details the formal process that will ensure that the HMP remains an active and relevant document and that the Planning Partnership maintains their eligibility for applicable funding sources. The plan maintenance process includes a schedule for monitoring and evaluating the plan annually and producing an updated plan every five years. In addition, this section describes how public participation will be integrated throughout the plan maintenance and implementation process. It explains how the mitigation strategies outlined in this plan update will be incorporated into existing planning mechanisms and programs, such as comprehensive land use planning processes, capital improvement planning, and building code enforcement and implementation. The plan's format allows sections to be reviewed and updated when new data become available, resulting in a plan that will remain current and relevant.

The plan maintenance matrix shown in Table 7-1 provides a synopsis of responsibilities for plan monitoring, evaluation, and update, which are discussed in further detail in the sections below.

Table 7-1. Plan Maintenance Matrix

Task	Approach	Timeline	Lead Responsibility	Support Responsibility
Monitoring	Preparation of status updates and action implementation tracking as part of submission for Annual Progress Report.	Meet annually or upon major update to comprehensive plan or major disaster declaration	Jurisdictional points of contact identified in Section 3 (Planning Process)	Jurisdictional implementation lead identified in Section 3 (Planning Process)
Integration	In order for integration of mitigation principles action to become an organic part of the ongoing county and municipal activities, the County will incorporate the distribution of the FEMA 386-4 guidance worksheets for annual review and update by all participating jurisdictions.	August each year with interim email reminders to address integration in county and municipal activities.	HMP Coordinator and jurisdictional points of contact identified in Section 3 (Planning Process)	HMP Coordinator
Evaluation	Review the status of previous actions as submitted by the monitoring task lead and support to assess the effectiveness of the plan; compile and finalize the Annual Progress Report	Finalized progress report completed by January 31st of each year	Planning Partnership; Plan Maintenance element	Jurisdictional points of contacts identified in Section 3 (Planning Process)
Update	Reconvene the planning partners, at a minimum, every 5 years to guide a comprehensive update to review and revise the plan.	Every 5 years or upon major update to Master Plan or major disaster	Pike County HMP Coordinator	Jurisdictional points of contacts identified in Section 3 (Planning Process)



7.1 Update Process Summary

Monitoring, evaluating, and updating the HMP is critical to maintaining its value and supporting the success of Pike 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 2017 plan maintenance procedures and carried them forward to the current HMP update process, as described in the sections below. Going forward, the plan will continue to be available on the Pike County Office of Community Planning website (https://www.pikepa.org/living_working/community_planning/hazard_mitigation_plan.php). The 2022 plan maintenance procedures also describe the ways in which this plan may be integrated into other planning mechanisms in the county.

7.2 Monitoring, Integrating, Evaluating, and Updating the Plan

The Pike County HMP Planning Team intends to remain intact as the organization responsible for monitoring, evaluating, and updating this plan. The Pike County Office of Community Planning's Community Planner will serve as HMP Coordinator for the Planning Team. Each participating jurisdiction is expected to retain a municipal hazard mitigation representative to support the jurisdiction's input to the monitoring, evaluating, and updating responsibilities identified in this section. Members of the Planning Team are listed in Section 3.

Understanding that individual commitments change over time, each jurisdiction and its representatives are responsible for informing the Pike County HMP Coordinator of any changes in representation by formal letter. The HMP Coordinator will strive to ensure that the Planning Team is made up of representatives from planning partners and stakeholder organizations within the county. The HMP Coordinator will maintain a record of the current membership of the Planning Team on the Pike County Office of Community Planning website (https://www.pikepa.org/living_working/community_planning/hazard_mitigation_plan.php) or in publicly-accessible county records. During the planning process, the HMP can be found at <https://www.pikecountypahmp.com/>. Upon approval by FEMA, the HMP can be found on the Pike County Office of Community Planning website.

The following sections describe the monitoring, evaluating, and updating processes and protocols for the Pike County HMP.

7.2.1 Monitoring

The Planning Team will be responsible for monitoring implementation, evaluating the effectiveness of the HMP, and documenting this information in an annual 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 (Mitigation Strategy) 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 requested by the Planning Team. Further, the representatives shall 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.

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, and residential areas) to consider in the risk assessment and mitigation strategy, so that the HMP can include more details regarding the vital assets of each municipality;
- Hazard events and losses occurring in their jurisdiction, including their nature, 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;
- Ways in which each municipality conducts floodplain management in accordance with the National Flood Insurance Program (NFIP) (through completion of the NFIP Survey worksheet); and
- Public and stakeholder input and comments on the plan.

Planning Team representatives may use the progress reporting forms (Worksheets #1 (Figure 7-1) and #3 (Figure 7-2) 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 Integration Process of the HMP into Municipal Planning Mechanisms

Hazard mitigation is sustained action taken to reduce or eliminate the long-term risk to human life and property from **natural hazards**. Integrating hazard mitigation into a community's existing plans, policies, codes, and programs leads to development patterns that do not increase risk from known hazards or leads to redevelopment that reduces risk from known hazards.

The Planning Team representatives will incorporate mitigation planning as an integral component of daily government operations. They 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 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 Planning Team anticipates that:

1. Hazard mitigation planning will be formally recognized as an integral part of overall planning and emergency management efforts.
2. The Hazard Mitigation Plan, Comprehensive/Master Plans, Emergency Management/Operations Plans and other relevant planning mechanisms will become mutually supportive documents that work in concert to meet the goals and needs of County residents.



Figure 7-1. Worksheet #1

Worksheet #1

Progress Report

step **2**

Page 1 of 3

Progress Report Period: _____ to _____
(date) (date)

Project Title: _____ Project ID#: _____

Responsible Agency: _____

Address: _____

City/County: _____

Contact Person: _____ Title: _____

Phone #(s): _____ email address: _____

List Supporting Agencies and Contacts:

Total Project Cost: _____

Anticipated Cost Overrun/Underrun: _____

Date of Project Approval: _____ Start date of the project: _____

Anticipated completion date: _____

Description of the Project (include a description of each phase, if applicable, and the time frame for completing each phase): _____

Milestones	Complete	Projected Date of Completion



Plan Goal(s)/Objective(s) Addressed:

Goal: _____

Objective: _____

Indicator of Success (e.g., losses avoided as a result of the acquisition program):

In most cases, you will list losses avoided as the indicator. In cases where it is difficult to quantify the benefits in dollar amounts, you will use other indicators, such as the number of people who now know about mitigation or who are taking mitigation actions to reduce their vulnerability to hazards.

Status (Please check pertinent information and provide explanations for items with an asterisk. For completed or canceled projects, see Worksheet #2 — to complete a project evaluation):

Project Status

☐ Project on schedule

☐ Project completed

☐ Project delayed*

*explain: _____

☐ Project canceled

Project Cost Status

☐ Cost unchanged

☐ Cost overrun*

*explain: _____

☐ Cost underrun*

*explain: _____

Summary of progress on project for this report:

A. What was accomplished during this reporting period?

B. What obstacles, problems, or delays did you encounter, if any?

C. How was each problem resolved?

Page 3 of 3

Next Steps: What is/are the next step(s) to be accomplished over the next reporting period?

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Other comments:

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Adapted from the North Carolina HMGP Progress Report Form at http://www.dem.dcc.state.nc.us/mitigation/document_index.htm.



Figure 7-2. Worksheet #3

Worksheet #3 Evaluate Your Project Results**step 3**

page 1 of 2

Project Name and Number: _____

Project Budget: _____

Project Description: _____

Associated Goal and Objective(s): _____

Indicator of Success (e.g., losses avoided): _____

*Insert location map.
Include before and after
photos if appropriate.*

Was the action implemented? ☐ YES ☐ NOIF **NO****Why not?**

Was there political support for the action?

Were enough funds available?

Were workloads equitably or realistically distributed?

Was new information discovered about the risks or community that made implementation difficult or no longer sensible?

Was the estimated time of implementation reasonable?

Were sufficient resources (for example staff and technical assistance) available?

YES NO

☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐☐ ☐IF **YES**

What were the results of the implemented action? _____



page 2 of 2

	YES	NO
Were the outcomes as expected? If No, please explain:		
Did the results achieve the goal and objective(s)? Explain how:		
Was the action cost-effective? Explain how or how not:		
What were the losses avoided after having completed the project?		
If it was a structural project, how did it change the hazard profile?		
Additional comments or other outcomes:		

Date: _____

Prepared by: _____



During the HMP annual review process, each participating municipality will be asked to document how they are utilizing and incorporating the Pike County HMP 2022 update into their day-to-day operations and planning and regulatory processes. Additionally, the County will identify additional policies, programs, practices, and procedures that could be modified to accommodate hazard mitigation actions and include these findings and recommendations in the Annual HMP Progress Report. **The following checklist was adapted from FEMA's Local Mitigation Handbook (2013), Appendix A, Worksheet 4.2.** This checklist will help a community analyze how hazard mitigation is integrated into local plans, ordinances, regulations, ordinances, and policies. By completing the checklist, it will help the County identify areas that integrate hazard mitigation currently and where to make improvements and reduce vulnerability to future development. In this manner, the integration of mitigation into municipal activities will evolve into an ongoing culture within the County.

Table 7-2. Safe Growth Check List

Planning Mechanisms	Do you Do This?		Notes: How is it being done or how will this be utilized in the future?
	Yes	No	
Operating, Municipal and Capital Improvement Program Budgets			
<ul style="list-style-type: none">When constructing upcoming budgets, hazard mitigation actions will be funded as budget allows. Construction projects will be evaluated to see if they meet the hazard mitigation goals.			
<ul style="list-style-type: none">Annually, during adoption process, the municipality will review mitigation actions when allocating funding.			
<ul style="list-style-type: none">Do budgets limit expenditures on projects that would encourage development in areas vulnerable to natural hazards?			
<ul style="list-style-type: none">Do infrastructure policies limit extension of existing facilities and services that would encourage development in areas vulnerable to natural hazards?			
<ul style="list-style-type: none">Do budgets provide funding for hazard mitigation projects identified in the County HMP?			
Human Resource Manual			
<ul style="list-style-type: none">Do any job descriptions specifically include identifying and/or implementing mitigation projects/actions or other efforts to reduce natural hazard risk?			
Building and Zoning Ordinances			
<ul style="list-style-type: none">Prior to, zoning changes, or development permitting, the municipality will review the hazard mitigation plan and other hazard analyses to ensure consistent and compatible land use.			
<ul style="list-style-type: none">Does the zoning ordinance discourage development or redevelopment within natural areas including wetlands, floodways, and floodplains?			
<ul style="list-style-type: none">Does it contain natural overlay zones that set conditions			
<ul style="list-style-type: none">Does the ordinance require developers to take additional actions to mitigate natural hazard risk?			
<ul style="list-style-type: none">Do rezoning procedures recognize natural hazard areas as limits on zoning changes that allow greater intensity or density of use?			
<ul style="list-style-type: none">Do the ordinances prohibit development within, of filling of, wetlands, floodways, and floodplains?			
Subdivision Regulations			
<ul style="list-style-type: none">Do the subdivision regulations restrict the subdivision of land within or adjacent to natural hazard areas?			



Planning Mechanisms	Do you Do This?		Notes: How is it being done or how will this be utilized in the future?
	Yes	No	
<ul style="list-style-type: none"> Do the subdivision regulations restrict the subdivision of land within or adjacent to natural hazard areas? 			
<ul style="list-style-type: none"> Do the regulations provide for conservation subdivisions or cluster subdivisions in order to conserve environmental resources? 			
<ul style="list-style-type: none"> Do the regulations allow density transfers where hazard areas exist? 			
Comprehensive Plan			
<ul style="list-style-type: none"> Are the goals and policies of the plan related to those of the County HMP? 			
<ul style="list-style-type: none"> Does the future land use map clearly identify natural hazard areas? 			
<ul style="list-style-type: none"> Do the land use policies discourage development or redevelopment with natural hazard areas? 			
<ul style="list-style-type: none"> Does the plan provide adequate space for expected future growth in areas located outside natural hazard areas? 			
Land Use			
<ul style="list-style-type: none"> Does the future land use map clearly identify natural hazard areas? 			
<ul style="list-style-type: none"> Do the land use policies discourage development or redevelopment with natural hazard areas? 			
<ul style="list-style-type: none"> Does the plan provide adequate space for expected future growth in areas located outside natural hazard areas? 			
Transportation Plan			
<ul style="list-style-type: none"> Does the transportation plan limit access to hazard areas? 			
<ul style="list-style-type: none"> Is transportation policy used to guide growth to safe locations? 			
<ul style="list-style-type: none"> Are transportation systems designed to function under disaster conditions (e.g. evacuation)? 			
Environmental Management			
<ul style="list-style-type: none"> Are environmental systems that protect development from hazards identified and mapped? 			
<ul style="list-style-type: none"> Do environmental policies maintain and restore protective ecosystems? 			
<ul style="list-style-type: none"> Do environmental policies provide incentives to development that is located outside protective ecosystems? 			
Grant Applications			
<ul style="list-style-type: none"> Data and maps will be used as supporting documentation in grant applications. 			
Municipal Ordinances			
<ul style="list-style-type: none"> When updating municipal ordinances, hazard mitigation will be a priority 			
Economic Development			
<ul style="list-style-type: none"> Local economic development group will take into account information regarding identified hazard areas when assisting new businesses in finding a location. 			
Public Education and Outreach			
<ul style="list-style-type: none"> Does the municipality have any public outreach mechanisms / programs in place to inform citizens on natural hazards, risk, and ways to protect themselves during such events? 			



7.2.3 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.

The status of the HMP will be discussed and documented at annual plan review meetings of the Hazard Mitigation Planning Team. At least one month before the progress plan review meeting, the Pike County HMP Coordinator will advise Planning Team members of the meeting date, agenda, and expectations of the members. The Pike County HMP Coordinator may also distribute additional flood mitigation survey and mitigation project opportunity forms for jurisdictions that may have new information or jurisdictions that did not participate in the update process.

The Pike 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 guidance and/or regulations on the county and municipal levels;
- Current resources are appropriate for implementing the HMP, and whether 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 201.2;
- 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;
- Under or over-spending regarding proposed mitigation action budgets;
- Achievement of the goals and objectives;
- Resource allocation to note whether resources are required to implement mitigation activities;
- Timeframe comments on whether proposed schedules are sufficient to address actions;
- Budget notes (in other words 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 regarding whether resources are available to implement actions; and
- Feasibility comments regarding 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 5.2.6). 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; and
- Transportation.

The Planning Team may refer to the evaluation forms (Worksheets #2 [Figure 7-3] and #4 [Figure 7-4] in the FEMA 386-4 guidance document) to assist in the evaluation process.

The Pike County HMP Coordinator will be responsible for preparing an annual HMP progress report that will summarize information included on the local progress reports provided by each jurisdiction, information presented at the Planning Team meeting, and other information as appropriate and relevant. These reports will provide data for the 5-year update of this HMP and will assist in identifying implementation challenges. By monitoring the implementation of the plan, the Planning Team will be able to assess which projects are completed, are no longer feasible, or may require additional funding.

The 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 HMP Coordinator will establish a schedule for the development, review, comment, amendment, and submission of the HMP progress report to the State Hazard Mitigation Officer.

The plan will also be evaluated and revised, if needed, following any major disasters to determine whether the recommended actions remain relevant and appropriate. The risk assessment will also be revisited to see if any changes are necessary based on the pattern of disaster damages, or if data listed in the Section 4.3 (Hazard Profiles) of this plan have been collected over the performance period 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.



7.2.4 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 Pike County Hazard Mitigation Planning Team updates this plan on a 5-year cycle from the date of plan adoption.

To facilitate the update process, the Pike 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 Pike 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 Pike County HMP Coordinator will be responsible for ensuring that needed resources are secured.

The Pike County HMP Coordinator is 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. The Pike 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 tools can be used as an interactive tool to facilitate** this process. Additional meetings may also be held as deemed necessary by the Planning Team. The purpose of these meetings would be to provide an opportunity for the public to express concerns, opinions, and ideas about the HMP.

7.2.5 Grant Monitoring and Coordination

Pike County recognizes the importance of having an annual coordination period that helps each planning partner become aware of upcoming mitigation grant opportunities and identifies multi-jurisdiction projects to pursue. Grant monitoring will be the responsibility of each municipal partner as part of their annual progress reporting. The Pike County HMP Coordinator will keep the planning partners apprised of FEMA Hazard Mitigation Assistance grant openings and assist in developing letters of intent for grant opportunities when practicable.

Pike County intends to be a resource to the planning partnership in the support of project grant writing and development. The degree of this support will depend on the level of assistance requested by the partnership during open windows for grant applications. As part of grant monitoring and coordination, Pike County intends to provide the following:

- Notification to planning partners about impending grant opportunities.
- A current list of eligible, jurisdiction-specific projects for funding pursuit consideration.
- Notification about mitigation priorities for the fiscal year to assist the planning partners in the selection of appropriate projects.



Grant monitoring and coordination will be integrated into the annual progress report or as needed based on the availability of non-HMA or post-disaster funding opportunities

Figure 7-3. Worksheet #2

Worksheet #2 Evaluate Your Planning Team **step 3**

When gearing up for the plan evaluation, the planning team should reassess its composition and ask the following questions:

	YES	NO
Have there been local staffing changes that would warrant inviting different members to the planning team?		
Comments/Proposed Action:		
Are there organizations that have been invaluable to the planning process or to project implementation that should be represented on the planning team?		
Comments/Proposed Action:		
Are there any representatives of essential organizations who have not fully participated in the planning and implementation of actions? If so, can someone else from this organization commit to the planning team?		
Comments/Proposed Action:		
Are there procedures (e.g., signing of MOAs, commenting on submitted progress reports, distributing meeting minutes, etc.) that can be done more efficiently?		
Comments/Proposed Action:		
Are there ways to gain more diverse and widespread cooperation?		
Comments/Proposed Action:		
Are there different or additional resources (financial, technical, and human) that are now available for mitigation planning?		
Comments/Proposed Action:		

If the planning team determines the answer to any of these questions is "yes," some changes may be necessary.



Figure 7-4. Worksheet #4

Worksheet #4 **Revisit Your Risk Assessment** **step 4**

Risk Assessment Steps	Questions	YES	NO	COMMENTS
Identify hazards	Are there new hazards that can affect your community?			
Profile hazard events	Are new historical records available?			
	Are additional maps or new hazard studies available?			
	Have chances of future events (along with their magnitude, extent, etc.) changed?			
	Have recent and future development in the community been checked for their effect on hazard areas?			
Inventory assets	Have inventories of existing structures in hazard areas been updated?			
	Is future land development accounted for in the inventories?			
	Are there any new special high-risk populations?			
Estimate losses	Have loss estimates been updated to account for recent changes?			

If you answered "Yes" to any of the above questions, review your data and update your risk assessment information accordingly.



7.3 Continued Public Involvement

Pike 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 **Office of Community Planning's** website (https://www.pikepa.org/living___working/community_planning/hazard_mitigation_plan.php), and copies of the plan will be made available for review during normal business hours at the Pike County Office of Community Planning. Pike County will make electronic copies of the plan available for local municipalities to provide public access.

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 Pike County HMP Coordinator will be responsible for receiving, tracking, and filing public comments regarding this 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. Pike County will maintain an active link on the **Office of Community Planning's** website to collect public comments.

The Planning Team representatives are 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 Office of Community Planning website, and provisions for public comment submitted in writing will also be made. All public comments shall be addressed to:
Brian Snyder, Community Planner
Pike County Office of Community Planning
837 Route 6, Unit 3
Shohola, PA 18458
- Copies of the latest approved version of the plan are available for review at the municipal buildings along with instructions to facilitate public input and comment on the plan.
- Appropriate links to a Pike County HMP website (<https://www.pikecountypahmp.com/>) 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 Office of Community Planning website (https://www.pikepa.org/living___working/community_planning/hazard_mitigation_plan.php).
- Public notices will be made, as appropriate, to inform the public of the availability of the plan, particularly during plan update cycles.

The Pike 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.
- HMP content on the Office of Community Planning website 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 Office of Community Planning, along with instructions to facilitate public input and comment on the plan.
- Public notices, including media releases, will be made (as appropriate) to inform the public of the availability of the plan, particularly during plan update cycles.

DRAFT



SECTION 8. PLAN ADOPTION

By adopting the Pike 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 Pike County and each participating jurisdiction legitimizes the HMP and authorizes responsible agencies to execute their responsibilities.

Each participating jurisdiction in Pike 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 Pike County Hazard Mitigation Plan Coordinator. Pike County will forward the executed resolutions to the Pennsylvania Emergency Management Agency (PEMA), who 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 Plan Coordinator. Resolutions reflecting the formal adoption of this HMP by the County and participating jurisdictions are included in Appendix H (Municipal Adoptions) of this HMP. A sample resolution to be used by the County and its jurisdictions is provided on the following pages.



Pike County Hazard Mitigation Plan County Adoption Resolution

Resolution No. _____

Pike County, Pennsylvania

WHEREAS, the municipalities of Pike 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, Pike County acknowledges the requirement of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving Hazard Mitigation Assistance funds, and

WHEREAS, the Pike County 2022 Hazard Mitigation Plan has been developed by Pike County Office of Community Planning in cooperation with other county departments, local municipal officials, and the citizens of Pike County, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Pike County 2022 Hazard Mitigation Plan, and

WHEREAS, the Pike County 2022 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 Pike that:

- The 2022 Pike County Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the county, and
- The respective officials and agencies identified in the implementation strategy of the 2022 Pike County Hazard Mitigation Plan are hereby directed to execute the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2022

ATTEST:

PIKE COUNTY COMMISSIONERS

By _____

By _____

By _____



APPENDIX A. BIBLIOGRAPHY

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APPENDIX B. LOCAL MITIGATION PLAN REVIEW TOOL

This appendix includes worksheets to facilitate plan maintenance and review by the Pike County Steering and Planning Committees. The FEMA 386-4 guidance worksheets are available to assist with progress reporting. These worksheets are provided below for ease of access to the HMP Coordinator and Planning Partnership to maintain the 2022 HMP throughout its period of performance.

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APPENDIX A:

LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction:	Title of Plan:	Date of Plan:
Local Point of Contact:	Address:	
Title:		
Agency:		
Phone Number:	E-Mail:	

State Reviewer:	Title:	Date:
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FEMA Reviewer:	Title:	Date:
Date Received in FEMA Region (insert #)		
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved		

SECTION 1: REGULATION CHECKLIST

INSTRUCTIONS: The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been 'Met' or 'Not Met.' The 'Required Revisions' summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is 'Not Met.' Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
ELEMENT A. PLANNING PROCESS				
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))				
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))				
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))				
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))				
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))				
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))				
ELEMENT A: REQUIRED REVISIONS				

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))				
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))				
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))				
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))				
<u>ELEMENT B: REQUIRED REVISIONS</u>				
ELEMENT C. MITIGATION STRATEGY				
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))				
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))				
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))				
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))				
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))				
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))				
<u>ELEMENT C: REQUIRED REVISIONS</u>				

1. REGULATION CHECKLIST		Location in Plan (section and/or page number)	Met	Not Met
Regulation (44 CFR 201.6 Local Mitigation Plans)				
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)				
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))				
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))				
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))				
<u>ELEMENT D: REQUIRED REVISIONS</u>				
ELEMENT E. PLAN ADOPTION				
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))				
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))				
<u>ELEMENT E: REQUIRED REVISIONS</u>				
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)				
F1.				
F2.				
<u>ELEMENT F: REQUIRED REVISIONS</u>				

SECTION 2: PLAN ASSESSMENT

INSTRUCTIONS: The purpose of the Plan Assessment is to offer the local community more comprehensive feedback to the community on the quality and utility of the plan in a narrative format. The audience for the Plan Assessment is not only the plan developer/local community planner, but also elected officials, local departments and agencies, and others involved in implementing the Local Mitigation Plan. The Plan Assessment must be completed by FEMA. The Assessment is an opportunity for FEMA to provide feedback and information to the community on: 1) suggested improvements to the Plan; 2) specific sections in the Plan where the community has gone above and beyond minimum requirements; 3) recommendations for plan implementation; and 4) ongoing partnership(s) and information on other FEMA programs, specifically RiskMAP and Hazard Mitigation Assistance programs. The Plan Assessment is divided into two sections:

1. Plan Strengths and Opportunities for Improvement
2. Resources for Implementing Your Approved Plan

Plan Strengths and Opportunities for Improvement is organized according to the plan Elements listed in the Regulation Checklist. Each Element includes a series of italicized bulleted items that are suggested topics for consideration while evaluating plans, but it is not intended to be a comprehensive list. FEMA Mitigation Planners are not required to answer each bullet item, and should use them as a guide to paraphrase their own written assessment (2-3 sentences) of each Element.

The Plan Assessment must not reiterate the required revisions from the Regulation Checklist or be regulatory in nature, and should be open-ended and to provide the community with suggestions for improvements or recommended revisions. The recommended revisions are suggestions for improvement and are not required to be made for the Plan to meet Federal regulatory requirements. The italicized text should be deleted once FEMA has added comments regarding strengths of the plan and potential improvements for future plan revisions. It is recommended that the Plan Assessment be a short synopsis of the overall strengths and weaknesses of the Plan (no longer than two pages), rather than a complete recap section by section.

Resources for Implementing Your Approved Plan provides a place for FEMA to offer information, data sources and general suggestions on the overall plan implementation and maintenance process. Information on other possible sources of assistance including, but not limited to, existing publications, grant funding or training opportunities, can be provided. States may add state and local resources, if available.

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Element A: Planning Process

How does the Plan go above and beyond minimum requirements to document the planning process with respect to:

- *Involvement of stakeholders (elected officials/decision makers, plan implementers, business owners, academic institutions, utility companies, water/sanitation districts, etc.);*
- *Involvement of Planning, Emergency Management, Public Works Departments or other planning agencies (i.e., regional planning councils);*
- *Diverse methods of participation (meetings, surveys, online, etc.); and*
- *Reflective of an open and inclusive public involvement process.*

Element B: Hazard Identification and Risk Assessment

In addition to the requirements listed in the Regulation Checklist, 44 CFR 201.6 Local Mitigation Plans identifies additional elements that should be included as part of a plan's risk assessment. The plan should describe vulnerability in terms of:

- 1) *A general description of land uses and future development trends within the community so that mitigation options can be considered in future land use decisions;*
- 2) *The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; and*
- 3) *A description of potential dollar losses to vulnerable structures, and a description of the methodology used to prepare the estimate.*

How does the Plan go above and beyond minimum requirements to document the Hazard Identification and Risk Assessment with respect to:

- *Use of best available data (flood maps, HAZUS, flood studies) to describe significant hazards;*
- *Communication of risk on people, property, and infrastructure to the public (through tables, charts, maps, photos, etc.);*
- *Incorporation of techniques and methodologies to estimate dollar losses to vulnerable structures;*
- *Incorporation of Risk MAP products (i.e., depth grids, Flood Risk Report, Changes Since Last FIRM, Areas of Mitigation Interest, etc.); and*
- *Identification of any data gaps that can be filled as new data became available.*

Element C: Mitigation Strategy

How does the Plan go above and beyond minimum requirements to document the Mitigation Strategy with respect to:

- *Key problems identified in, and linkages to, the vulnerability assessment;*
- *Serving as a blueprint for reducing potential losses identified in the Hazard Identification and Risk Assessment;*
- *Plan content flow from the risk assessment (problem identification) to goal setting to mitigation action development;*
- *An understanding of mitigation principles (diversity of actions that include structural projects, preventative measures, outreach activities, property protection measures, post-disaster actions, etc);*
- *Specific mitigation actions for each participating jurisdictions that reflects their unique risks and capabilities;*
- *Integration of mitigation actions with existing local authorities, policies, programs, and resources; and*
- *Discussion of existing programs (including the NFIP), plans, and policies that could be used to implement mitigation, as well as document past projects.*

Element D: Plan Update, Evaluation, and Implementation (Plan Updates Only)

How does the Plan go above and beyond minimum requirements to document the 5-year Evaluation and Implementation measures with respect to:

- *Status of previously recommended mitigation actions;*
- *Identification of barriers or obstacles to successful implementation or completion of mitigation actions, along with possible solutions for overcoming risk;*
- *Documentation of annual reviews and committee involvement;*
- *Identification of a lead person to take ownership of, and champion the Plan;*
- *Reducing risks from natural hazards and serving as a guide for decisions makers as they commit resources to reducing the effects of natural hazards;*
- *An approach to evaluating future conditions (i.e. socio-economic, environmental, demographic, change in built environment etc.);*
- *Discussion of how changing conditions and opportunities could impact community resilience in the long term; and*
- *Discussion of how the mitigation goals and actions support the long-term community vision for increased resilience.*

B. Resources for Implementing Your Approved Plan

Ideas may be offered on moving the mitigation plan forward and continuing the relationship with key mitigation stakeholders such as the following:

- *What FEMA assistance (funding) programs are available (for example, Hazard Mitigation Assistance (HMA)) to the jurisdiction(s) to assist with implementing the mitigation actions?*
- *What other Federal programs (National Flood Insurance Program (NFIP), Community Rating System (CRS), Risk MAP, etc.) may provide assistance for mitigation activities?*
- *What publications, technical guidance or other resources are available to the jurisdiction(s) relevant to the identified mitigation actions?*
- *Are there upcoming trainings/workshops (Benefit-Cost Analysis (BCA), HMA, etc.) to assist the jurisdictions(s)?*
- *What mitigation actions can be funded by other Federal agencies (for example, U.S. Forest Service, National Oceanic and Atmospheric Administration (NOAA), Environmental Protection Agency (EPA) Smart Growth, Housing and Urban Development (HUD) Sustainable Communities, etc.) and/or state and local agencies?*

SECTION 3:
MULTI-JURISDICTION SUMMARY SHEET (OPTIONAL)

INSTRUCTIONS: For multi-jurisdictional plans, a Multi-jurisdiction Summary Spreadsheet may be completed by listing each participating jurisdiction, which required Elements for each jurisdiction were 'Met' or 'Not Met,' and when the adoption resolutions were received. This Summary Sheet does not imply that a mini-plan be developed for each jurisdiction; it should be used as an optional worksheet to ensure that each jurisdiction participating in the Plan has been documented and has met the requirements for those Elements (A through E).

MULTI JURISDICTION SUMMARY SHEET												
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Requirements
1												
2												
3												
4												
5												
6												
7												
8												
9												

MULTI JURISDICTION SUMMARY SHEET												
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Requirements
10												
11												
12												
13												
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18												
19												
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APPENDIX C. MEETING AND OTHER PARTICIPATION DOCUMENTATION

Appendix C includes meeting agendas, minutes (where applicable and available), and PowerPoint presentations for meetings convened during the development of the Pike County Hazard Mitigation Plan 2022 Update.

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Pike County Hazard Mitigation Plan (HMP) 2021 Update

Steering Committee Kickoff Meeting | June 24, 2021

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Agenda



- Welcome and Introductions
- Benefits of Hazard Mitigation
- Project Scope
- Hazards of Concern
- Problems and Problem Areas
- Planning Team Members
- Public and Stakeholder Outreach
- Meeting Strategy
- Project Schedule
- Next Steps
- Questions



3



Introductions



- Tell us...
 - What's your name?
 - What is your mitigation experience?
 - What do you want to focus on during this process or what is your area of expertise?
 - What are your *natural hazard risk concerns or resilience goals* for Pike County?



Hazard Mitigation – What is it?



Mitigation is a sustained action taken to reduce or eliminate long-term risk to life and property from a hazard event

-or-

Any action taken to reduce future disaster losses

“provides the blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and local ability...” (CFR).





Does Mitigation Work??



- According to the January 2019 National Institute of Building Sciences Natural Hazard Mitigation Saves: 2018 Interim Report, federal mitigation grants save \$6 for every \$1 spent!

**More Mitigation Measures,
More Savings**



**One dollar invested in mitigation =
six dollars U.S. saves in future costs**

6

Why Update?



- The mitigation plan update will:
 - Help the County prepare for and mitigate the effects of disasters
 - Continue to allow the county and participating partners to be eligible for pre- and post-disaster mitigation funding
 - Support CRS participation/rating of municipalities
- What is at risk in Pike County?

Hazard	Losses
Blizzard	\$400,000
Cold/Wind Chill	\$15,000
Drought	\$200,000 (crop)
Excessive Heat	-
Flood/Flash Flood	\$52.3 million
Hail	\$15,000
Heavy Rain	-
Hurricane/ Tropical Storm/ Tropical Depression	-
Lightning/ Thunderstorm	\$850,000
Tornado/Funnel Cloud	\$1.7 million
Wind	\$1.3 million
Winter Weather	\$617,000
Wildfire	-
TOTAL	\$57.3 million

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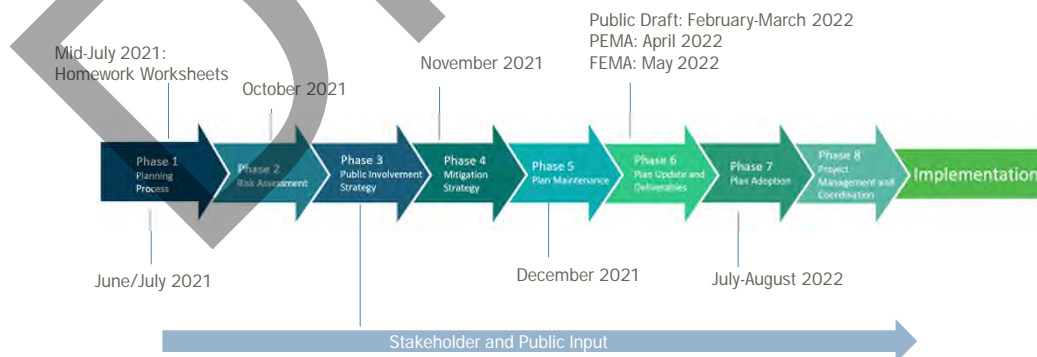


Planning Team Members



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Planning Process Overview



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Project Scope



- Update the Risk Assessment
- Update the Capabilities Assessment
- Update the Mitigation Strategy
- Update Other Sections of the HMP
- Submit the HMP for Review
- Adopt the HMP
- Implement the HMP

Hazards of Concern and Risk Assessment



- Update assets
- Examine previous impacts
- Analyze risks
- Review with Steering Committee
- Risk Assessment Meeting





Hazards of Concern



2017 County HMP	2019 State HMP	2021 County HMP Update
Drought	Drought	Drought
Drowning	-	Drowning
Earthquake	Earthquake	Earthquake
Environmental Hazards (Hazardous Materials Release, Oil and Gas Wells, Pyrite)	Environmental Hazard – Coal Mining Environmental Hazard – Conventional Oil and Gas Wells Environmental Hazard – Gas and Liquid Pipeline Environmental Hazard – Hazardous Materials Releases Environmental Hazard – Unconventional Wells	Environmental Hazards (Hazardous Materials Release, Oil and Gas Wells, Pyrite)
Extreme Temperatures	Extreme Temperature	Extreme Temperature (heat and cold)
Flood	Flood, Flash Flood, Ice Jam	Flood (riverine, flash, stormwater, and ice jam)
Hurricane, Tropical Storm, Nor'easter	Hurricane and Tropical Storm	Hurricane, Tropical Storm, Nor'easter
Invasive Species	Invasive Species	Invasive Species and Harmful Algal Bloom
Landslide	Subsidence and Sinkholes	Geologic Hazards (landslides, subsidence/sinkholes)
Lightning	Lightning Strike	Combine with Severe Weather
Nuclear Incidents	Nuclear Incidents	Nuclear Incidents
Pandemic	Pandemic and Infectious Disease	Disease Outbreak/Pandemic
Radon Exposure	Radon Exposure	Radon Exposure
Terrorism	Terrorism	Terrorism
Tornadoes and Windstorms	Tornadoes and Windstorms	Severe Weather (thunderstorms, lightning, hail, wind)
Transportation Accidents	Transportation Accidents	Transportation Accidents
Urban Fire and Explosions	Urban Fire and Explosions	Urban Fire and Explosions
Utility Interruptions	Utility Interruptions	Utility Interruptions
Wildfire	Wildfire	Wildfire
Winter Storm	Winter Storm	Severe Winter Weather (heavy snow, blizzards, ice storm)

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EXERCISE – Identifying Hazards of Concern



- **Looking at the hazards included in the 2017 plan...**
 - Have additional hazards impacted the County since 2017?
 - Have hazard been mitigated and no longer cause damage?
 - Should hazards be regrouped to align with the 2019 State HMP?
 - Should additional hazards be included?
- **How have hazards affected the county? Where are your problem areas?**
- **Quick survey!**
 - We will send around a quick online survey (<https://forms.gle/mpDyoygjUEXshicj7>) to get your input on the hazards of concern for the 2022 HMP

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Critical Facilities and Lifelines



- Review the 2017 critical facility inventory to ensure complete
- Crosswalk and identify lifelines
- Protecting these facilities should be a priority for hazard mitigation

Critical Facilities are those facilities considered critical to the health and welfare of the population and that are especially important following a hazard. As defined for this HMP, critical facilities include essential facilities, transportation systems, lifeline utility systems, high-potential loss facilities, and hazardous material facilities.

Essential facilities are a subset of critical facilities that include those facilities that are important to ensure a full recovery following the occurrence of a hazard event. For the County risk assessment, this category was defined to include police, fire, EMS, schools/colleges, shelters, senior facilities, and medical facilities.

Lifelines provide indispensable service that enables the continuous operation of critical business and government functions, and is critical to human health and safety, or economic security



Critical Facilities and Lifelines



- Airports/Heliports
- Bridges
- Child/Adult Day Cares
- Correctional Facilities
- Dams
- Electric Grid/Powerlines
- Fire Stations
- Government Offices
- Historic Sites
- Historic/Cultural Resources
- Local Streets
- Major and Minor Highways
- Natural Gas Pipelines
- Nursing Homes/Senior Care/Senior Centers
- Oil Pipelines
- Parks (county, municipal and state)
- Police Stations
- Railroad Line
- Schools
- Search and Rescue / EMS
- Shelters
- Wastewater Treatment Plans
- Wireless Facilities



Goals and Objectives



- We need to review the goals and objectives from the last plan and decide whether or not we want to add or modify goals. We will send an online survey (<https://forms.gle/i3B4AN4NT5tHVz798>) around to get your input.

Goal #	2017 HMP Goal Statement	Modify, Add, or Remove?
1	Provide for properly managed and environmentally sound growth and disaster-resistant development.	
2	Reduce the potential impact of natural and human made hazards on property.	
3	Enhance and improve emergency services provided to the growing population of Pike County.	
4	Reduce vulnerability including loss of life and damage to assets and the environment from natural and human-made hazards.	Revise to follow the 2019 PA HMP Protect lives, property, environmental quality, and resources of Pike County from natural and human-made hazards.
5	Conserve, protect, restore and enhance existing natural systems and water resources that serve a natural hazard mitigation function.	
6	Increase awareness, understanding, and preparedness across all sectors by encouraging hazard risk, preparedness, and mitigation related education, training and outreach activities.	
Additional Goals?	Address Long-Term Vulnerabilities from High Hazard Dams	

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Public and Stakeholder Outreach



- HMP Project Website
 - We developed a website just for the HMP - <https://www.pikecountypahmp.com/>
- Social Media
- Stakeholder Survey
- Public Survey
- Stakeholder Outreach –
 - Neighboring Counties and Stakeholders were notified of the planning process



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Next Steps



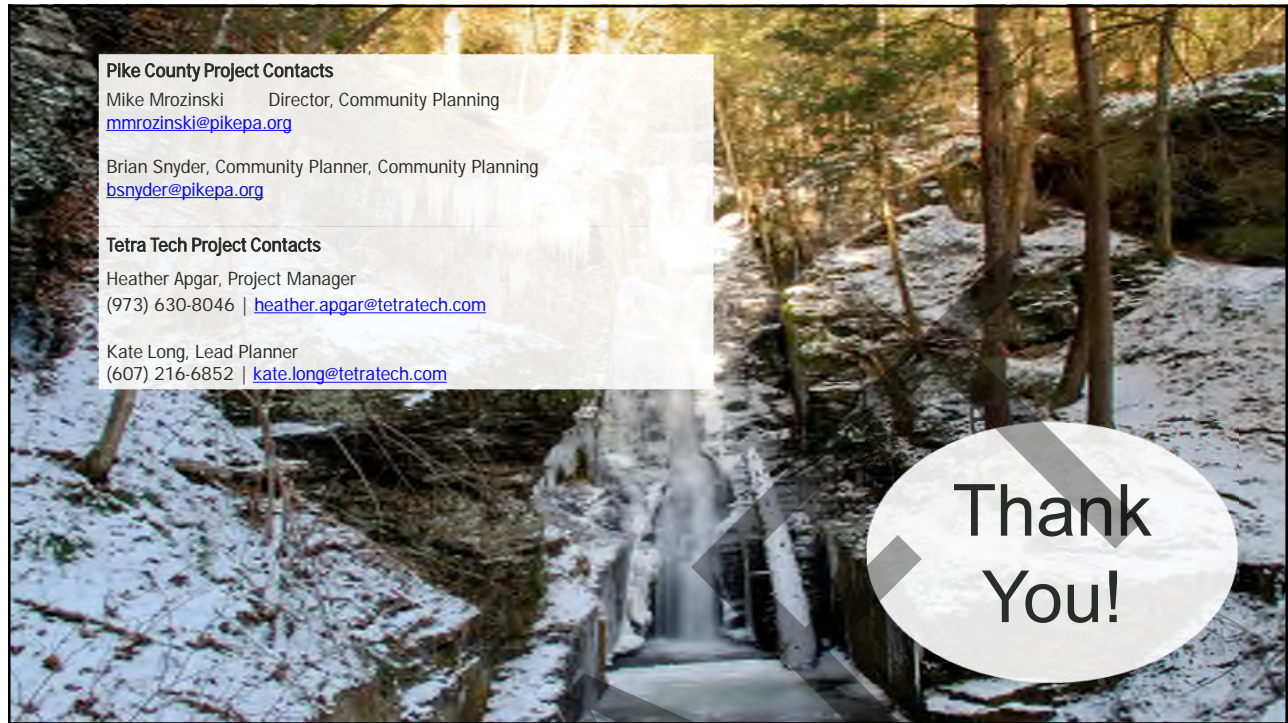
- Take online survey re: update of goals – *to be distributed via email*
- Planning Team Kickoff (Steering Committee and Municipalities): **July 1st at 1:30pm**
- Risk Assessment Meeting: **October 2021**
- Mitigation Strategy Workshop: **November 2021**

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Questions?



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Pike County Project Contacts

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Brian Snyder, Community Planner, Community Planning
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Tetra Tech Project Contacts

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Kate Long, Lead Planner
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Thank
You!

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Pike County Hazard Mitigation Plan Update

Minutes of Meeting



Purpose of Meeting: Steering Committee Meeting #1 – Kick Off		
Location of Meeting: Microsoft Teams		
Date/Time of Meeting: June 24, 2021, 1:30 PM		
Attendees: <input checked="" type="checkbox"/> Pike County Brian Snyder, Community Planning Mike Mrozinski, Community Planning Tim Knapp, Emergency Management Agency Michele Long, Pike County Conservation District		
<input checked="" type="checkbox"/> Tetra Tech Heather Apgar Kate Long		
Agenda Summary: Provide a general overview of the planning process; go over roles and responsibilities of Steering Committee members; identify next steps		
Item No.	Description	Action By:
1.	Introductions <ul style="list-style-type: none">Tetra Tech began the meeting and attendees introduced themselves and their experiences with hazard mitigation planningMike & Tim want this HMP to focus on and to include section on the COVID-19 Pandemic	-
2.	Intro to Hazard Mitigation <ul style="list-style-type: none">Help communities prepare for, or prevent an event from occurring and reduce or eliminate future damages and losses through identifying Mitigation ActionsPike County previously received FEMA grants to elevate Floodprone properties in Matamoras in 2008	-
3.	Planning Process overview <ul style="list-style-type: none">Defined the responsibilities of the Steering Committee:<ul style="list-style-type: none">Providing guidance and leadership throughout the planning process and guide decision makingReview of the Schedule and Project ScopeOn October 1st there is a Pike County Municipal Officials Meeting with all municipalities, stakeholders, and organizations within the county – Tetra Tech can put together presentation to present to everyone about the importance of the HMP	-
4.	Critical Facilities <ul style="list-style-type: none">Remove parksAdd state/county highway departmentsAdd additional water facilities – DEP has GIS layer	Michele to send GIS layer of critical facilities to add
5.	Goals and Objectives <ul style="list-style-type: none">Suggestion to add High Hazard Dam goal and objectives to allow municipalities to be eligible for HHPD grant funding in the future, if needed for High and Intermediate DamsWill need EAPs for dams to include in confidential annex in HMP	Tim Knapp to provide Dam EAPs to Tetra Tech
6.	Public and Stakeholder Outreach <ul style="list-style-type: none">Project Website: https://www.pikecountypahmp.com/Tetra Tech will also be providing social media & website posts for municipalities and departments to useWill also send surveys to stakeholders, neighboring counties and residents to inform the mitigation strategy	-
7.	Next Steps <ul style="list-style-type: none">Take online survey re: update of Goals: https://forms.gle/Uct7bYCMR8B39TxU6Take online survey re: Hazards of Concern: https://forms.gle/o6vuiW7q5p9j9jhD8Attend Planning Partnership Kick-Off on July 1st, 1:30 PMRisk Assessment Meeting – October 2021Mitigation Strategy Workshop – November 2021	Pike was part of a recent 10-county COVID response plan for Northeast Terrorism Task Force – Tim to provide copy



Pike County Hazard Mitigation Plan (HMP) 2021 Update

Planning Team Kickoff Meeting | July 1, 2021

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Agenda



- Attendance
 - Please use the chat feature to state your name and municipality
- Hazard Mitigation – what is it and what are the benefits
- Planning Process
- Review Schedule
- Introduce Worksheets
- Next Steps
- Questions



3

3



Hazard Mitigation – What is it?

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-or-

Any action taken to reduce future disaster losses

“provides the blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and local ability...” (CFR).



Does Mitigation Work??

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More Mitigation Measures,
More Savings



One dollar invested in mitigation =
six dollars U.S. saves in future costs



Why Update?

- The mitigation plan update will:
 - Help the County prepare for and mitigate the effects of disasters
 - Continue to allow the county and participating partners to be eligible for pre- and post-disaster mitigation funding
 - Support CRS participation/rating of municipalities
- What is at risk in Pike County?

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Flood/Flash Flood	\$52.3 million
Hail	\$15,000
Heavy Rain	-
Hurricane/ Tropical Storm/ Tropical Depression	-
Lightning/ Thunderstorm	\$850,000
Tornado/Funnel Cloud	\$1.7 million
Wind	\$1.3 million
Winter Weather	\$617,000
Wildfire	-
TOTAL	\$57.3 million



Planning Team Members





Planning Process Overview



Project Scope



- Update the Risk Assessment
- Update the Capabilities Assessment
- Update the Mitigation Strategy
- Update Other Sections of the HMP
- Submit the HMP for Review
- Adopt the HMP
- Implement the HMP



Update the Risk Assessment

- Hazards of Concern

- Drought
- Disease Outbreak/Pandemic
- Drowning
- Earthquake
- Environmental Hazards (Hazardous Materials Release, Oil and Gas Wells, Pyrite)
- Extreme Temperature (heat and cold)
- Flood (riverine, flash, stormwater, and ice jam)
- Hurricane, Tropical Storm, Nor'easter
- Invasive Species and Harmful Algal Bloom
- Geologic Hazards (landslides, subsidence/sinkholes)
- Nuclear Incidents
- Radon Exposure
- Terrorism
- Severe Weather (thunderstorms, lightning, hail, wind)
- Severe Winter Weather (heavy snow, blizzards, ice storm)
- Transportation Accidents
- Urban Fire and Explosions
- Utility Interruptions
- Wildfire

- Risk Assessment Review Meeting



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Update the Capabilities Assessment

- Capabilities

- Planning and Regulatory Capability
- Administrative and Technical Capability
- Financial Capability
- Education and Outreach
- Self-Assessment of Capability



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11



Update the Mitigation Strategy

- Review the goals and objectives
- Determine status of mitigation actions
- Identify new mitigation actions/projects
 - Focus on specific, implementable and achievable actions!
- Conduct Mitigation Strategy Workshop

Goal #	2021 HMP Goal Statement
1	Provide for properly managed and environmentally sound growth and disaster-resistant development.
2	Reduce the potential impact of natural and human made hazards on property.
3	Enhance and improve emergency services provided to the growing population of Pike County.
4	<i>Protect lives, property, environmental quality, and resources of Pike County from natural and human-made hazards.</i>
5	Conserve, protect, restore and enhance existing natural systems and water resources that serve a natural hazard mitigation function.
6	Increase awareness, understanding, and preparedness across all sectors by encouraging hazard risk, preparedness, and mitigation related education, training and outreach activities.
7	<i>Address Long-Term Vulnerabilities from High Hazard Dams</i>



Update Other Sections of the HMP

- County Profile
 - Taking the previous profile from the last plan and updating it accordingly
- Planning Process
 - Documentation of the update process
- Plan Maintenance
 - Incorporation into other plans as well as identifying way to incorporate other plans into the updated HMP
 - Identify a game plan for annually reviewing and updating the HMP



Submit the HMP for Review

- Review Draft with Planning Team
- 30-day Public Comment Period
- Conduct Public Meeting to Review the Draft
- Submit for Pennsylvania Emergency Management Agency (PEMA) Review
 - 14 to 28 days
- Submit for Federal Emergency Management Agency (FEMA) Review
 - 45 days
- "Approvable Pending Adoption" Status



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Adopt the HMP



- Pike County and at least one participating municipality need to adopt the HMP
- Once FEMA approves the plan, adoption can begin
- Adoption deadline – August 2022



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Implement the HMP

- Regular Planning Team meetings
- Stakeholder meetings
- Implement mitigation actions and projects
 - Integrate actions where appropriate



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Review Schedule

- Capabilities Assessment
 - July – September 2021
- Risk Assessment
 - September – October 2021
- Mitigation Strategy
 - November 2021 – January 2022
- Draft Plan by the end of March 2022
- Submit to PEMA by the end of April 2022
- Submit to FEMA by May 2022
- “Approvable Pending Adoption” by August 2022



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Introduce Worksheets



- Hazard Identification and Risk Evaluation
- Capability Assessment Survey
- National Flood Insurance Program (NFIP) Survey
- Mitigation Strategy 5-Year Mitigation Plan Review

Hazard Identification and Risk Evaluation



PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- | | |
|--|--|
| <input type="checkbox"/> Avalanche/Glacier | <input type="checkbox"/> Expansive Soils |
| <input type="checkbox"/> Coastal Erosion | <input type="checkbox"/> Tsunami |
| <input type="checkbox"/> Dust, Sand Storm | <input type="checkbox"/> Volcano |

Human-Caused

- | | |
|---|--|
| <input type="checkbox"/> Building or Structure Collapse | <input type="checkbox"/> Environmental Hazard - Gas and Liquid Pipelines |
| <input type="checkbox"/> Civil Disturbance | <input type="checkbox"/> Levee Failure |
| <input type="checkbox"/> Cyber Terrorism | <input type="checkbox"/> Mass Food/Animal Feed Contamination |
| <input type="checkbox"/> Disorientation | <input type="checkbox"/> Opioid Addiction Response |
| <input type="checkbox"/> Environmental Hazard - Coal Mining | <input type="checkbox"/> War and Criminal Activity |

Additional Comments:



Hazard Identification and Risk Evaluation



Hazard Identification and Risk Evaluation		
Hazard Identification and Risk Evaluation		
Hazard Identification and Risk Evaluation		
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Capability Assessment Survey



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Capability Assessment Survey



Section/Category	Y1	Y2	Y3	Y4	Comments
Emergency Response Operations	1	2	3	4	Emergency Response Operations
Emergency Response Operations	1	2	3	4	Emergency Response Operations
Emergency Response Operations	1	2	3	4	Emergency Response Operations
Emergency Response Operations	1	2	3	4	Emergency Response Operations
Emergency Response Operations	1	2	3	4	Emergency Response Operations
Emergency Response Operations	1	2	3	4	Emergency Response Operations
Emergency Response Operations	1	2	3	4	Emergency Response Operations
Emergency Response Operations	1	2	3	4	Emergency Response Operations
Emergency Response Operations	1	2	3	4	Emergency Response Operations
Emergency Response Operations	1	2	3	4	Emergency Response Operations

Staff/Personnel/Resource	Y1	Y2	Department/Agency	Comments
Human Resources/Personnel Management	1	2	Township/County/Department	Human Resources/Personnel Management
Human Resources/Personnel Management	1	2	Township/County/Department	Human Resources/Personnel Management
Human Resources/Personnel Management	1	2	Township/County/Department	Human Resources/Personnel Management
Human Resources/Personnel Management	1	2	Township/County/Department	Human Resources/Personnel Management
Human Resources/Personnel Management	1	2	Township/County/Department	Human Resources/Personnel Management
Human Resources/Personnel Management	1	2	Township/County/Department	Human Resources/Personnel Management
Human Resources/Personnel Management	1	2	Township/County/Department	Human Resources/Personnel Management
Human Resources/Personnel Management	1	2	Township/County/Department	Human Resources/Personnel Management
Human Resources/Personnel Management	1	2	Township/County/Department	Human Resources/Personnel Management
Human Resources/Personnel Management	1	2	Township/County/Department	Human Resources/Personnel Management

NFIP Checklist



Section/Category	Y1	Y2	Y3	Y4	Comments
Emergency Response Operations	1	2	3	4	Emergency Response Operations
Emergency Response Operations	1	2	3	4	Emergency Response Operations
Emergency Response Operations	1	2	3	4	Emergency Response Operations
Emergency Response Operations	1	2	3	4	Emergency Response Operations
Emergency Response Operations	1	2	3	4	Emergency Response Operations
Emergency Response Operations	1	2	3	4	Emergency Response Operations
Emergency Response Operations	1	2	3	4	Emergency Response Operations
Emergency Response Operations	1	2	3	4	Emergency Response Operations
Emergency Response Operations	1	2	3	4	Emergency Response Operations
Emergency Response Operations	1	2	3	4	Emergency Response Operations



Next Steps

- Document Request
- Complete Municipal Worksheets
 - Due back to the County and/or Tetra Tech by [July 30, 2021](#)
- Update the Risk Assessment
- Risk Assessment Meeting: [October 2021](#)
- Mitigation Strategy Workshop: [November 2021](#)

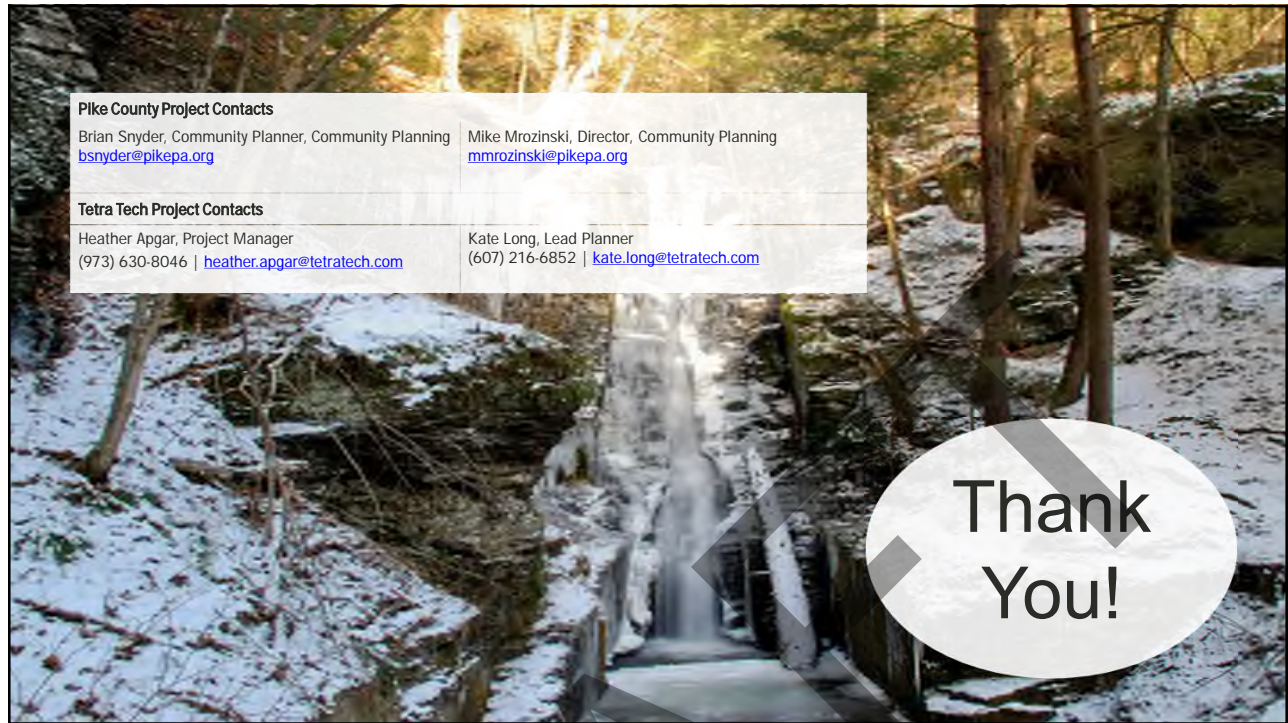


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Pike County Project Contacts	
Brian Snyder, Community Planner, Community Planning bsnyder@pikepa.org	Mike Mrozinski, Director, Community Planning mmrozinski@pikepa.org
Tetra Tech Project Contacts	
Heather Apgar, Project Manager (973) 630-8046 heather.apgar@tetratech.com	Kate Long, Lead Planner (607) 216-6852 kate.long@tetratech.com

Thank
You!

DRAFT



Pike County Hazard Mitigation Plan Update

Minutes of Meeting



Purpose of Meeting: Planning Partnership Kick-Off		
Location of Meeting: Microsoft Teams		
Date/Time of Meeting: July 1, 2021		
Attendees: <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <input checked="" type="checkbox"/> Pike County Mike Mrozinski, Community Planning Brian Snyder, Community Planning Michele Long, Conservation District Kayla Orben, Human Service Krista Gromalski, Commissioners Office <input type="checkbox"/> Blooming Grove (Twp) <input checked="" type="checkbox"/> Delaware (Twp) Krista Predmore <input type="checkbox"/> Dingman (Twp) <input type="checkbox"/> Greene (Twp) <input checked="" type="checkbox"/> Lackawaxen (Twp) Denise Steuhl <input checked="" type="checkbox"/> Lehman (Twp) Edwina Wolfe Rob Rohner <input type="checkbox"/> Matamoras (Twp) <input type="checkbox"/> Milford (B) <input checked="" type="checkbox"/> Milford (Twp) Peggy Emanuel, Planning Committee <input checked="" type="checkbox"/> Palmyra (Twp) Nick Spinelli, EMA <input type="checkbox"/> Porter (Twp) <input type="checkbox"/> Shohola (Twp) <input checked="" type="checkbox"/> Westfall (Twp) Mike Fischetta, EMA Coordinator </div> <div style="width: 48%;"> <input checked="" type="checkbox"/> PEMA Mike Wasko <input checked="" type="checkbox"/> Tetra Tech Heather Apgar Kate Long <input checked="" type="checkbox"/> Other Sharon Fisher, Orange County EM Mari Radford, FEMA R3, Community Planning Lead Mike Roche, DCNR Bureau of Forestry – Delaware Forest District Cody B Hendrix, National Parks Service James Hamill, PMVB Linda Messerschmidt, Monroe County Office of Emergency Management Shannon Cilento, Upper Delaware Council Brian Bossuyt, Pocono Mountains Visitors Bureau Shane Kleiner, DEP Watershed Manager Nick Spinelli, Lake Wallenpaupack Watershed Management District and Palmyra Township EMA Jill Weyer, Sullivan County Department of Planning Andrew Seder, PA State Senator Baker's Representative/Wayne County Wayne County EMA Sharon Fisher Marianne 570-426-0388 570-390-9216 </div> </div>		
Agenda Summary: Provide an overview of the first steps of the Hazard Mitigation Planning Process.		
Item No.	Description	Action By:
1.	Introductions <ul style="list-style-type: none"> Tetra Tech began the meeting and attendees introduced themselves via the chat The Meeting was recorded for anyone not in attendance 	-
2.	Intro to Hazard Mitigation <ul style="list-style-type: none"> Help communities prepare for, or prevent an event from occurring and reduce or eliminate future damages and losses through identifying Mitigation Actions Pike County previously received FEMA grants to elevate Floodprone properties in Matamoras in 2008 	-
3.	Planning Process overview <ul style="list-style-type: none"> Defined the responsibilities of the Planning Team: <ul style="list-style-type: none"> Municipal Responsibilities: Completing worksheets, attending meetings, provide requested information to update the plan, and ultimately adopt and maintain the approved plan. Stakeholder Responsibilities: complete a survey, provide input on the planning process, and review the draft plan. 	-



Pike County Hazard Mitigation Plan Update Minutes of Meeting



	<ul style="list-style-type: none">○ Stakeholders include neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests.• Review of the Schedule and Project Scope	
4.	<p>Public and Stakeholder Outreach</p> <ul style="list-style-type: none">• Project Website: https://www.pikecountypahmp.com/• Tetra Tech will also be providing social media & website posts for municipalities and departments to use• Will also send surveys to stakeholders, neighboring counties and residents to inform the mitigation strategy	All to review project website and complete surveys and post on municipal websites/social media
5.	<p>Worksheets</p> <ul style="list-style-type: none">• There are 4 worksheets each municipality will need to complete. We ask that they be returned by July 30th.• Tt will send them out along with instructions on completing.• If you have any questions or need assistance with completing, please reach out to Kate Long or Heather Apgar.	Municipalities to complete worksheets by August 6th
6.	<p>Next Steps</p> <ul style="list-style-type: none">• Risk Assessment Meeting– October 2021• Mitigation Strategy Workshop – November 2021	-



PIKE COUNTY HAZARD MITIGATION PLAN - 2022 UPDATE

SIGN-IN SHEET

TOPIC: Municipal Support Meetings

MEETING DATE: 9/8/2021

*Pike County or Tetra Tech may take pictures during the meeting and include in the public plan



Name	Jurisdiction/Title	Email	Phone Number	Photo Release (Y/N)
Brian Snyder	Pike County	bsnyder@pikepa.org	570 296 3500	
Terri Koch	Porter Township	info@portertownship.net	570.561.4950	
Nick Spinelli	Palmyra Twp	nrs161@gmail.com	570.241.2559	
Dana Steuhl	Lackawanna Twp	dones@lackawannatwp.org	570-685-7288	
Mark Osterberg	Pike Co Office			
Ellen Enslin	Pike Co. Conservation Dist	eenslin@pikepa.org	570 226 8220	
Michelle Long	Pike Co. Conservation Dist.	mlong@pikepa.org	570 226 8220	
Clint Malzak	Shohola Twp.	malzakwps@yahoo	570-618-2010	
ROB ROHNER	LEHMAN TWP	lehmanpkptd.net	570-588-9365	



Pike County Hazard Mitigation Plan 2022 Update

Township Officials Conference | October 1, 2021



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1

What is Hazard Mitigation?

- Hazard mitigation describes actions taken to help reduce or eliminate long-term risks caused by hazards or disasters.
- There are several steps a community can take to help mitigate hazards – developing a Hazard Mitigation Plan (HMP) is one of them.

“provides the blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and local ability...” (CFR).



2

What is a Hazard Mitigation Plan?



- Mitigation is most effective when it is based on a comprehensive, long-term plan that is developed BEFORE a disaster occurs.
- A Hazard Mitigation Plan (HMP) is used to identify policies and actions that can be implemented to reduce risk and future losses from hazards and disasters.
- It is a community-driven, living document that encourages communities to integrate mitigation into their day-to-day operations and decisions.

Public Involvement

- Builds community-wide support
- Gets feedback from those who live and work in the community
- Creates a more resilient community

Risk Assessment

- Looks at hazards that can impact a community
- Estimates the potential losses
- Provides a basis for developing actions to reduce or eliminate damages from a hazard

Mitigation Strategy

- Communities identify projects to mitigate hazards
- Uses public input, risk assessment data, and capabilities to develop projects

3

Why Prepare an HMP?



Plan for the future

Recovery quickly after disasters

Identify mitigation actions

Access to FEMA funding

- An HMP provides a strategy to reduce or eliminate damages from disaster and break the cycle of disasters and damages.
- Reduces the risk to people and property and reduces the cost of disaster recovery.
- Identifies ways communities can become more resilient and disaster-resistant.
- Communities remain eligible for FEMA pre-disaster mitigation funding.

4

Hazard Mitigation Works!

- According to the January 2019 National Institute of Building Sciences Natural Hazard Mitigation Saves: 2018 Interim Report, federal mitigation grants save \$6 for every \$1 spent!

More Mitigation Measures, More Savings



5

5

Why Update the Current Plan?

- Every five years, FEMA requires a County's HMP to be updated.
- The mitigation plan update will:
 - Help the County prepare for and mitigate the effects of disasters
 - Continue to allow the county and participating partners to be eligible for pre- and post-disaster mitigation funding
 - Support CRS participation/rating of municipalities

Hazard	Losses
Blizzard	\$400,000
Cold/Wind Chill	\$15,000
Drought	\$200,000 (crop)
Excessive Heat	-
Flood/Flash Flood	\$52.3 million
Hail	\$15,000
Heavy Rain	-
Hurricane/ Tropical Storm/ Tropical Depression	-
Lightning/ Thunderstorm	\$850,000
Tornado/Funnel Cloud	\$1.7 million
Wind	\$1.3 million
Winter Weather	\$617,000
Wildfire	-
TOTAL	\$57.3 million



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Participation Requirements

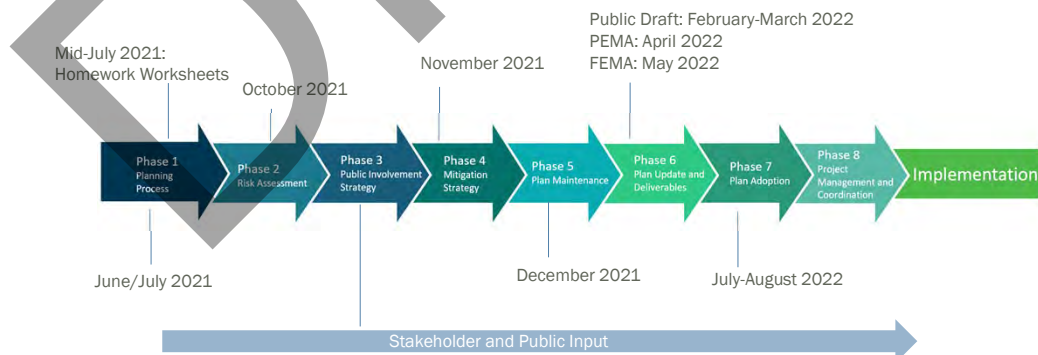
- Participation is required in order to be included in the HMP
- The plan will include a description of municipal involvement (attending meetings, completing forms, providing mitigation actions)
- Participation to date:

Municipality	Planning Team Meeting #1 7/1/2021	Municipal Support Meeting 9/8/21	Worksheet 1 – Hazard ID	Worksheet 2 – Capability Assessment	Worksheet 3 – NFIP Checklist	Worksheet 4 – Mitigation Strategy Review
Pike County	X	X	X	X	X	X
Blooming Grove Township						
Delaware Township	X	X	X	X	X	X
Dingman Township						
Greene Township						
Lackawaxen Township	X	X	X	X	X	X
Lehman Township	X	X	X	X	X	X
Matamoras Borough			X	X	X	X
Millford Borough			X	X	X	X
Millford Township	X	X	X	X	X	X
Palmyra Township	X		X	X	X	X
Porter Township		X	X	X	X	X
Shohola Township		X	X	X	X	X
Westfall Township	X		X	X	X	X

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Planning Process Overview



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Project Scope

- Update the Risk Assessment
- Update the Capabilities Assessment
- Update the Mitigation Strategy
- Update Other Sections of the HMP
- Submit the HMP for Review
- Adopt the HMP
- Implement the HMP

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Planning Process Schedule

- Capabilities Assessment
 - July – September 2021
- Risk Assessment
 - September – October 2021
- Mitigation Strategy
 - November 2021 – January 2022
- Draft Plan by the end of March 2022
- Submit to PEMA by the end of April 2022
- Submit to FEMA by May 2022
- “Approvable Pending Adoption” by August 2022

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Public and Stakeholder Outreach



- HMP Project Website
 - We developed a website just for the HMP - <https://www.pikecountypahmp.com/>
- Social Media
- Stakeholder Survey
- Public Survey
- Stakeholder Outreach –
 - Neighboring Counties and Stakeholders were notified of the planning process



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Pike County Project Contacts Brian Snyder, Community Planner, Community Planning bsnyder@pikepa.org		Mike Mrozinski, Director, Community Planning mmrozinski@pikepa.org
Tetra Tech Project Contacts Heather Appgar, Project Manager (973) 630-8046 heather.appgar@tetratech.com		Kate Long, Lead Planner (607) 216-6901 kate.long@tetratech.com

Thank You!

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PIKE COUNTY HAZARD MITIGATION PLAN - 2022 UPDATE

SIGN-IN SHEET

TOPIC: Risk Assessment

MEETING DATE: 11/10/21 2:00pm

*Pike County or Tetra Tech may take pictures during the meeting and include in the public plan



Name	Jurisdiction/Title	Email	Phone Number	Photo Release (Y/N)
Teresa J. Jels	Reliance WSP	tpluhers@yachow.com	914-443-5727	
Cheryl Schmitt	Supervisor Inter-Township	cs3239@ptd.net	570-527-2260	
Heather Apgar	Project Manager T	heather.apgar@tetratech.com	973-630-8040	
Nick May	MWA Superintendent	nmay@milfordpaucher.com	570-460-9737	
Michelle Long	PCCD Exec. Director	mlong@pikepa.org	570-226-8220	
Mike McAffery	Bloomington Zoning & Code Enforc	Michael.McAffery@BloomingtonPA.com	775-6461	
DEVIDE STEHL	LACRAWATER TWP SECRETARY	DENISE(WLACKAWATER TOWNSHIP)@PA.GOV	570-685-7288	
Brian Snyder	Pike County	bsnyder@pikepa.org	570-296-3500	
Bernie Schwartz	Pike County	911@pikepa.org	570-296-3405	
Kyle Rohrer	Lehman / EMA	KRohrer17@gmail.com	570-234-9883	
Jordan Wisniewski	PIKE CO. EMA	jwisniewski@pikepa.org	570-296-1960	



Pike County Hazard Mitigation Plan (HMP) 2022 Update

Risk Assessment Meeting | November 10, 2021

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1

Agenda



- Welcome
- Project Status – where we are in the process
- Risk Assessment Overview – draft results to date
- Next Steps



2

2



Project Schedule Review

- | | |
|---|--|
| ✓ June/July 2021 | Kick-Off Meetings |
| ✓ July-September 2021 | Data Collection |
| <input type="checkbox"/> November 10, 2021 | Risk Assessment Presentation – TODAY! |
| <input type="checkbox"/> October-November 2021 | Update Hazard Profiles – <i>in progress</i> |
| <input type="checkbox"/> December 2021 | Mitigation Strategy Workshop (date TBD) |
| <input type="checkbox"/> June 2021 – March 2022 | Plan Development |
| <input type="checkbox"/> March 2022 | Review Draft Plan |
| <input type="checkbox"/> April 2022 | Plan Submitted to PEMA |
| <input type="checkbox"/> May 2022 | Plan Submitted to FEMA |



3

3



Worksheet Completion Status

- Received worksheets from all 13 jurisdictions – great job!
 - Tetra Tech will follow-up with the municipalities to fill in any missing gaps
- Providing information and attending meetings is a participation requirement for the HMP
 - Lack of participation in this HMP planning process can prevent funding eligibility



4

4



Public Outreach and Engagement



- Stakeholder and neighboring county surveys were distributed
- To date, we have received over 50 responses to the public survey
- Public Engagement – County and municipalities were sent different tools they can use to help – please continue to share!
 - HMP website
<https://www.pikecountypahmp.com/>
 - Social Media announcements – Facebook and Twitter
 - Let Tetra Tech know when you post about the HMP so we can include in the HMP



TETRA TECH

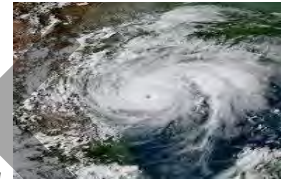
Risk Assessment Overview



What is Risk?

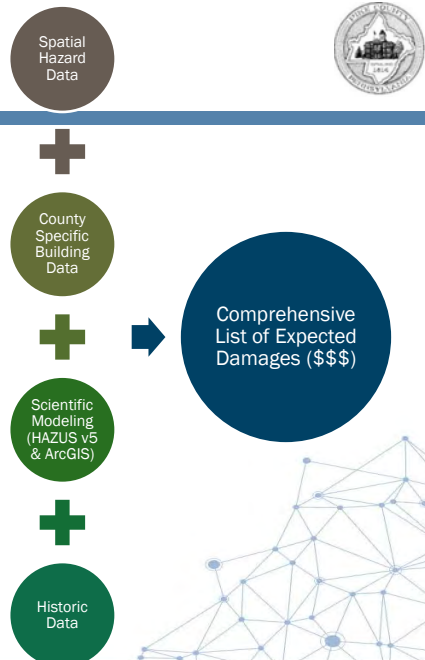
Risk is defined as a function of :

- ✓ Hazard
 - *Source of potential danger or adverse condition*
- ✓ Exposure
 - *Manmade or natural features that are exposed to the hazard*
- ✓ Vulnerability
 - *Damage susceptibility of the exposed features*



Purpose of the Risk Assessment

- To get a better understanding of the risks you face
- Initial results based on available data
- Quantitative data (population/structures exposed, structural damages within hazard zones) used when available
- Qualitative community input (such as unmapped flood areas) integrated to adjust results
- Local community input to adjust relative rankings





Ranking the Hazards of Concern

How are the rankings calculated? What is the preliminary ranking?

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Preliminary Risk Factor Methodology



- What is used to calculate the risk factor?
 - Probability – what is the likelihood of a hazard event occurring in any given year?
 - Impact – looks at injuries, damages, or deaths from a hazard
 - Spatial Extent – how large of an area will be impacted?
 - Warning Time – is there some lead time associated with the hazard?
 - Duration – how long does the event usually last?



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Summary of Risk Factor (RF) Methodology

Risk Assessment Category	Level	Criteria	Index	Weight Value
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 PROBABILITY	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?	NEGIGIBLE	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	

TETRA TECH

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Preliminary Risk Factor																
RISK FACTOR CALCULATION																
Risk Factor = Probability x 0.30 + Impact x 0.30 + Spatial Extent x 0.20 + Warning Time x 0.10 + Duration x 0.10																
Hazard	PROBABILITY			IMPACT			SPATIAL EXTENT			WARNING TIME			DURATION			RISK FACTOR
	Level	Index	Weight Value	Level	Index	Weight Value	Level	Index	Weight Value	Level	Index	Weight Value	Level	Index	Weight Value	
Disease Outbreak	Possible	2	30%	Critical	3	30%	Moderate	3	20%	More than 24 hrs	1	10%	More than 1 week	4	10%	2.6
Drought	Likely	3	30%	Limited	2	30%	Large	4	20%	More than 24 hrs	1	10%	More than 1 week	4	10%	2.8
Drowning	Highly Likely	4	30%	Minor	1	30%	Negligible	1	20%	Less than 6 hrs	4	10%	Less than 6 hrs	1	10%	2.2
Earthquake	Unlikely	1	30%	Minor	1	30%	Large	4	20%	Less than 6 hrs	4	10%	Less than 6 hrs	1	10%	1.9
Environmental Hazards	Highly Likely	4	30%	Limited	2	30%	Moderate	3	20%	Less than 6 hrs	4	10%	Less than 24 hrs	2	10%	3
Extreme Temperatures	Likely	3	30%	Limited	2	30%	Large	4	20%	12 to 24 hrs	2	10%	Less than 1 week	3	10%	2.8
Flood	Highly Likely	4	30%	Critical	3	30%	Moderate	3	20%	12 to 24 hrs	2	10%	Less than 1 week	3	10%	3.2
Hurricane/Nor'Easter	Possible	2	30%	Limited	2	30%	Moderate	3	20%	More than 24 hrs	1	10%	Less than 1 week	3	10%	2.2
Invasive Species	Highly Likely	4	30%	Minor	1	30%	Large	4	20%	More than 24 hrs	1	10%	More than 1 week	4	10%	2.8
Geologic	Possible	2	30%	Minor	1	30%	Negligible	1	20%	Less than 6 hrs	4	10%	Less than 6 hrs	1	10%	1.6
Nuclear Incidents	Unlikely	1	30%	Minor	1	30%	Moderate	3	20%	Less than 6 hrs	4	10%	More than 1 week	4	10%	2
Radon	Highly Likely	4	30%	Limited	2	30%	Large	4	20%	More than 24 hrs	1	10%	More than 1 week	4	10%	3.1
Terrorism	Possible	2	30%	Minor	1	30%	Small	2	20%	Less than 6 hrs	4	10%	More than 1 week	4	10%	2.1
Severe Weather	Highly Likely	4	30%	Limited	2	30%	Large	4	20%	6 to 12 hrs	3	10%	Less than 24 hrs	2	10%	3.1
Severe Winter Weather	Highly Likely	4	30%	Limited	2	30%	Large	4	20%	12 to 24 hrs	2	10%	Less than 24 hrs	2	10%	3
Transportation	Highly Likely	4	30%	Limited	2	30%	Negligible	1	20%	Less than 6 hrs	4	10%	Less than 6 hrs	1	10%	2.5
Urban Fire	Possible	2	30%	Limited	2	30%	Negligible	1	20%	Less than 6 hrs	4	10%	Less than 24 hrs	2	10%	2
Utility	Highly Likely	4	30%	Limited	2	30%	Small	2	20%	Less than 6 hrs	4	10%	More than 1 week	4	10%	3
Wildfire	Highly Likely	4	30%	Minor	1	30%	Moderate	3	20%	Less than 6 hrs	4	10%	Less than 1 week	3	10%	2.8
																High > = 2.5 Moderate = 2.0 to 2.4 Low < 2.0

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Disease Outbreak and Pandemic



- Includes:
 - West Nile Virus
 - Lyme Disease
 - Influenza
 - Measles
 - Ebola
 - Zika
 - COVID-19
- Exposure
 - Entire County is vulnerable
 - Increased vulnerability in highly populated areas, tourists
- Overall Ranking - HIGH

1,104
Confirmed Cases of Influenza
(2015-2019)

436
Cases of Lyme Disease
(2015 - 2019)

5,503
Confirmed cases of COVID-19
(as of 11/5/2021)
63 Total Deaths

Disease Outbreak FEMA
Declarations
• COVID-19 - DR-4506 - January 2020
to present

Drought



Since 2012, the County has experienced 15 periods of drought.

Potential impacts:

1. Increased wildfire risk
2. Impacts to agriculture/farms
3. Drinking water supply (groundwater and surface water)

53
Number of farms

24,700
Acres of farmland

\$892,000

Total market value of
products sold (2017)

From 2017 Census of Agriculture

Overall Ranking - HIGH

Drowning

•History

- Majority of drownings occur along in the Delaware River
- Pike County EMA conducts water rescues throughout the year

•Overall Ranking - Medium



Earthquake

•History

- No historic earthquakes with epicenters in Pike County

•Annualized Losses - \$129,570

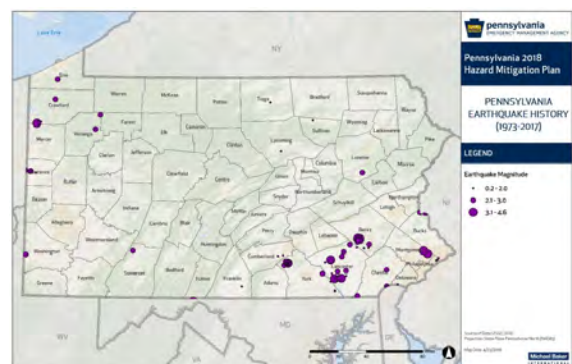
•Losses from 500-year mean return period (MRP) event

- \$11,398,663 in building damages
- 8,781 tons of debris

•Losses from 2,500-year MRP event

- \$110,564,051 in building damages
- 48,071 tons of debris

•Overall Ranking - Low





Environmental Hazards

- Types of hazards:
 - Hazardous materials release (fixed or in-transit)
 - Oil and gas well incidents
- History
 - 5 reported in-transit hazmat incidents since 2017 (US DOT database; North American Hazmat Situations)
- Exposure
 - HazMat sites
 - Major routes that transport hazardous materials
 - Natural gas transmission lines
- Damages depend on the incident
- Overall Ranking - High

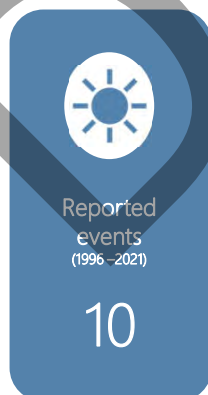


17

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Extreme Temperatures



Overall Ranking - HIGH



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Flood

- Types of hazards:

- Riverine/flash
- Urban/stormwater
- Dam failure
- Ice jam

- History of Events

- 6 FEMA disaster declarations
 - DR-273 (1969) – Severe Storms and Flood
 - DR-1093 (1996) – Severe Storms and Flooding
 - DR-1219 (1998) – Severe Storms, Tornadoes, and Flooding
 - DR-1555 (2004) – Severe Storms and Flooding Associated with Tropical Depression Frances
 - DR-1587 (2005) – Severe Storms and Flooding
 - DR-1649 (2006) – Severe Storms, Flooding, and Mudslides
- 4 ice jams along the Delaware River and Shohola Creek

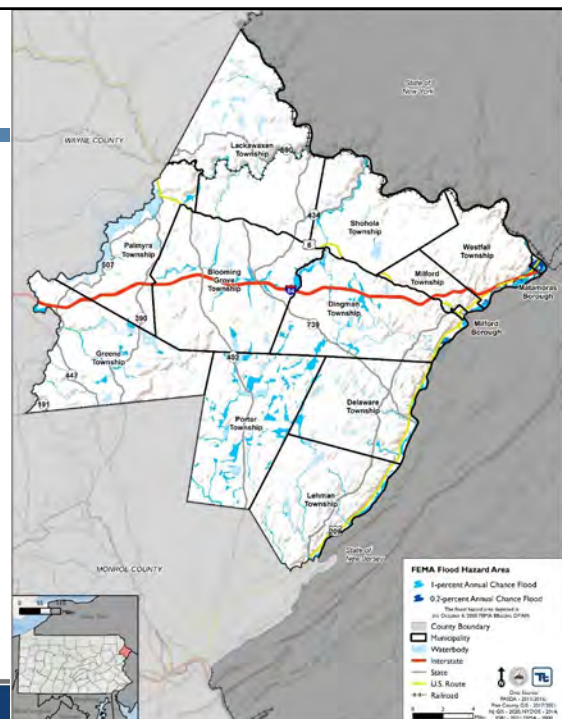


Flood

- Risk Assessment Results

- Estimated 1,749 people in the 1% annual chance flood area (2019 ACS)
- Estimated \$188,590,000 in exposed property value
- Expected Losses (1-Percent Annual Chance Flood)
 - \$3,258,305 in property damage (including residential, commercial, and other occupancy types)
 - 32,175 tons of debris (including finished, structure, and foundation)
 - 1,865 households displaced
 - 854 people seeking shelter

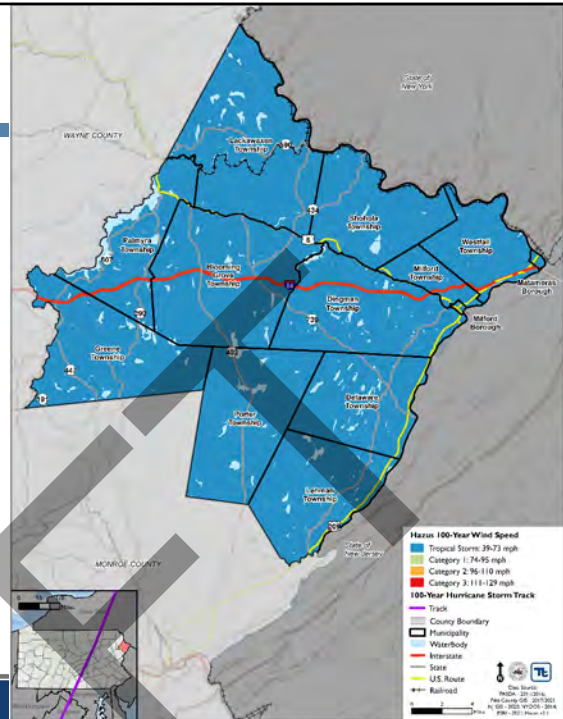
- Overall Ranking – High





Hurricane/Nor'Easter

- History
 - 28 tropical cyclone events within 60 miles of Pike County since 1861
 - 5 FEMA-declared hurricane/tropical storm events since 1954
 - Several major events that impacted the County over the last 5 years, including recent impacts from Hurricane Ida
- Vulnerability Assessment
 - Annualized Losses: \$58,878
 - Losses from 100-year mean return period (MRP) event: TS wind speeds
 - \$549,080 (Structure Only) in building damages
 - Less than 100 tons of debris
 - Losses from 500-year MRP event: TS and Cat 1 wind speeds
 - \$7,094,001 (Structure Only) in building damages
 - 124 tons of debris
- Overall Ranking - Medium



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Invasive Species and Harmful Algal Bloom

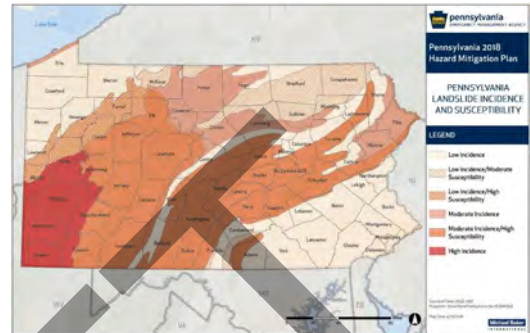
- Types of hazards:
 - Emerald Ash Borer
 - Hemlock Woolly Adelgid
 - Ticks and Mosquitos
 - Spotted Lanternfly
 - Harmful Algal Bloom
- Overall Ranking - High



22

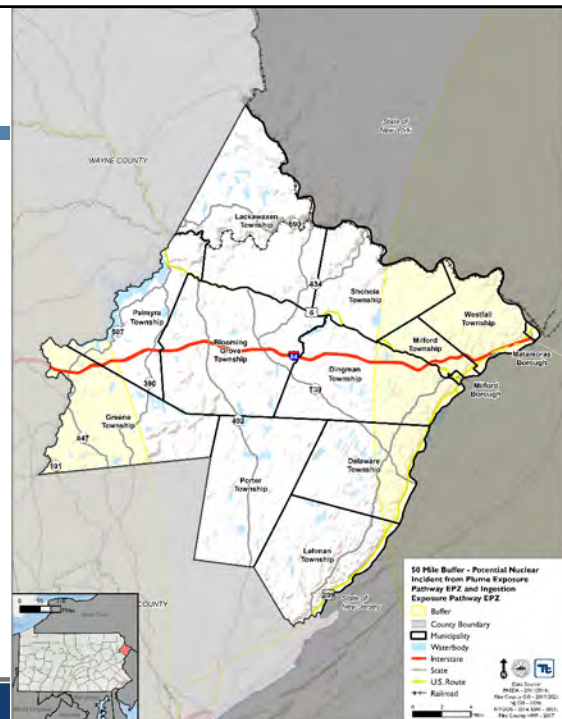
Geologic Hazards

- Types of hazards:
 - Landslides
 - Subsidence/Sinkholes
- Exposed County population
 - 31.7% of the population is in the high-susceptibility/moderate-incidence zone
- Exposed property value
 - \$3,565,516,000 in the high-susceptibility/moderate-incidence zone
- Expected losses depend on the nature and extent of the landslide
- Overall Ranking - Low



Nuclear Incidents

- Hazard Profile:
 - Susquehanna Steam Electric Station in Luzerne County, PA
 - Indian Point Power Plant in Westchester County, NY
 - History: No major accidents
- Vulnerability Assessment
 - 17,040 estimated population located within the 50-mile nuclear incident hazard area
- Overall Ranking - Medium





Radon Exposure



- Hazard Profile

- History

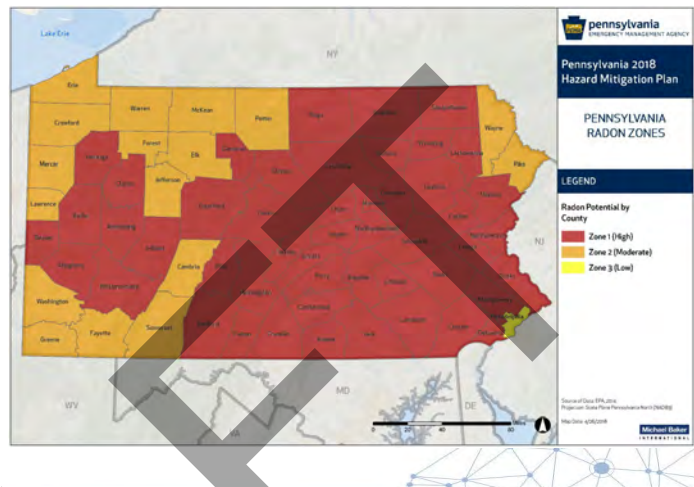
- Estimated 40% homes in PA have elevated radon levels
 - Tests > 4 pCi/L (picoCuries per liter)

- Exposure: Entire County (no known safe level of exposure)

- Impacts Include

- Lung cancer
 - Contaminated groundwater
 - Economic loss – radon mitigation system (average \$1200)

- Overall Ranking - High



Terrorism



- Hazard Profile:

- History

- Threats made in several municipalities (e.g., bomb threats)

- Considerations

- Influx of people from New York metropolitan area seeking shelter

- Overall Ranking - Medium



Severe Weather



- Hazard Profile

- Includes: hail, thunderstorms, lightning, tornadoes, heavy rain
- 129 severe weather events since 1989; 3 injuries and \$4.14 million in property damage (as reported to NOAA)
- 6 FEMA disaster declarations since 1954

- Exposure

- Entire County is vulnerable to severe weather events
- Over \$8 billion in structural value
- Impacts
 - Vulnerable populations
 - Damage to roofs and building frames
 - Damage to roadways and infrastructure
 - Power outages
- Overall Hazard Ranking - High



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Severe Winter Weather

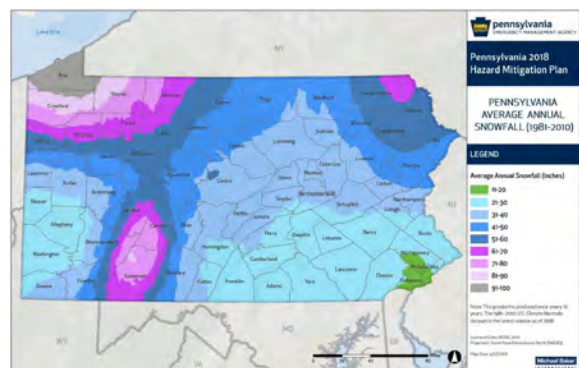


- Hazard Profile:

- 73 winter storm events since 1996
- 2 disaster declarations since 1954

- Exposure

- Entire County is vulnerable to heavy snow and ice storms
- Over \$8 billion in structural value
- Impacts
 - Vulnerable populations
 - Damage to roofs and building frames
 - Cost of snow/ice removal
 - Damage to roadways and infrastructure
- Overall Hazard Ranking - High



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Transportation Accidents

- Hazard Profile:

- History

- 2,303 vehicle crashes (2017-2020)
 - 39 fatalities from automobile crashes (2017-2020)
 - 1 pedestrian fatality (2017-2020)

- Potential impacts and other damages

- Release of hazardous materials
 - Interruption of critical supply/access routes
 - Traffic congestion

- Overall Ranking – High



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Urban Fire



- Hazard Profile:

- Mainly residential structure fires and explosions.

- Exposure and vulnerability

- Urban areas have greater vulnerability
 - Compliance with current fire safety codes

- Overall Ranking – Medium



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Utility Interruptions

- Hazard Profile:
 - Often a secondary impact of another hazard event (e.g., thunderstorms, winter storms, hurricanes, strong winds)
 - Exposure: Entire County
 - Regional events are usually the most severe
 - Impacts to vulnerable populations
- Overall Ranking – High



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Wildfire



- Hazard Profile:
 - History
 - 225 wildfires within Pike County between 2002-2008
 - April 2016 – 16-Mile Fire
 - Near border of Monroe and Pike Counties – more than 8,000 acres burned



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Risk Assessment Results

- Municipal Risk Factor Analysis – what do you think is your municipality's ranking?

	Disease Outbreak	Drought	Drowning	Earthquake	Environmental Hazards	Extreme Temperatures	Flood	Geologic	Hurricane, Nor' Easter	Invasive Species	Nuclear Incidents	Radon	Severe Weather	Severe Winter Weather	Terrorism	Transportation	Urban Fire	Utility	Wildfire
Municipality	2.8	2.0	2.2	1.9	3.0	2.8	3.2	1.6	2.2	2.8	2.0	3.1	3.1	3.2	2.1	2.5	2.0	3.0	2.8
Blooming Grove Township																			
Delaware Township																			
Dingman Township																			
Greene Township																			
Lackawaxen Township																			

- > Your municipality's risk from this hazard is greater than the County's risk as a whole
- < Your municipality's risk from this hazard is less than the County's risk as a whole
- = Your municipality's risk from this hazard is about the same as the County's risk as a whole

Next Steps

- Complete Municipal Worksheets
- Finalize Risk Assessment – due to Tetra Tech by Tuesday, November 30th
- Conduct Mitigation Strategy Workshop – date TBD
 - Start thinking about your mitigation actions!



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1. Welcome

2. Project Status

3. Municipal Participation

4. Municipal Risk Factor Analysis

5. Develop the Updated Mitigation Strategy

- a. Problems and Problem Areas
 - b. Purpose of the Mitigation Strategy
 - c. Goals and Objectives
 - d. Categories of Mitigation Actions
 - e. Identify Mitigation Actions
 - f. Mitigation Action Examples
 - g. Mitigation Action Worksheet
-

6. Next Steps

- a. Identify and Submit Mitigation Actions
 - b. Solicit Additional Participation
 - c. Finalize the Draft HMP
 - d. Provide Public Comment Period
 - e. Conduct Draft Review Meeting
 - f. Submit Plan Update to PEMA
 - g. Submit Plan Update to FEMA
-

7. Questions



Pike County Hazard Mitigation Plan (HMP) 2022 Update

Mitigation Strategy Workshop | January 19, 2022

complex world | CLEAR SOLUTIONS™

1

Agenda



- Welcome
- Project Status – where we are in the process
- Municipal Participation
- Municipal Risk Factor Analysis
- Develop the Updated Mitigation Strategy
- Next Steps
- Questions



2

2



Project Schedule Review



- | | |
|---|--|
| ✓ June/July 2021 | Kick-Off Meetings |
| ✓ July-September 2021 | Data Collection |
| ✓ November 10, 2021 | Risk Assessment Presentation |
| ✓ October-November 2021 | Update Hazard Profiles – <i>County reviewing</i> |
| <input type="checkbox"/> January 19, 2022 | Mitigation Strategy Workshop – TODAY! |
| <input type="checkbox"/> June 2021 – March 2022 | Plan Development |
| <input type="checkbox"/> March 2022 | Review Draft Plan |
| <input type="checkbox"/> April 2022 | Plan Submitted to PEMA |
| <input type="checkbox"/> May 2022 | Plan Submitted to FEMA |



3

3

Worksheet Completion Status



- Received worksheets from all 13 jurisdictions – great job!
 - Tetra Tech will follow-up with the municipalities to fill in any missing gaps
- Providing information and attending meetings is a participation requirement for the HMP
 - Lack of participation in this HMP planning process can prevent funding eligibility



4

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Municipal Participation Status

Jurisdiction	Worksheet 1 - Hazard ID	Worksheet 2 - Capabilities	Worksheet 3 - NFIP	Worksheet 4 - Previous Actions	Risk Ranking Review
Pike County	X	X	N/A	X	X
Blooming Grove Township	X	X	X	X	X
Delaware Township	X	X	X	X	
Dingman Township	X	X	X	X	X
Greene Township	X	X			X
Lackawaxen Township	X	X	X	X	
Lehman Township	X	X	X	X	X
Matamoras Borough	X	X	X	X	
Milford Borough	X	X	X	X	X
Milford Township	X	X	X	X	X
Palmyra Township	X	X	X	X	
Porter Township	X	X	X	X	X
Shohola Township	X	X	X	X	
Westfall Township	X	X	X	X	X

Public Outreach and Engagement

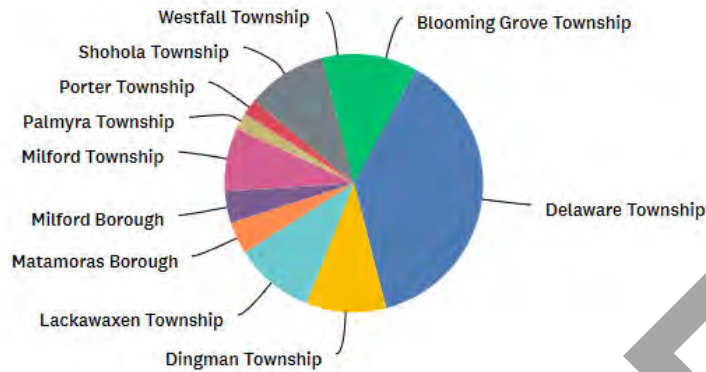


- Stakeholder and neighboring county surveys were distributed – 7 responses to date
- To date, we have received over 50 responses to the public survey
- Public Engagement – County and municipalities were sent different tools they can use to help – please continue to share!
 - HMP website
<https://www.pikecountypahmp.com/>
 - Social Media announcements – Facebook and Twitter
 - Let Tetra Tech know when you post about the HMP so we can include in the HMP





Public Survey Feedback



Residents

TO: All Pike County Residents

Published on: HMP Website and Social Media; Municipal and Department Websites

52 responses received

Public Responses and Feedback



- Public Outreach – 49% of responses said that the local programs are not effective at informing the public and 21% said they do not know of any programs in place
- Top hazards experienced in the last 5 years:
 - Winter Storm
 - Pandemic and Infectious Disease
 - Hurricane/Tropical Storm/Nor'Easter
 - Invasive Species
 - Tornado/Windstorm
- Identified issues:
 - Power outages
 - Downed trees
 - Poor drainage issues
 - Flooding
- Top three choices for how the County can reduce hazard damages:
 - 80%: Work on improving the damage resistance of utilities (electricity, communications, water/wastewater facilities etc.)
 - 64%: Improve and strengthen infrastructure (e.g., elevating roads, improve drainage systems)
 - 49%: Improve and strengthen critical facilities such as police, schools, hospitals



Risk Factor Analysis

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Risk Assessment Results



Hazard Risk	Hazards	Risk Assessment Category					Risk Factor (RF)
		Probability	Impact	Spatial Extent	Warning Time	Duration	
High	Flood	4	3	3	2	3	3.2
	Radon	4	2	4	1	4	3.1
	Severe Weather	4	2	4	3	2	3.1
	Environmental Hazards	4	2	3	4	2	3
	Severe Winter Weather	4	2	4	2	2	3
	Utility	4	2	2	4	4	3
	Drought	3	2	4	1	4	2.8
	Extreme Temperatures	3	2	4	2	3	2.8
	Invasive Species	4	1	4	1	4	2.8
	Wildfire	4	1	3	4	3	2.8
Moderate	Disease Outbreak	2	3	3	1	4	2.6
	Transportation	4	2	1	4	1	2.5
	Drowning	4	1	1	4	1	2.2
	Hurricane/Nor'Easter	2	2	3	1	3	2.2
	Terrorism	2	1	2	4	4	2.1
Low	Nuclear Incidents	1	1	3	4	4	2
	Urban Fire	2	2	1	4	2	2
	Earthquake	1	1	4	4	1	1.9
	Geologic	2	1	1	4	1	1.6

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Risk Assessment Results



- Municipal Risk Factor Analysis – what do you think is your municipality's ranking?

Municipality	Disease Outbreak	Drought	Drowning	Earthquake	Environmental Hazards	Extreme Temperatures	Flood	Geologic	Hurricane, /Nor' Easter	Invasive Species	Nuclear Incidents	Radon	Severe Weather	Severe Winter Weather	Terrorism	Transportation	Urban Fire	Utility	Wildfire
Blooming Grove Township	28	20	22	19	3	28	32	16	22	28	2	31	31	3	21	25	2	3	28
Delaware Township																			
Dingman Township																			
Greene Township																			
Lackawaxen Township																			

- > Your municipality's risk from this hazard is greater than the County's risk as a whole
- < Your municipality's risk from this hazard is less than the County's risk as a whole
- = Your municipality's risk from this hazard is about the same as the County's risk as a whole



Mitigation Strategy



2022 HMP Hazards of Concern

- Disease Outbreak
- Drought
- Drowning
- Earthquake
- Environmental Hazards
- Extreme Temperature
- Flood
- Geologic Hazards
- Hurricane/Tropical Storm/Nor'Easter
- Invasive and Nuisance Species
- Nuclear Incidents
- Terrorism
- Severe Weather
- Severe Winter Weather
- Transportation
- Urban Fire
- Utility Failure
- Wildfire



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Risk Reduction

- How do you reduce risk for a hazard?
 - Manipulate the Hazard
 - Structural flood control
 - Reduce/Eliminate Exposure
 - Acquire floodprone properties
 - Reduce Vulnerability
 - Retrofit (floodproofing)
 - Increase Capability
 - \$, preparation, technical assistance, planning enforcement



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Using Your Mitigation Strategy to Reduce Risk

- What is a **Mitigation Strategy**?
 - A group of projects or actions to reduce the impacts of the hazards of concern on your community
 - Plans and Regulations
 - Structure and Infrastructure Studies and Projects
 - Natural Systems Protection Studies and Projects
 - Education and Awareness Programs
- Terms to describe the Mitigation Strategy include:
 - **Mitigation Action Plan** or **Action Plan**
 - **Mitigation Projects** or **Initiatives** or **Actions**



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Requirements for the Mitigation Strategy Update

- A minimum of one action per hazard of concern
 - An action can address more than one hazard of concern and count towards the minimum
- NFIP-Related Actions –
 - If you participate in the NFIP or have Special Flood Hazard Areas in your community, you need to have at least one specific action that relates to continued compliance with the NFIP.
- 2017 Projects
 - If a project is not finished and still a priority, include in 2022 HMP
- Complete one action worksheet for each mitigation strategy identified

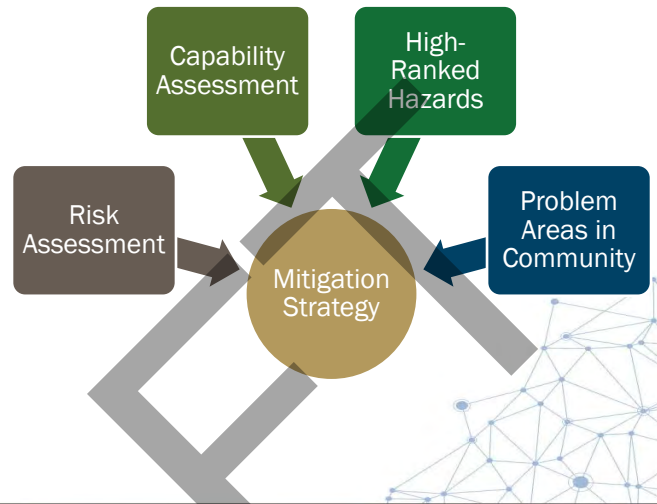


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Connecting to the Mitigation Strategy

- Need a clear connection between vulnerability and proposed mitigation actions.
- Capability assessment provides insight into challenges and opportunities for the mitigation strategy.
- Provides the factual basis for activities proposed in the mitigation strategy.



Update the Mitigation Strategy



Update the Mitigation Strategy

- Purpose of the Mitigation Strategy
 - Reduce likelihood of hazard impacts
 - Lessen impacts of hazards
- Review the Goals and Objectives of the HMP
- Identify new Mitigation Actions/Projects/Strategies
- Modify incomplete projects from the 2017 HMP
 - **More specific** or to **address different aspects of the original problem**
- Start with problems (look at the problem areas worksheet)
 - Turn challenges/obstacles/gaps into mitigation actions
 - Examine historic impacts
 - Review the risk and capability assessment results
 - RL/SRL properties
 - Stormwater flooding areas
 - Critical facilities and lifelines located in a hazard area (if feasible)
 - Additional areas of vulnerability
 - Previous FEMA HMA submitted projects – awarded/unawarded



Mitigation Action Types



Plans and regulations include government authorities, policies, or codes that encourage risk reduction, such as building codes and state planning regulations. This may also include planning studies.



Structure and infrastructure projects involve modifying existing structures and infrastructure or constructing new structures to reduce the impact of hazards.



Natural systems protection projects minimize losses while also preserving or restoring the function of natural systems.



Education and awareness programs include long-term, sustained programs to inform and educate citizens and stakeholders about hazards and mitigation options. This category could also include training.



Range of Mitigation Actions

- Primary types of mitigation actions to reduce long-term vulnerabilities include:

Local Plans and Regulations	<ul style="list-style-type: none">• Zoning codes• Ordinances• Open space plan• Debris management plan
Structural Projects	<ul style="list-style-type: none">• Elevation• Drainage improvements• Property acquisitions
Natural Systems Protection	<ul style="list-style-type: none">• Stream and wetland restoration• Erosion control
Education and Outreach	<ul style="list-style-type: none">• Public awareness• Education programs

Getting Started...



- If you had all the time and money in the world, what would you do to protect your community from future disasters?
- Ask yourself these questions -
 - What plans or regulations does your municipality need?
 - What information must you provide to your residents and visitors?
 - What property and products can be insured?
 - What additional staff do you need?
 - Where are your problem areas? What can be done about them?
 - What critical facilities need backup power generators?





Mitigation Action Examples

- All Hazards
 - Public outreach to increase awareness of hazards and actions people can take
- Disease Outbreak
 - Increase PPE stockpile to distribute as needed
 - Continuity planning
- Drought
 - Emergency plans
 - Schedule to monitor/report conditions
- Earthquake
 - Adopt and enforce updated building codes to reduce earthquake risk
- Critical facilities vulnerable to hazmat releases
 - Outreach to make owners/operators aware
 - HVAC system retrofits
- Extreme Temperatures
 - Establish heating/cooling centers; ensure backup power is at the centers
- Wind damage
 - Tree maintenance programs
 - Retrofit structures
- Steep Slopes
 - Assess property as a whole
 - Retrofit
- Carbonate bedrock/karst topography
 - Assess risk at specific property
 - Acquisition/relocation



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Develop the Updated Mitigation Strategy

- Wildland-Urban Interface
 - Assess property
 - Clear brush from near structure(s)
- Lack of backup power
 - Generators at critical facilities
 - Alternative energy sources
- Terrorism
 - Work with private and public sectors to improve cyber security for critical infrastructure
 - Increase public awareness
- Urban/Structural Fire
 - Mitigate buildings and structures, including historic structures, at risk from structural fires
- Dam Failure
 - Assess risk at specific properties
 - Create EAPs for all high hazard dams
 - Adopt special land use codes in dam inundation areas
- Poor water/sewer infrastructure
 - System upgrades
 - Enhance maintenance
- Special Flood Hazard Areas
 - Acquisition/relocation
 - Elevation
 - Fill basements
 - Floodproofing
 - Protect/restore wetlands
 - Enhanced regulations
- Stormwater Management Issues
 - Upgrade culverts, bridges, road drainage
 - Enhanced regulations



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Mitigation Action Worksheet



Municipality(ies):	Action
Action Number:	
Location (address, lat/long)	
Mitigation Technique Category	
Hazard(s) Addressed	
Priority (High, Medium, Low)	
Estimated Cost	
Potential Funding Streams	
Timeline	
Lead Agency/Department	
Support Agency(ies)/Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

Guidance to Complete the Mitigation Action Worksheet

The following provides additional guidance on how to complete the mitigation action worksheet. A minimum of one mitigation action must be identified for each hazard. Each participating jurisdiction in the planning process must identify at least one specific mitigation action for which it will be responsible.

- If you participate in the NFIP or have identified Special Flood Hazard Areas (SFHAs), you must have at least one specific action that related to continued compliance with the NFIP. The action must be specific and an implementable measure to enhance the municipality's compliance.

Action Worksheet

Action Number: 2022-Jurisdiction-001

Action: Include a detailed description of the action. Describe the physical area (project limits) to be affected, both by direct work and by the project's effects; how the action would address the existing conditions previously identified; proposed construction methods, including any excavation and earth-moving activities; where you are in the development process (e.g., are studies and/or drawings complete), etc., the extent of any analyses or studies performed (attach any reports or studies).

Municipality: List the municipalities that this action cover

Location (address, lat/long): Provide the address/location of the proposed action

Mitigation Action Category: List the category that the action falls under (can be more than one):

- Local Plans and Regulations (LPR) – These actions include government authorities, policies, or codes that influence the way land and buildings are

Mitigation Action Worksheet



Municipality(ies):	Action
Blooming Grove	The Township will develop a hazardous tree management program that will include routine inspections of trees, identify at-risk trees, and implement a schedule to maintain or remove. Once the inspections and schedule are complete, the Township will work on removing the identified trees. In the event the trees are located on or along power lines, the Township will work with the utility companies to request removal or trimming.
Action Number:	
2022-Blooming Grove-01	
Location (address, lat/long)	Throughout Township
Mitigation Technique Category	Local Plans and Regulations; Natural Systems Protection
Hazard(s) Addressed	Hurricane/Tropical Storm; Severe Weather; Severe Winter Weather; Utility Failure; Wildfire
Priority (High, Medium, Low)	High
Estimated Cost	Low to Medium
Potential Funding Streams	Municipal Budget
Timeline	Short/On-Going
Lead Agency/Department	Township Supervisor
Support Agency(ies)/Department(s)	N/A



Next Steps

- Complete Municipal Worksheets
- Identify and submit mitigation actions by Wednesday, February 9th
- Finalize the draft HMP
- Provide public comment period
- Conduct draft review meeting
- Submit Plan Update to Pennsylvania Emergency Management Agency (PEMA)
- Submit Plan Update to Federal Emergency Management Agency (FEMA)

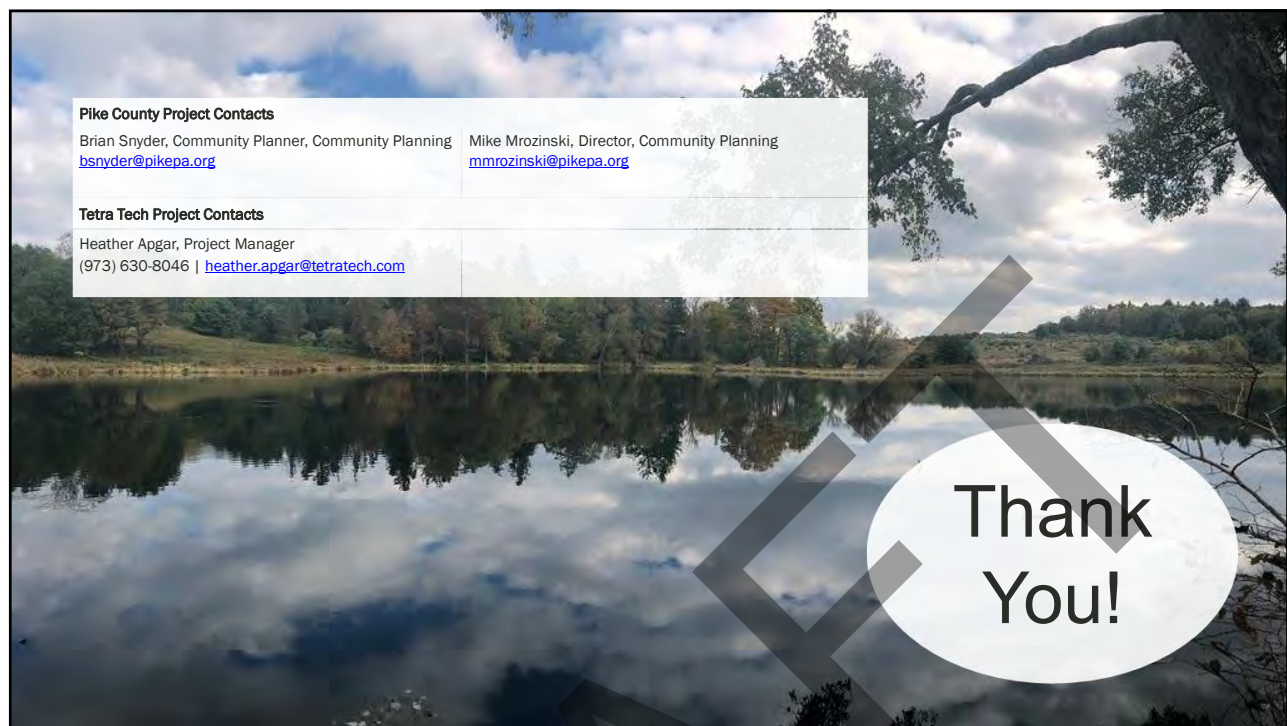


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Questions?

28



Pike County Project Contacts

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bsnyder@pikepa.org

Mike Mrozinski, Director, Community Planning
mmrozinski@pikepa.org

Tetra Tech Project Contacts

Heather Apgar, Project Manager
(973) 630-8046 | heather.apgar@tetrattech.com

Thank
You!



APPENDIX D. LOCAL MUNICIPALITY FLOOD VULNERABILITY MAPS

Figure D-1. Blooming Grove Township

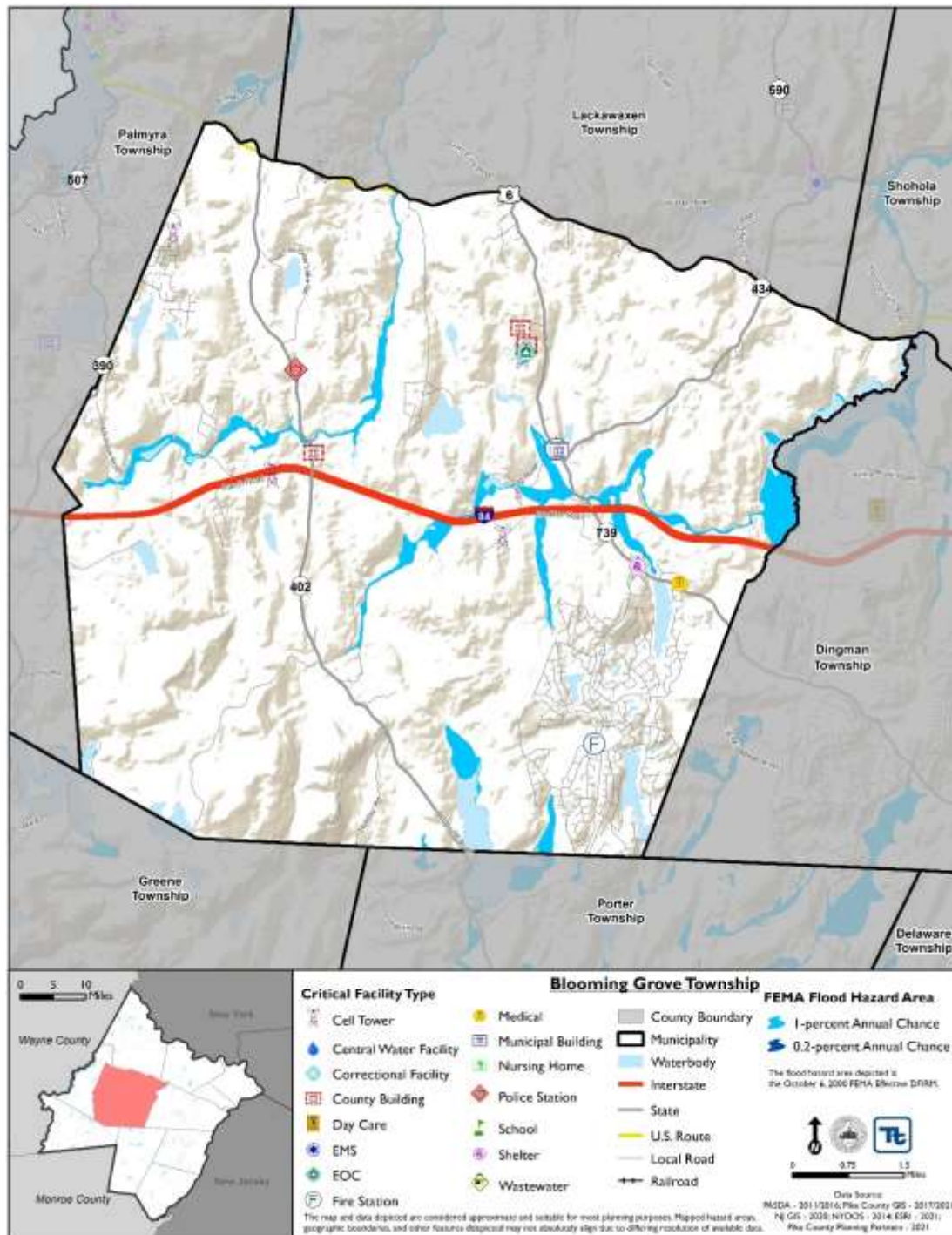




Figure D-2. Delaware Township

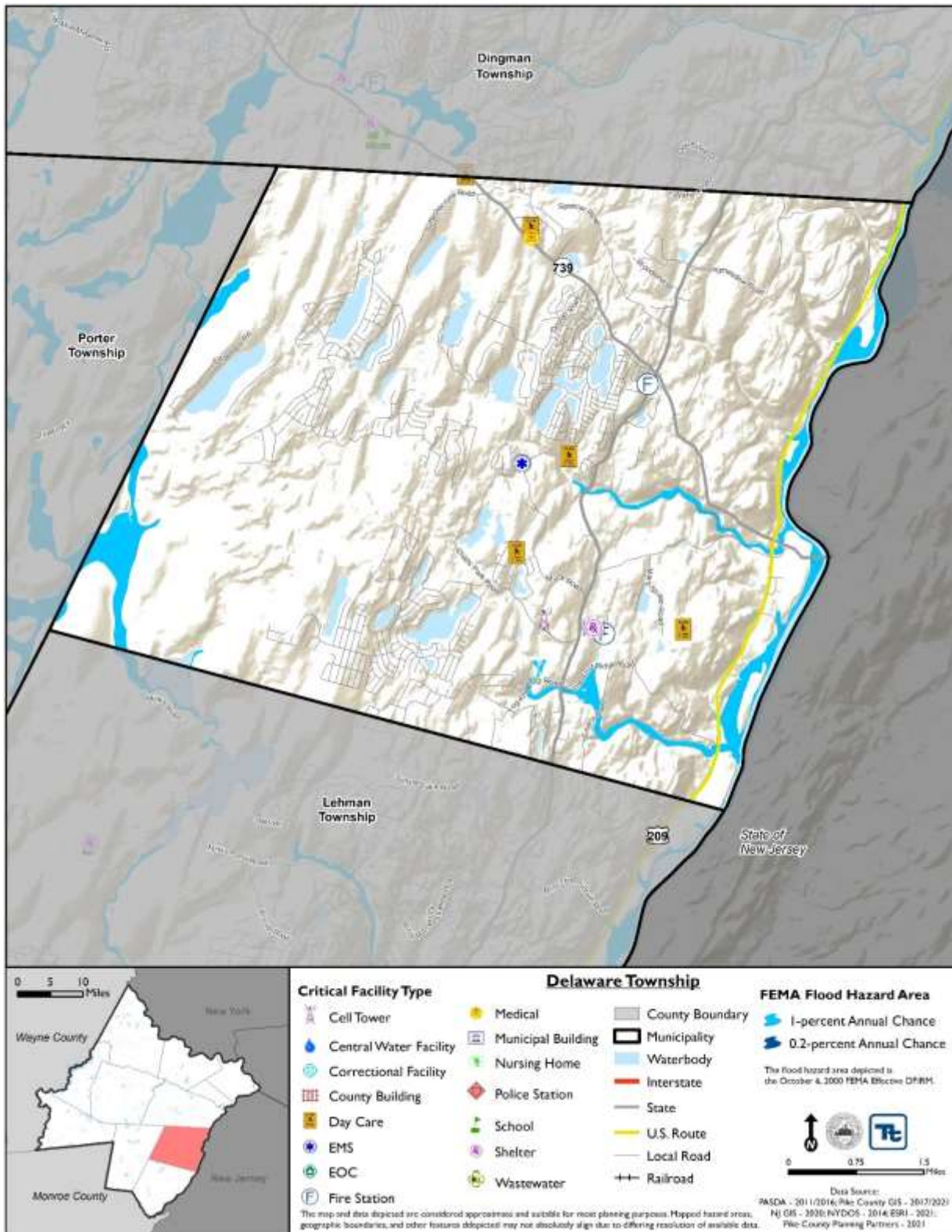




Figure D-3. Dingman Township

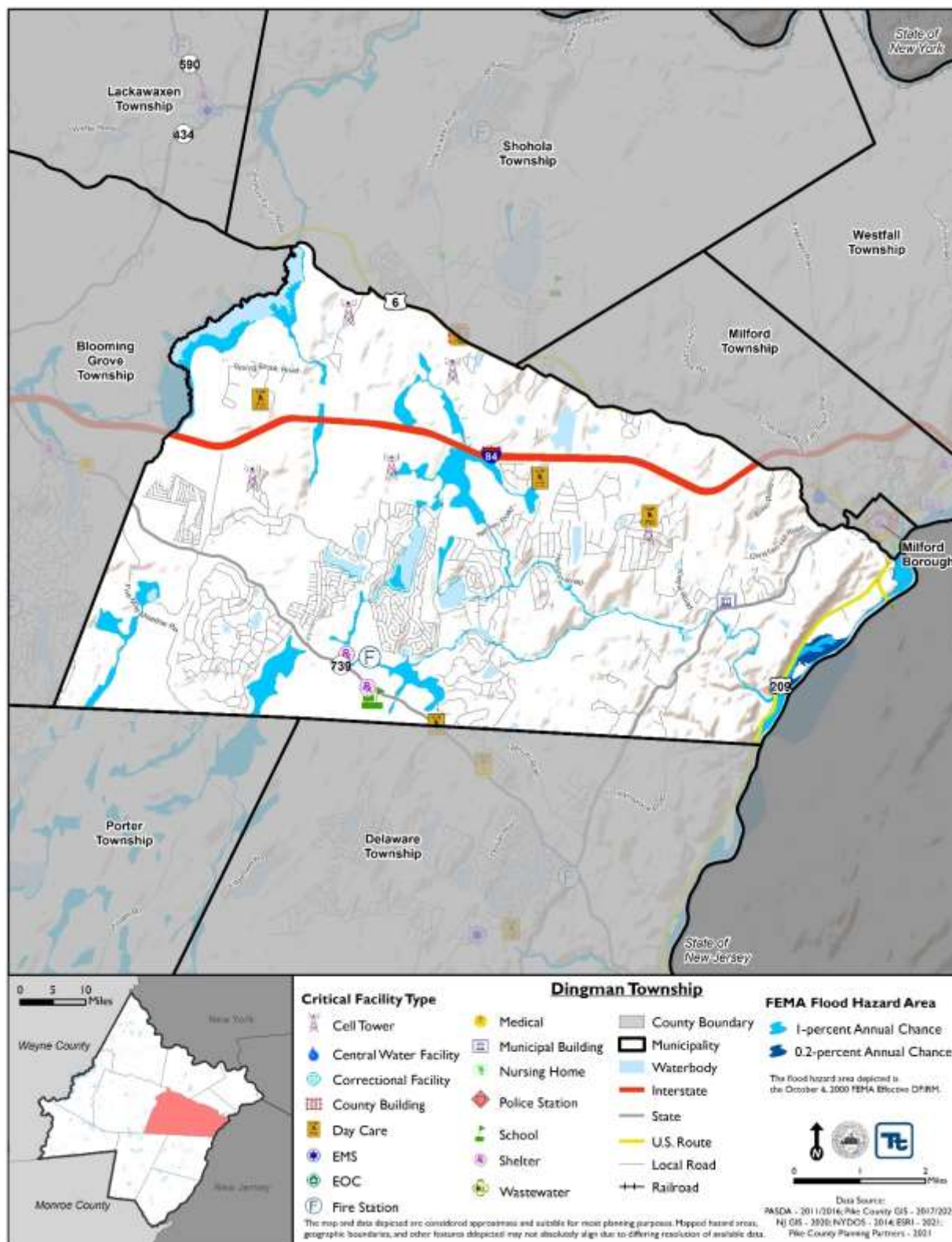




Figure D-4. Greene Township

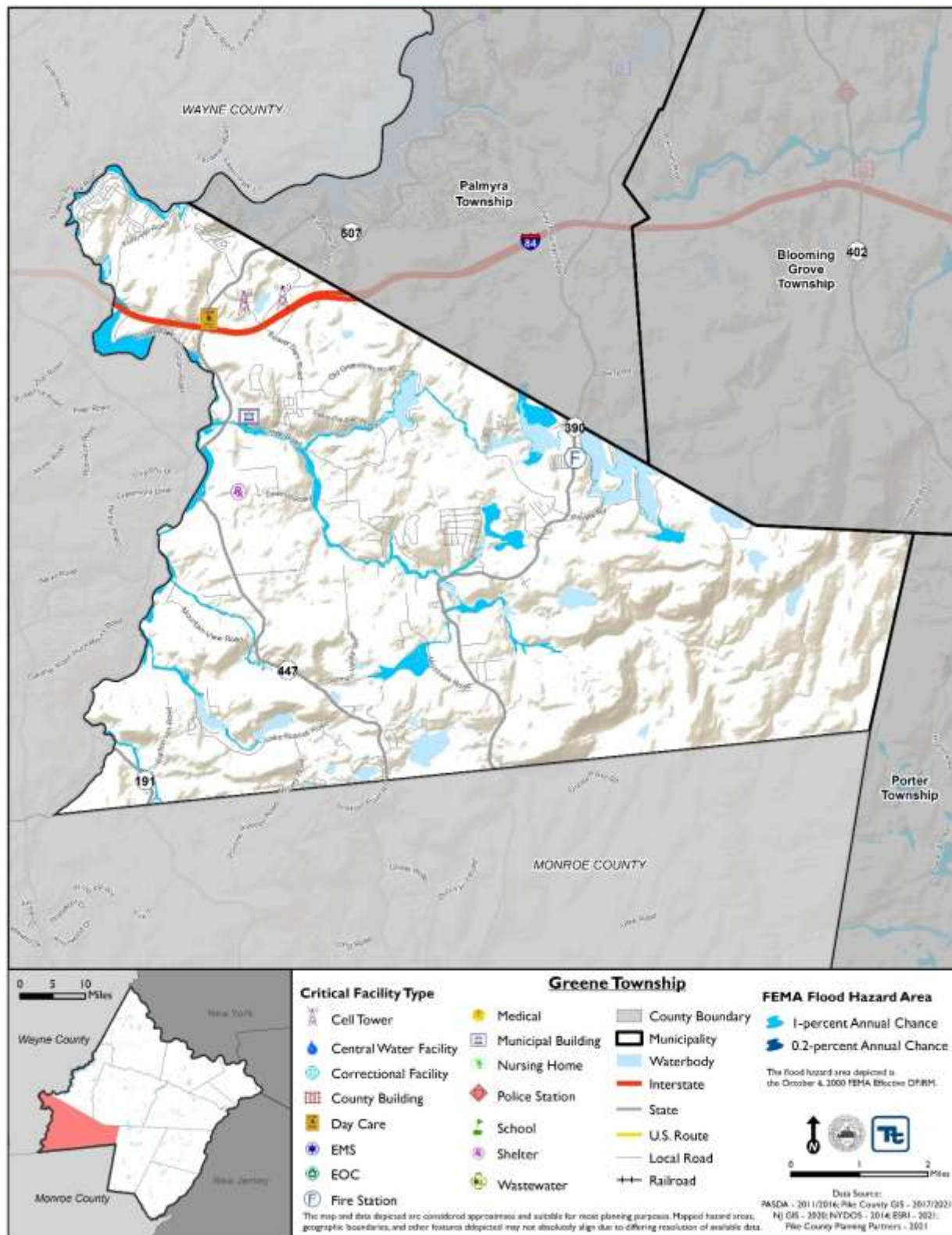




Figure D-5. Lackawaxen Township

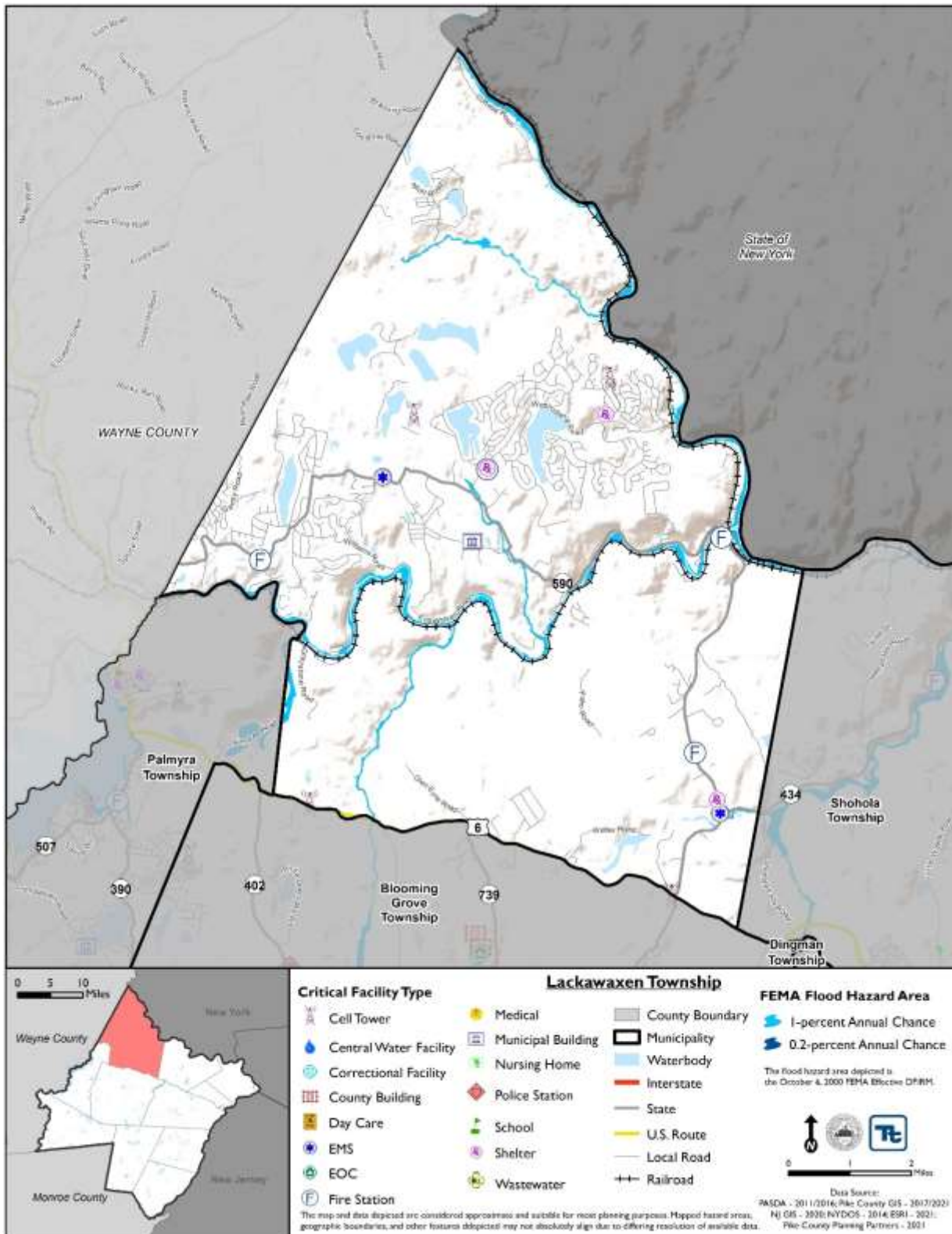




Figure D-6. Lehman Township

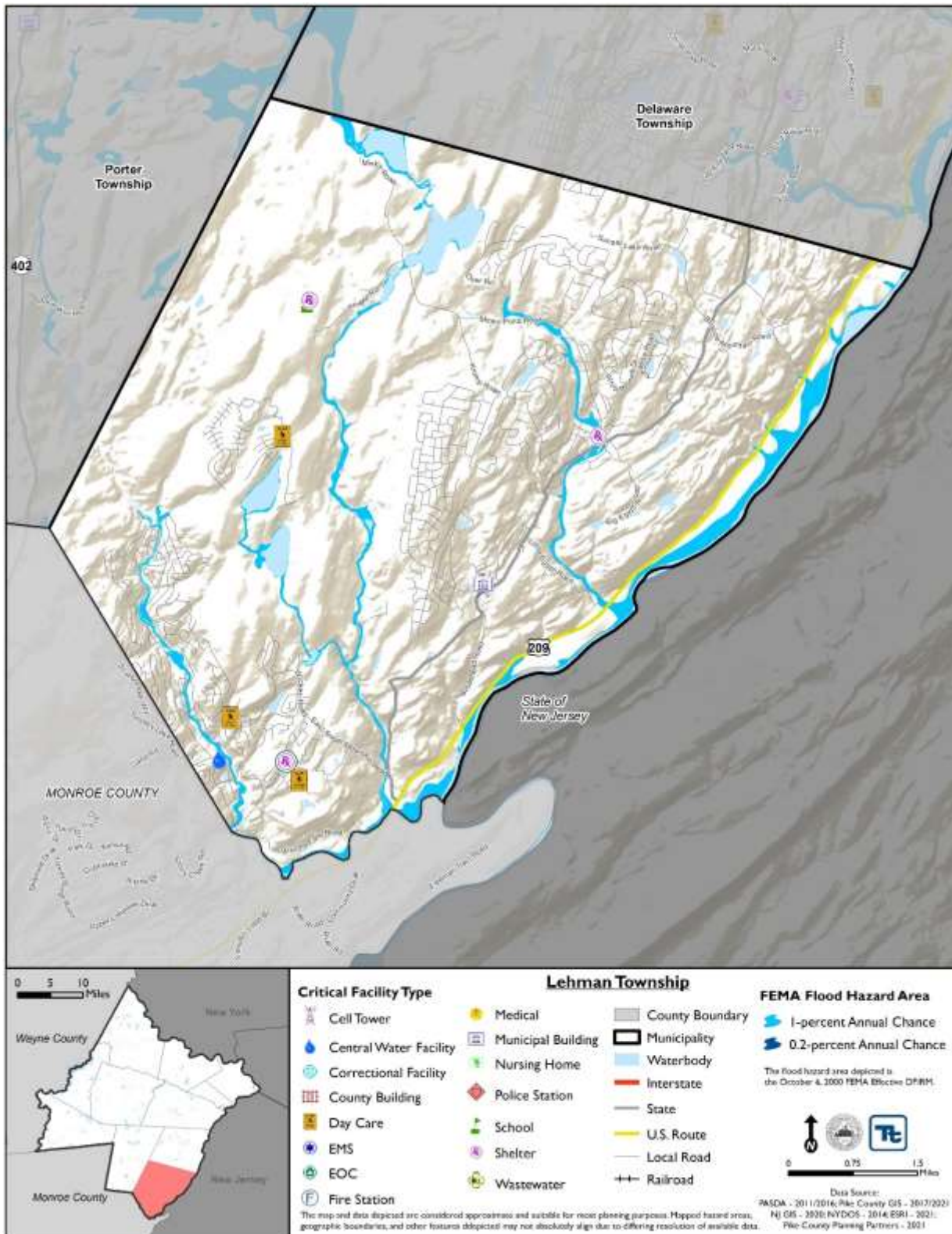




Figure D-7. Matamoras Township

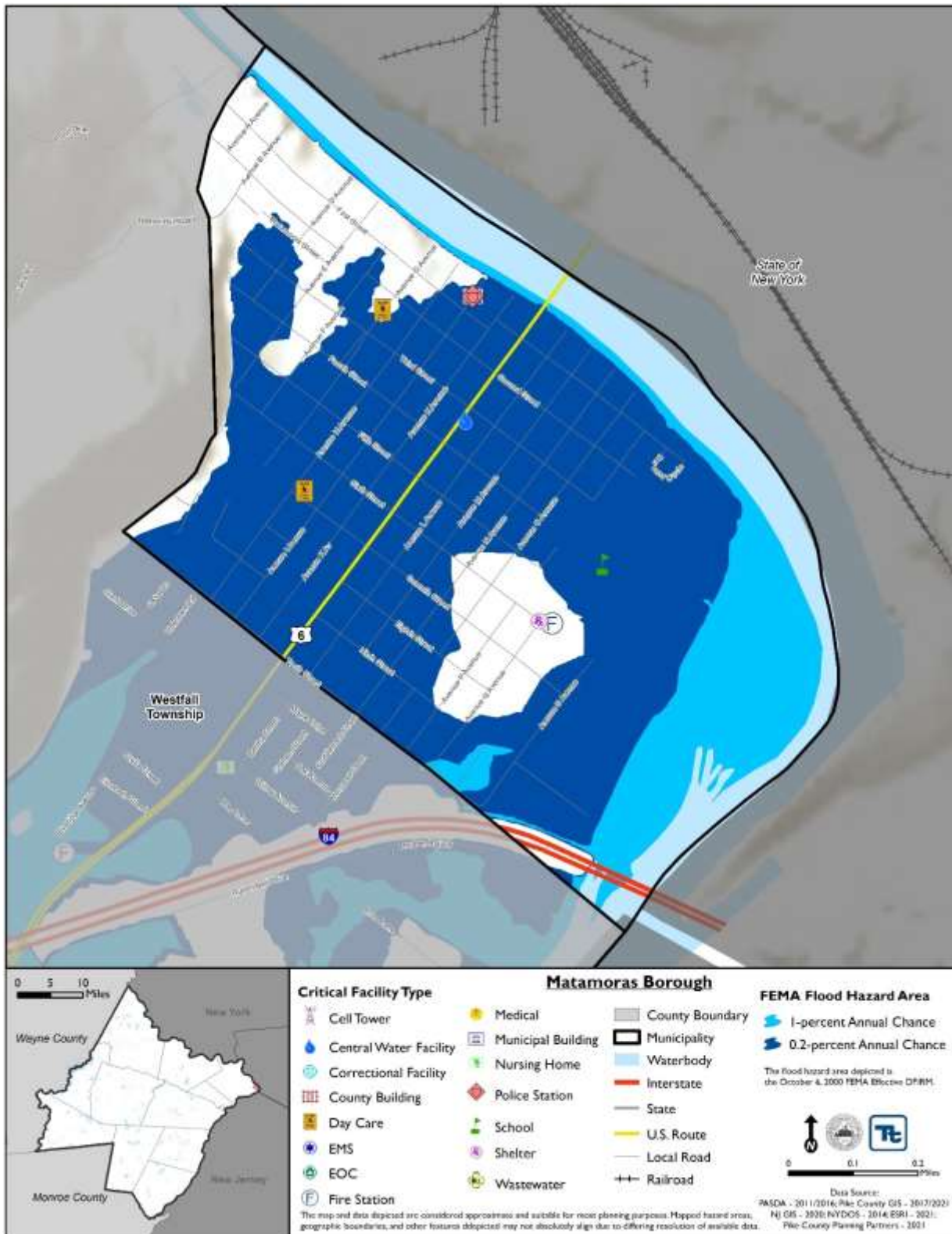




Figure D-8. Milford Borough

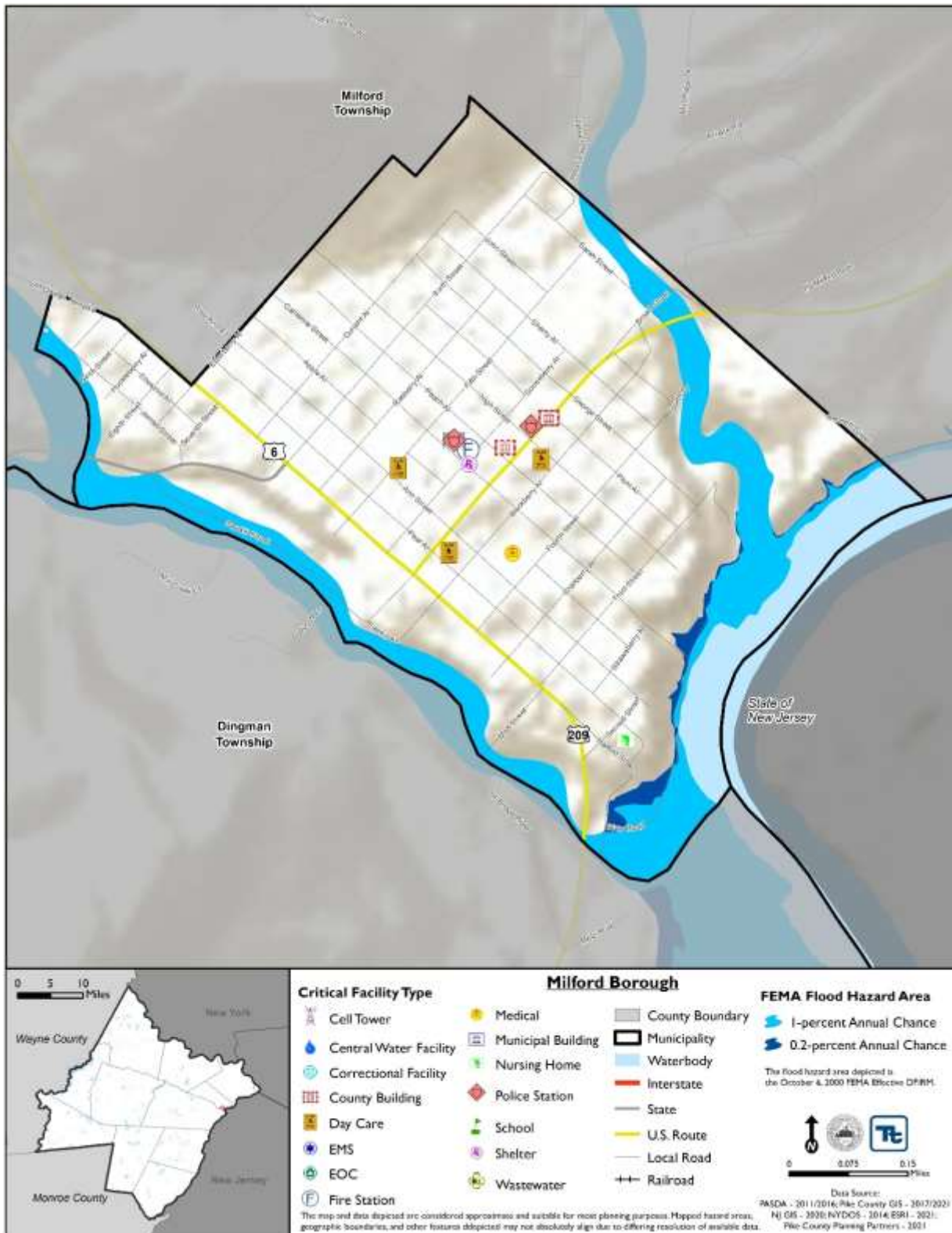




Figure D-9. Milford Township

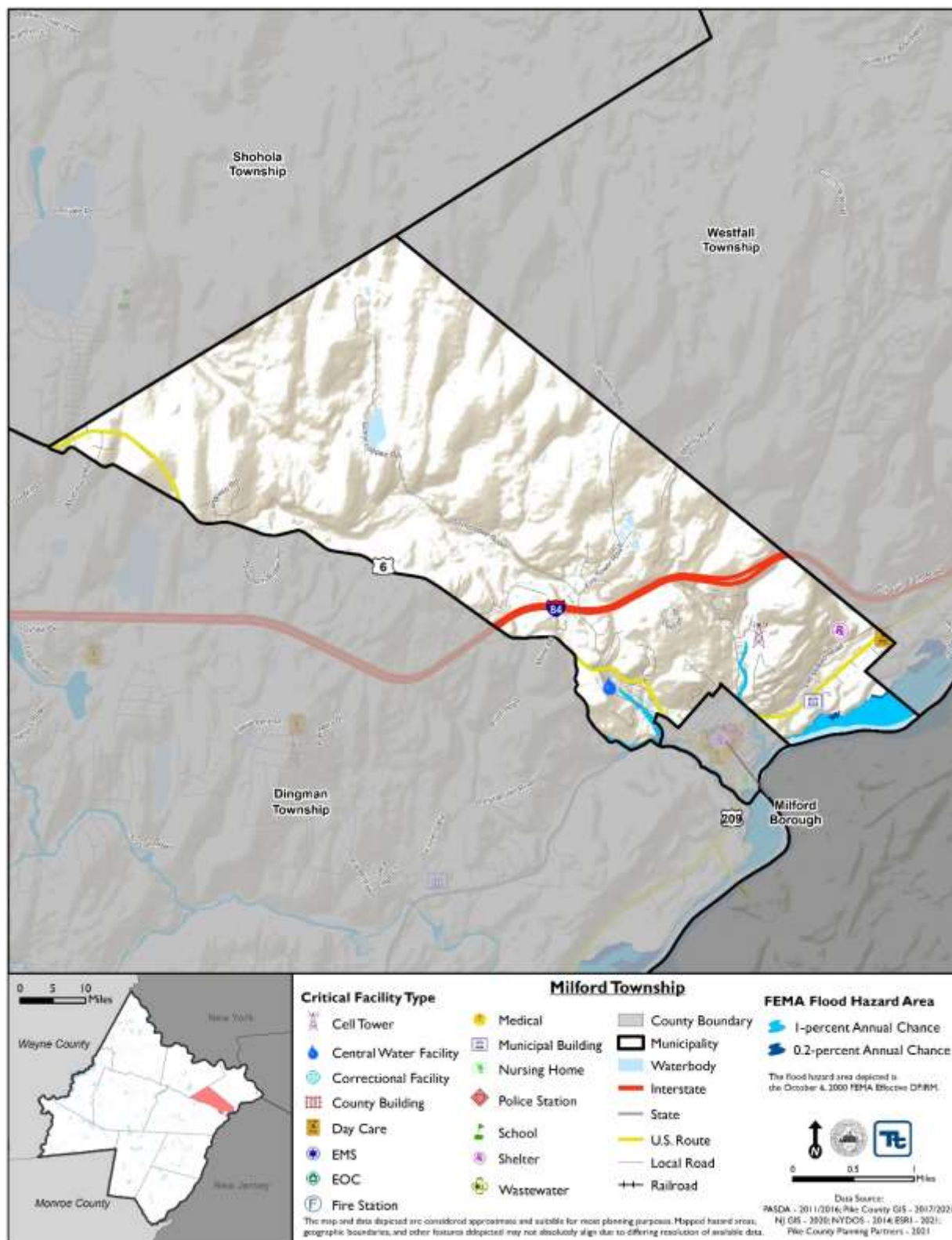




Figure D-10. Palmyra Township

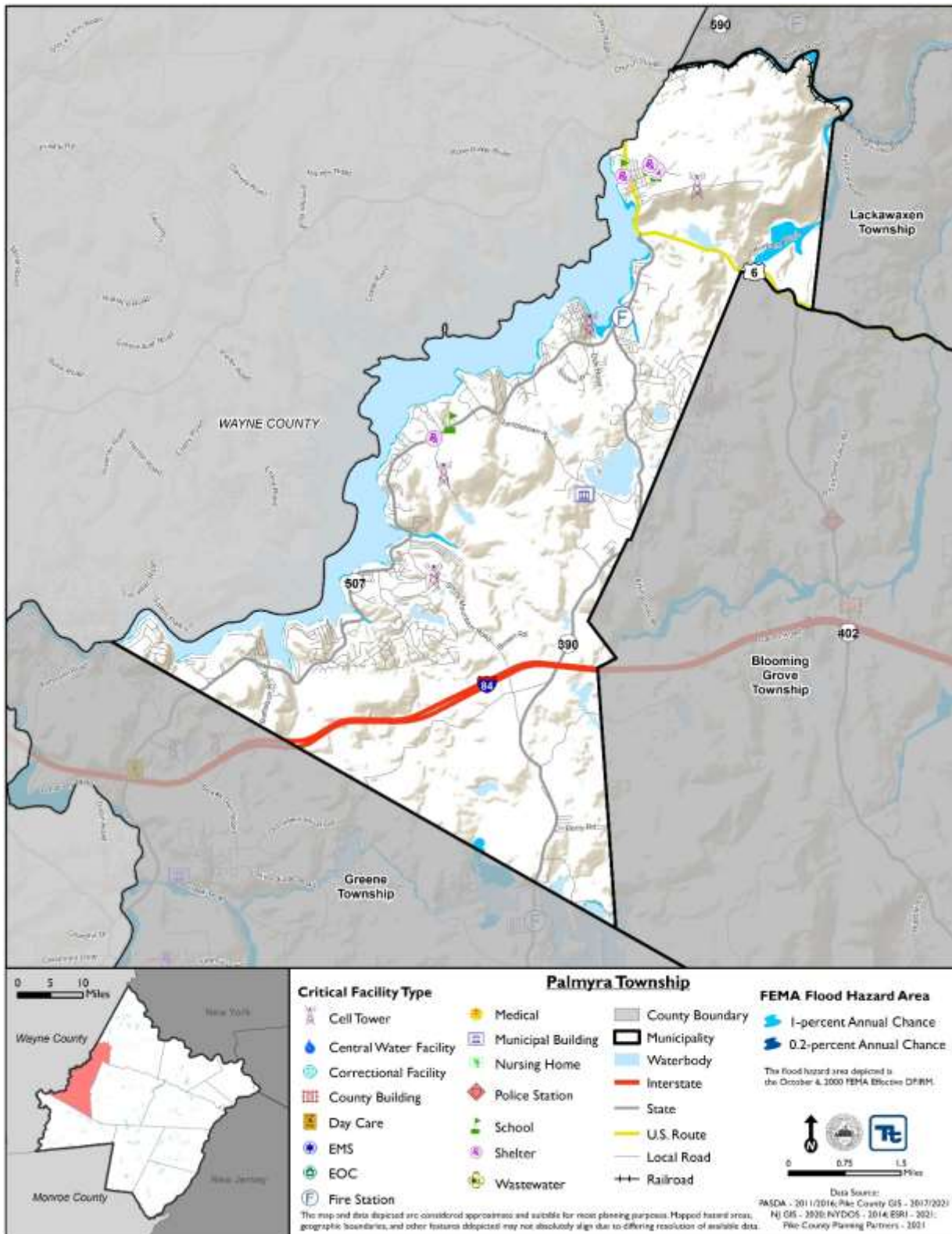




Figure D-11. Porter Township

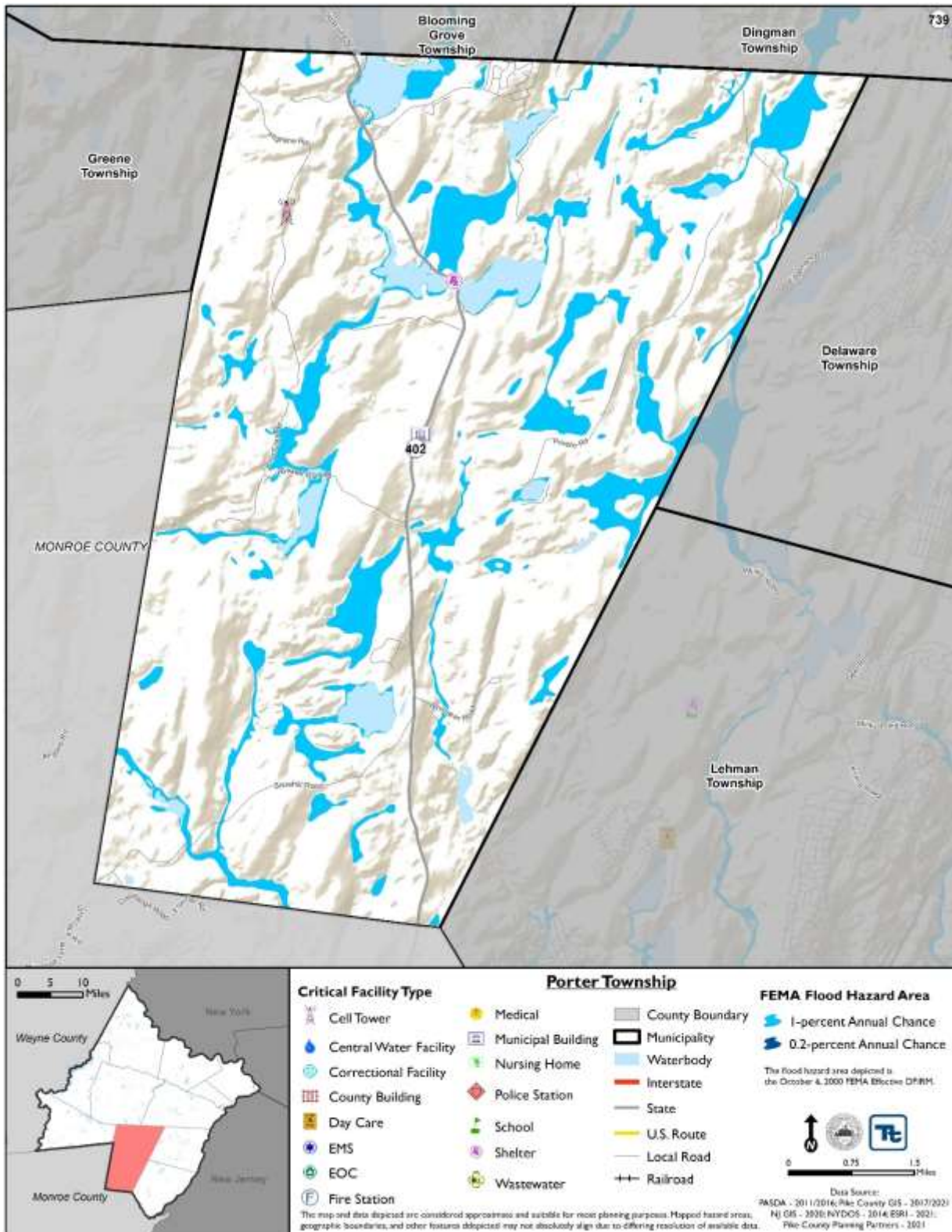




Figure D-12. Shohola Township

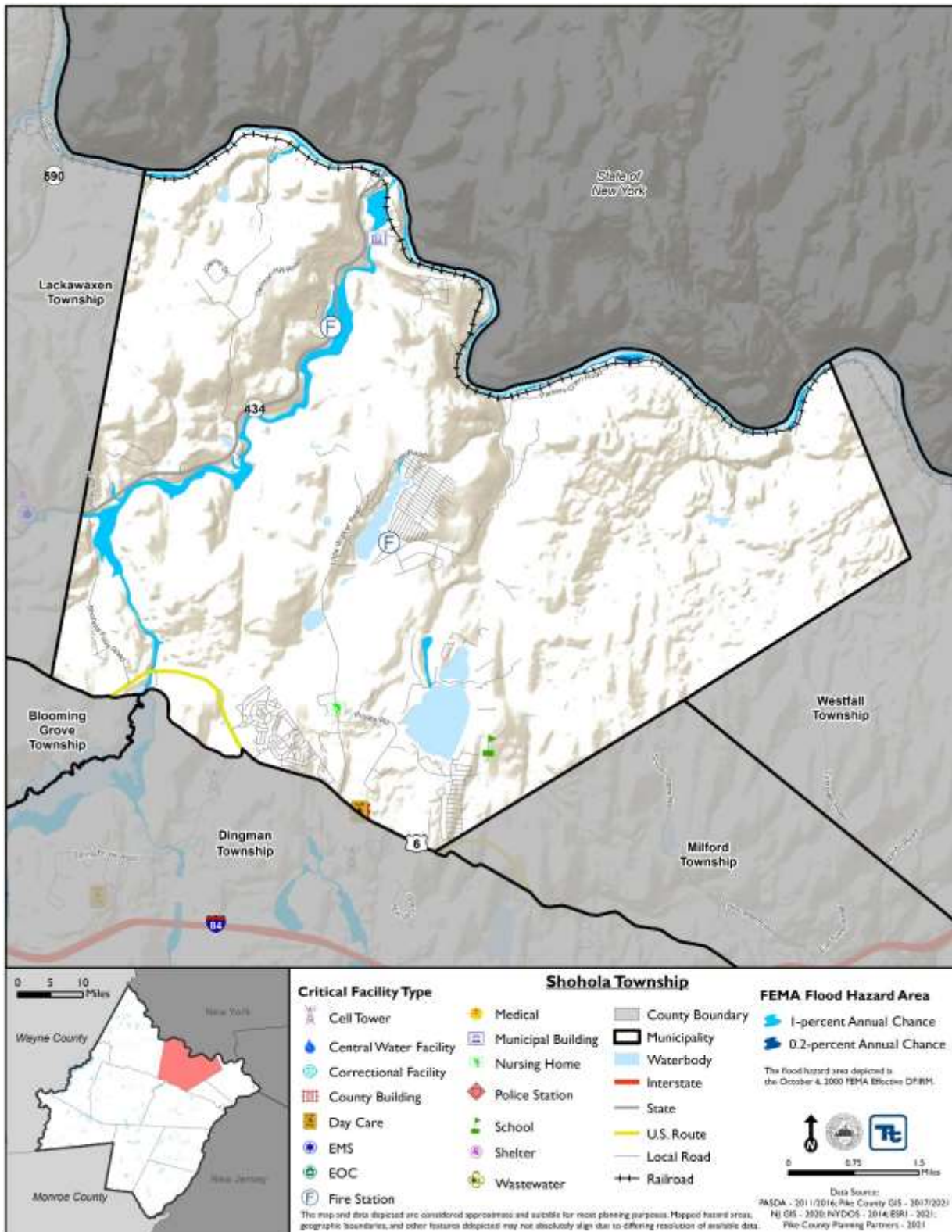
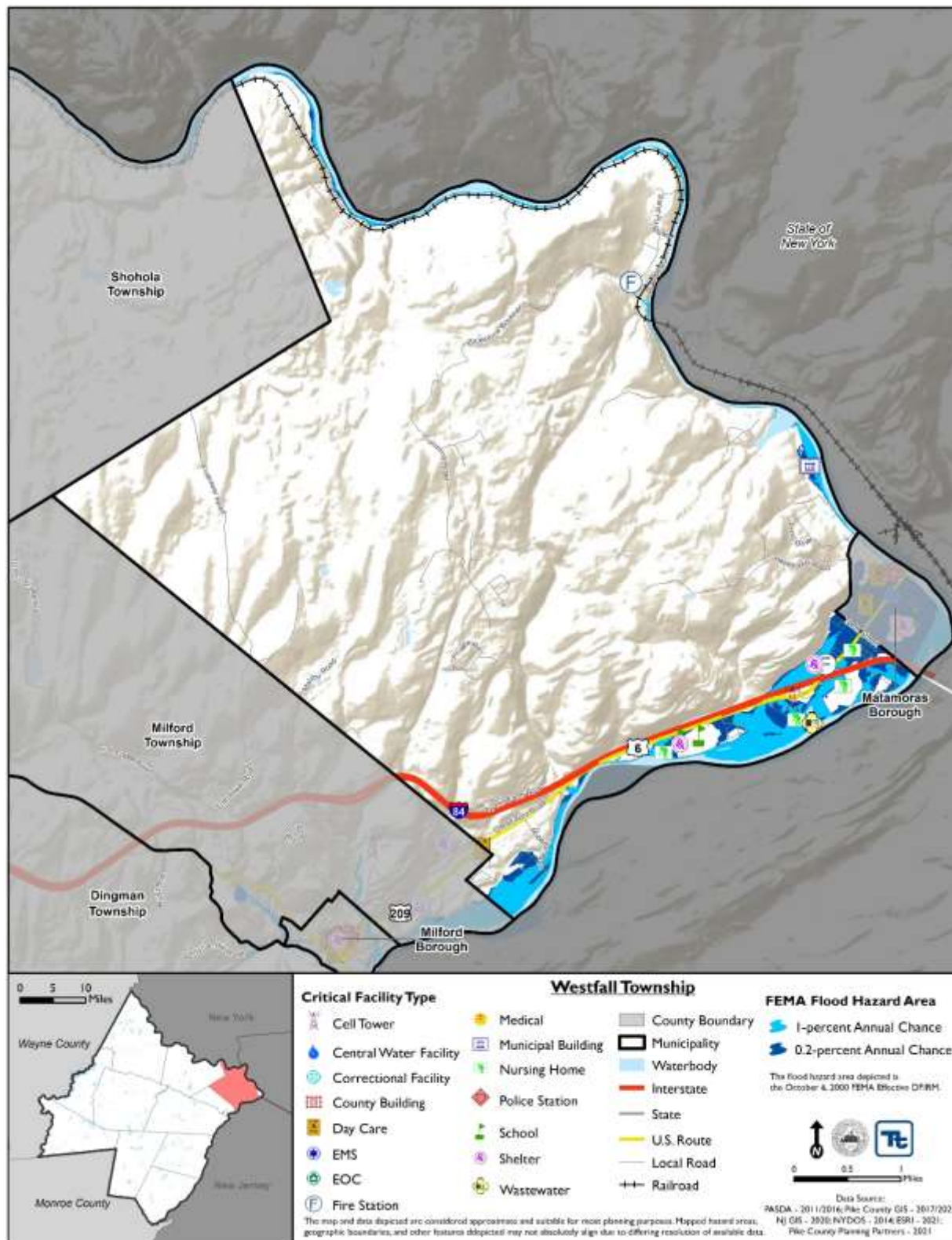




Figure D-13. Westfall Township





APPENDIX E. CRITICAL FACILITIES

This appendix contains information on critical facilities within Pike County. Due to the sensitive nature of this information, details of the facilities have been redacted for the public document. For a full list of critical facilities identified for the vulnerability analysis, please contact Brian Snyder at 570-296-3500 or bsnyder@pikepa.org.

DRAFT



APPENDIX F. PUBLIC AND STAKEHOLDER OUTREACH

This appendix provides documentation of public and stakeholder outreach. Stakeholder involvement in this planning process was broad and productive as discussed and further documented in Section 3 (Planning Process). Public and stakeholder input has been incorporated throughout this HMP as appropriate, as identified in Section 3 and the References section.

DRAFT

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Public invited to contribute to Pike's disaster plan update

Milford. The updated plan, which is needed for FEMA relief funds, will focus on the buildings, infrastructure, and critical facilities that might be affected by natural and human-made disasters.

MILFORD / | 07 JUL 2021 | 02:55



The five-year regulatory update of the 2017 Pike County Hazard Mitigation Plan is underway.

Pike County Courier

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Public invited to contribute to Pike's disaster plan update

Milford. The updated plan, which is needed for FEMA relief funds, will focus on the buildings, infrastructure, and critical facilities that might be affected by natural and human-made disasters.

MILFORD | 107 JUL 2021 | 12:55



Tags

FEMA
PIKE COUNTY HAZARD MITIGATION PLAN

The five-year regulatory update of the 2017 Pike County Hazard Mitigation Plan is underway.

The updated plan will focus on existing and future buildings, infrastructure, and critical facilities that might be affected by natural and human-made disasters.

This effort by the county and its municipalities is being coordinated by the Pike County Office of Community Planning.

The mitigation projects that ultimately will be put in place will reduce the county's vulnerability to disaster and help communities become more resilient.

The plan will include a risk assessment that identifies potential hazards and their consequences, identifies assets subject to loss or damage, and estimates the losses that could result from each type of hazard.

The county will then develop a mitigation strategy that will identify goals and a prioritized list of actions to reduce losses.

A series of public meetings, with dates to be announced, will be part of the development process, both to solicit comment and to present the draft plan to residents and local officials.

As mandated by the Disaster Mitigation Act of 2000, counties and municipalities are required to complete a local Hazard Mitigation Plan in order to qualify for Federal Emergency Management Agency (FEMA) funding should a natural disaster occur. Examples of grant-eligible projects include home acquisitions or elevations – to either remove houses located in the floodplain to generate open space and increase flood storage or to raise their first floor above the FEMA base flood elevation – and local flood control measures.

Pike County's planning process is made possible by a grant from FEMA.

Information about the Hazard Mitigation Plan will be posted on the HMP website through pikecountypahmp.com.

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- 2 Milford Borough approves earned income tax to address financial woes
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Pike County To Update Hazard Mitigation Plan

By Sam Miller • 07/09/21 6:00 AM



Pike County has begun the process of updating its Hazard Mitigation Plan. Every five years, the County is required to update the plan which create strategies to avoid and reduce the impact of natural and man-made disasters. The plan will include a risk assessment to identify hazards that may impact Pike County and its municipalities, profile the relevant hazards and their potential consequences, identify assets that are subject to losses or damage, and estimate the potential losses that could result from each type of hazard. Following the risk assessment, the County will develop a hazard mitigation strategy, including the identification of hazard mitigation goals and a prioritized list of actions designed to reduce losses. The public is encouraged to participate by attending a series of planning meetings. The dates on those meetings are to be announced. During the meetings the public can provide comment, and drafts of the plan will be presented. Information about the Hazard Mitigation Plan will be posted on the HMP website through the following link: <https://www.pikecountypahmp.com/>.

NEWS

Pike County To Update Hazard Mitigation Plan

By Sam Miller • 07/09/21 6:00 AM



Pike County has begun the process of updating its Hazard Mitigation Plan. Every five years, the County is required to update the plan which create strategies to avoid and reduce the impact of natural and man-made disasters. The plan will include a risk assessment to identify hazards that may impact Pike County and its municipalities, profile the relevant hazards and their potential consequences, identify assets that are subject to losses or damage, and estimate the potential losses that could result from each type of hazard. Following the risk assessment, the County will develop a hazard mitigation strategy, including the identification of hazard mitigation goals and a prioritized list of actions designed to reduce losses. The public is encouraged to participate by attending a series of planning meetings. The dates on those meetings are to be announced. During the meetings the public can provide comment, and drafts of the plan will be presented. Information about the Hazard Mitigation Plan will be posted on the HMP website through the following link: <https://www.pikecountypahmp.com/>.



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PA Environment Digest Blog

An Update On Environmental Issues In Pennsylvania

Edited By: David E. Hess

Former Secretary, PA Department of Environmental Protection

THURSDAY, JULY 22, 2021

Pike County Seeking Public Comments On Hazard Mitigation Plan



The Pike County Office of Community Planning is leading the process of updating the [County's Hazard Mitigation Plan](#) (HMP) to help reduce vulnerability and enable local communities to become more resilient to disasters.

Public participation is essential to ensure the new plan is effective.

An [online Mitigation Survey](#) is available to provide the community an outlet to contribute to the development of the updated HMP.

The questionnaire will take approximately 15 minutes and consists of questions about current hazard and disaster issues, and information regarding potential areas vulnerable to disaster. Feedback collected from the survey will remain anonymous.

[Click Here to take the survey.](#)

For more information visit [Pike County's Hazard Mitigation Plan](#) webpage.

[Posted: July 22, 2021] [PA Environment Digest](#)     

Posted by [David E. Hess](#) at 5:01 PM

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About Me

 [David E. Hess](#)

This Blog is a companion to [www.PaEnvironmentDigest.com](#), the weekly online newsletter and a product of PA Environment News LLC. I can be contacted by sending email to:

PaEnviroDigest@gmail.com. I served as Secretary of the Pennsylvania Department of Environmental Protection from 2001 to 2003, Executive Deputy at DEP from 1995 to 2001, as staff to the PA Senate Environmental



Dingman Township

July 23, 2021 · ⚙

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Public Input Sought to Help Update Pike County's Hazard Mitigation Plan

MILFORD, PA — The Pike County Office of Community Planning is leading the process of updating the County's Hazard Mitigation Plan (HMP) to help reduce vulnerability and enable local communities to become more resilient to disasters. Public participation is essential to ensure the new plan is effective.

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Pike County, PA

Commissioners Meetings: Public Commissioners meetings are held on the first and third Wednesdays of the month at 9:00 a.m. in the Commissioners Meeting Room, unless otherwise noted.



Pike County Hazard Mitigation Plan

Pike County has begun the process of updating its Hazard Mitigation Plan. Every five years, the County is required to update the plan which create strategies to avoid and reduce the impact of natural and man-made disasters. The plan will include a risk assessment to identify hazards that may impact Pike County and its municipalities, profile the relevant hazards and their potential consequences, identify assets that are subject to losses or damage, and estimate the potential losses that could result from each type of hazard. Following the risk assessment, the County will develop a hazard mitigation strategy, including the identification of hazard mitigation goals and a prioritized list of actions designed to reduce losses. Information about the Hazard Mitigation Plan will be posted on the HMP website through the following link:

<https://www.pikecountypahmp.com/>.

Public Survey – if you live or work in Pike County, please take our public survey

(https://www.surveymonkey.com/r/PikeHMP_CitizenSurvey). This survey helps us collect input from the public to get an understanding of their preparedness or natural events. We ask that you share the survey on your municipal websites or social media accounts to help us gather as many responses as we can. We will follow-up with social media graphics and language you can use to get the word out about the HMP update.

PLAN UPDATE

WE NEED YOUR HELP!

 Grants & Funding

 Plan & Prepare

 Mitigate

CLICK HERE TO TAKE THE PUBLIC SURVEY AND HELP! ⓘ

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Home - Pike County Hazard Mitigation Plan Update

Pike County and its 13 municipalities are updating their 2017 Hazard Mitigation Plan. The 202...



Lackawaxen Township, Pike County, Pennsylvania

July 26, 2021 · 🌐

...

FOR IMMEDIATE RELEASE July 22, 2021

CONTACT: Krista Gromalski 570-296-9805 office / 570-832-1434 cell / kgromalski@pikepa.org

Public Input Sought to Help Update Pike County's Hazard Mitigation Plan

MILFORD, PA — The Pike County Office of Community Planning is leading the process of updating the County's Hazard Mitigation Plan (HMP) to help reduce vulnerability and enable local communities to become more resilient to disasters. Public participation is essential to ensure the new plan is effective.

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PIKE COUNTY COMMISSIONERS

PIKE COUNTY ADMINISTRATION BUILDING
504 BROAD STREET
MILFORD, PA 18337
570-296-7611
FAX: 570-296-6055

MATTHEW SA. OSTERBRAG
RONALD R. SCHWABELE
STEVEN R. GUCCINI

COMMISSIONERS



GARY R. ORSHEN
CHIEF CLERK

THOMAS F. FARLEY, ESQ.
COUNTY SOLICITOR

FOR IMMEDIATE RELEASE July 22, 2021

CONTACT: Krista Gromalski 570-296-9805 office / 570-832-1434 cell / kgromalski@pikepa.org

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Visit pikecountypahmp.com for more information about the Hazard Mitigation Plan.

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Pike County, along with its towns, and villages, are in the process of updating the Hazard Mitigation Plan (HMP) in order to be eligible for federal grant funding for public and private mitigation projects. The HMP provides a “blueprint” by which participating jurisdictions can make coordinated, cost-effective efforts towards reducing losses from natural and human-caused disasters.

The following survey is designed to help identify general needs for hazard mitigation and resiliency within Pike County from your perspective, as well as to identify specific projects that may be included in the mitigation plan. Given the ongoing nature of the COVID-19 pandemic, there are questions specific to this hazard at the end of the survey to help inform future decision making.

Please take a few minutes to answer the following questions and provide feedback on potential mitigation that affects your assets, infrastructure, and/or services within Pike County. Provide as much details as possible to support your choice in the comment box. Where possible, identify specific areas that need to be improved and your suggestions for possible improvements. If there are other important issues that you feel are not covered by this survey.

More information about this planning process and additional mitigation resources may be found at the Pike County HMP website by going to: <http://www.pikecountypahmp.com/>

Thank you for supporting the update of this planning process!

General Information

The answers provided in this section will be treated as **CONFIDENTIAL** and will be used solely for the purpose of preparing this plan. Please note that individual answers will not be published in the plan.

1. Name of your department/office/institution

2. Name and Title of Respondent

3. What is your position/title/role with your department/office/institution?

4. Please provide your contact information

Email Address

Phone Number

What is your/your organization's role in Pike County?

5. What category does your facility operation/service fall under?

Other (please specify)

6. Based on the above category, please provide additional description and information as to what your organization does or offers (please explain)

7. Please identify the location of your facility(ies) and/ or primary service area. You may choose more than one if your service area covers multiple communities or "Pike County (entire area)" if your service area is county-wide:

☐ Pike County (entire area)

☐ Lackawanna Township

☐ Pamyra Township

☐ Boomington Grove Township

☐ Lehman Township

☐ Porter Township

☐ Delaware Township

☐ Matamoras Borough

☐ Shohola Township

☐ Dingman Township

☐ Mifflin Borough

☐ Westfall Township

☐ Greene Township

☐ Monroe Township

☐ Other (please specify)

8. Does your organization maintain or manage any of the following within your designated service area? If not, answer "No" at the bottom, otherwise check all that apply.

☐ Buildings

☐ Water/Sewer

☐ Roads

☐ Stormwater

☐ Bridges

☐ No

☐ Other (please specify)

Hazard/Damage Identification

9. Looking back at previous hazard events, have buildings/facilities/structures you have worked in and/ or are responsible for been impacted by a hazard (ex. damage/closures/etc.)?

- ☐ Yes
- ☐ No
- ☐ Don't Know

10. If you answered "Yes" to the above question, in your own words please describe the event that caused or is causing (if recurring) damage and loss of service/ property. If quantifiable data is available please provide that as well (number of damaged structures, monetary loss, etc. please explain)

11. Looking at where your facilities or services are located in Pike County, what areas do you believe to be the most vulnerable to hazards? What are these hazards? (please explain).

Preparedness

12. Is your organization covered by any of the following plans? Check all that apply

☐ Continuity of Operations Plan

☐ Business Continuity Plan

☐ Continuity of Government Plan

☐ None

☐ Emergency Operations Plan

☐ Don't Know

☐ Other (please specify)

13. Do you believe the facilities and infrastructure for your organization are equipped to handle a disaster and/or resilient to damages?

☐ Yes

☐ No

☐ Maybe

☐ Don't Know

☐ Other (please specify)

Project Identification

14. Can you identify projects or programs that will reduce your facility/organization's vulnerability to damages and losses, including loss of operation/service, to hazard events? (Please explain)

15. Can you identify projects or programs that have been recently been implemented to reduce your facility's/organization's vulnerability, damage and losses, including loss of operation/service, to hazard events? (please explain)

DRAFT

COVID-19

COVID-19 has shed light onto our County's strengths and weaknesses. Please answer the following questions.

16. How has your organization been involved in response to this pandemic? (please explain)

17. What specific services/ infrastructure needs to be built/ improved in your organization in order to mitigate damage we have experienced from this pandemic? (please explain)

DRAFT

Final Thoughts

18. Do you have any questions or comments for Pike County?

DRAFT

1. Introduction

Pike County Residents,

A planning committee, along with the support of county, regional and state agencies and stakeholders, has recently been formed to address hazards and disasters that may occur in Pike County and develop strategies to mitigate against losses. In order to identify and plan for future disasters, we need assistance from the residents of Pike County.

This questionnaire is designed to help us gauge the level of knowledge local residents already have about hazard/disaster issues. Our questionnaire also asks for information you may have about areas vulnerable to any type of disasters. The information you provide will help us coordinate activities to reduce the risk of injury or property damage in the future.

You will be asked if you live in a floodplain. If you do not know, or are not sure, please check the FEMA website: <https://msc.fema.gov/portal/home>.

This survey will take approximately 15 minutes to complete.

Thank you for taking the time to participate in this information gathering process!

2. All-Hazard Information

In this section, we are looking for your input on the types of hazards that impact Pike County and its residents. Please answer the following questions to help us understand the concerns throughout the County.

DRAFT

1. In the past 5 years, which of the following types of natural hazards/disasters have you experienced within Pike County, or sustained damage as a result of, and how concerned are you about the following hazards impacting the County? (In the first column indicate if you have experienced the hazard, then indicate your level of concern).

	Have Experienced	Not Concerned	Somewhat Concerned	Very Concerned	Extremely Concerned
Climate Change	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coastal Erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drought	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Earthquake	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Extreme Temperatures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flooding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flooding - riverine/flood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flooding - ice jam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hail storm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hurricane, Tropical Storm, Nor'easter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Invasive Species	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Landslide	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lightning Strike	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pandemic and Infectious Disease	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radon Exposure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Subsidence, Sinkhole	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tornado, Windstorm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wildfire	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Winter Storm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other, indicate in comment box below	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Other (please specify)

2. In the past 5 years, which of the following types of human-made hazards/disasters have you experienced within Pike County, or sustained damage as a result of, and how concerned are you about the following hazards impacting the County? (In the first column indicate if you have experienced the hazard, then indicate your level of concern).

	Have Experienced	Not Concerned	Somewhat Concerned	Very Concerned	Extremely Concerned
Building and Structure Collapse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Civil Disturbance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cyber Terrorism	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dam Failure/Breaches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental Hazard - Coal Mining	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Environmental Hazard - Conventional Oil and Gas Wells	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental Hazard - Gas and Liquid Pipelines	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental Hazard - Hazardous Materials Releases	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental Hazard - Unconventional Oil and Gas Wells	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Levee Failure	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mass Food and Animal Feed Contamination	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nuclear Incident	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Operational Action Response	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Subsidence, Sinkhole	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Terrorism	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transportation Accident	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Urban Fire and Exposure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Utility Interruption	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Have Experienced

Not Concerned

Somewhat
Concerned

Very Concerned

Extremely Concerned

Other, indicate in
comment box
below

☐☐☐☐☐

Other (please specify)

3. In the last 5 years, were you evacuated from your home as a result of a disaster (e.g. flooding)? If so, how long were you displaced? Did you go to a shelter?

4. How prepared is your household to get along without electricity or natural gas for one to five days?

- ☐ Not at all prepared
- ☐ Somewhat prepared
- ☐ Very prepared

Please explain

5. Please rank how prepared you feel you and your household are for disaster events likely to occur within your community. Rank on a scale of 1 to 5, with 5 representing the most prepared.

1 (least)

5 (most)

☐

6. How do you receive your information concerning a disaster? Check all that apply.

- | | |
|--|---|
| <input type="checkbox"/> County website | <input type="checkbox"/> TV (news) |
| <input type="checkbox"/> Municipal website | <input type="checkbox"/> TV (advertising) |
| <input type="checkbox"/> Newspaper | <input type="checkbox"/> Radio (news) |
| <input type="checkbox"/> Municipal E-Mail | <input type="checkbox"/> Radio (advertising) |
| <input type="checkbox"/> Push notifications to my cell phone | <input type="checkbox"/> Outdoor Advertisements |
| <input type="checkbox"/> Police, Fire, EMS | <input type="checkbox"/> Internet |
| <input type="checkbox"/> Information Flyers/Brochures | <input type="checkbox"/> Social Media |
| <input type="checkbox"/> Public meetings, workshops, public awareness events | <input type="checkbox"/> Chamber of Commerce |
| <input type="checkbox"/> Schools/Academic Institutions | <input type="checkbox"/> Public Library |

Other (please specify)

7. Of the answers you provided above, what are the top three methods you use?

8. Do you think that the public is aware of, understands and takes advantage of emergency warning and notification systems and services (reverse 911, audible alerts, etc.)?

- ☐ Yes
- ☐ No
- ☐ I don't know

Please explain

9. Do you think that local public education and awareness programs are effective at informing the public on what they should do to be prepared for and reduce their personal risk to disasters?

- ☐ Yes
- ☐ No
- ☐ I don't know

Other (please explain)

10. Which of the following steps has your household taken to prepare for a hazard event? Check all that apply.

- | | |
|--|--|
| <input type="checkbox"/> Made an emergency plan | <input type="checkbox"/> Stored battery-operated radio |
| <input type="checkbox"/> Designated a meeting place | <input type="checkbox"/> Stored fire extinguisher |
| <input type="checkbox"/> Identified utility shutoffs | <input type="checkbox"/> Registered to receive emergency alerts |
| <input type="checkbox"/> Received first aid/CPR training | <input type="checkbox"/> Stored medical supplies |
| <input type="checkbox"/> Prepared a disaster supply kit | <input type="checkbox"/> Purchased additional insurance to cover losses (e.g. flood insurance) |
| <input type="checkbox"/> Installed smoke detectors on each level of home | <input type="checkbox"/> Received emergency preparedness information from a government source |
| <input type="checkbox"/> Stored food and water | <input type="checkbox"/> Identified the location of the nearest emergency shelter |
| <input type="checkbox"/> Stored flashlights and batteries | |

Other (please specify)

11. In the past, has your home been damaged by a hazard event? For example, the basement of your home flooded and damaged the hot water heater.

- ☐ Yes
- ☐ No

If yes, please explain the damage your structure sustained and when it occurred.

12. If you answered yes above, did you report the damages to your local police, fire, or emergency management department?

- ☐ Yes
- ☐ No

If you answered 'no', why did you not report the damages?

13. To the best of your knowledge is your property located in a designated floodplain?

If you do not know, or are not sure, please check the FEMA website: <https://msc.fema.gov/portal/home>.

- ☐ Yes ☐ No ☐ Not Sure

14. If your property is in the floodplain, do you have flood insurance?

- ☐ Yes
- ☐ No
- ☐ N/A

15. If your property is located outside of the floodplain, do you have flood insurance?

- ☐ Yes
- ☐ No
- ☐ N/A

16. If you do NOT have flood insurance, what is the primary reason?

- ☐ I don't need it
- ☐ My property has never flooded
- ☐ It's too expensive
- ☐ Not familiar with it/don't know about it
- ☐ Insurance company will not provide
- ☐ I believe that my homeowners' insurance will cover me
- ☐ My property is located on high ground

Other (please specify)

17. Do you or did you have problems getting homeowners' renters insurance due to risks from hazards?

- ☐ Yes ☐ No

If you answered "yes", please identify the risk that caused you to have problems obtaining homeowners'/renters' insurance.

3. Hazard Mitigation

As defined by FEMA, mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. In order for mitigation to be effective, we need to take action now - before the next disaster - to reduce human and financial consequences later.

Effective mitigation requires that we all understand local risks, address the hard choices, and invest in long-term community well-being. Without mitigation actions, we jeopardize our safety, financial security and self-reliance.

In this section of the survey, we want to hear from you how Chester County can help mitigate the county and become more resilient before the next storm strikes

18. Please identify any specific vulnerabilities that you are aware of in your city/township/borough (e.g. floodprone areas or specific properties, critical facilities that lack backup power, etc.). Please list street names and other specific identifiers if possible.

19. Please identify any specific vulnerabilities that you are aware of in Pike County outside of your city/township/borough (e.g. floodprone areas or specific properties, critical facilities that lack backup power, etc.). Please list city/town/village street names, and other specific identifiers if possible.

20. What types of projects do you believe local, county, state or federal government agencies could be doing in order to reduce the damage and disruption of hazards in Chester County? Select your top three choices.

- | | |
|---|---|
| <input type="checkbox"/> Improve and strengthen critical facilities such as police, schools, hospitals | <input type="checkbox"/> Strengthen codes, ordinances and plans to require higher hazard risk management standards and/or provide greater control over development in high hazard areas |
| <input type="checkbox"/> Improve and strengthen infrastructure, such as elevating roadways and improving drainage systems | <input type="checkbox"/> Buy out flood prone properties and maintain as open-space |
| <input type="checkbox"/> Work on improving the damage resistance of utilities (electricity, communications, water/wastewater facilities etc.) | <input type="checkbox"/> Inform property owners of ways they can mitigate damage to their properties |
| <input type="checkbox"/> Install or improve protective structures, such as bulkheads, floodwalls or levees to protect against flooding | <input type="checkbox"/> Provide better information about hazard risks and high-hazard areas |
| <input type="checkbox"/> Replace inadequate or vulnerable bridges and causeways | <input type="checkbox"/> Assist vulnerable property owners with securing funding to mitigate their properties |

Other (please specify)

21. Do you feel your municipality is doing enough towards reducing hazard risks, climate adaptation, or other mitigation/prevention measures?

- ☐ Yes
- ☐ No
- ☐ I don't know

Please provide details for your answer

22. If your property were located in a designated high-hazard area (for example, NFIP flood zone) or had received repeated damages from a hazard/disaster event, would you consider any of the following options?

If your response is dependent on certain factors, such as the funding source, please indicate those factors in the following question.

	Yes	No	Unsure
Having your property bought out	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Moving your structure to another property or a less risky part of your property	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Elevating your structure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Floodproof your structure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Looking into other ways to mitigate	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other (please specify)

23. Please select the factor(s) that would influence your decision in the mitigation options listed above (buyout/acquisition, relocation, or elevation).

- ☐ Cost
- ☐ Do not have the means to move/relocate
- ☐ Unaware of available programs
- ☐ Length of process
- ☐ Other (please specify)

24. If you have already spent money to mitigate your home, how much did you spend and on what measures?

25. Which (if any) incentives would motivate you to spend money to protect your home from the possible impacts of a disaster?

26. Please list any additional types of projects you believe local, county, state or federal government agencies could be doing to reduce the damage and disruption in Pike County.

27. Do you have any other comments, questions or concerns regarding hazard mitigation in Pike County?

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4. General Household Information

The answers provided in this section will be treated as **CONFIDENTIAL** and will be used solely for the preparation of this plan.

28. Please indicate in which municipality you live.

- | | | |
|--|---|---|
| <input type="radio"/> Boom ng Grove Townsh p | <input type="radio"/> Lehman Townsh p | <input type="radio"/> Port r Townsh p |
| <input type="radio"/> De aware Townsh p | <input type="radio"/> Matamoras Borough | <input type="radio"/> hoho a Townsh p |
| <input type="radio"/> D ngman Townsh p | <input type="radio"/> M ford Borough | <input checked="" type="radio"/> estfa Townsh p |
| <input type="radio"/> Greene Townsh p | <input type="radio"/> M ford Townsh p | |
| <input type="radio"/> Lackawaxen Townsh p | <input type="radio"/> Pa myra Townsh p | |
| <input type="radio"/> Other (p ease spec fy) | | |

29. How long have you lived here?

- | | |
|--|-------------------------------------|
| <input type="radio"/> Less than 1 year | <input type="radio"/> 10 o 19 years |
| <input type="radio"/> 1 to 5 years | <input type="radio"/> 20 yea more |
| <input type="radio"/> 6 to 9 years | |

30. Do you own or rent y r place of residence?

- ☐ Own ☐ Rent

31. What street s your prop on? Th optional and will be kept confidential - only used to identify hazard areas such s flooding.

32. If you received real estate disclosure information when you moved into your current residence, did your real estate agent or landlord explain the implications of living in a hazard risk zone and did you understand the information they presented?

- ☐ Yes
☐ No

Other (p ease spec fy)

33. Please indicate your age range:

☐

18 to 30

☐

31 to 40

☐

41 to 50

☐

51 to 60

☐

60 or over

DRAFT

Pike County, along with its municipalities, are in the process of updating the Hazard Mitigation Plan (HMP). Hazard mitigation is any action taken to reduce the loss of life and property by lessening the impact of disasters (natural, technological, and man-made). These include flooding, severe storms, severe winter storms, etc. The HMP provides a “blueprint” by which participating jurisdictions can make coordinated efforts towards reducing losses from natural hazards. It is required by the Federal Emergency Management Agency (FEMA) in order to be eligible for federal grant funding for public and private mitigation projects.

Due to your proximity to Pike County, the effects of many of these disasters could be similar in your county, and your involvement in this process could reap mutual benefits for both counties. By participating in the review of this plan, you will be engaging in the regional coordination of disaster mitigation planning, which is one of the intents of the Mitigation Planning Regulations (4 CFR 201).

The following survey is designed to help Pike County gain a better understanding of how their neighboring counties operate day-to-day and during an emergency and helps our neighboring counties be included in the planning process. This survey consists of 27 questions and will take approximately 15 minutes to complete.

The Pike County HMP Planning Partnership thanks you for giving the time to participate in this information-gathering process. More information about this planning process can be found at the HMP website at: <https://www.pikecounty.org/hmp/>

General Information

The answers provided in this section will be treated as **CONFIDENTIAL** and will be used solely for the purpose of preparing this plan. Please note that individual answers will not be published in the plan.

1. Please indicate the county in which you represent

- ☐ Wayne County, PA
- ☐ Monroe County, PA
- ☐ Sussex County, NJ
- ☐ Warren, NJ
- ☐ Orange County, NY
- ☐ Sullivan County, NY
- ☐ Other (please specify)

2. Name and Title of Respondent

3. What department do you represent?

4. Please provide your contact information.

Email Address

Phone Number

Emergency Operations and Continuity of Operations Planning

The answers provided in this section will be treated as **CONFIDENTIAL** and will be used solely for the purpose of preparing this plan.

5. Do you have any shared service agreements or mutual aid agreements in place with Pike County at the county level for the following?

- | | |
|--|-------------------------------------|
| <input type="checkbox"/> Equipment and staff for debris cleanup and snow removal | <input type="checkbox"/> Sheltering |
| <input type="checkbox"/> Emergency staff for evacuations/disaster response | <input type="checkbox"/> Other |
| <input type="checkbox"/> Damage assessments | |

If you checked any of the above, please explain.

6. Is Pike County involved in your county's comprehensive emergency operations planning, such as by participating on a planning team, or providing resources during an emergency?

- ☐ Yes
- ☐ No
- ☐ Don't Know
- ☐ N/A

If yes, please explain.

7. Is your county involved in Pike County's comprehensive emergency operations planning, such as by participating on a planning team, or providing resources during an emergency?

- ☐ Yes
- ☐ No
- ☐ Don't Know
- ☐ N/A

If yes, please explain.

8. Is Pike County involved in your county's Continuity of Operations planning, such as by participating on a planning team, providing resources during an emergency, or carrying out some of your county's essential functions for a period of time?

- ☐ Yes
- ☐ No
- ☐ Don't Know
- ☐ N/A

If yes, please explain.

9. Is your county involved in Pike County's Continuity of Operations planning, such as by participating on a planning team, providing resources during an emergency, or carrying out some of Pike County's essential functions for a period of time?

- ☐ Yes
- ☐ No
- ☐ Don't Know
- ☐ N/A

If yes, please explain.

10. Thinking about emergency operations and disaster response, please explain how these actions are communicated between counties.

Risk and Vulnerability

The answers provided in this section will be treated as **CONFIDENTIAL** and will be used solely for the purpose of preparing this plan.

11. Does your county share risk and vulnerability assessments (flood mapping, HAZUS, etc.) with Pike County?

- ☐ Yes
- ☐ No
- ☐ Don't Know
- ☐ N/A

If yes, please explain

DRAFT

Evacuation and Sheltering

The answers provided in this section will be treated as **CONFIDENTIAL** and will be used solely for the purpose of preparing this plan.

12. Do you collaborate with Pike County on establishing evacuation routes and alternate evacuation routes?

- ☐ Yes
- ☐ No
- ☐ Don't Know
- ☐ N/A

If yes, please explain.

13. Do you and Pike County consult with one another before making evacuation decisions that would impact one another (recommending evacuation route in neighboring counties)?

- ☐ Yes
- ☐ No
- ☐ Don't Know
- ☐ N/A

If yes, please explain

14. Are evacuation routes maintained the same level of protection across county lines?

- ☐ Yes
- ☐ No
- ☐ Don't Know
- ☐ N/A
- ☐ Other (please specify)

15. Do you collaborate with Pike County on establishing shelters?

- ☐ Yes
- ☐ No
- ☐ Don't Know
- ☐ N/A

If yes, please explain.

16. Do you and Pike County consult with one another before making sheltering decisions that would impact one another (recommending shelters in neighboring counties)?

- ☐ Yes
- ☐ No
- ☐ Don't Know
- ☐ N/A

If yes, please explain.

17. Do you and Pike County share any spaces suitable for emergency housing? This includes locations suitable to place temporary housing units to house residents displaced by a disaster.

- ☐ Yes
- ☐ No
- ☐ Don't Know
- ☐ N/A

If yes, please explain.

Information Sharing

The answers provided in this section will be treated as **CONFIDENTIAL** and will be used solely for the purpose of preparing this plan.

18. Does your county have access to contact information for Pike County's emergency operation centers at the county and local level?

- ☐ Yes
- ☐ No
- ☐ Don't Know
- ☐ N/A

If yes, please explain.

19. Please describe any situations or hazards that are of a concern to both your and Pike County. For example, would flooding along a particular waterway affect both counties or are there any facilities or infrastructure that would affect both counties if it/they failed?

20. Please explain how information is shared between counties regarding mitigation projects.

21. Is information regarding mitigation shared during the planning and implementation phases of the projects?

- ☐ Yes
- ☐ No
- ☐ Don't Know
- ☐ N/A

If yes, please explain.

Projects, Grants, Education, and Outreach

The answers provided in this section will be treated as **CONFIDENTIAL** and will be used solely for the purpose of preparing this plan.

22. Are you aware of any projects for the following that requires cross-collaboration between county boundaries?

- | | |
|---|---|
| <input type="checkbox"/> Stormwater projects | <input type="checkbox"/> Connected roadway improvements |
| <input type="checkbox"/> Watershed projects or planning | <input type="checkbox"/> Natural infrastructure restoration |
| <input type="checkbox"/> Food plan projects or planning | <input type="checkbox"/> Outreach (education and outreach campaigns, programs for public information, etc.) |
| <input type="checkbox"/> Other (please specify) | |

23. If you selected anything above, please explain.

24. Have your county and Pike County collaborated in grant applications?

- ☐ Yes
- ☐ No
- ☐ Don't Know
- ☐ N/A

If yes, please explain.

25. Are you aware of any organizations that carry out education and outreach regarding hazards in both counties?

- ☐ Yes
- ☐ No
- ☐ Don't Know
- ☐ N/A

If yes, please explain.

26. What are opportunities or ideas to optimize cooperation with Pike County on emergency management operations and hazard mitigation projects?

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Final Thoughts

27. Do you have any relevant questions or comments for Pike County?

DRAFT

Q1 Name of your department/office/institution

Answered: 5 Skipped: 0

#	RESPONSES	DATE
1	[REDACTED]	7/15/2021 7:50 AM
2	[REDACTED]	7/13/2021 7:29 PM
3	[REDACTED]	7/13/2021 3:56 PM
4	[REDACTED]	7/13/2021 1:01 PM
5	[REDACTED]	7/12/2021 11:28 AM

DRAFT

Q2 Name of Respondent

Answered: 5 Skipped: 0

#	RESPONSES	DATE
1	[REDACTED]	7/15/2021 7:50 AM
2	[REDACTED]	7/13/2021 7:29 PM
3	[REDACTED]	7/13/2021 3:56 PM
4	[REDACTED]	7/13/2021 1:01 PM
5	[REDACTED]	7/12/2021 11:28 AM

DRAFT

Q3 What is your position/title/role with your department/office/institution?

Answered: 5 Skipped: 0

#	RESPONSES	DATE
1	Department of public works	7/15/2021 7:50 AM
2	Captain	7/13/2021 7:29 PM
3	Resources and Land Use Specialist	7/13/2021 3:56 PM
4	Public Information Officer	7/13/2021 1:01 PM
5	Emergency Management Coordinator	7/12/2021 11:28 AM

DRAFT

Q4 Please provide your contact information.

Answered: 5 Skipped: 0

ANSWER CHOICES	RESPONSES	
Name	0.00%	0
Company	0.00%	0
Address	0.00%	0
Address 2	0.00%	0
City/Town	0.00%	0
State/Province	0.00%	0
ZIP/Postal Code	0%	0
Country	0.00%	0
Email Address	100.0	5
Phone Number	100.00%	5

#	NAME	DATE
#	There are no responses.	
#	COMPANY	DATE
#	There are no responses.	
#	ADDRESS	DATE
#	There are no responses.	
#	ADDRESS 2	DATE
#	There are no responses.	
#	CITY/TOWN	DATE
#	There are no responses.	
#	STATE/PROVINCE	DATE
#	There are no responses.	
#	ZIP/POSTAL CODE	DATE
#	There are no responses.	
#	COUNTRY	DATE
#	There are no responses.	
#	EMAIL ADDRESS	DATE
1	[REDACTED]	7/15/2021 7:50 AM
2	[REDACTED]	7/13/2021 7:29 PM
3	[REDACTED]	7/13/2021 3:56 PM
4	[REDACTED]	7/13/2021 1:01 PM
5	[REDACTED]	7/12/2021 11:28 AM

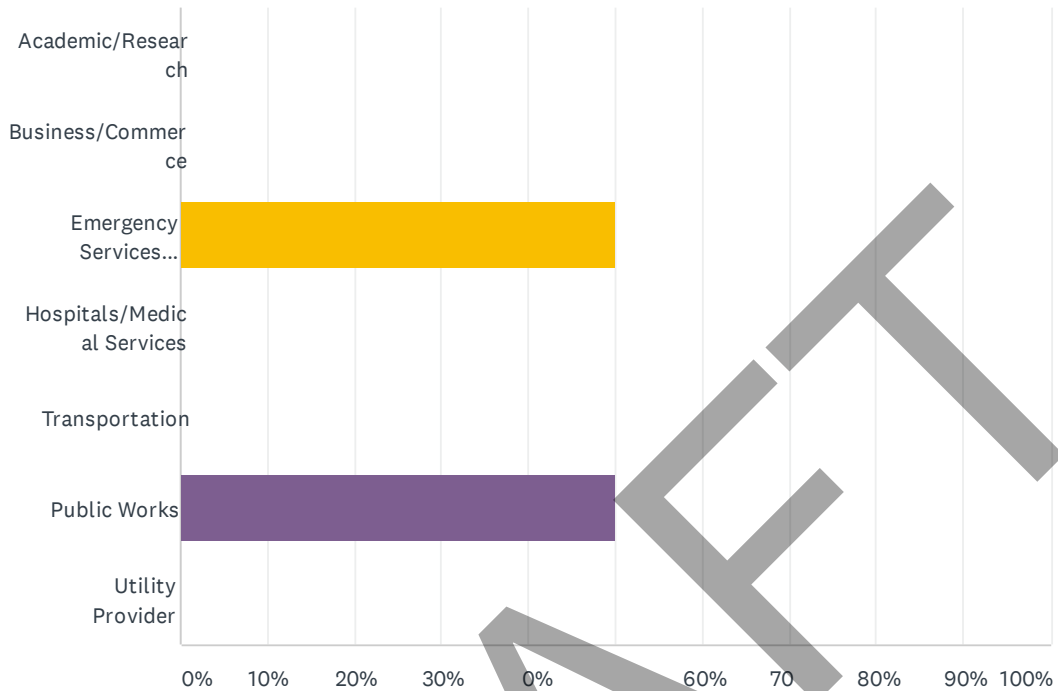
Pike County Hazard Mitigation Plan - Stakeholder Survey

#	PHONE NUMBER	DATE
1	██████	7/15/2021 7:50 AM
2	██████	7/13/2021 7:29 PM
3	██████	7/13/2021 3:56 PM
4	██████	7/13/2021 1:01 PM
5	██████	7/12/2021 11:28 AM

DRAFT

Q5 What category does your facility operation/service fall under?

Answered: 4 Skipped: 1



ANSWER CHOICES		RESPONSES	
Academic/Research		0.00%	0
Business/Commerce		0.00%	0
Emergency Services (police, fire, EMS)		50.00%	2
Hospitals/Medical Services		0.00%	0
Transportation		0.00%	0
Public Works		50.00%	2
Utility Provider		0.00%	0
TOTAL			4

#	OTHER (PLEASE SPECIFY)	DATE
1	Environmental/Inter-governmental Agency	7/13/2021 4:01 PM

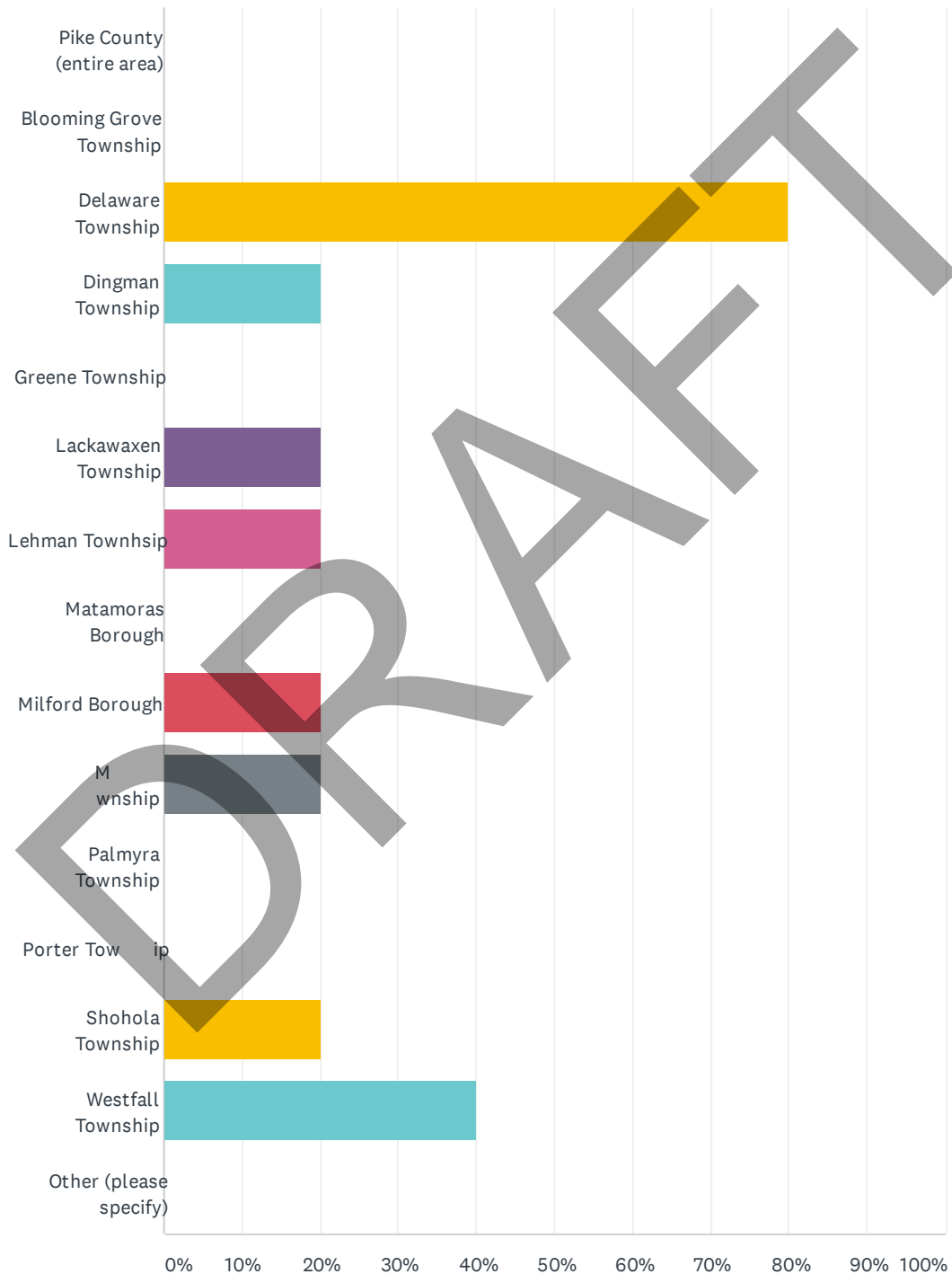
Q6 Based on the above category, please provide additional description and information as to what your organization does or offers (please explain)

Answered: 5 Skipped: 0

#	RESPONSES	DATE
1	Safe traveling roads for Township residence	7/15/2021 7:51 AM
2	The organization provides emergency medical services to Eastern Pike County. EMS includes emergency and non-emergency medical transportation, welfare checks, and community outreach activities including blood drives and child safety seat inspections.	7/13/2021 7:31 PM
3	The Upper Delaware Council, Inc. (UDC) was established in 1988 as a formal partner of local, state, and federal governments and agencies which have joined together to manage the Upper Delaware Scenic and Recreational River, a true national treasure. We work with the National Park Service to administer the 1988 Final River Management Plan (RMP).	7/13/2021 4:01 PM
4	We are a local municipality taking care of township buildings and roads, our public park, and serving the residents of the township.	7/13/2021 1:08 PM
5	Functions under NIMS and the national response plan to provide guidance as to the elected board of supervisors for the township as mandated by the community in the areas of mitigation, preparation, response and recovery	7/12/2021 11:32 AM

Q7 Please identify the location of your facility(ies) and/ or primary service area. You may choose more than one if your service area covers multiple communities, or “Pike County (entire area)” if your service area is county-wide:

Answered: 5 Skipped: 0



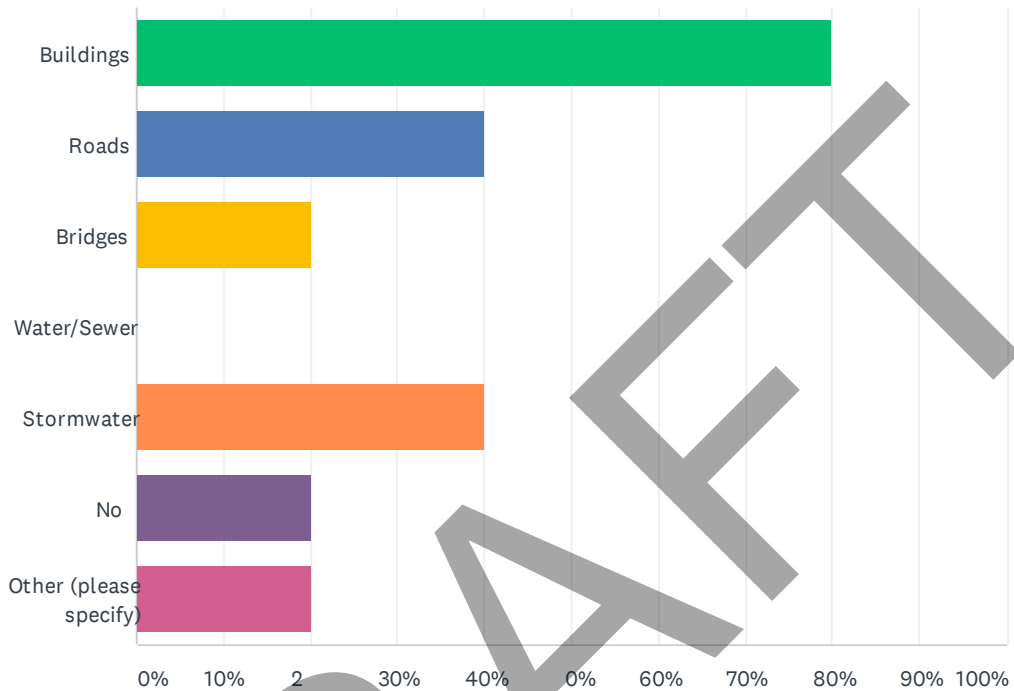
Pike County Hazard Mitigation Plan - Stakeholder Survey

ANSWER CHOICES	RESPONSES	
Pike County (entire area)	0.00%	0
Blooming Grove Township	0.00%	0
Delaware Township	80.00%	4
Dingman Township	20.00%	1
Greene Township	0.00%	0
Lackawaxen Township	20.00%	1
Lehman Townhsip	20.00%	1
Matamoras Borough	0.00%	0
Milford Borough	20.00%	1
Milford Township	20.00%	1
Palmyra Township	0.00%	0
Porter Township	0.00%	0
Shohola Township	20.00%	1
Westfall Township	40.00%	2
Other (please specify)	0.00%	0
Total Respondents: 5		

#	OTHER (PLEASE SPECIFY)	DATE
	There are no responses.	

Q8 Does your organization maintain or manage any of the following within your designated service area? If not, answer "No" at the bottom, otherwise check all that apply.

Answered: 5 Skipped: 0

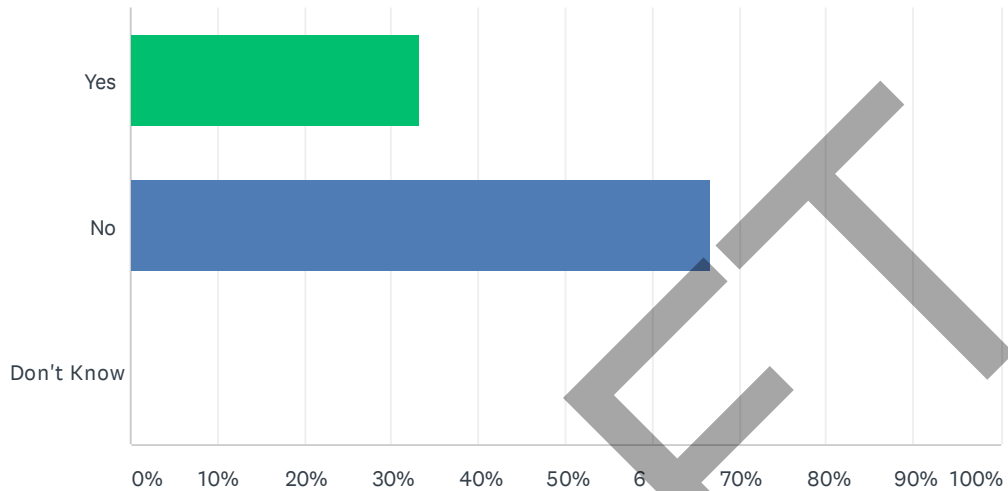


ANSWER CHOICES	RESPONSES
Bu d ngs	80.00% 4
Roads	40.00% 2
B dges	20.00% 1
Water/Sewe	0.00% 0
Stormwate	40.00% 2
No	20.00% 1
Othe (p ease spec fy)	20.00% 1
Total Respondents: 5	

#	OTHER (PLEASE SPECIFY)	DATE
1	dedicate township-"stand alone" Emergency Operations Center and township owned emergency response equipment	7/12/2021 11:32 AM

Q9 Looking back at previous hazard events, have buildings/facilities/structures you have worked in and/ or are responsible for been impacted by a hazard (ex. damage/closures/etc.)?

Answered: 3 Skipped: 2



ANSWER CHOICES	RESPONSES
Yes	33.33% 1
No	66.67% 2
Don't Know	0.00% 0
TOTAL	3

Q10 If you answered “Yes” to the above question, please describe the event that caused or is causing (if recurring) damage and loss of service/ property. If quantifiable data is available, please provide that as well (number of damaged structures, monetary loss, etc.) (please explain)

Answered: 1 Skipped: 4

#	RESPONSES	DATE
1	Storms Riley and Quinn	7/13/2021 1:14 PM

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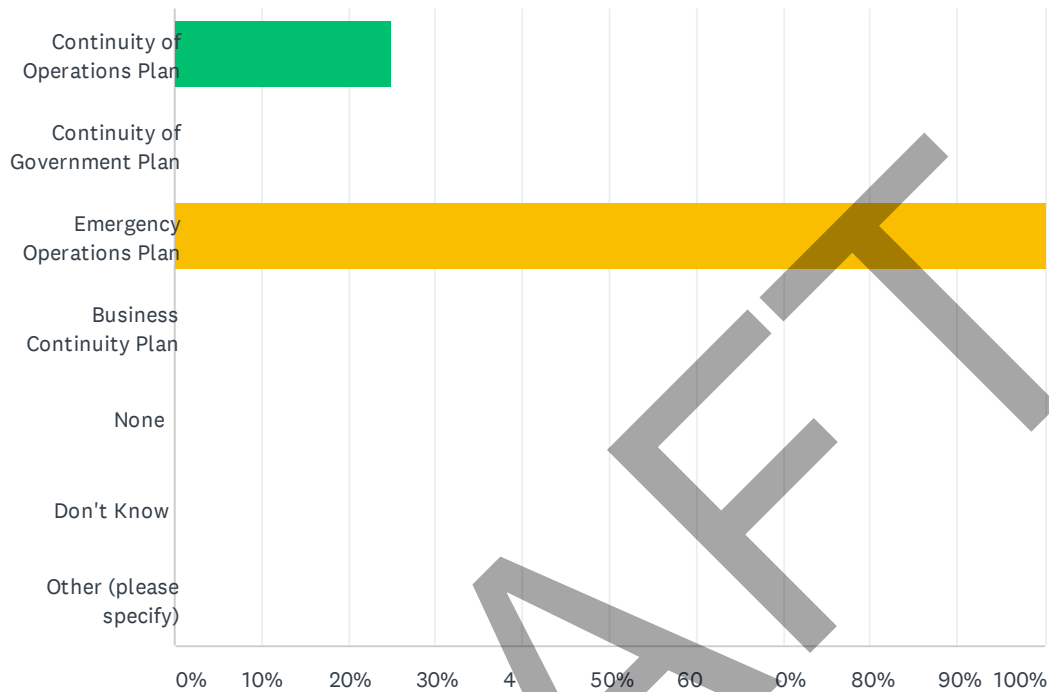
Q11 Looking at where your facilities or services are located in Pike County, what areas do you believe to be the most vulnerable to hazards? What are these hazards? (please explain).

Answered: 4 Skipped: 1

#	RESPONSES	DATE
1	Falling trees	7/15/2021 7:52 AM
2	Environmental hazards with secondary associated issues (winter storm causing a month-long power outage)	7/13/2021 7:33 PM
3	Communication, power and roadways. The hazards are anything that will disrupt them such as high winds, excessive rain, car accidents, fallen trees, etc..	7/13/2021 1:14 PM
4	all of the private development/community associations/ township roads that provide primary points of access/ seasonal youth camps primary hazards are severe weather events that lead to downed trees, blocked roads and extended power outages	7/12/2021 11:35 AM

Q12 Is your organization covered by any of the following plans? Check all that apply

Answered: 4 Skipped: 1

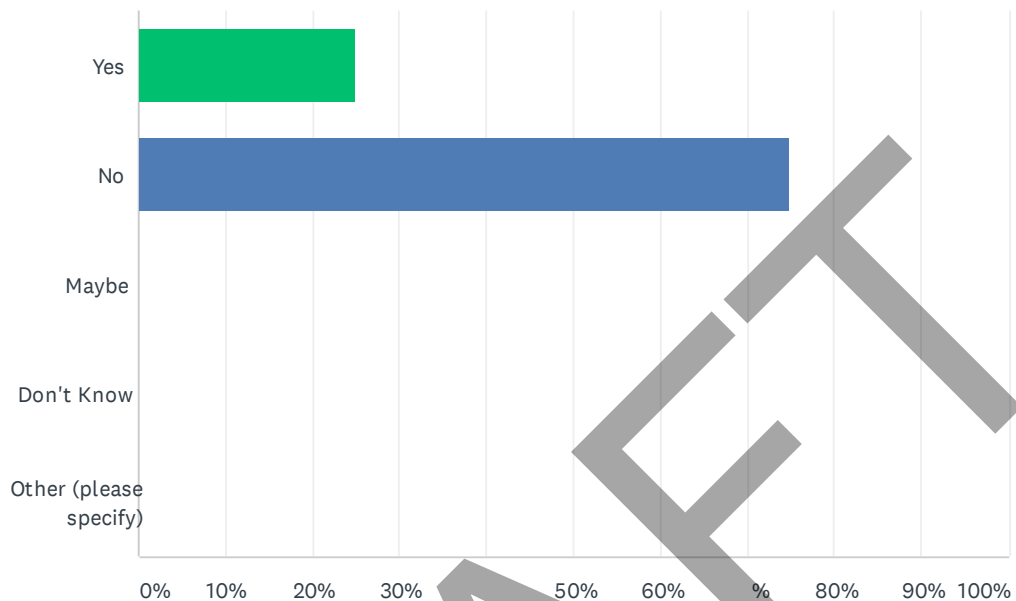


ANSWER CHOICES	RESPONSES	
Continuity of Operations Plan	25.00%	1
Continuity of Government Plan	0.00%	0
Emergency Operations Plan	100.00%	4
Business Continuity Plan	0.00%	0
None	0.00%	0
Don't Know	0.00%	0
Other (please specify)	0.00%	0
Total Respondents: 4		

#	OTHER (PLEASE SPECIFY)	DATE
	There are no responses.	

Q13 Do you believe the facilities and infrastructure for your organization are equipped to handle a disaster and/or resilient to damages?

Answered: 4 Skipped: 1



ANSWER CHOICES		PERCENTAGES	COUNTS
Yes		25.00%	1
No		75.00%	3
Maybe		0.00%	0
Don't Know		0.00%	0
Other (please specify)		0.00%	0
TOTAL			4

#	OTHER PLEASE SPECIFY	DATE
	There are no responses.	

Q14 Can you identify projects or programs that will reduce your facility/organization's vulnerability to damages and losses, including loss of operation/service, to hazard events? (Please explain)

Answered: 4 Skipped: 1

#	RESPONSES	DATE
1	In some scenarios we don't have the right equipment or manpower	7/15/2021 7:54 AM
2	Replacement of a generator; upgraded security at building (building stores Schedule I, III, IV ,V drugs and houses emergency service workers).	7/13/2021 7:37 PM
3	Work with PennDot, Met-Ed and Verizon to trim/remove any trees that would down line. Work with PennDot to fix drainage issues along 2001, and by the corner of Silver Lake Road and 2001 which is ALWAYS a disaster! Work to get a better communication plan in place. When Storms Riley and Quinn hit the township had no communication with the county for 3 days due to no phone, internet or cell service.	7/13/2021 1:54 PM
4	yes- continued purchase/upgrading of local emergency response equipment including portable pumps/generators/temporary traffic control devices review of abandoned right of ways and emergency access roads that can provide secondary access and egress to population centers in disaster	7/12/2021 11:40 AM

Q15 Can you identify projects or programs that have been recently been implemented to reduce your facility's/organization's vulnerability, damage and losses, including loss of operation/service, to hazard events? (please explain)

Answered: 4 Skipped: 1

#	RESPONSES	DATE
1	I believe there is none	7/15/2021 7:54 AM
2	Upgraded access control system; replacement of rusted-out hollow steel door with glass doors.	7/13/2021 7:37 PM
3	The township has established a better contact at Met-Ed for information when the power is	7/13/2021 1:54 PM
4	purchases as outlined above using township budget designated for	7/12/2021 11:40 AM

Q16 How has your organization been involved in response to this pandemic? (please explain)

Answered: 4 Skipped: 1

#	RESPONSES	DATE
1	We worked through the whole thing safely and had no hazardous pay	7/15/2021 7:55 AM
2	Yes, our organization provided transportation and treatment to COVID-19 patients who utilized the EMS (911 system). We coordinated and transported (evacuated) COVID-19 patients from nursing homes in Pike County to facilities in other Counties/states. In addition, we conducted research and provided educational sessions and materials for healthcare and emergency service workers. We also procured and distributed supplies including personal protective equipment, medications, and treatment supplies.	7/13/2021 7:47 PM
3	We tried to provide information to our residents as quickly as possible regarding testing and vaccination locations, although we hardly received any information from the county to distribute.	7/13/2021 1:59 PM
4	interfaced on regular basis with township board and administration/fire dept and EMS to maintain consistent compliance with state and federal directives during declaration. Advised these functions on mitigation and response activities to ensure continuity of critical township operations.	7/12/2021 11:44 AM

Q17 What specific services/ infrastructure needs to be built/ improved in your organization in order to mitigate damage we have experienced from this pandemic? (please explain)

Answered: 4 Skipped: 1

#	RESPONSES	DATE
1	As far as the township is concerned we did everything safely we cleaned everything every day sanitized everything every day and we work for the government and we didn't get an hazardous pay	7/15/2021 7:55 AM
2	Services - Coordination of emergency services. (In the absence of a county EM system or health department and no single provider of the majority of health services such as a single hospital network, the county lacks any coordination for the effective, efficient, and safe delivery of EMS/healthcare. Our agency will be attempting to mitigate this issue in the coming year(s).	7/13/2021 7:47 PM
3	We need to establish a better communication system with the county, so we can better inform our residents.	7/13/2021 1:59 PM
4	expanded/ more reliable internet/network capability to allow remote work capability	7/12/2021 11:44 AM

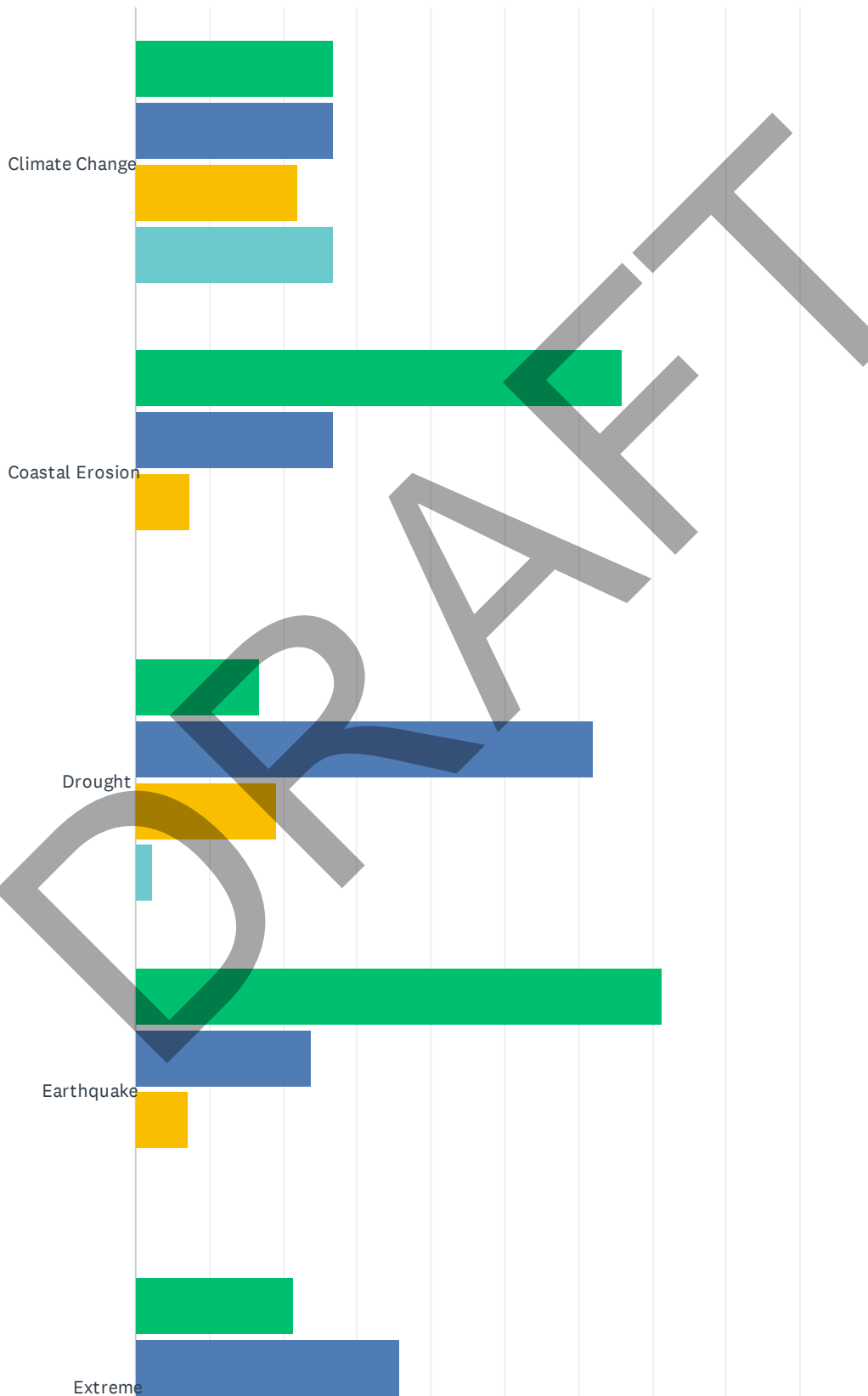
Q18 Do you have any questions or comments for Pike County?

Answered: 3 Skipped: 2

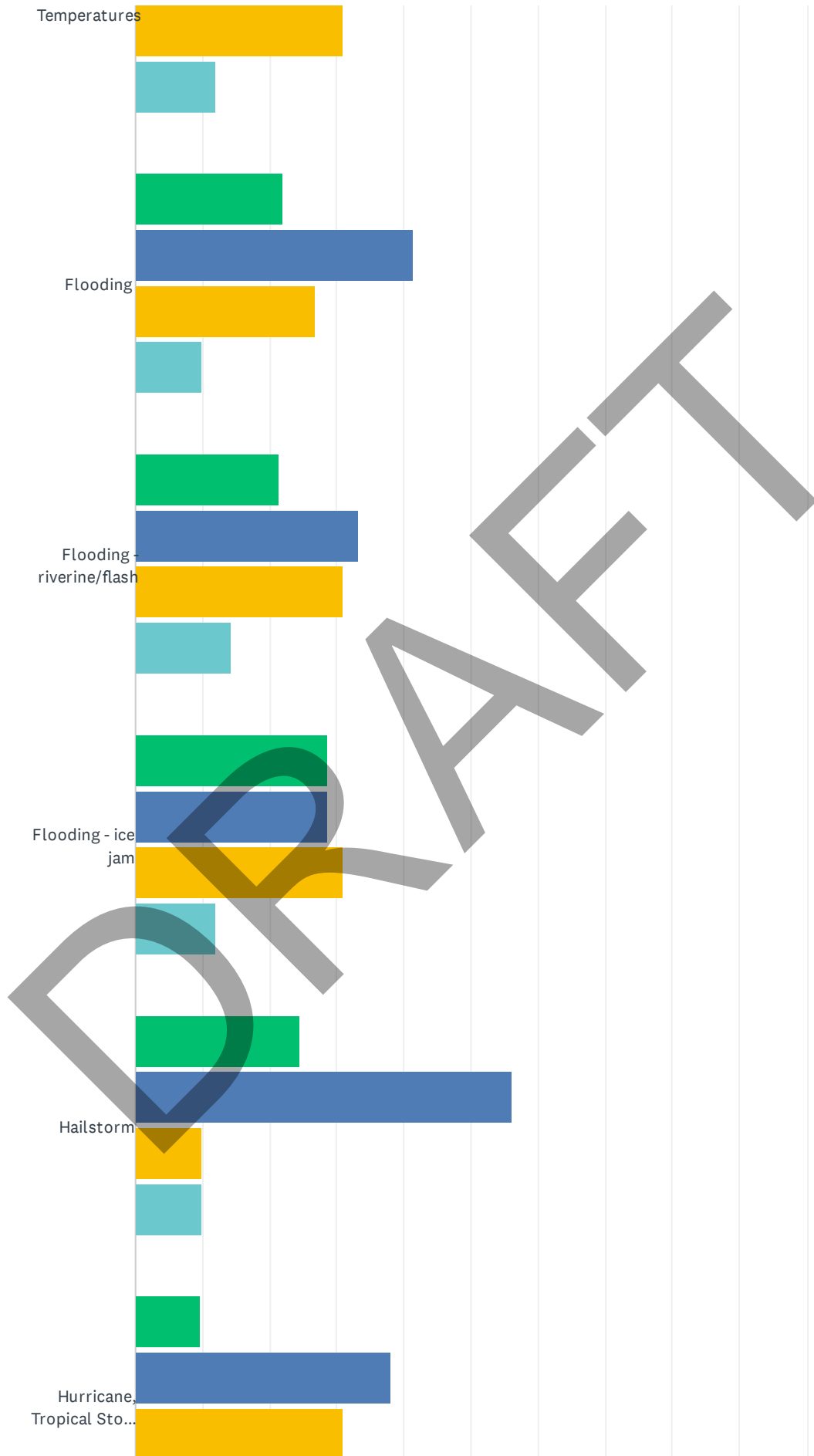
#	RESPONSES	DATE
1	Yes I do I believe the Township got a stimulus package and some of it was supposed to be for employees in other matters and they haven't done anything with it	7/15/2021 7:56 AM
2	I believe we need to work as one unit, sharing information and expertise. We need to have an Urgent Care or hospital and ambulance corp. that will service the residents of this county. I feel if we would have had these our response to COVID-19 would have had a better outcome.	7/13/2021 2:06 PM
3	pandemic and other events since last mitigation cycle show the need for expanded permanent emergency management and planning staff(including county health dept/agriculture) in line with demographic changes and increase in need for coordinated planning and the increase in numbers of emergency calls being experienced	7/12/2021 11:47 AM

Q1 How concerned are you about the following natural hazards/disasters impacting Pike County?

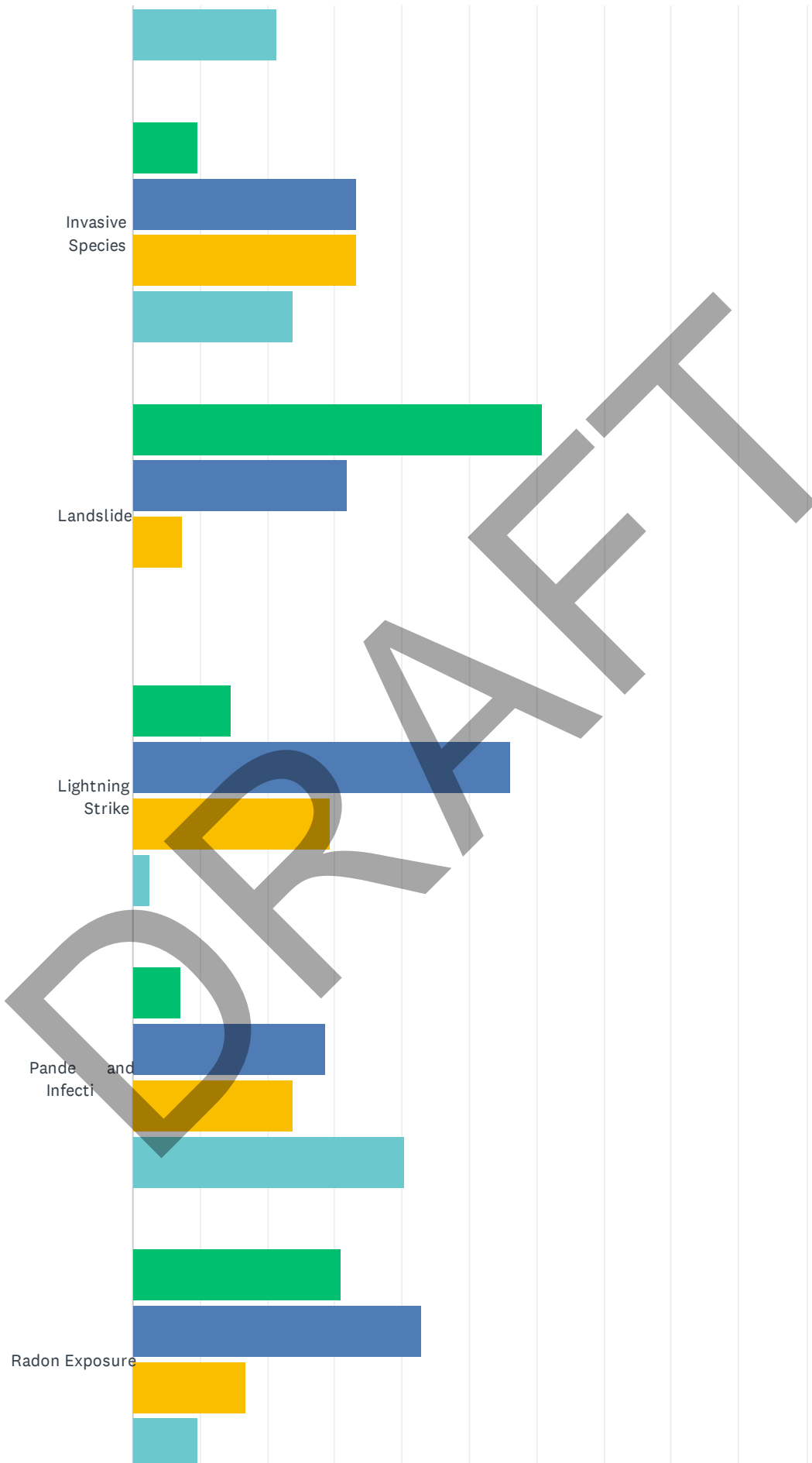
Answered: 42 Skipped: 0



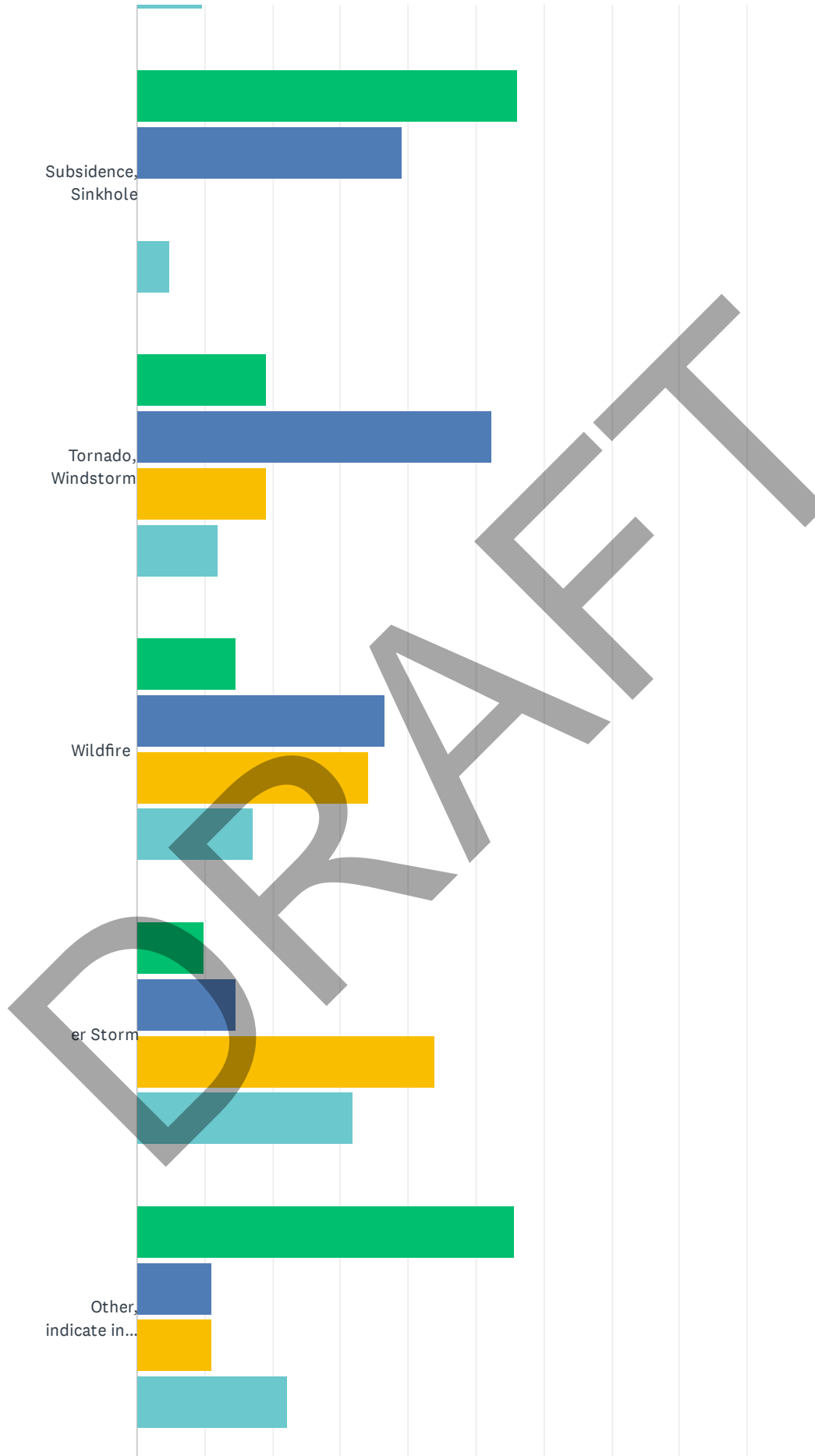
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0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

■ Not Concerned
 ■ Somewhat Concerned
 ■ Very Concerned
 ■ Extremely Concerned

	NOT CONCERNED	SOMEWHAT CONCERNED	VERY CONCERNED	EXTREMELY CONCERNED	TOTAL RESPONDENTS
Climate Change	26.83% 11	26.83% 11	21.95% 9	26.83% 11	41
Coastal Erosion	65.85% 27	26.83% 11	7.32% 3	0.00% 0	41
Drought	16.67% 7	61.90% 26	19.05% 8	2.38% 1	42
Earthquake	71.43% 30	23.81% 10	7.14% 3	0.00% 0	42
Extreme Temperatures	21.43% 9	35.71% 15	30.95% 13	1.90% 5	42
Flooding	21.95% 9	41.46% 17	26.83% 11	9.76% 4	41
Flooding - levee/flood	21.43% 9	33.33% 14	30.9% 13	14.29% 6	42
Flooding - ice jam	28.57% 12	28.57% 12	30.9% 13	11.90% 5	42
Hailstorm	24.39% 10	10% 4	9.76% 4	9.76% 4	41
Hurricane, Tropical Storm, Nor'easter	9.52% 4	38.1% 16	30.95% 13	21.43% 9	42
Invasive Species	2% 1	33.33% 14	33.33% 14	23.81% 10	42
Landslide	6.8% 3	9% 4	7.32% 3	0.00% 0	41
Lightning Strike	14.63% 6	56.10% 23	29.27% 12	2.44% 1	41
Pandemic and Infectious Disease	7.1% 3	28.57% 12	23.81% 10	40.48% 17	42
Radon Exposure	30.9% 13	42.86% 18	16.67% 7	9.52% 4	42
Subsidence, Sinkhole	6.10% 3	39.02% 16	0.00% 0	4.88% 2	41
Tornado, Windstorm	19.05% 8	52.38% 22	19.05% 8	11.90% 5	42
Wildfire	14.63% 6	36.59% 15	34.15% 14	17.07% 7	41
Winter Storm	9.76% 4	14.63% 6	43.90% 18	31.71% 13	41
Other, indicate in comment box below	55.56% 5	11.11% 1	11.11% 1	22.22% 2	9

#	OTHER (PLEASE SPECIFY)	DATE
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1	insect damage. spotted lantern and emerald ash and more	8/1/2021 8:35 AM
2	Failure of manmade infrastructure ie bridge overpass	7/25/2021 9:59 AM
3	Long term interuptions to critical infastructure. Building (more specifically bridge) collapse.	7/23/2021 8:33 AM
4	domestic terrorism	7/12/2021 11:12 AM

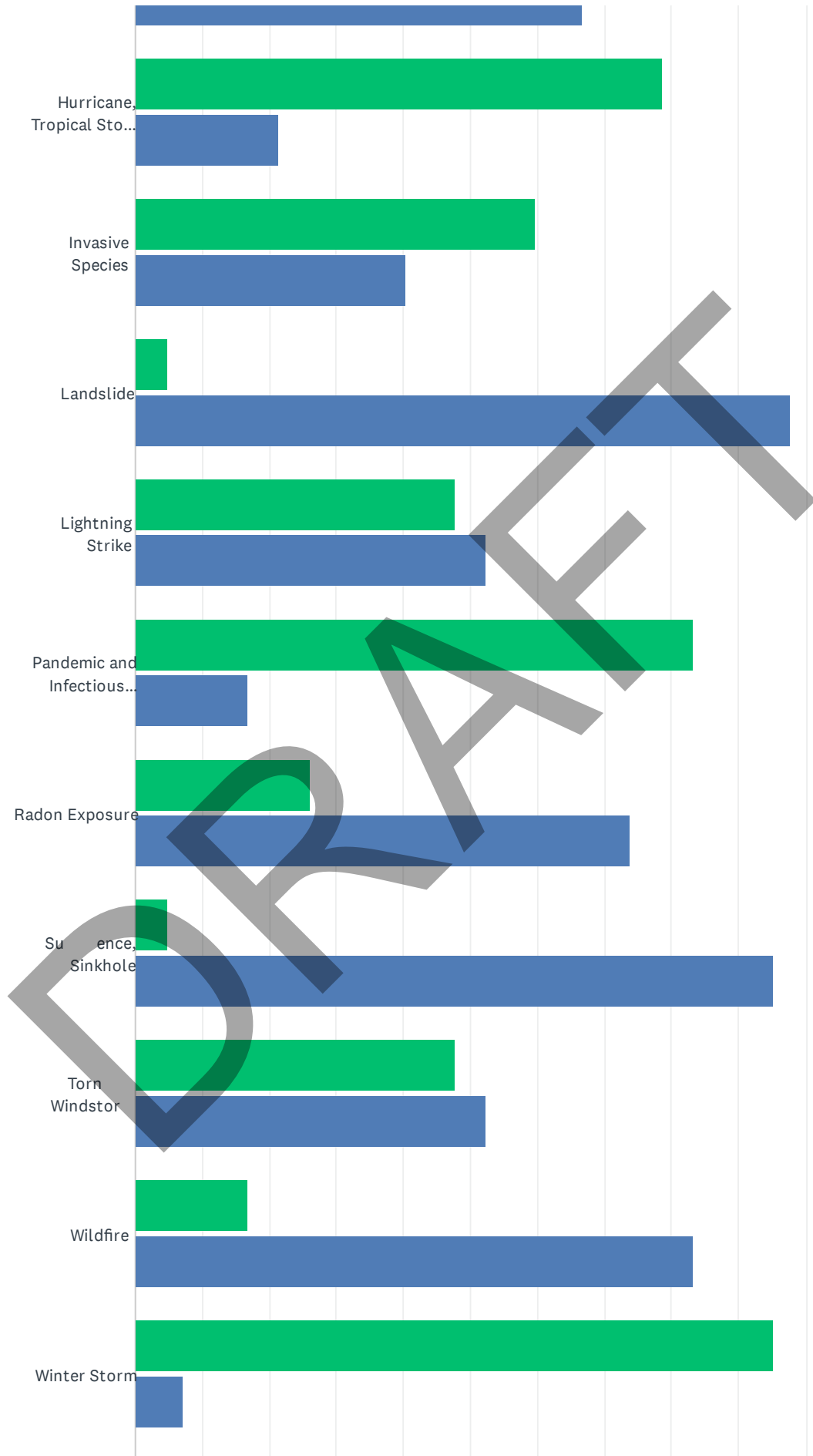
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Q2 In the past 5 years, which of the following types of natural hazards/disasters have you experienced within Pike County, or sustained damage as a result of each?

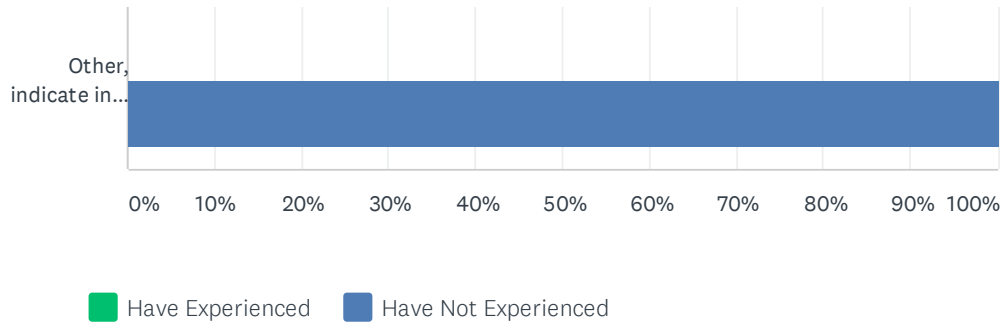
Answered: 42 Skipped: 0



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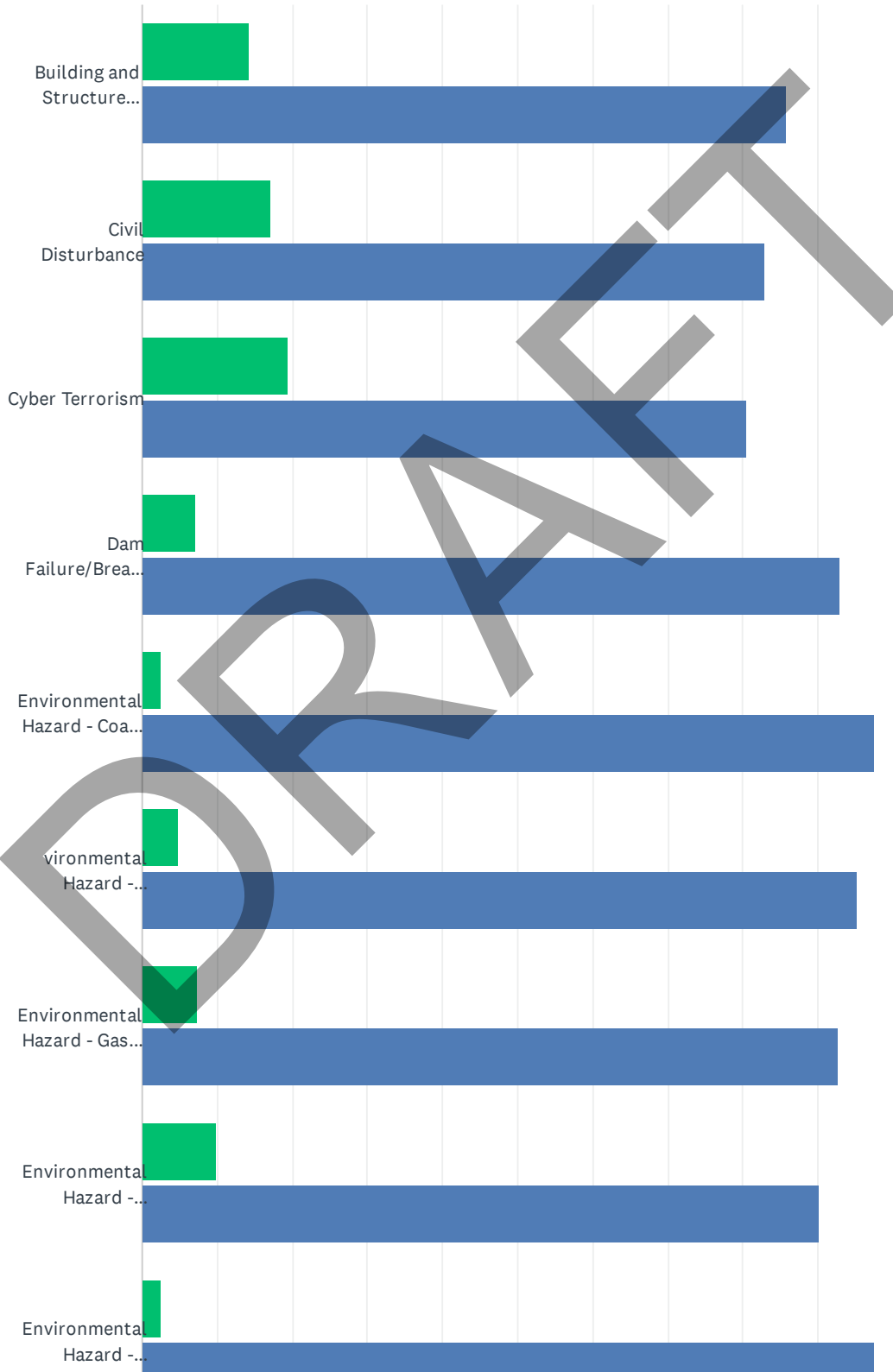
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	HAVE EXPERIENCED	HAVE NOT EXPERIENCED	TOTAL RESPONDENTS
Climate Change	35.71% 15	64.29% 27	42
Coastal Erosion	2.38% 1	97.62% 41	42
Drought	23.81% 10	76.19% 32	42
Earthquake	4.76% 2	95.24% 40	42
Extreme Temperatures	52.38% 22	47.62% 20	42
Flooding	33.33% 14	66.67% 28	42
Flooding - riverine/flash	35.71% 15	64.29% 27	42
Flooding - ice jam	11.90% 5	88.10% 37	42
Hailstorm	33.33% 14	66.67% 28	42
Hurricane, Tropical Storm, Nor'easter	78.57% 33	21.43% 9	42
Invasive Species	59.52% 25	40.48% 17	42
Landslide	4.76% 2	95.24% 40	42
Lightning Strike	47.62% 20	52.38% 22	42
Pandemic and Infectious Disease	83.33% 35	16.67% 7	42
Radon Exposure	26.19% 11	73.81% 31	42
Subsidence, Sinkhole	4.76% 2	95.24% 40	42
Tornado, Windstorm	47.62% 20	52.38% 22	42
Wildfire	16.67% 7	83.33% 35	42
Winter Storm	95.24% 40	4.76% 2	42
Other, indicate in comment box below	0.00% 0	100.00% 42	42

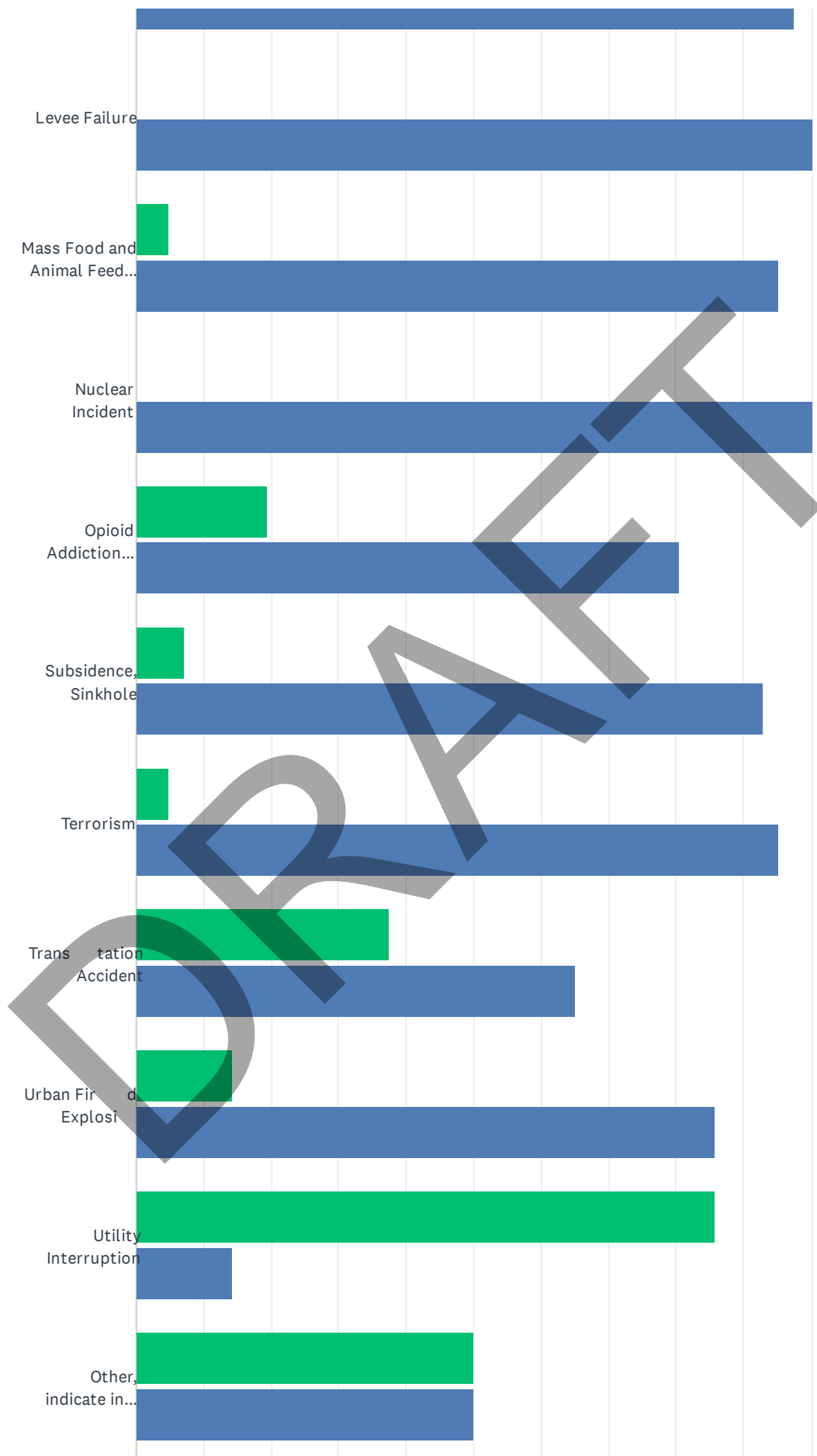
#	OTHER (PLEASE SPECIFY)	DATE
1	Failure of man-made infrastructure ie bridge overpass	7/25/2021 9:59 AM

Q3 In the past 5 years, which of the following types of human-made hazards/disasters have you experienced within Pike County, or sustained damage as a result of each?

Answered: 42 Skipped: 0



Pike County Multi-Jurisdictional Hazard Mitigation Plan - Public Survey



Pike County Multi-Jurisdictional Hazard Mitigation Plan - Public Survey

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

■ Have Experienced ■ Have Not Experienced

	HAVE EXPERIENCED	HAVE NOT EXPERIENCED	TOTAL RESPONDENTS
Bu d ng and St uctu e Co apse	14.29% 6	85.71% 36	42
C v D stu bance	17.07% 7	82.93% 34	41
Cyber Ter o ism	19.51% 8	80.49% 33	41
Dam Fa u e/B eaches	7.14% 3	92.86% 39	42
Env onmental Haza d - Coa M n ng	2.44% 1	97 %	41
Env onmental Haza d - Convent onal O and Gas We s	4.7 % 2	95.24% 40	42
Env onmental Haza d - Gas and L qu d P pe nes	7.32 % 3	92.68% 38	41
Env onmental Haza d - Haza dous Mate a s Re eases	9.76% 4	90.24% 37	41
Env onmental Haza d - Unconvent ona O and Gas We s	2. % 1	97.56% 40	41
Levee Fa u e	0.00% 0	100.00% 39	39
Mass Food and An ma Feed Contam n n	4.88% 2	95.12% 39	41
Nuc ea Inc dent	0.00% 0	100.00% 42	42
Opio d Add ct on Respon	19.51% 8	80.49% 33	41
Subs dence, S n e	7.14% 3	92.86% 39	42
Ter o ism	4.76% 2	95.24% 40	42
T anspo tat on Acc dent	37.50% 15	65.00% 26	40
U ban F e and Expos on	14.29% 6	85.71% 36	42
Ut ty Inte upt on	85.71% 36	14.29% 6	42
Othe , nd cate n comment box be ow	50.00% 5	50.00% 5	10

#	OTHER (PLEASE SPECIFY)	DATE
1	under maintained road ways and trenches on side of road	8/1/2021 8:35 AM

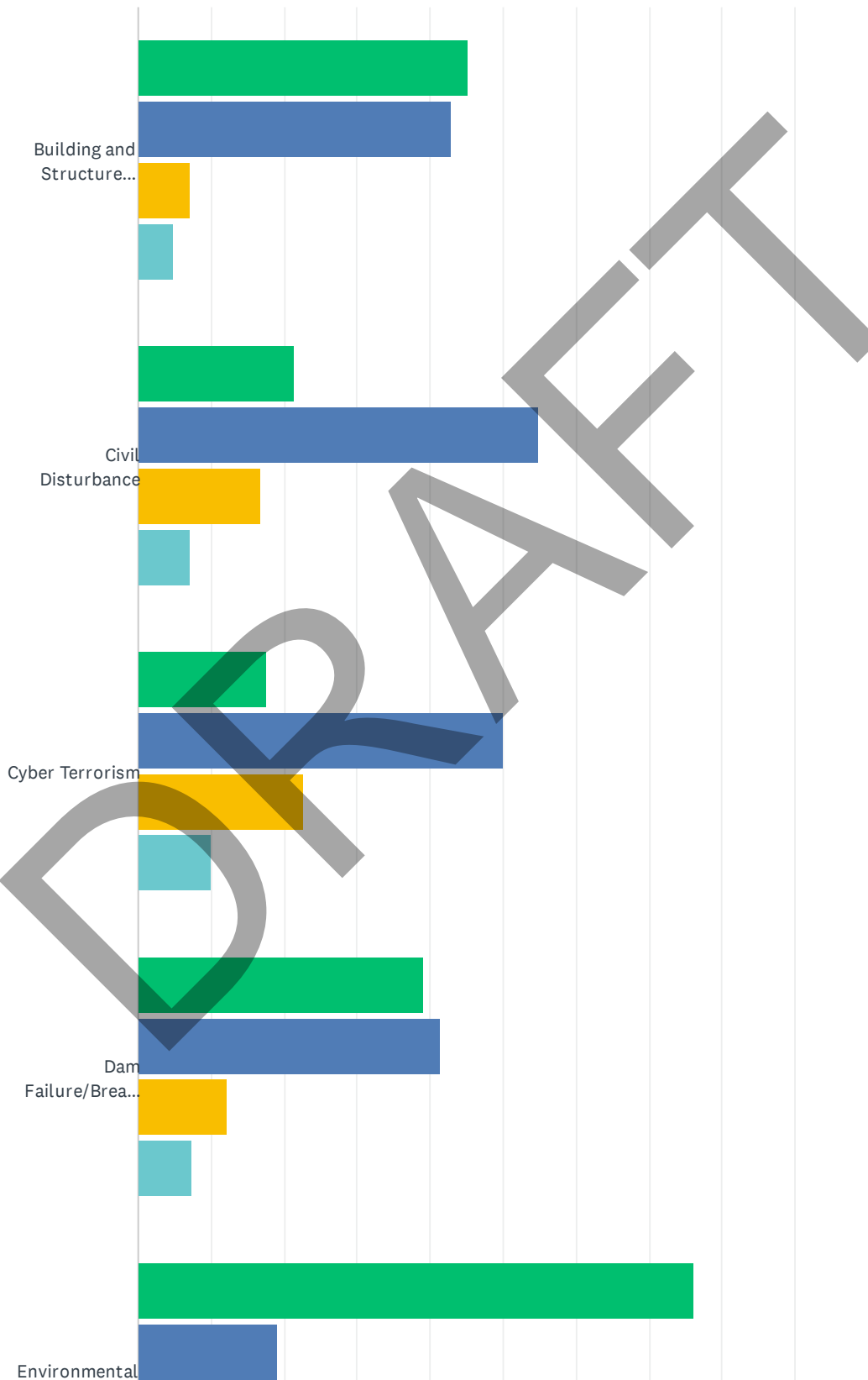
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2	PENDOT has created many road hazards by constantly working on our roads. Also, I have had to replace many tires because of roadwork.	7/30/2021 5:52 PM
3	Extreme flooding due to logging on neighboring property	7/26/2021 7:37 AM
4	Landslide closing Rt. 209	7/25/2021 9:59 AM
5	cell phone interruption	7/23/2021 9:19 AM

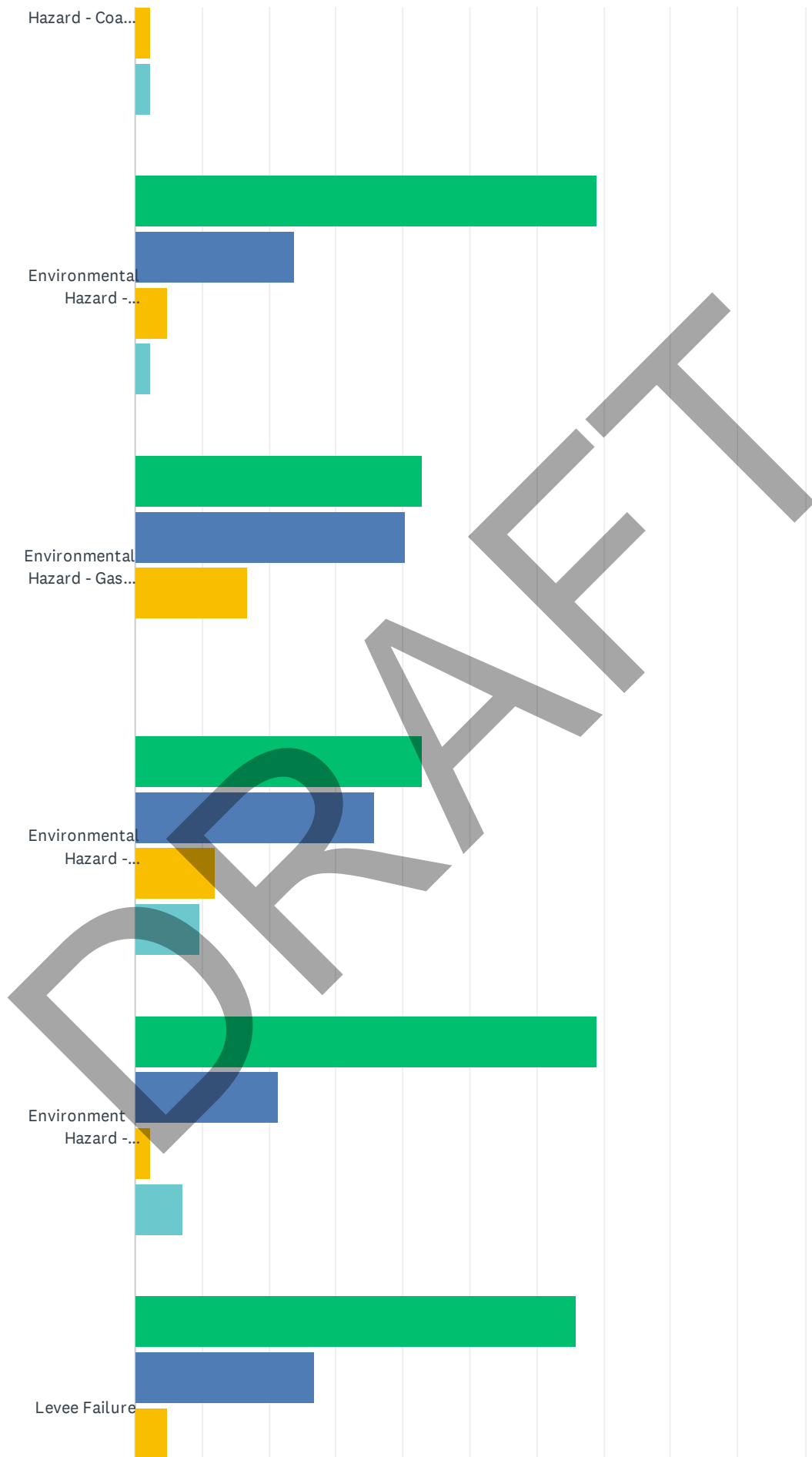
DRAFT

Q4 How concerned are you about the following human-made hazards/disasters impacting the County?

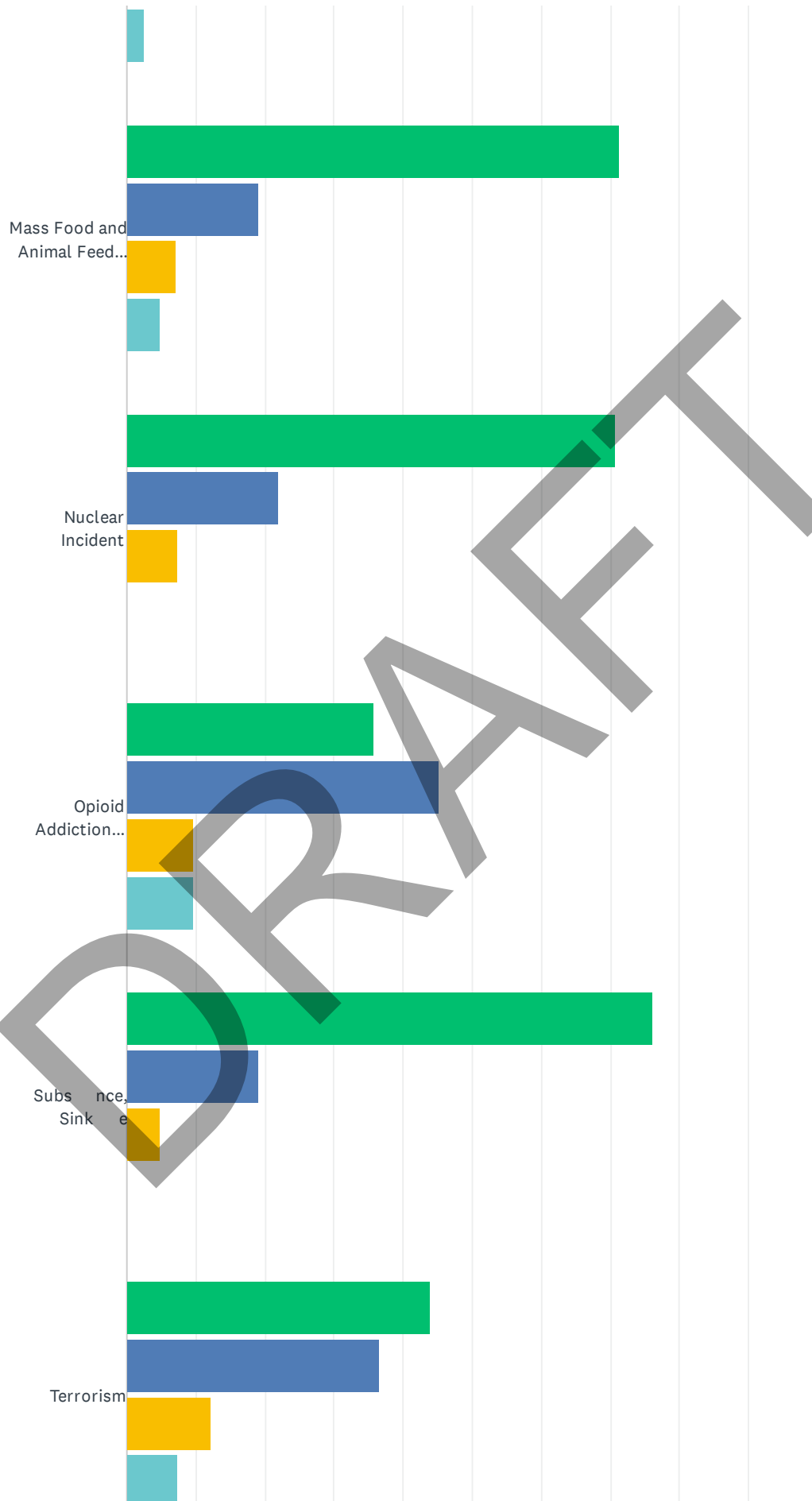
Answered: 42 Skipped: 0



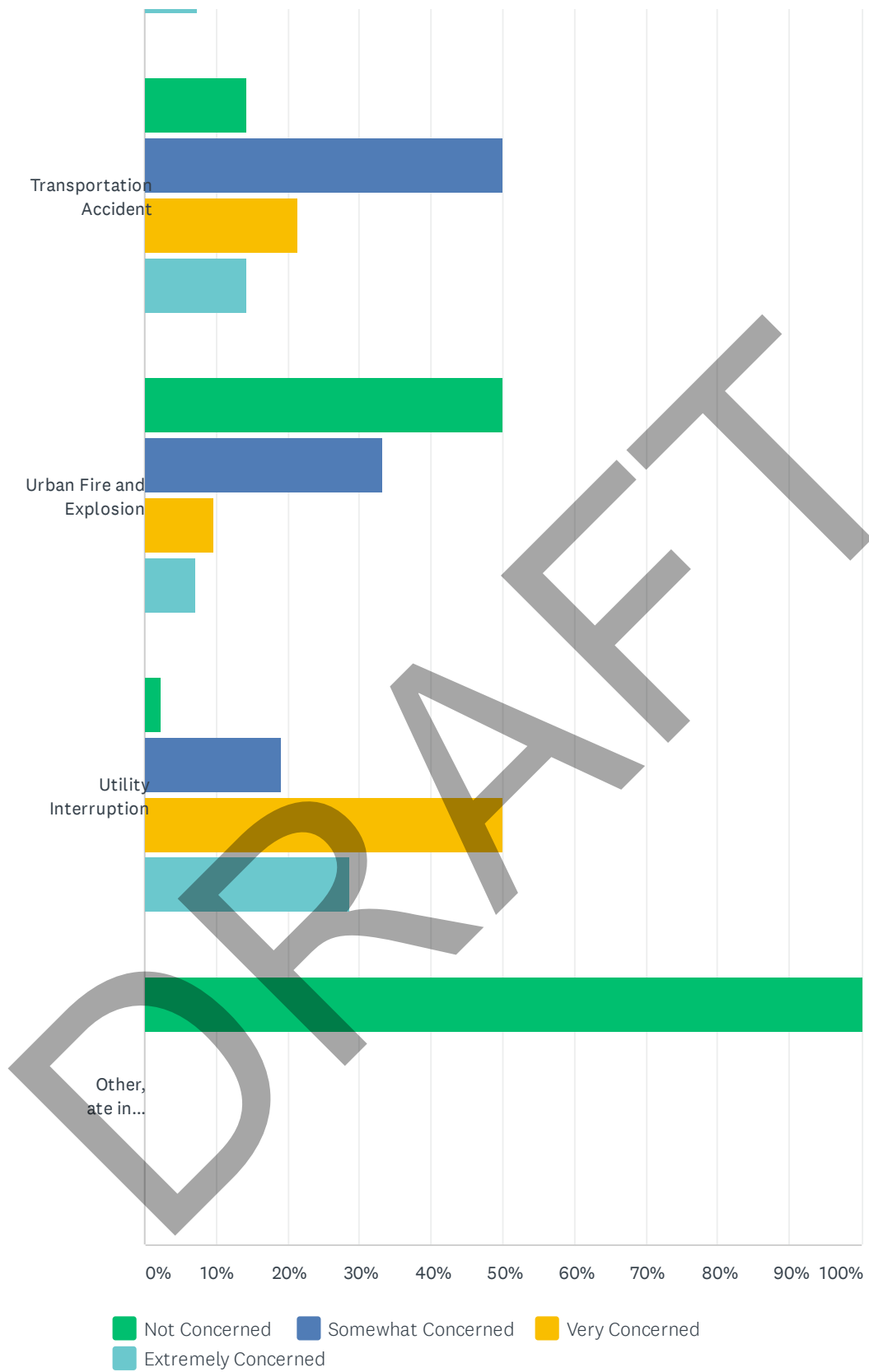
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Pike County Multi-Jurisdictional Hazard Mitigation Plan - Public Survey

	NOT CONCERNED	SOMEWHAT CONCERNED	VERY CONCERNED	EXTREMELY CONCERNED	TOTAL RESPONDENTS
Building and Structure Collapse	45.24% 19	42.86% 18	7.14% 3	4.76% 2	42
Civil Disturbance	21.43% 9	54.76% 23	16.67% 7	7.14% 3	42
Cyber Terrorism	17.50% 7	50.00% 20	22.50% 9	10.00% 4	40
Dam Failure/Breaches	39.02% 16	41.46% 17	12.20% 5	7.32% 3	41
Environmental Hazard - Coal Mining	76.19% 32	19.05% 8	2.38% 1	2.38% 1	42
Environmental Hazard - Conventional Oil and Gas Wells	69.05% 29	23.81% 10	4.76% 2	2.38% 1	42
Environmental Hazard - Gas and Liquid Pipelines	42.86% 18	40.48% 17	16.67% 7	0.00% 0	42
Environmental Hazard - Hazardous Materials Releases	42.86% 18	35.71% 15	11.90% 5	9.52% 4	42
Environmental Hazard - Unconventional Oil and Gas Wells	69.05% 29	21.43% 9	7.38% 3	7.14% 3	42
Levee Failure	65.85% 27	26.83% 11	4.88% 2	2.44% 1	41
Mass Food and Animal Feed Contamination	71.43% 30	19.0% 8	7.14% 3	4.76% 2	42
Nuclear Incident	70.73% 29	29.26% 12	7.32% 3	0.00% 0	41
Opioid Addiction Response	35.71% 15	24.24% 10	9.52% 4	9.52% 4	42
Subsidence, Sinkhole	76.19% 32	19.05% 8	4.76% 2	0.00% 0	42
Terrorism	39.0% 16	36.59% 15	12.20% 5	7.32% 3	41
Transportation Accident	14.29% 6	50.00% 21	21.43% 9	14.29% 6	42
Urban Fire and Explos	50.00% 21	33.33% 14	9.52% 4	7.14% 3	42
Utility Interruption	2.38% 1	19.05% 8	50.00% 21	28.57% 12	42
Other, indicate in comment box below	100.00% 6	0.00% 0	0.00% 0	0.00% 0	6

#	OTHER (PLEASE SPECIFY)	DATE
1	Illegal fireworks.	7/30/2021 5:52 PM

Q5 In the last 5 years, were you evacuated from your home as a result of a disaster (e.g. flooding)? If so, how long were you displaced? Did you go to a shelter?

Answered: 33 Skipped: 9

#	RESPONSES	DATE
1	No but my next door neighbor was evacuated from her home due to trees falling on her house during a violent winter storm. She has relocated to another state.	8/3/2021 5:36 PM
2	No	8/3/2021 8:22 AM
3	NA	8/1/2021 4:29 PM
4	no	8/1/2021 8:35 AM
5	Snow storm. No heat or hot water for 5 days. Stayed with family	7/30/2021 5:52 PM
6	no	7/29/2021 11:19 AM
7	no	7/27/2021 4:02 PM
8	no	7/27/2021 1:43 PM
9	Not evacuated.	7/27/2021 7:03 AM
10	No	7/26/2021 7:47 PM
11	No	7/26/2021 4:03 PM
12	10 days	7/26/2021 12:03 PM
13	No	7/26/2021 8:21 AM
14	Yes. 9 days. Yes dingm fire departme	7/26/2021 7:58 AM
15	no	7/26/2021 7:43 AM
16	Yes. When we lost power from ice storm, I had to relocate to a nearby hotel with a dog and a parrot.	7/26/2021 7:37 AM
17	No	7/26/2021 7:21 AM
18	Le to power outage for 3 days	7/25/2021 3:29 PM
19	We have never been "evacuated" but we had to leave our home due to lack of power for extended time periods.	7/25/2021 9:59 AM
20	0	7/25/2021 9:57 AM
21	No	7/25/2021 7:47 AM
22	No.	7/24/2021 4:39 PM
23	No	7/23/2021 9:27 AM
24	no	7/23/2021 9:19 AM
25	No. But I must point out that if you push that out to 10 years then yes a total of 3 times. Yes to shelter for all 3.	7/23/2021 8:33 AM
26	no	7/16/2021 8:36 AM
27	no	7/12/2021 11:12 AM
28	No	7/10/2021 8:55 PM

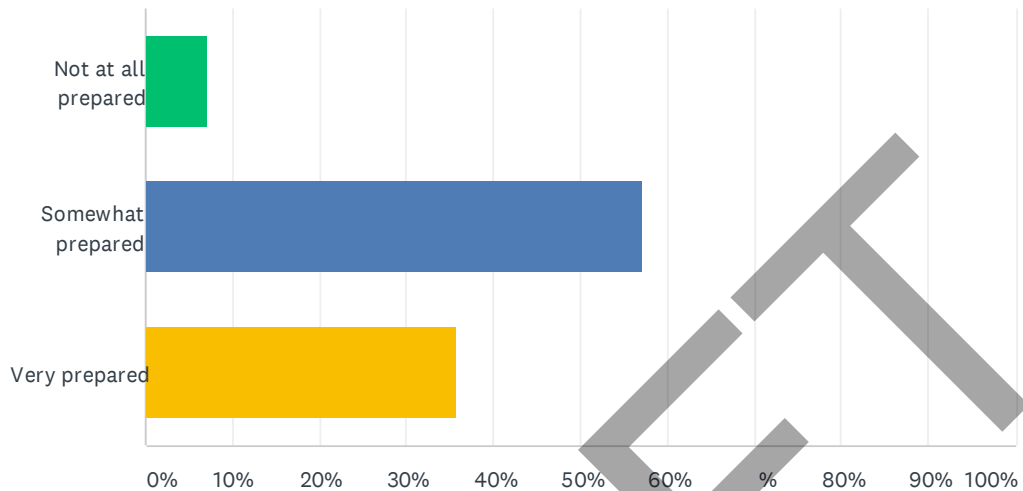
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29	No	7/9/2021 7:53 AM
30	NO	7/8/2021 3:04 PM
31	Not evacuated. Had no choice but to leave for 9 days due to no power March 2 2018 winter storm	7/8/2021 2:13 PM
32	No	7/8/2021 2:06 PM
33	No.	7/8/2021 1:03 PM

DRAFT

Q6 How prepared is your household to get along without normal power/heat for one to five days?

Answered: 42 Skipped: 0



ANSWER CHOICES	PERCENTAGE	RESPONSES
Not at all prepared	7.14%	3
Somewhat prepared	57.14%	24
Very prepared	35.71%	15
TOTAL		42

#	PLEASE EXPLAIN	DATE
1	whole house generator / propane	8/3/2021 5:36 PM
2	I live very close to township building here in Lords Valley so I would utilize the facility.	8/1/2021 5:58 PM
3	Full home propane generator will kick in	8/1/2021 4:29 PM
4	Have wood stove but don't always have wood.	7/30/2021 5:52 PM
5	Have gas propane powered generator, and keep enough fuel for 10 days	7/28/2021 8:17 AM
6	Generator 5000 watt	7/26/2021 7:47 PM
7	Have generator	7/26/2021 8:21 AM
8	Have a generator and some supplies	7/26/2021 7:43 AM
9	I have a generator and a 1000 gallon and 250 gallon buried propane tanks	7/26/2021 7:37 AM
10	If he's natural gas to my generator is interrupted, then there is no prep	7/26/2021 7:21 AM
11	Now have a entire house generator	7/25/2021 3:29 PM
12	Would be better if had generator	7/25/2021 10:31 AM
13	Back up heat source, water still works but not hot, portable generator	7/25/2021 9:59 AM
14	Generator, food, woodstove	7/25/2021 7:47 AM
15	We have a whole-house generator, which has already sustained us for 168 continuous hours re: storm-related power outage.	7/24/2021 4:39 PM

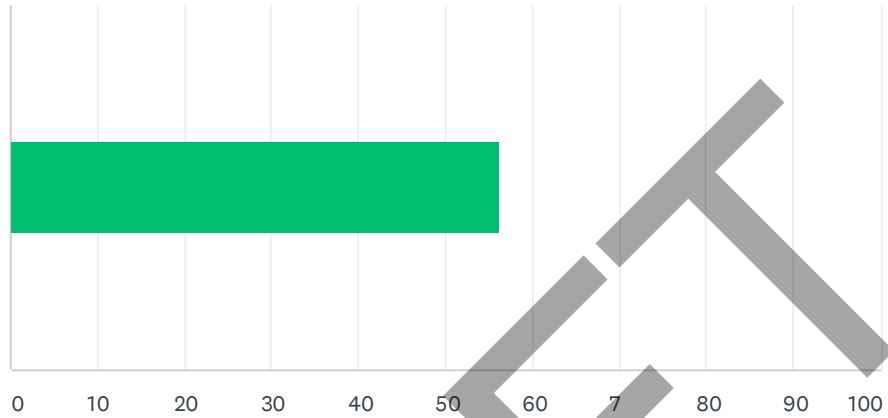
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16	Generator	7/23/2021 9:27 AM
17	I have a plan in place.	7/23/2021 8:33 AM
18	back up generator, emergency supplies as recommended by FEMA	7/12/2021 11:12 AM
19	Mostly prepared for about 3 days	7/10/2021 8:55 PM
20	We have a wood stove to keep us warm and try to have food on hand to eat without needing to use electricity.	7/9/2021 7:53 AM
21	House generator	7/8/2021 3:04 PM
22	Portable generator, wood stove, emergency food, etc	7/8/2021 2:13 PM
23	We have a generator	7/8/2021 2:06 PM

DRAFT

Q7 Please rank how prepared you feel you and your household are for disaster events likely to occur within your community. Rank on a scale of 1 to 5, with 5 representing the most prepared.

Answered: 41 Skipped: 1



ANSWER CHOICES	AVERAGE NUMBER	TO	NUMBER	RESPONSES
	56		2,307	41
Total Respondents: 41				

#		DATE
1	94	8/3/2021 5:36 PM
2	50	8/3/2021 8:22 AM
3	51	8/2/2021 10:18 AM
4	0	8/1/2021 5:58 PM
5	51	8/1/2021 4:29 PM
6	50	8/1/2021 8:35 AM
7	70	7/30/2021 5:52 PM
8	50	7/30/2021 11:38 AM
9	17	7/29/2021 11:19 AM
10	64	7/28/2021 8:17 AM
11	48	7/27/2021 4:02 PM
12	23	7/27/2021 1:43 PM
13	50	7/27/2021 9:53 AM
14	28	7/27/2021 7:03 AM
15	96	7/26/2021 7:47 PM
16	67	7/26/2021 4:03 PM
17	50	7/26/2021 12:03 PM
18	68	7/26/2021 8:21 AM

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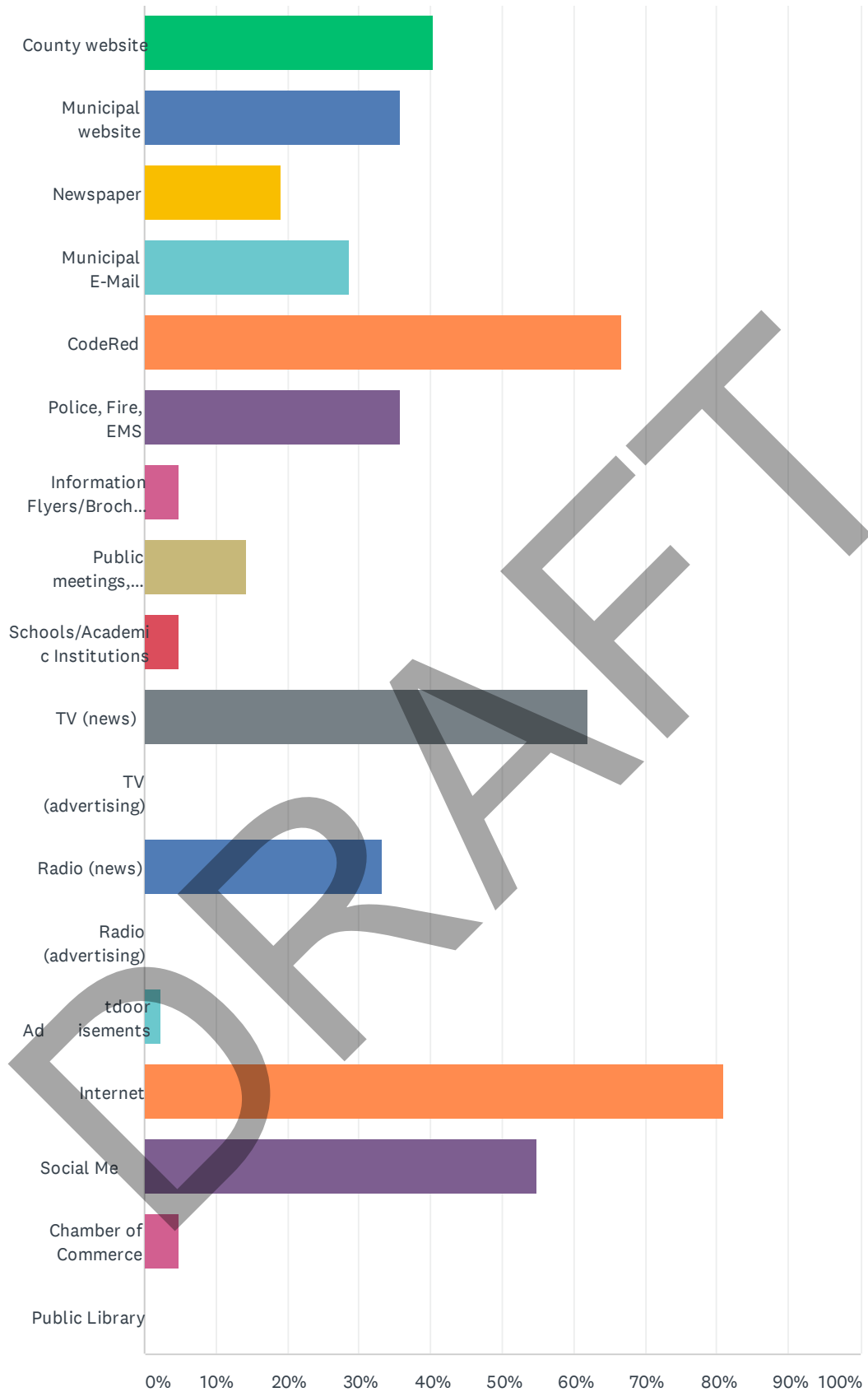
19	68	7/26/2021 7:58 AM
20	38	7/26/2021 7:43 AM
21	50	7/26/2021 7:37 AM
22	50	7/26/2021 7:21 AM
23	73	7/25/2021 3:29 PM
24	30	7/25/2021 12:02 PM
25	64	7/25/2021 10:31 AM
26	58	7/25/2021 10:15 AM
27	50	7/25/2021 9:59 AM
28	16	7/25/2021 9:57 AM
29	100	7/25/2021 7:47 AM
30	84	7/24/2021 4:39 PM
31	93	7/23/2021 9:27 AM
32	49	7/23/2021 9:19 AM
33	94	7/23/2021 8:33 AM
34	74	7/16/2021 8:36 AM
35	27	7/13/2021 7:19 PM
36	96	7/12/2021 11:12 AM
37	50	7/10/2021 8:55 PM
38	48	7/9/2021 7:53 AM
39	51	7/8/2021 3:04 PM
40	58	7/8/2021 2:13 PM
41	59	7/8/2021 1:03 PM

Q8 How do you receive your information concerning a disaster? Check all that apply.

Answered: 42 Skipped: 0

DRAFT

Pike County Multi-Jurisdictional Hazard Mitigation Plan - Public Survey



Pike County Multi-Jurisdictional Hazard Mitigation Plan - Public Survey

ANSWER CHOICES	RESPONSES	
County website	40.48%	17
Municipal website	35.71%	15
Newspaper	19.05%	8
Municipal E-Mail	28.57%	12
CodeRed	66.67%	28
Police, Fire, EMS	35.71%	15
Information Flyers/Brochures	4.76%	2
Public meetings, workshops, public awareness events	14.29%	6
Schools/Academic Institutions	4.76%	2
TV (news)	61.90%	26
TV (advertising)	0.0	0
Radio (news)	33.33%	14
Radio (advertising)	0.00%	0
Outdoor Advertisements	2.38%	1
Internet	80.95%	34
Social Media	54.76%	23
Chamber of Commerce	4.76%	2
Public Library	0.00%	0
Total Respondents: 42		

#	OTHER (PLEASE SPECIFY)	DATE
1	info from social media looked in I don't believe most of what I see.	7/28/2021 8:17 AM
2	DO NOT get PA TV	7/27/2021 1:43 PM
3	Nixle	7/25/2021 7:47 AM

Q9 Of the answers you provided above, what are the top three methods you use?

Answered: 33 Skipped: 9

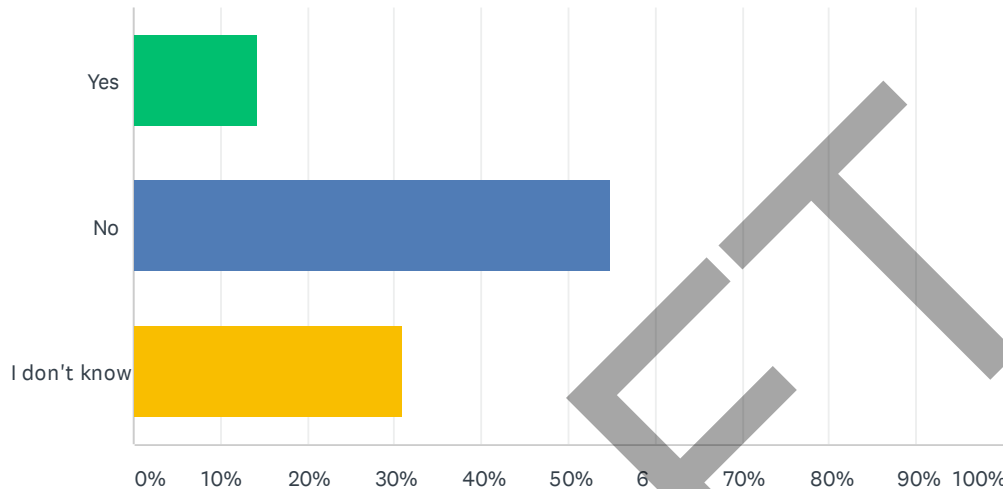
#	RESPONSES	DATE
1	Internet news, tv news, codeRed - cell phone alarm	8/3/2021 5:36 PM
2	TV, Internet, Code Red	8/3/2021 8:22 AM
3	New radio, social media, tv	8/2/2021 10:18 AM
4	Internet, TV, Radio	8/1/2021 4:29 PM
5	TV Internet CodeRed	7/30/2021 5:52 PM
6	Code Red EMail TV news	7/30/2021 11:38 AM
7	CodeRed, Internet, Social Media	7/29/2021 11:19 AM
8	radio, internet, schools	7/28/2021 8:17 AM
9	TV, Internet, Radio	7/27/2021 4:02 PM
10	internet, paper, schools	7/27/2021 1:43 PM
11	Code red, police, public mtgs.	7/27/2021 7:03 AM
12	Internet social media, tv	7/26/2021 7:47 PM
13	Social media	7/26/2021 12:03 PM
14	listed	7/26/2021 8:21 AM
15	Internet, Codered, Social Media	7/26/2021 7:43 AM
16	I only checked three, so they are the top three	7/26/2021 7:37 AM
17	Phone text from Milford Borough	7/26/2021 7:21 AM
18	Internet, online papers (News, Times, Washington Post, etc.)	7/25/2021 3:29 PM
19	Internet social media,	7/25/2021 10:31 AM
20	Social Media, Code Red, TV news	7/25/2021 9:59 AM
21	Social media, police fire ems	7/25/2021 9:57 AM
22	Internet, 911 dispatch, email	7/25/2021 7:47 AM
23	code red, tv news internet	7/23/2021 9:19 AM
24	Internet, Social Media, TV News.	7/23/2021 8:33 AM
25	CodeRed, Social Media and Municipal Email	7/16/2021 8:36 AM
26	Police/Fire/EMS, Municipal Email, Social Media	7/13/2021 7:19 PM
27	code red, police fire ems, tv news	7/12/2021 11:12 AM
28	Code Red (love the emails, calls and texts) TV news Internet News (essentially local TV and newspaper sites)	7/10/2021 8:55 PM
29	Internet and TV like the weather channel and local news	7/9/2021 7:53 AM
30	Social media, municipal website, being a Township Supervisor.	7/8/2021 3:04 PM
31	Tv ,county news and social media groups for pike county	7/8/2021 2:13 PM

32	Social Media Municipal Website Municipal E-Mail	7/8/2021 2:06 PM
33	social media internet codeRed	7/8/2021 1:03 PM

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Q10 Do you think that the public is aware of, understands, and takes advantage of emergency warning and notification systems and services (e.g. CodeRed alerts)?

Answered: 42 Skipped: 0

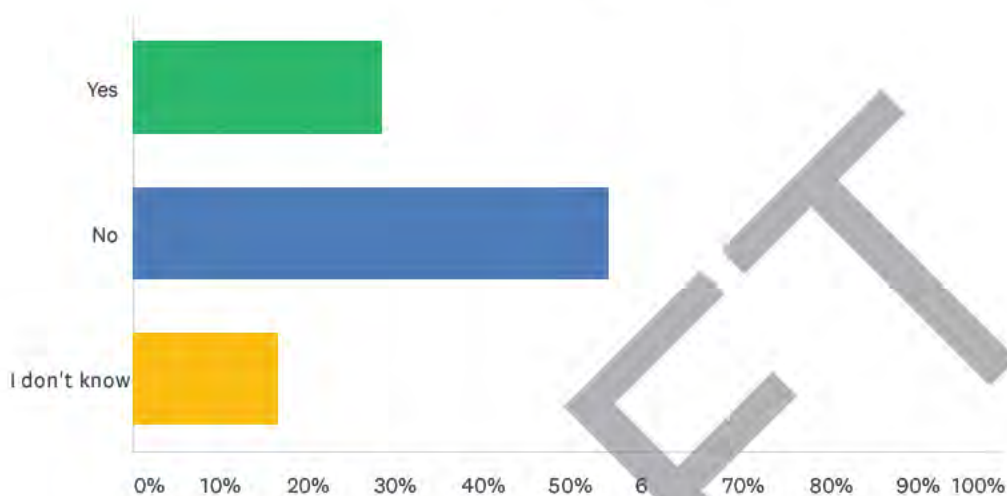


ANSWER CHOICES	RESPONSES
Yes	14.3% 6
No	54.76% 23
I don't know	30.95% 13
TOTAL	42

#	PLEASE EXPLAIN	DATE
1	I don't think any people have CodeRed on their smartphones	8/3/2021 8:22 AM
2	very hard to get any info on something happens	8/1/2021 8:35 AM
3	Stores are always packed before a snowstorm, hurricane etc.	7/30/2021 5:52 PM
4	not sure about code red alerts	7/28/2021 8:17 AM
5	There are none	7/26/2021 12:03 PM
6	I have heard people complain the system sends notifications irrelevant to them and sends multiple notifications in the middle of the night that wake them up so they unsubscribe.	7/25/2021 9:59 AM
7	Not much knowledge of these systems	7/25/2021 7:47 AM
8	recently moved populations unfamiliar with HVA or resources to prepare/react	7/12/2021 11:12 AM
9	More Public advertising needed.	7/8/2021 3:04 PM
10	I don't believe enough people are signed up.	7/8/2021 2:06 PM

Q11 Do you think that local public education and awareness programs are effective at informing the public on what they should do to be prepared for and reduce their personal risk to disasters?

Answered: 42 Skipped: 0

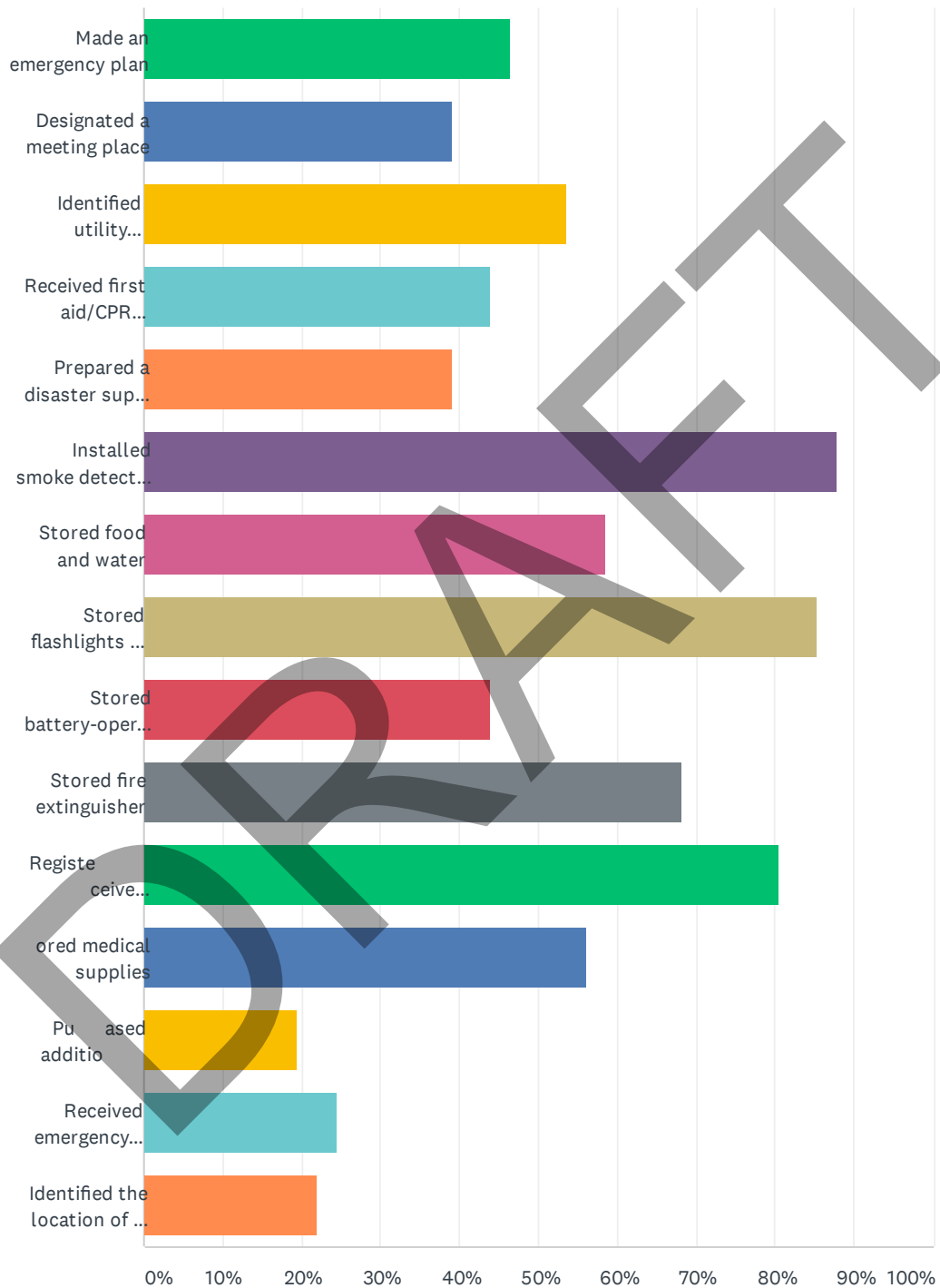


ANSWER CHOICES	RESPONSES	
Yes	29.76%	12
No	54.76%	23
I don't know	16.67%	7
TOTAL		42

#	OTHER (PLEASE EXPLAIN)	DATE
1	I'm not aware of any public awareness programs re: disasters	8/3/2021 5:36 PM
2	on the chance. I, like others, am very skeptical of side agendas.	7/28/2021 8:17 AM
3	There are none	7/26/2021 12:03 PM
4	I think there needs to be a better way of communicating local issues. Too many outlets	7/26/2021 7:43 AM
5	Generally yes but here it is very hard to reach the majority of residents & visitors.	7/25/2021 9:59 AM
6	same as above, pandemic lifestyle to insular	7/12/2021 11:12 AM
7	I don't think people read them or take them serious until it is too late.	7/8/2021 2:06 PM

Q12 Which of the following steps has your household taken to prepare for a hazard event? Check all that apply.

Answered: 41 Skipped: 1



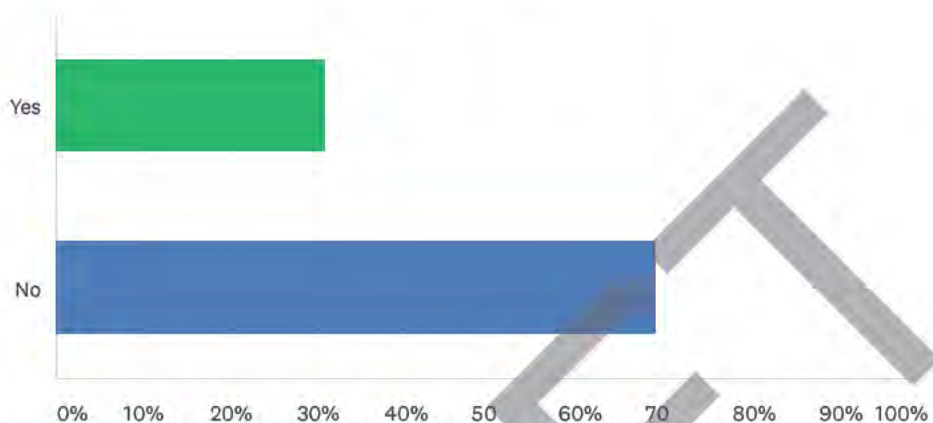
Pike County Multi-Jurisdictional Hazard Mitigation Plan - Public Survey

ANSWER CHOICES	RESPONSES	
Made an emergency plan	46.34%	19
Designated a meeting place	39.02%	16
Identified utility shutoffs	53.66%	22
Received first aid/CPR training	43.90%	18
Prepared a disaster supply kit	39.02%	16
Installed smoke detectors on each level of home	87.80%	36
Stored food and water	58.54%	24
Stored flashlights and batteries	85.37%	35
Stored battery-operated radio	43.90%	18
Stored fire extinguisher	68.29%	28
Registered to receive emergency alerts	80.49%	33
Stored medical supplies	56.10%	23
Purchased additional insurance to cover losses (e.g. flood insurance)	19.51%	8
Received emergency preparedness information from a government source	24.39%	10
Identified the location of the nearest emergency shelter	21.95%	9
Total Respondents: 41		

#	OTHER (PLEASE SPECIFY)	DATE
1	collected neighbors' contact info	8/3/2021 5:36 PM
2	Full gas tank.	7/30/2021 5:52 PM
3	Bought whole-house generator	7/25/2021 3:29 PM
4	Meeting place house fire only	7/25/2021 9:59 AM
5	Pet preparedness -- big dog son people behind!	7/10/2021 8:55 PM
6	No reason to store a radio as we do not have a radio station for Pike County, nor do we have a news center that is printed daily	7/8/2021 2:06 PM

Q13 In the past, has your home been damaged by a hazard event? For example, the basement of your home flooded and damaged the hot water heater.

Answered: 42 Skipped: 0

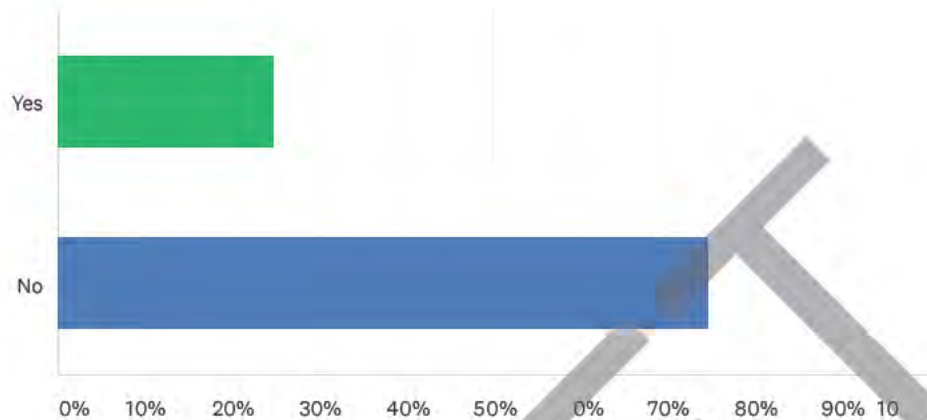


ANSWER CHOICES	RESPONSES	
Yes	30.95	13
No	69.05%	29
TOTAL		42

#	IF YES, PLEASE EXPLAIN THE DAMAGE YOUR STRUCTURE SUSTAINED AND WHEN IT OCCURRED.	DATE
1	a tree fell on the house prior to our move and structure repairs were needed.	8/3/2021 5:36 PM
2	runoff from road extreme caused damage to property	8/1/2021 8:35 AM
3	At least 12 inches of water on my home, driveway and lawn.	7/30/2021 5:52 PM
4	Stream flooded into the house, basement was under 3 feet of water.	7/27/2021 7:03 AM
5	Crawlspace flooded	7/26/2021 7:58 AM
6	Extreme flooding from logging on a neighboring property has undermined the foundation of my 191 year old home.	7/26/2021 7:37 AM
7	walls, ceiling damaged from excess rain	7/25/2021 3:29 PM
8	Extreme wind and rain	7/25/2021 12:02 PM
9	basement flooded	7/23/2021 9:19 AM
10	Yes flood damage.	7/23/2021 8:33 AM
11	storm damage to house, fence, property	7/10/2021 8:55 PM
12	We had a leak in our basement due to a heavy rain.	7/8/2021 2:06 PM

Q14 If you answered 'yes' above, did you report the damages to your local police, fire, or emergency management departments?

Answered: 12 Skipped: 30



ANSWER CHOICES

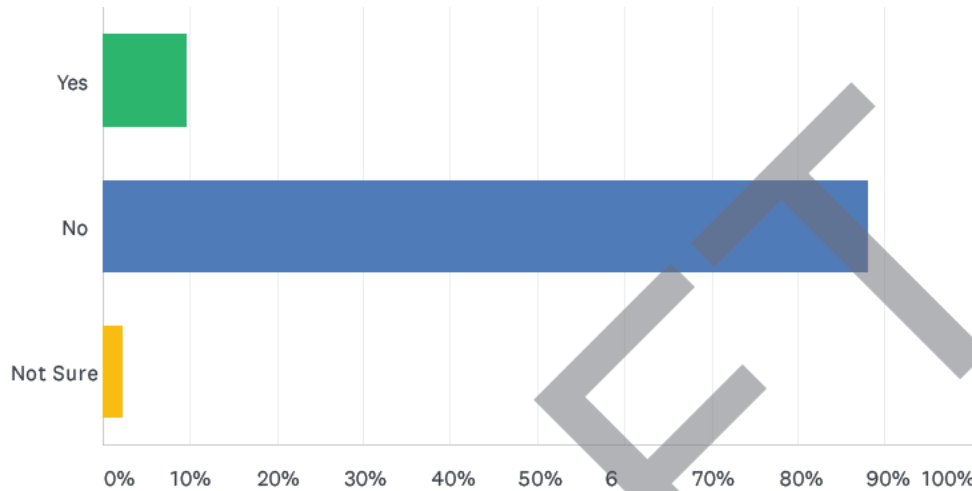
RESPONSES

Yes	2	16.7%	3
No	9	75.00%	9
TOTAL			12

#	IF YOU ANSWERED 'NO', WHY DID YOU NOT REPORT THE DAMAGES?	DATE
1	it happened to a prior owner not sure	8/3/2021 5:36 PM
2	Everyone in the area has the same problem.	7/30/2021 5:52 PM
3	I thought it was personal responsibility, or I had to hire a lawyer. Right now, I can't afford to hire a lawyer.	7/26/2021 7:37 AM
4	Police ineffective	7/25/2021 12:02 PM
5	fire company came to put out fire	7/23/2021 9:19 AM
6	no one	7/12/2021 11:12 AM
7	Just too many of them myself - hired professionals	7/10/2021 8:55 PM
8	We don't have local police or would our emergency management department even handle this and I would never have to ask our volunteer fire department to handle this as they already are short staffed.	7/8/2021 2:06 PM

Q15 To the best of your knowledge is your property located in a designated floodplain? If you do not know, or are not sure, please check the FEMA website: <https://msc.fema.gov/portal/home>.

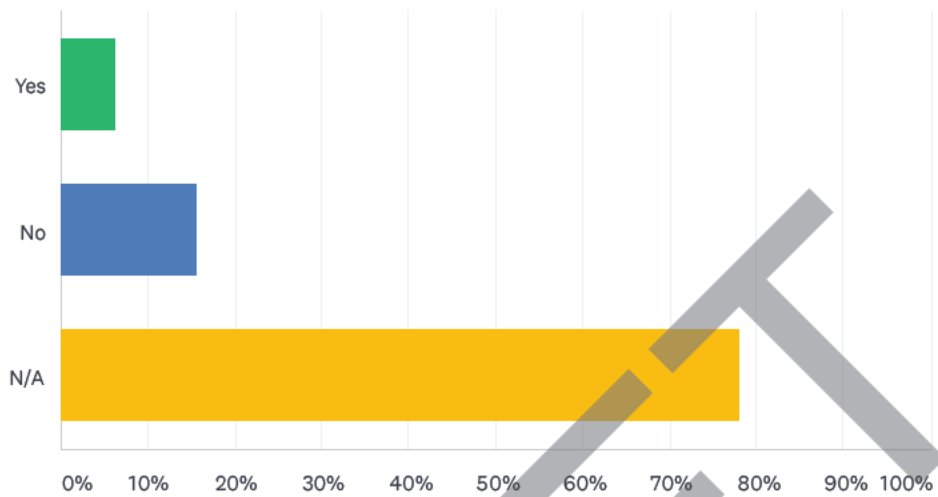
Answered: 42 Skipped: 0



ANSWER CHOICES	RESPONSES
Yes	9.5% 4
No	88.10% 37
Not Sure	2.38% 1
TOTAL	42

Q16 If your property is in the floodplain, do you have flood insurance?

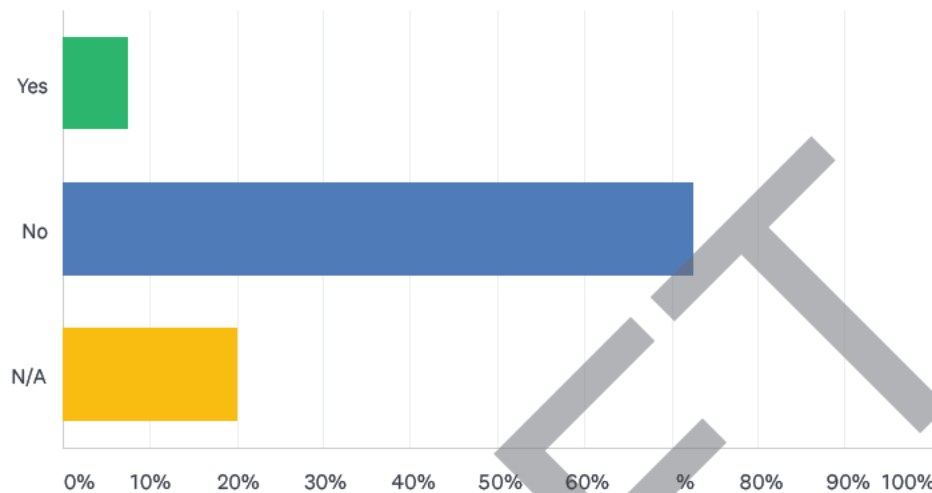
Answered: 32 Skipped: 10



ANSWER CHOICES	PONSES	
Yes	6.2	2
No	15.63%	5
N/A	78.17%	25
TOTAL		32

Q17 If your property is located outside of the floodplain, do you have flood insurance?

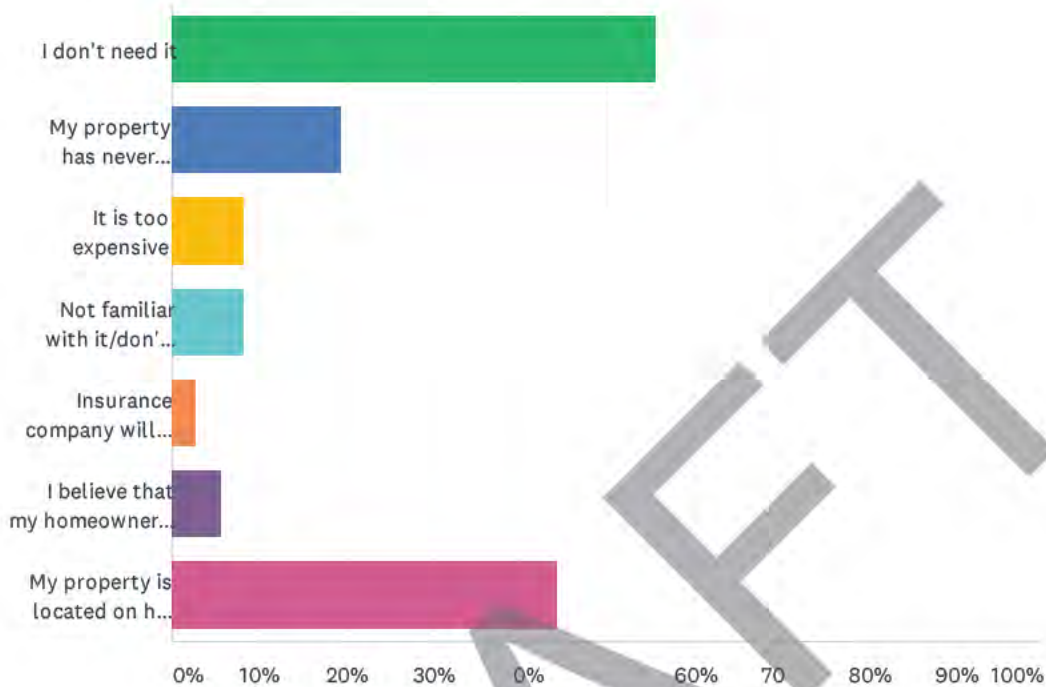
Answered: 40 Skipped: 2



ANSWER CHOICES	PERCENTAGES	COUNTS
Yes	7.50%	3
No	72.50%	29
N/A	20.00%	8
TOTAL		40

Q18 If you do NOT have flood insurance, what is the primary reason?

Answered: 36 Skipped: 6

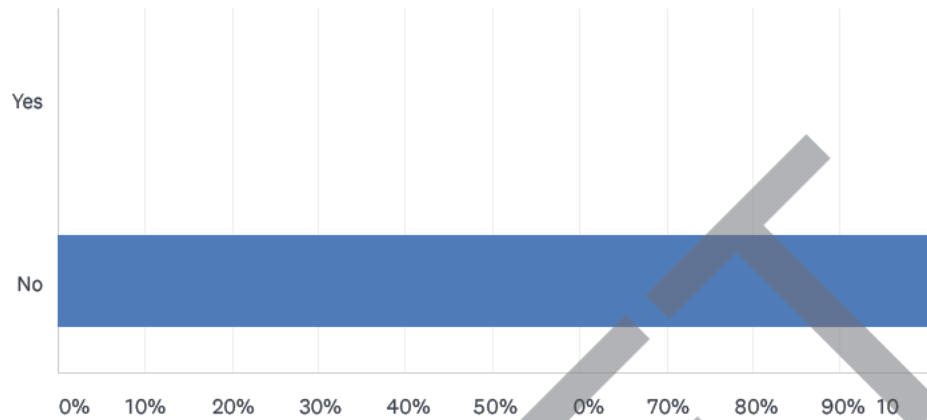


ANSWER CHOICES		RESPONSES	
I don't need it		55.56%	20
My property has never flooded		19.44%	7
It is too expensive		8.33%	3
Not familiar with it/don't know		8.33%	3
Insurance company will not provide		2.78%	1
I believe that my homeowner's insurance will cover me		5.56%	2
My property is located on high ground		44.44%	16
Total Respondents: 36			

#	OTHER (PLEASE SPECIFY)	DATE
1	we just deal with what ever event comes about	8/1/2021 8:35 AM
2	Previously told it was not available	7/25/2021 9:59 AM

Q19 Do you or did you have problems getting homeowners/renters insurance due to risks from hazards?

Answered: 41 Skipped: 1



ANSWER CHOICES		RESPONSES	
Yes		0%	0
No		100.00	41
TOTAL			41

#	IF YOU ANSWERED "YES", PLEASE IDENTIFY THE HAZARD RISK THAT CAUSED YOU TO HAVE PROBLEMS OBTAINING HOMEOWNERS/RENTERS INSURANCE.	DATE
There are no responses		

Q20 Please identify any specific vulnerabilities that you are aware of in your township/borough (e.g. floodprone areas or specific properties, critical facilities that lack backup power, etc.). Please list street names and other specific identifiers if possible.

Answered: 23 Skipped: 19

#	RESPONSES	DATE
1	The entire area (Delaware Township, Dingmans Ferry) is vulnerable to wind damage isolating road closures and power outages. Rt 2001, 739 have potential for trees down. W and Drive in Delaware Twp - a large tree fell into Long Meadow Brook last summer. It was reported to HOA but it is still there.	8/3/2021 5:50 PM
2	Twin Cedars assisted living home - little walker lake road	8/3/2021 8:25 AM
3	Utility interruptions.	7/1/2021 4:37 PM
4	We always lose power during storms. Sometimes cell phones don't work either Dingmans Ferry.	7/30/2021 6:17 PM
5	Matamoras- lack of drainage	7/26/2021 4:05 PM
6	Doolan Road. Power outages	7/26/2021 12:07 PM
7	?	7/26/2021 8:24 AM
8	Mulberry lane, dingmans ferry. Pa Power is always going out here always needed	7/26/2021 8:01 AM
9	Logging companies need to mitigate potential flooding issues of those downhill from the areas logged. My basement has never flooded three times since the neighboring property was logged approx. 2-3 years ago. Outside there were waterfalls and rivers coming down the hill. I live at 100 Gelderm Road, Hawle PA. 18428, and all excess water washes down the hill to empty in to the Lehigh River. I have videos.	7/26/2021 7:50 AM
10	If there is a hazardous waste truck crash and spill on I-4 near the water supply area, that would be a long term disaster...happened in the last town I lived in, water was contaminated and ruined for future use. It is an EPA hazardous waste site now and it is not able to be cleaned due to the depth of contamination. Contamination occurred as a result of water being used by the fire department to fight the fire so the contaminants leaked deep into the subsurface water source. Fire department needs to be trained and supplied with proper tools so they know how to handle hazardous waste accidents.	7/26/2021 7:30 AM
11	Put more sewer lines underground. Avoid over-development on Milford aquifer, prohibit hazardous materials	7/25/2021 3:32 PM
12	Ineffective government	7/25/2021 12:06 PM
13	Delaware river flooding matamoras/Westfall, ice jam potential because of islands	7/25/2021 10:36 AM
14	In our community lack of power and resulting lack of heat and water seems to be the biggest challenge practically routinely faced.	7/25/2021 10:15 AM
15	Road bed erosion 739 Delaware state forest area	7/25/2021 10:02 AM
16	Decaying bridges over Shohola Creek, poor forest management for wildfires and downed trees, poor access to the elementary school for emergencies, Shohola firehouse is in a flood plane	7/25/2021 7:52 AM
17	Flooding in Westfall Township; Bell Manor, Rose Ln, Reuben Bell/ Home Depot, Kokolias Ln.	7/23/2021 8:46 AM
18	Ambulance Station needs back-up generator replaced. There is no designated shelter (specifically where victims of a disaster can sleep) in the municipality.	7/13/2021 7:27 PM
19	delaware river flooding compromising ability to travel out of the area or evacuate numerous	7/12/2021 11:25 AM

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high hazard dams in private communities that can impact or lead to flash flooding loss of power due to inadequacy of the grid and transmission lines inadequate state and local resources for winter road maintenance vulnerability/ inadequacy of internet access

20	More education for the public Planning for pets -- people will stay home if they can't take their pets with them	7/10/2021 9:01 PM
21	Anywhere near rivers and streams	7/9/2021 7:56 AM
22	Our fire department and ambulance corp. has limited volunteers. There is no police force in Dingman Township and to have to rely on the state police is useless. They take forever to show up.	7/8/2021 2:34 PM
23	Lack of resources for power outages, no shelters and pike county is the " forgotten county" of PA. Always last to receive help. Look back to winter storm of March 2018 for answers	7/8/2021 2:17 PM

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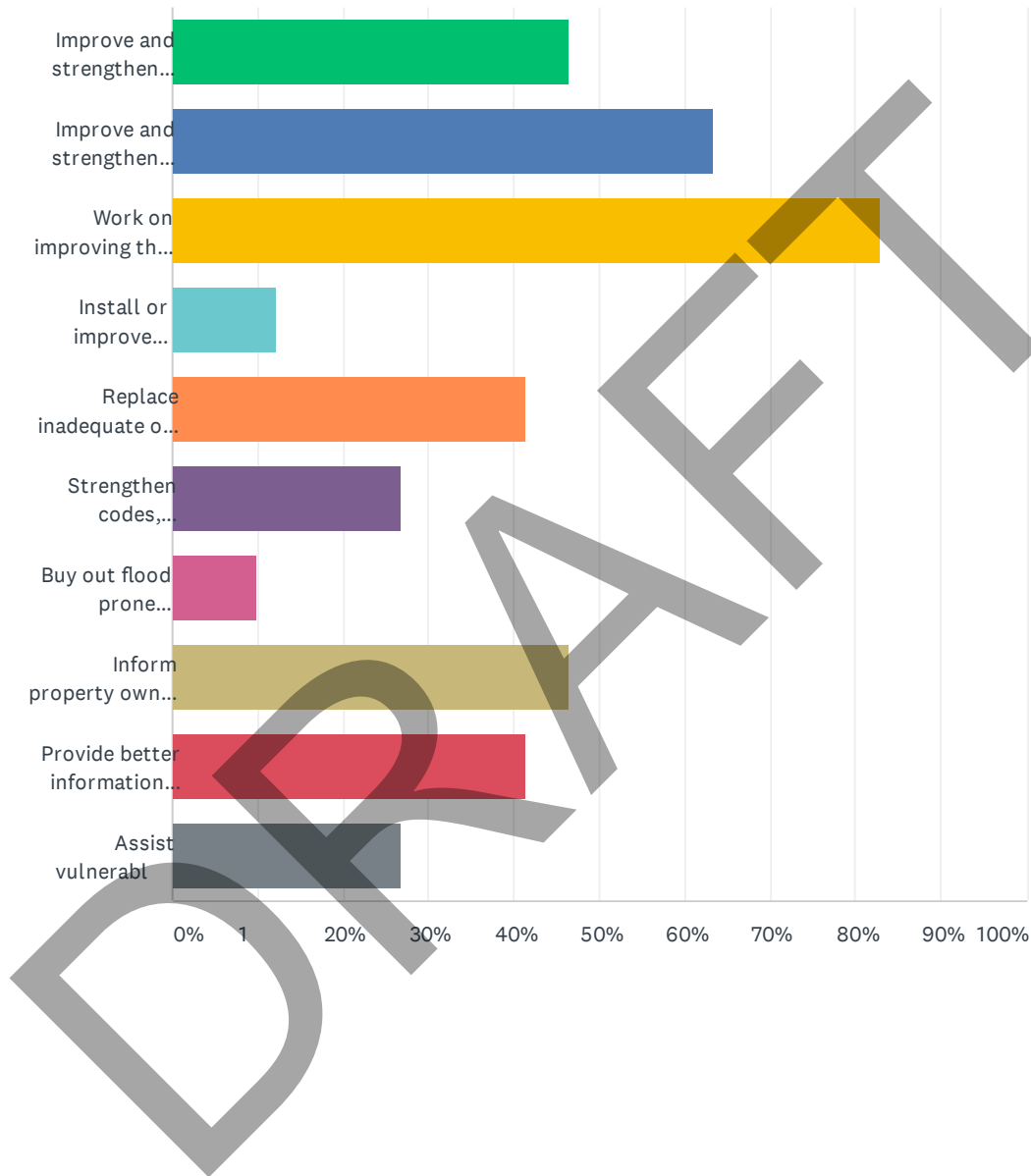
Q21 Please identify any specific vulnerabilities that you are aware of in Pike County outside of your township/borough (e.g. floodprone areas or specific properties, critical facilities that lack backup power, etc.). Please list city/town/village, street names, and other specific identifiers if possible.

Answered: 14 Skipped: 28

#	RESPONSES	DATE
1	Met Ed and Blue Ridge Cable don't have a back up plan. If I didn't have a wood stove I would have frozen to death.	7/30/2021 6:17 PM
2	o	7/26/2021 7:50 PM
3	Dingmans Ferry, PA. Lack of plowing when bad storms come. Power outages. No communication platform as to what is happening in an emergency	7/26/2021 12:07 PM
4	84 route	7/26/2021 7:30 AM
5	Lack of police	7/25/2021 12:06 PM
6	Power line/transformer issues @ avenue C in matamoras	7/25/2021 10:36 AM
7	It seems the cell and cable towers near here do not have adequate backup power and when the power goes out communication becomes difficult. Many people no longer have house phones that work so without cell service they cannot even call 911. In Pine Township cell service is spotty with power.	7/25/2021 10:15 AM
8	Wallenpaupack dam is not managed well when large storms come through, decaying infrastructure on major roads, poor upkeep on roads causing repeated washouts (ie, 590 near 434, 434 near Lackawanna rd, in Lakeside Beverly drive/grace rd)	7/25/2021 7:52 AM
9	Eastern end of Pike County relies heavily on bridges for main routes of egress.	7/23/2021 8:46 AM
10	Pike County lacks an advanced medical center as a hospital to care for its citizens and there is no other support network for medical professionals/supplies during a disaster.	7/13/2021 7:27 PM
11	same as above	7/12/2021 11:25 AM
12	N/A	7/9/2021 7:56 AM
13	All Pike County municipalities fire departments and ambulance corps have limited volunteers. There is no police force except in Milford Borough and to have to rely on the state police is useless. They take forever to show up.	7/8/2021 2:34 PM
14	Dingmans Ferry See above and also no hospital or urgent care in the township.	7/8/2021 2:17 PM

Q22 What types of projects do you believe local, county, state or federal government agencies could be doing in order to reduce the damage and disruption of hazards in Pike County? Select your top three choices.

Answered: 41 Skipped: 1



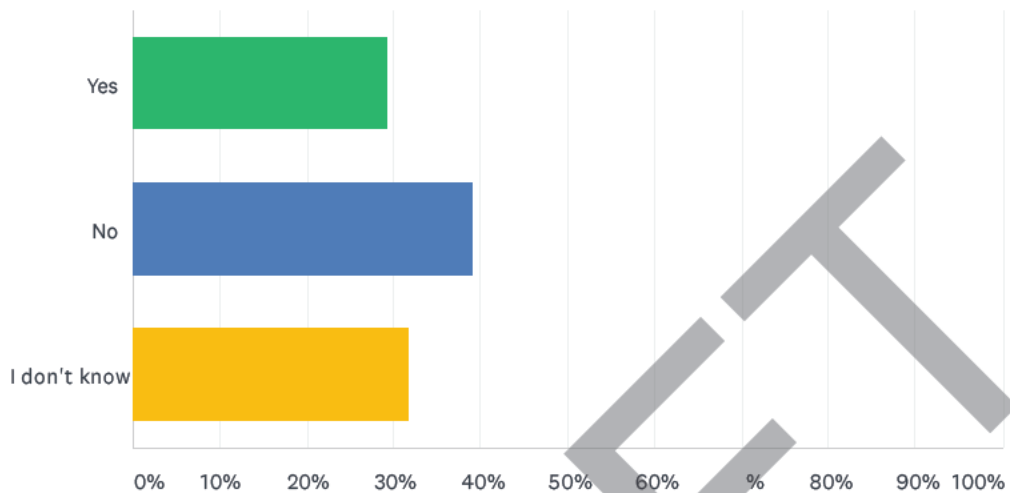
Pike County Multi-Jurisdictional Hazard Mitigation Plan - Public Survey

ANSWER CHOICES	RESPONSES	
Improve and strengthen critical facilities such as police, schools, hospitals	46.34%	19
Improve and strengthen infrastructure, such as elevating roadways and improving drainage systems	63.41%	26
Work on improving the damage resistance of utilities (electricity, communications, water/wastewater facilities etc.)	82.93%	34
Install or improve protective structures, such as bulkheads, floodwalls or levees to protect against flooding	12.20%	5
Replace inadequate or vulnerable bridges and causeways	41.46%	17
Strengthen codes, ordinances and plans to require higher hazard risk management standards and/or provide greater control over development in high hazard areas	26.83%	11
Buy out flood prone properties and maintain as open-space	9.76%	4
Inform property owners of ways they can mitigate damage to their properties	46.34%	19
Provide better information about hazard risks and high-hazard areas	41.46%	17
Assist vulnerable property owners with securing funding to mitigate their property	26.83%	11
Total Respondents: 41		

#	OTHER (PLEASE SPECIFY)	DATE
1	Plan on how to communicate with the community when a emergency happens	7/26/2021 12:07 PM
2	I also own undeveloped property that is potentially in floodzone.	7/26/2021 7:50 AM
3	Plan for better coordination during major storm recovery and deployment of resources to provide communication to residents and assist out of area power crews.	7/25/2021 10:15 AM
4	Work with utility companies to clear under/around power lines. In our daily travels we see many areas where utility lines are strung under/through tree branches and tall shrubbery. Also, we see dead tree trunks fall and hung on utility lines - some for more than 1-2 years.	7/24/2021 4:52 PM
5	improve ambulance service	7/23/2021 9:23 AM
6	critical infrastructure in rural areas is more than just schools and hospitals there are limited if any law enforcement	7/12/2021 11:25 AM

Q23 Do you feel that Pike County is doing enough towards reducing hazard risks, climate adaptation, or other mitigation/prevention measures?

Answered: 41 Skipped: 1



ANSWER CHOICES	PERCENTAGE	RESPONSES
Yes	29.27%	12
No	31.71%	13
I don't know	39.02%	16
TOTAL		41

#	PLEASE PROVIDE DETAILS FOR YOUR RESPONSE	DATE
1	I have been here for 10 years and at time nothing has changed.	7/30/2021 6:17 PM
2	I don't know what they are doing	7/26/2021 7:45 AM
3	Always room for improvement	7/26/2021 7:30 AM
4	Emergency services are evasive, incompetent and ineffective	7/25/2021 12:06 PM
5	You can never do enough. Hazards are a constantly evolving and growing concern.	7/23/2021 8:46 AM
6	county agency staffing to support mitigation initiatives and other emergency preparedness activities is not sufficient with regards to the influx of population and change in character of communities from completely rural to suburban/commuter based. expand both county planning and emergency management to correspond with new demands	7/12/2021 11:25 AM
7	I think the county does a good job	7/10/2021 9:01 PM
8	I think they try to remove dead trees and branches from roads and that helps	7/9/2021 7:56 AM
9	They have been working for years to get a centralized ambulance corp. and to date we still do not have one, nor do we have a hospital or an adequate Urgent Care.	7/8/2021 2:34 PM
10	See above	7/8/2021 2:17 PM

Q24 If your property were located in a designated high-hazard area (for example, NFIP flood zone) or had received repeated damages from a hazard/disaster event, would you consider any of the following options? If your response is dependent on certain factors, such as the funding source, please indicate those factors in the following question.

Answered: 32 Skipped: 10

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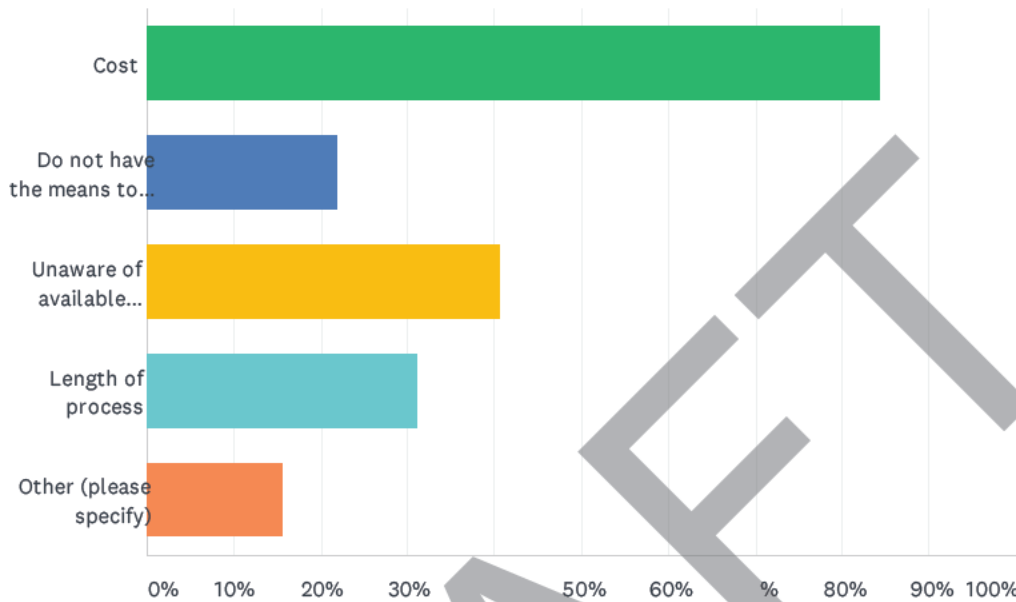
Pike County Multi-Jurisdictional Hazard Mitigation Plan - Public Survey

	YES	NO	UNSURE	TOTAL
Having your property bought out	53.13% 17	28.13% 9	18.75% 6	32
Moving your structure to another property or a less risky part of your property	25.81% 8	61.29% 19	12.90% 4	31
Elevating your structure	38.71% 12	45.16% 14	16.13% 5	31
Floodproof your structure	70.97% 22	19.35% 6	9.68% 3	31
Look into other ways to mitigate	77.42% 24	3.23% 1	19.35% 6	31

#	OTHER (PLEASE SPECIFY)	DATE
1	it would depend on cost. Flood risk does not apply to my current property	8/3/2021 5:50 PM
2	Move out of pike county ASAP	7/26/2021 12:07 PM
3	My property has historic significance in Pike County and its unfortunate that this was not considered when the logging company cleared all of the trees off the hill from my property.	7/26/2021 7:50 AM
4	question not applicable.	7/24/2021 4:52 PM

Q25 Please select the factor(s) that would influence your decision on the mitigation options listed above (buyout/acquisition, relocation, or elevation).

Answered: 32 Skipped: 10



ANSWER CHOICES	RESPONSES	
Cost	84.38%	27
Do not have the means to move/ relocate	21.88%	7
Unaware of available programs	40.63%	13
Length of process	31.25%	10
Other (please specify)	15.63%	5
Total Respondents: 32		

#	OTHER PLEASE SPECIFY	DATE
1	My age (70)	7/30/2021 6:17 PM
2	certainty of the relocation option	7/27/2021 4:08 PM
3	Most mitigation strategies suggested would potentially destroy the historic nature of this property.	7/26/2021 7:50 AM
4	Distrust local government	7/25/2021 12:06 PM
5	N/A	7/24/2021 4:52 PM

Q26 If you have already spent money to mitigate your home, how much did you spend and on what measures?

Answered: 11 Skipped: 31

#	RESPONSES	DATE
1	Added generator in 2019, \$10,000	8/3/2021 5:50 PM
2	Removed trees.	7/30/2021 6:17 PM
3	Additional french drains and other drainage systems around the property. 30k spent so far.	7/27/2021 7:06 AM
4	I upgraded two sump pumps at an approx. cost of \$1200 and installed a 1000 gallon propane tank for alternative electricity at the cost of about \$2000?	7/26/2021 7:50 AM
5	\$6,000	7/25/2021 3:32 PM
6	Several thousand	7/25/2021 12:06 PM
7	Uncertain of cost but had my home grounded for lightning strikes and applied a dry system to most vulnerable basement wall	7/25/2021 10:15 AM
8	Trees removed near house, installation of whole house propane generator, along with 500 gal propane tank. Under \$10,000.00	7/24/2021 4:52 PM
9	Chose property not in flood plain and with some elevation; Unsure of money but excavator installed drainage; and I avoid paving to avoid lawns are can't hold wet spots	7/10/2021 9:01 PM
10	Bought a generator. \$1000.00	7/8/2021 2:34 PM
11	not applicable	7/8/2021 1:06 PM

Q27 Which (if any) incentives would motivate you to spend money to protect your home from the possible impacts of a disaster?

Answered: 12 Skipped: 30

#	RESPONSES	DATE
1	we are committed to preserving our safety and already invest in tree management near our house.	8/3/2021 5:50 PM
2	Tax incentives	8/3/2021 8:25 AM
3	Onsite home hazard/disaster assessment.	8/1/2021 4:37 PM
4	Stupid question - If I had money I would do it.	7/30/2021 6:17 PM
5	If there were grant funding to redirect the water flow coming down the hill away from my home but I feel as though the logging company should be responsible for remedying the issue.	7/26/2021 7:50 AM
6	Almost any that seemed to mitigate a hazard I perceive as applicable to my home.	7/25/2021 10:15 AM
7	clear indication of need or projected need within the next 15-20 years.	7/24/2021 4:52 PM
8	Decent cost and access to services Have no idea what I can do regularly for worsening storms both summer and winter	7/10/2021 9:01 PM
9	If I feel it's a real threat to my home.	7/9/2021 7:56 AM
10	Rebate to help offset the cost.	7/8/2021 2:34 PM
11	Tax rebates	7/8/2021 2:17 PM
12	grants	7/8/2021 1:06 PM

Q28 Please list any additional types of projects you believe local, county, state or federal government agencies could be doing to reduce the damage and disruption in Pike County.

Answered: 12 Skipped: 30

#	RESPONSES	DATE
1	County or local gov should remove trees that have fallen in or across streams and create to reduce threat of flooding. (Woodland Drive - large tree fell into Long Meadow Brook 1 summer)	8/3/2021 5:50 PM
2	Coordinate with local utilities to reduce interruptions.	8/1/2021 4:37 PM
3	Wider roads with guardrails where needed. Underground electrical wiring. Additional cell towers in case our tower is unavailable. Streetlights near dangerous intersections. Financial assistance to remove older trees that may damage homes.	7/30/2021 6:17 PM
4	Transparency	7/25/2021 12:06 PM
5	Plan to coordinate diversion of resources (such as Sheriff's officers) to assist power crews with traffic control and location-finding and communication with the public for road closures in long term and major impact events. Dam and bridge replacement resources for privately owned dams and bridges to be maintained/replaced timely	7/25/2021 10:15 AM
6	none at this time.	7/24/2021 4:52 PM
7	improve ambulance service, additional internet/cable provider	7/23/2021 9:23 AM
8	Collaboration amount local government, NGOs, and third party fire/EMS services to help mitigate and prepare for large-scale prolonged disaster.	7/13/2021 7:27 PM
9	acquire funding to secure additional personnel in agency outlined above specifically dedicated to the HVA /mitigation and response functions. Secure more firm commitments from utilities for upgrade of infrastructure to respond with current demographics of the county	7/12/2021 11:25 AM
10	Educational programs to motivate and manage disasters	7/10/2021 9:01 PM
11	Continue to remove trees that pose a hazard and take care of snow covered roads as soon as you can	7/9/2021 7:56 AM
12	Get the County, PennDot, Met-Ed to effectively communicate with local municipalities, so they can provide up to date information quickly.	7/8/2021 2:34 PM

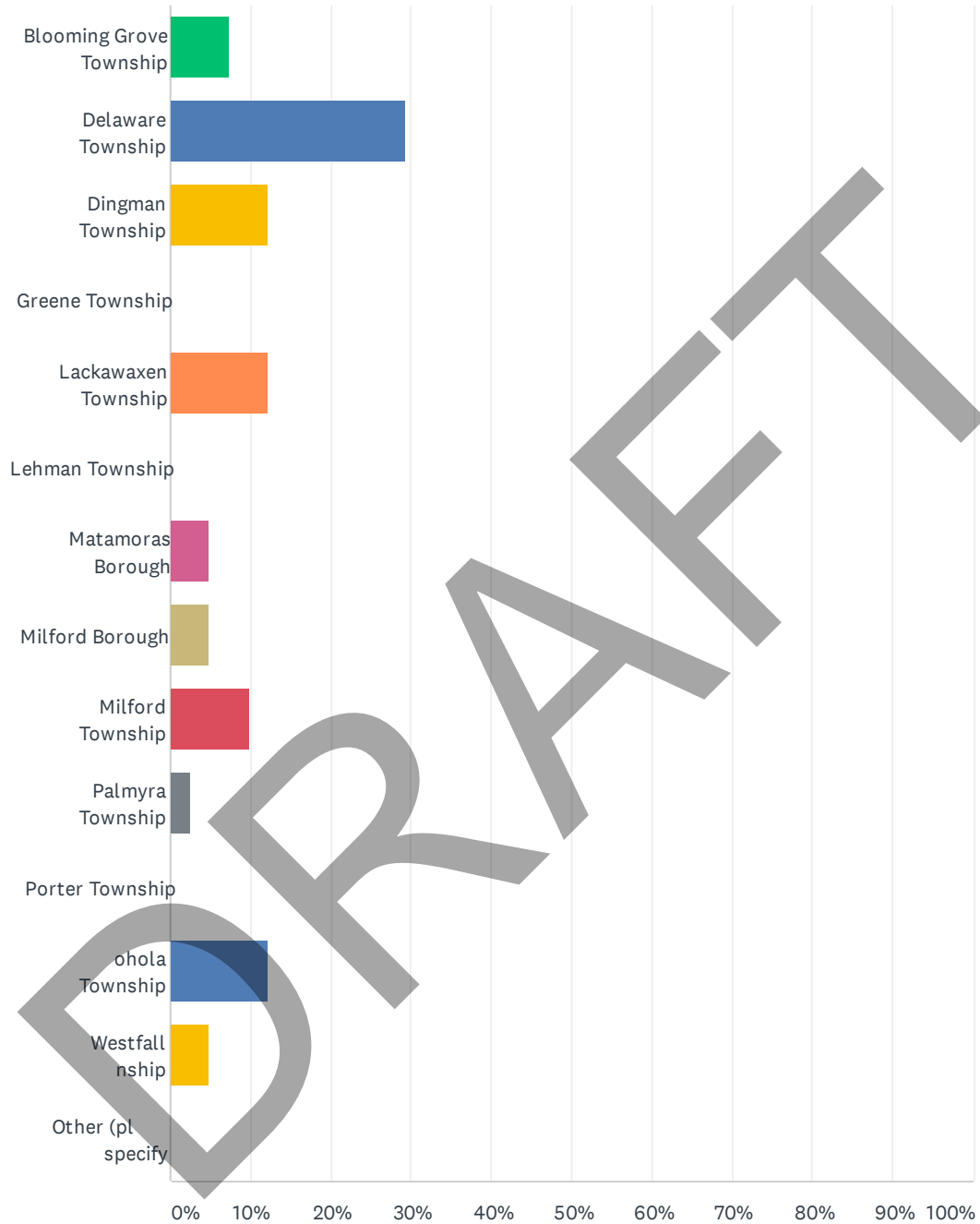
Q29 Do you have any other comments, questions or concerns regarding hazard mitigation in Pike County?

Answered: 7 Skipped: 35

#	RESPONSES	DATE
1	Pike County is not perfect but it is much better than most other counties in the area.	7/30/2021 6:17 PM
2	No	7/26/2021 7:50 PM
3	Zero trust or faith in current county elected	7/25/2021 12:06 PM
4	Repeatedly long term power outages plague our area and force people from their homes and do damage. Provide more communication in advance as to how to mitigate this risk for property owners including proper use of generators, water resources, back up heat safety and how best prepare the home if you must leave and it's cold outside, locally using multiple channels of communication.	7/25/2021 10:15 AM
5	none at this time.	7/24/2021 4:52 PM
6	Let us know how we can volunteer to help	7/10/2021 9:01 PM
7	In order to assist the public better the county and Pike County Emergency Management need to make sure that they have communication with the municipalities ahead of a disaster, so information can be distributed to the public quickly. During Riley and Quaker Delaware Township was without power for 3 days before contact was made between Pike County Emergency Management and the township.	7/8/2021 2:34 PM

Q30 Please indicate in which municipality you live.

Answered: 41 Skipped: 1



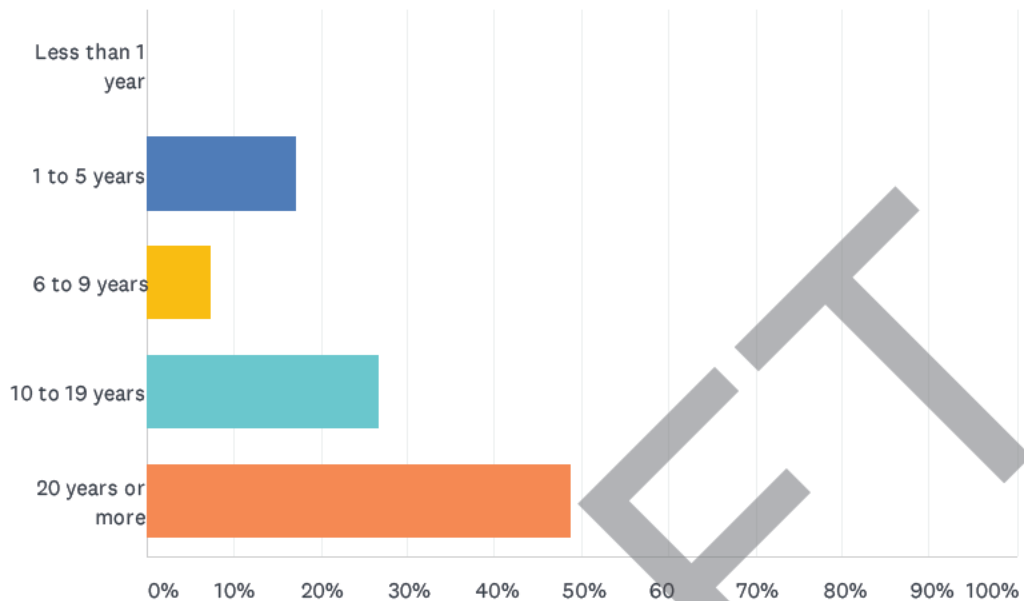
Pike County Multi-Jurisdictional Hazard Mitigation Plan - Public Survey

ANSWER CHOICES	RESPONSES	
Blooming Grove Township	7.32%	3
Delaware Township	29.27%	12
Dingman Township	12.20%	5
Greene Township	0.00%	0
Lackawaxen Township	12.20%	5
Lehman Township	0.00%	0
Matamoras Borough	4.88%	2
Milford Borough	4.88%	2
Milford Township	9.76%	4
Palmyra Township	2.44%	1
Porter Township	0.00%	0
Shohola Township	12.20%	5
Westfall Township	4.88%	2
Other (please specify)	0.00%	0
TOTAL		41

#	OTHER (PLEASE SPECIFY)	DATE
	There are no responses.	

Q31 How long have you lived here?

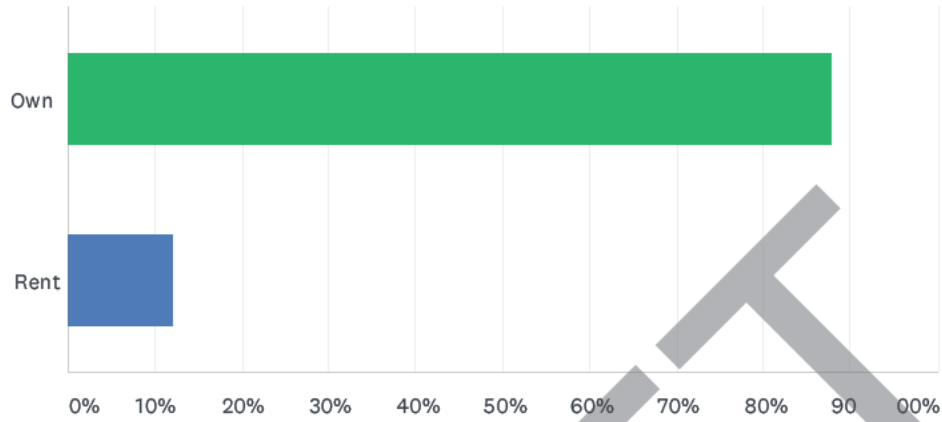
Answered: 41 Skipped: 1



ANSWER CHOICES	PERCENTAGE	RESPONSES
Less than 1 year	0%	0
1 to 5 years	17.07%	7
6 to 9 years	7.32%	3
10 to 19 years	26.83%	11
20 years or more	48.78%	20
TOTAL		41

Q32 Do you own or rent your place of residence?

Answered: 41 Skipped: 1



ANSWER CHOICES	RESPONSES	
Own	87.8	36
Rent	12.2%	5
TOTAL		41

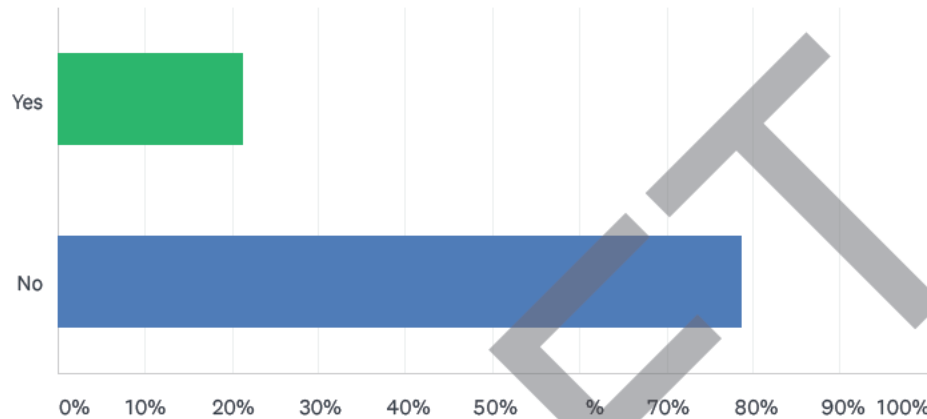
Q33 What street is your property on? This is optional and will be kept confidential - only used to identify hazard areas such as flooding.

Answered: 29 Skipped: 13

#	RESPONSES	DATE
1	[REDACTED]	[REDACTED]
2	[REDACTED]	[REDACTED]
3	[REDACTED]	[REDACTED]
4	[REDACTED]	[REDACTED]
5	[REDACTED]	[REDACTED]
6	[REDACTED]	[REDACTED]
7	[REDACTED]	[REDACTED]
8	[REDACTED]	[REDACTED]
9	[REDACTED]	[REDACTED]
10	[REDACTED]	[REDACTED]
11	[REDACTED]	[REDACTED]
12	[REDACTED]	[REDACTED]
13	[REDACTED]	[REDACTED]
14	[REDACTED]	[REDACTED]
15	[REDACTED]	[REDACTED]
16	[REDACTED]	[REDACTED]
17	[REDACTED]	[REDACTED]
18	[REDACTED]	[REDACTED]
19	[REDACTED]	[REDACTED]
20	[REDACTED]	[REDACTED]
21	[REDACTED]	[REDACTED]
22	[REDACTED]	[REDACTED]
23	[REDACTED]	[REDACTED]
24	[REDACTED]	[REDACTED]
25	[REDACTED]	[REDACTED]
26	[REDACTED]	[REDACTED]
27	[REDACTED]	[REDACTED]
28	[REDACTED]	[REDACTED]
29	[REDACTED]	[REDACTED]
30	[REDACTED]	[REDACTED]
31	[REDACTED]	[REDACTED]
32	[REDACTED]	[REDACTED]
33	[REDACTED]	[REDACTED]
34	[REDACTED]	[REDACTED]
35	[REDACTED]	[REDACTED]
36	[REDACTED]	[REDACTED]
37	[REDACTED]	[REDACTED]
38	[REDACTED]	[REDACTED]
39	[REDACTED]	[REDACTED]
40	[REDACTED]	[REDACTED]
41	[REDACTED]	[REDACTED]
42	[REDACTED]	[REDACTED]
43	[REDACTED]	[REDACTED]
44	[REDACTED]	[REDACTED]
45	[REDACTED]	[REDACTED]
46	[REDACTED]	[REDACTED]
47	[REDACTED]	[REDACTED]
48	[REDACTED]	[REDACTED]
49	[REDACTED]	[REDACTED]
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51	[REDACTED]	[REDACTED]
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65	[REDACTED]	[REDACTED]
66	[REDACTED]	[REDACTED]
67	[REDACTED]	[REDACTED]
68	[REDACTED]	[REDACTED]
69	[REDACTED]	[REDACTED]
70	[REDACTED]	[REDACTED]
71	[REDACTED]	[REDACTED]
72	[REDACTED]	[REDACTED]
73	[REDACTED]	[REDACTED]
74	[REDACTED]	[REDACTED]
75	[REDACTED]	[REDACTED]
76	[REDACTED]	[REDACTED]
77	[REDACTED]	[REDACTED]
78	[REDACTED]	[REDACTED]
79	[REDACTED]	[REDACTED]
80	[REDACTED]	[REDACTED]
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91	[REDACTED]	[REDACTED]
92	[REDACTED]	[REDACTED]
93	[REDACTED]	[REDACTED]
94	[REDACTED]	[REDACTED]
95	[REDACTED]	[REDACTED]
96	[REDACTED]	[REDACTED]
97	[REDACTED]	[REDACTED]
98	[REDACTED]	[REDACTED]
99	[REDACTED]	[REDACTED]
100	[REDACTED]	[REDACTED]

Q34 If you received real estate disclosure information when you moved into your current residence, did your real estate agent or landlord explain the implications of living in a hazard risk zone and did you understand the information they presented?

Answered: 28 Skipped: 14

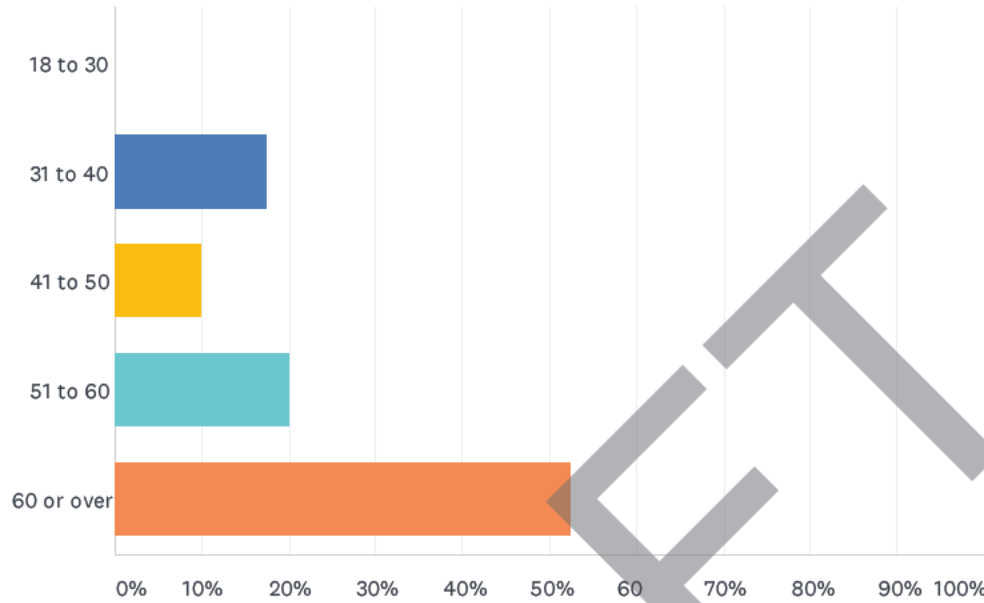


ANSWER CHOICES		RESP	SES
Yes		21.43%	6
No		78.57%	22
TOTAL			28

#	OTHER (PLEASE SPECIFY)	DATE
1	I don't remember.	7/30/2021 6:19 PM
2	N/A	7/24/2021 4:53 PM
3	na	7/12/2021 11:26 AM
4	Don't remember receiving a real estate disclosure information	7/8/2021 2:37 PM

Q35 Please indicate your age range:

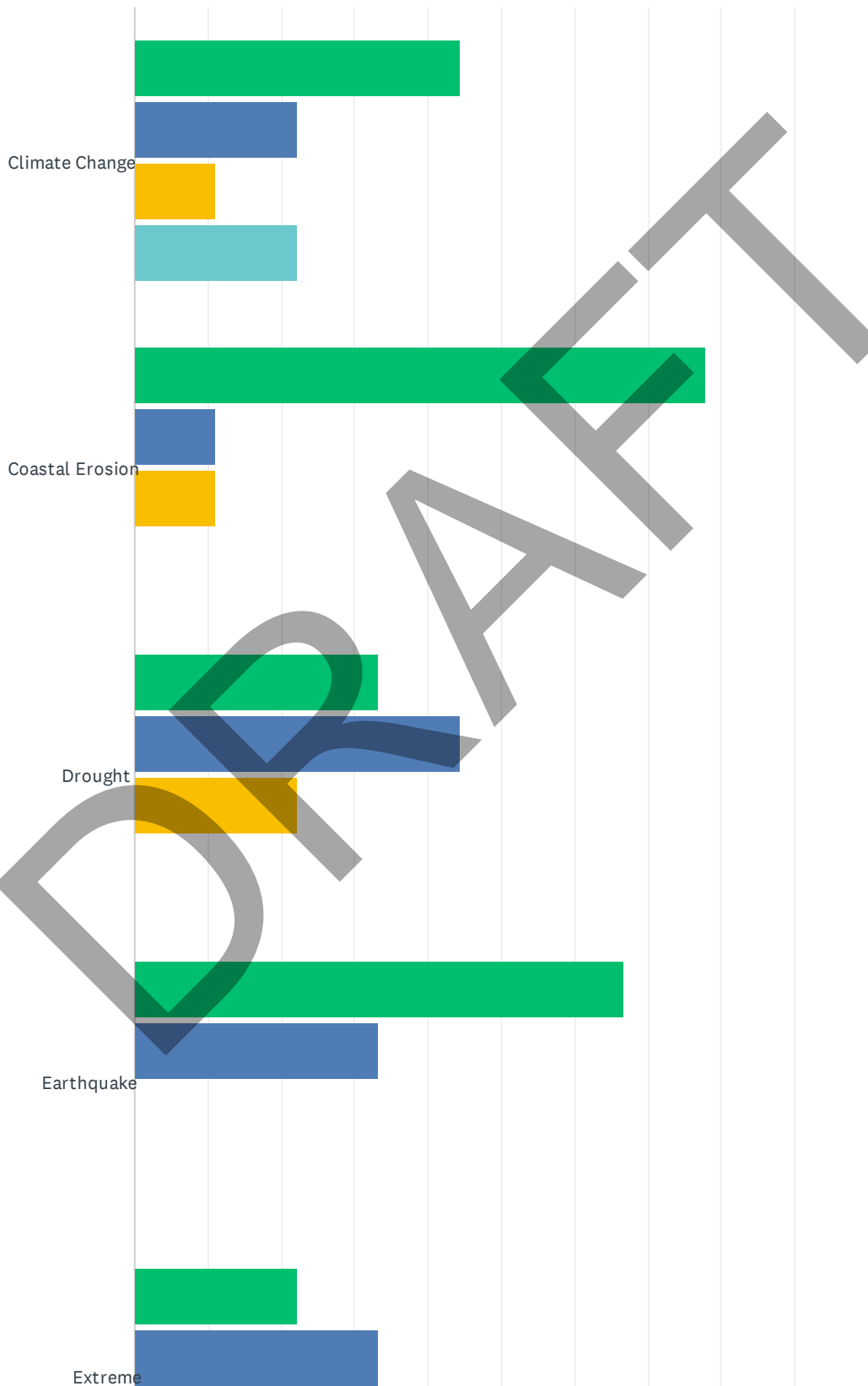
Answered: 40 Skipped: 2



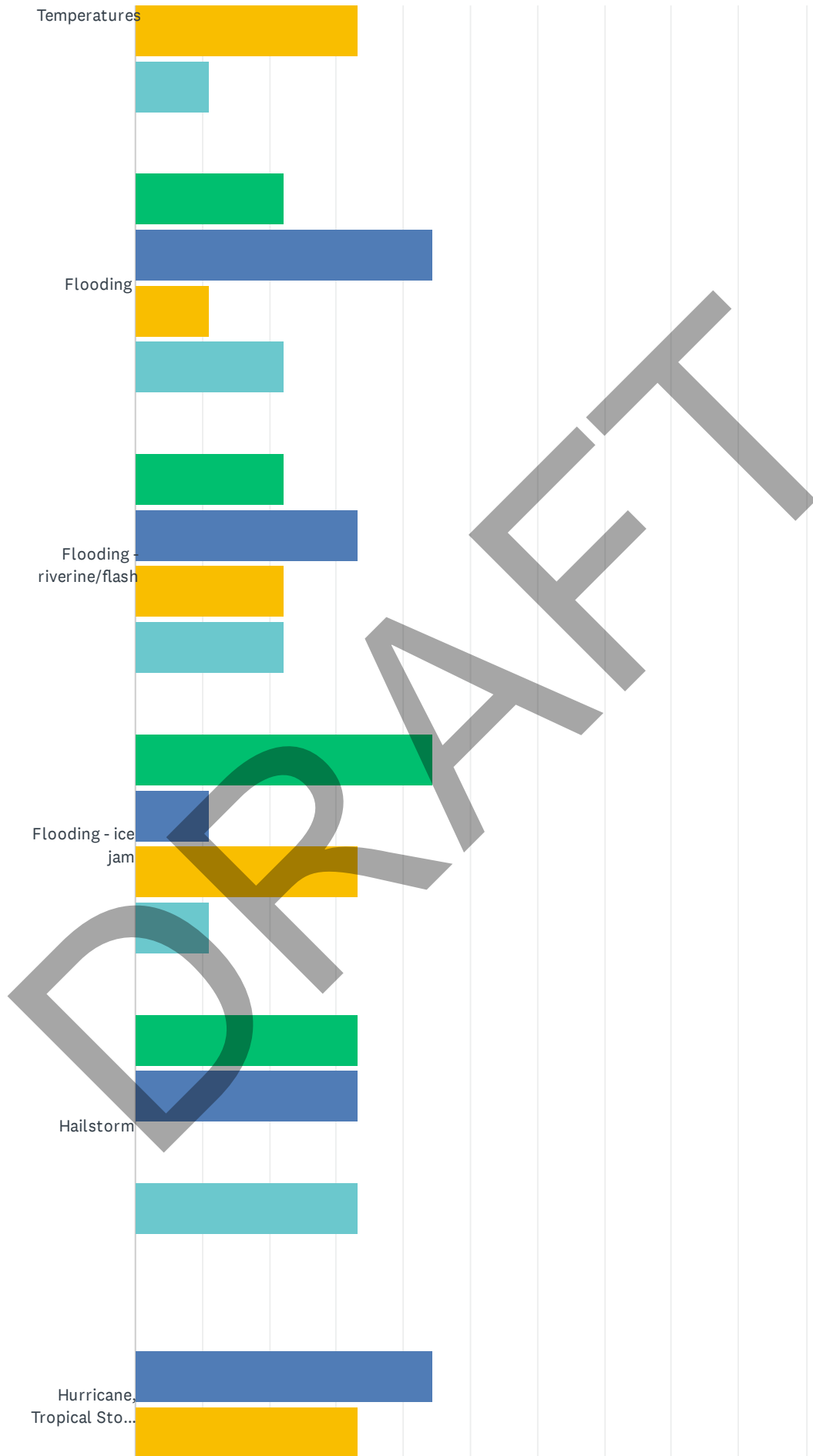
ANSWER CHOICES	RESPONSES
18 to 30	0
31 to 40	17.50% 7
41 to 50	10.00% 4
51 to 60	20.00% 8
60 or over	52.50% 21
TOTAL	40

Q1 How concerned are you about the following natural hazards/disasters impacting Pike County?

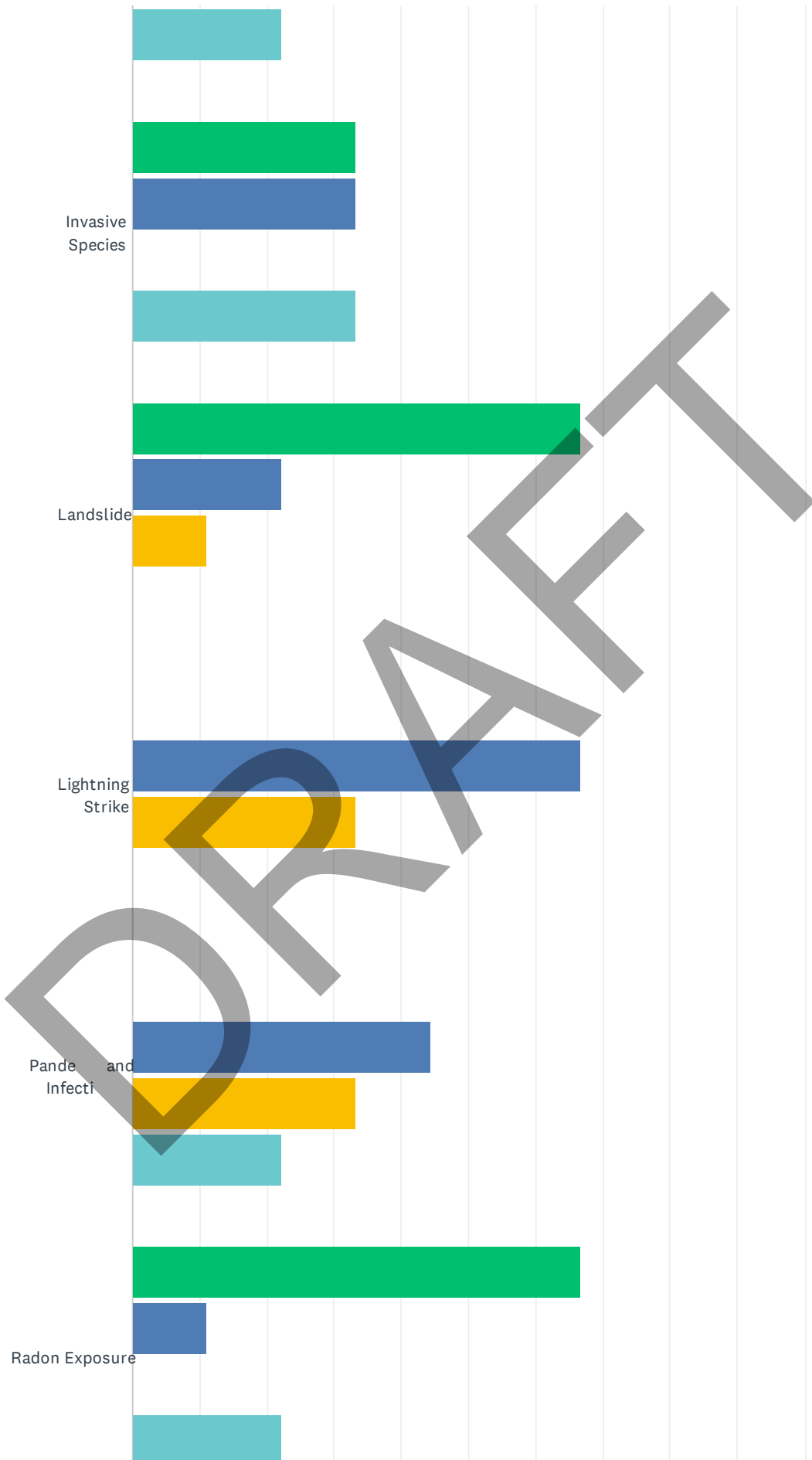
Answered: 9 Skipped: 0



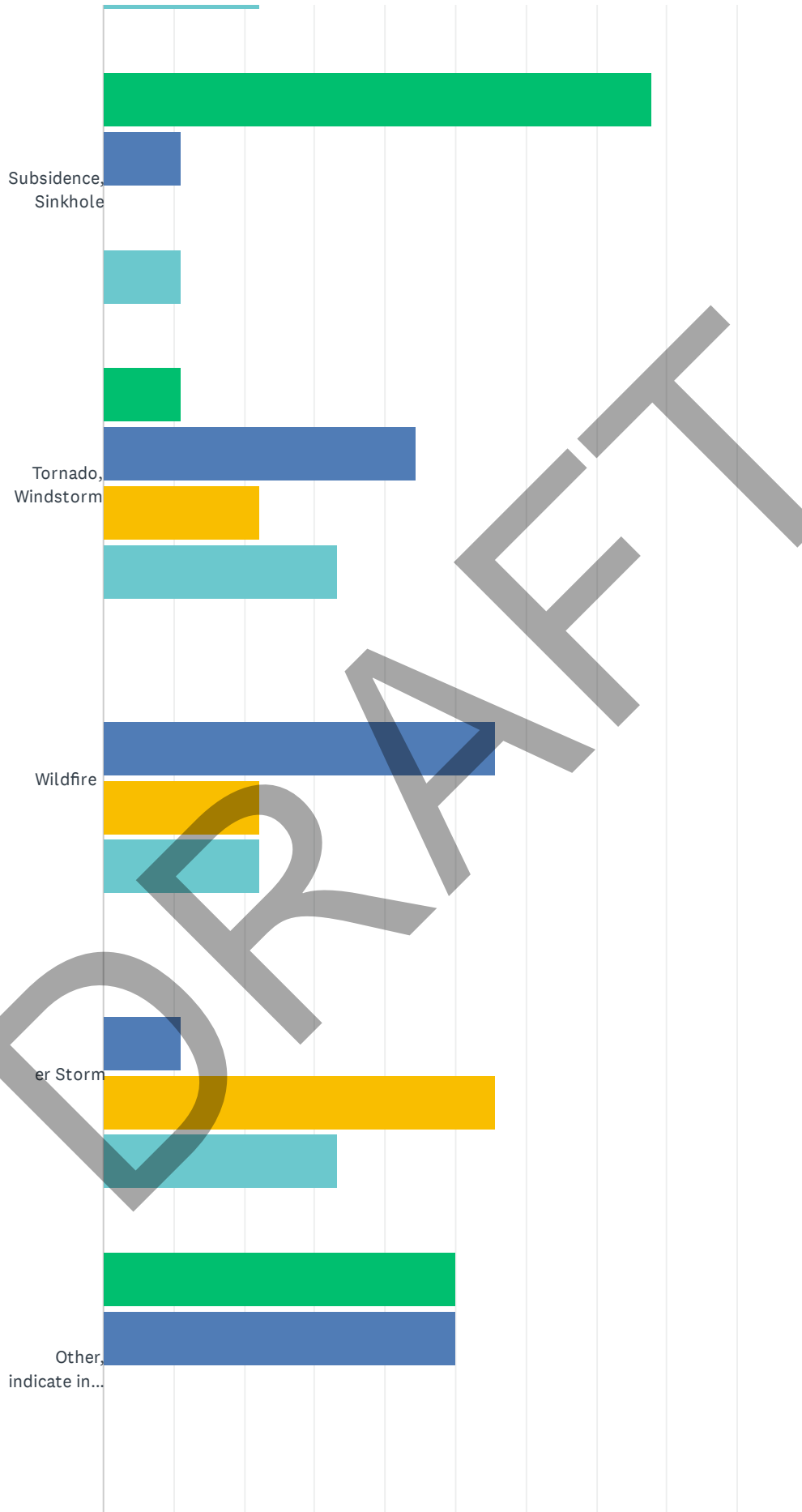
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0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

■ Not Concerned
 ■ Somewhat Concerned
 ■ Very Concerned
 ■ Extremely Concerned

	NOT CONCERNED	SOMEWHAT CONCERNED	VERY CONCERNED	EXTREMELY CONCERNED	TOTAL RESPONDENTS
Climate Change	44.44% 4	22.22% 2	11.11% 1	22.22% 2	9
Coastal Erosion	77.78% 7	11.11% 1	11.11% 1	0.00% 0	9
Drought	33.33% 3	44.44% 4	22.22% 2	0.00% 0	9
Earthquake	66.67% 6	33.33% 3	0.00% 0	0.00% 0	9
Extreme Temperatures	22.22% 2	33.33% 3	33.33% 3	11.11% 1	9
Flooding	22.22% 2	44.44% 4	11.11% 1	22.22% 2	9
Flooding - levee/flood wall	22.22% 2	33.33% 3	22.22% 2	22.22% 2	9
Flooding - ice jam	44.44% 4	11.11% 1	33.33% 3	11.11% 1	9
Hailstorm	33.33% 3	33.33% 3	0.00% 0	33.33% 3	9
Hurricane, Tropical Storm, Nor'easter	0.00% 0	44.44% 4	33.33% 3	22.22% 2	9
Invasive Species	33.33% 3	33.33% 3	0.00% 0	33.33% 3	9
Landslide	66.67% 6	0.00% 0	11.11% 1	0.00% 0	9
Lightning Strike	0.00% 0	66.67% 6	33.33% 3	0.00% 0	9
Pandemic and Infectious Disease	0.00% 0	44.44% 4	33.33% 3	22.22% 2	9
Radon Exposure	66.67% 6	11.11% 1	0.00% 0	22.22% 2	9
Subsidence, Sinkhole	7.78% 1	11.11% 1	0.00% 0	11.11% 1	9
Tornado, Windstorm	11.11% 1	44.44% 4	22.22% 2	33.33% 3	9
Wildfire	0.00% 0	55.56% 5	22.22% 2	22.22% 2	9
Winter Storm	0.00% 0	11.11% 1	55.56% 5	33.33% 3	9
Other, indicate in comment box below	50.00% 1	50.00% 1	0.00% 0	0.00% 0	2

#	OTHER (PLEASE SPECIFY)	DATE
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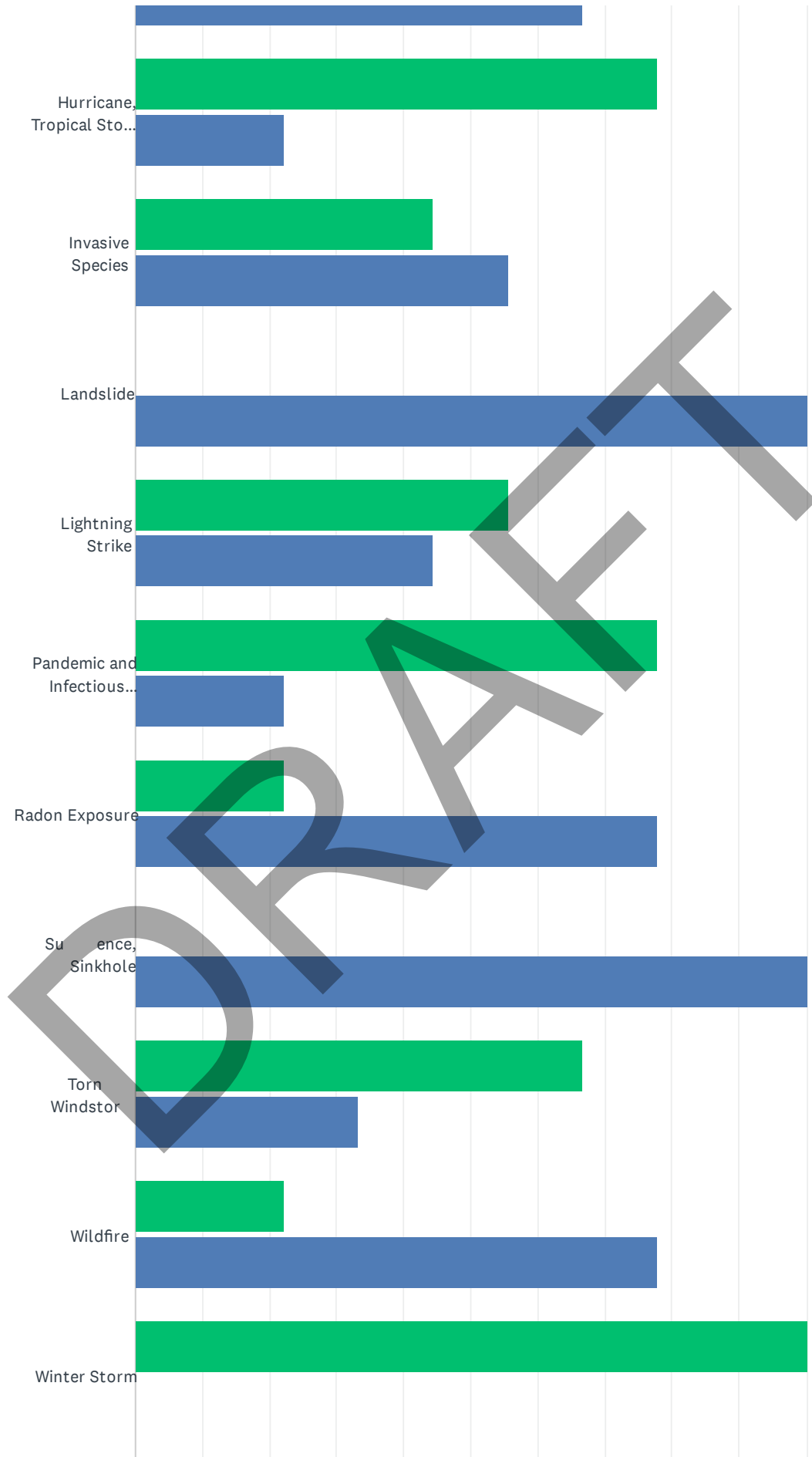
DRAFT

Q2 In the past 5 years, which of the following types of natural hazards/disasters have you experienced within Pike County, or sustained damage as a result of each?

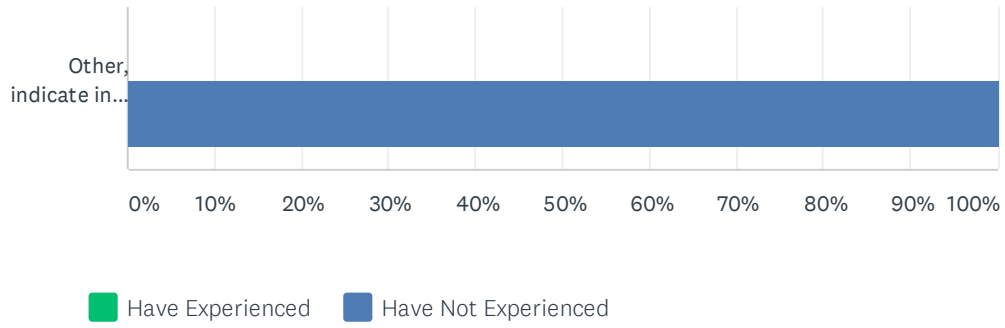
Answered: 9 Skipped: 0



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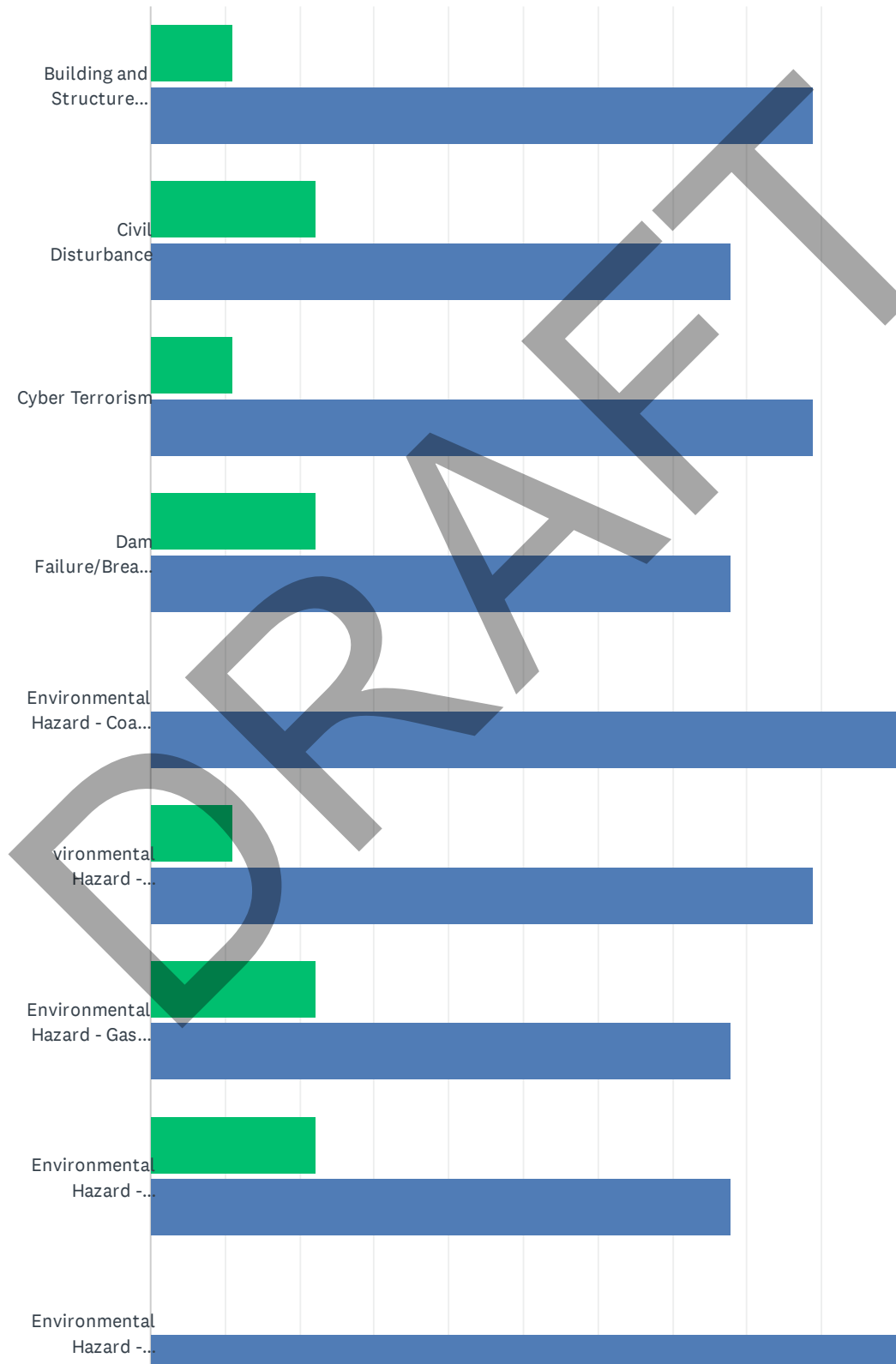
DRAFT

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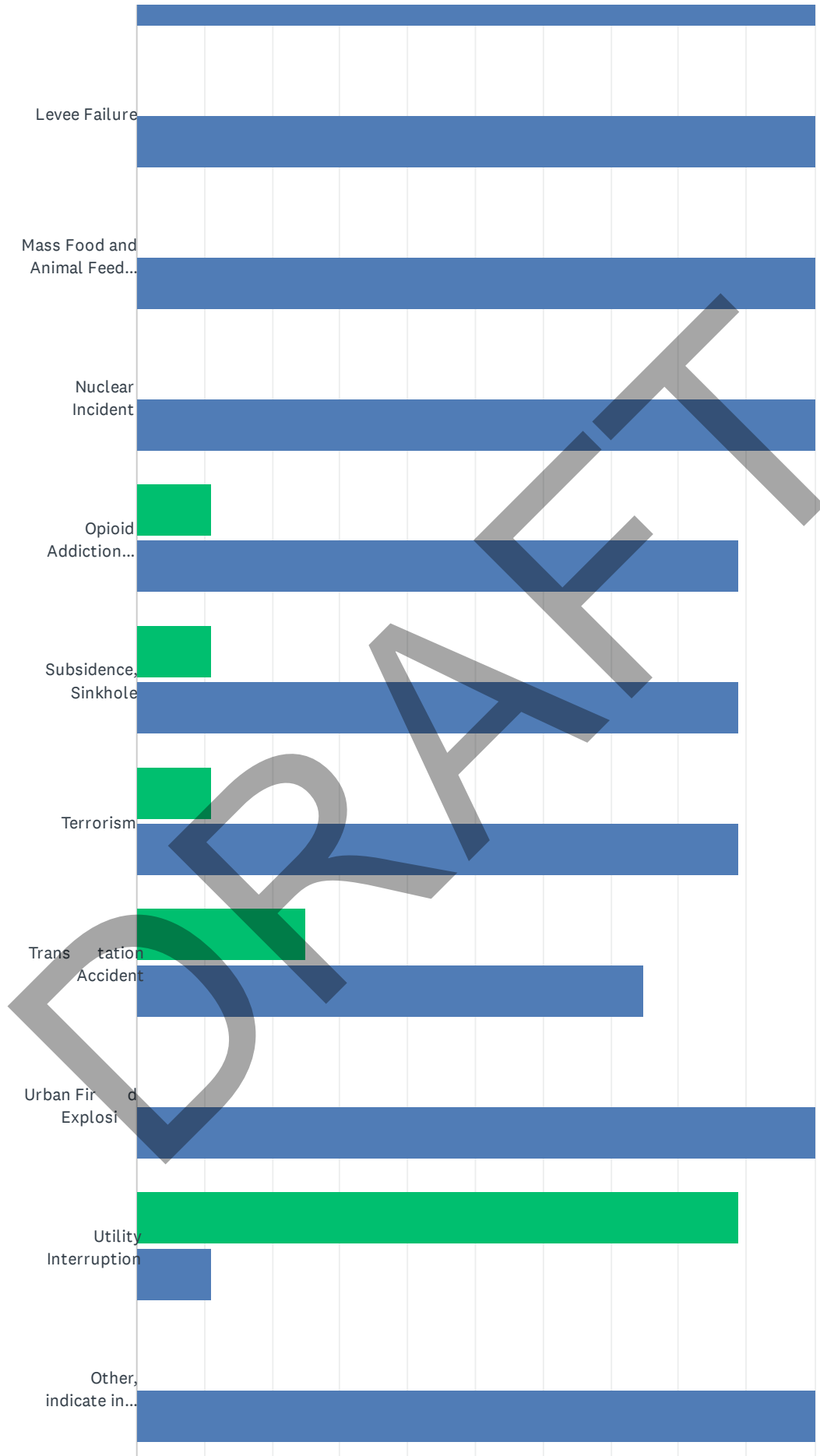
	HAVE EXPERIENCED	HAVE NOT EXPERIENCED	TOTAL RESPONDENTS
Climate Change	22.22% 2	77.78% 7	9
Coastal Erosion	0.00% 0	100.00% 9	9
Drought	33.33% 3	66.67% 6	9
Earthquake	0.00% 0	100.00% 9	9
Extreme Temperatures	66.67% 6	33.33% 3	9
Flooding	33.33% 3	66.67% 6	9
Flooding - riverine/flash	33.33% 3	66.67% 6	9
Flooding - ice jam	11.11% 1	88.89% 8	9
Hailstorm	33.33% 3	66.67% 6	9
Hurricane, Tropical Storm, Nor'easter	77.78% 7	22.22% 2	9
Invasive Species	44.44% 4	55.56% 5	9
Landslide	0.00% 0	100.00% 9	9
Lightning Strike	55.56% 5	44.44% 4	9
Pandemic and Infectious Disease	77.78% 7	22.22% 2	9
Radon Exposure	22.22% 2	77.78% 7	9
Subsidence, Sinkhole	0.00% 0	100.00% 9	9
Tornado, Windstorm	66.67% 6	33.33% 3	9
Wildfire	22.22% 2	77.78% 7	9
Winter Storm	100.00% 9	0.00% 0	9
Other, indicate in comment box below	0.00% 0	100.00% 1	1

Q3 In the past 5 years, which of the following types of human-made hazards/disasters have you experienced within Pike County, or sustained damage as a result of each?

Answered: 9 Skipped: 0



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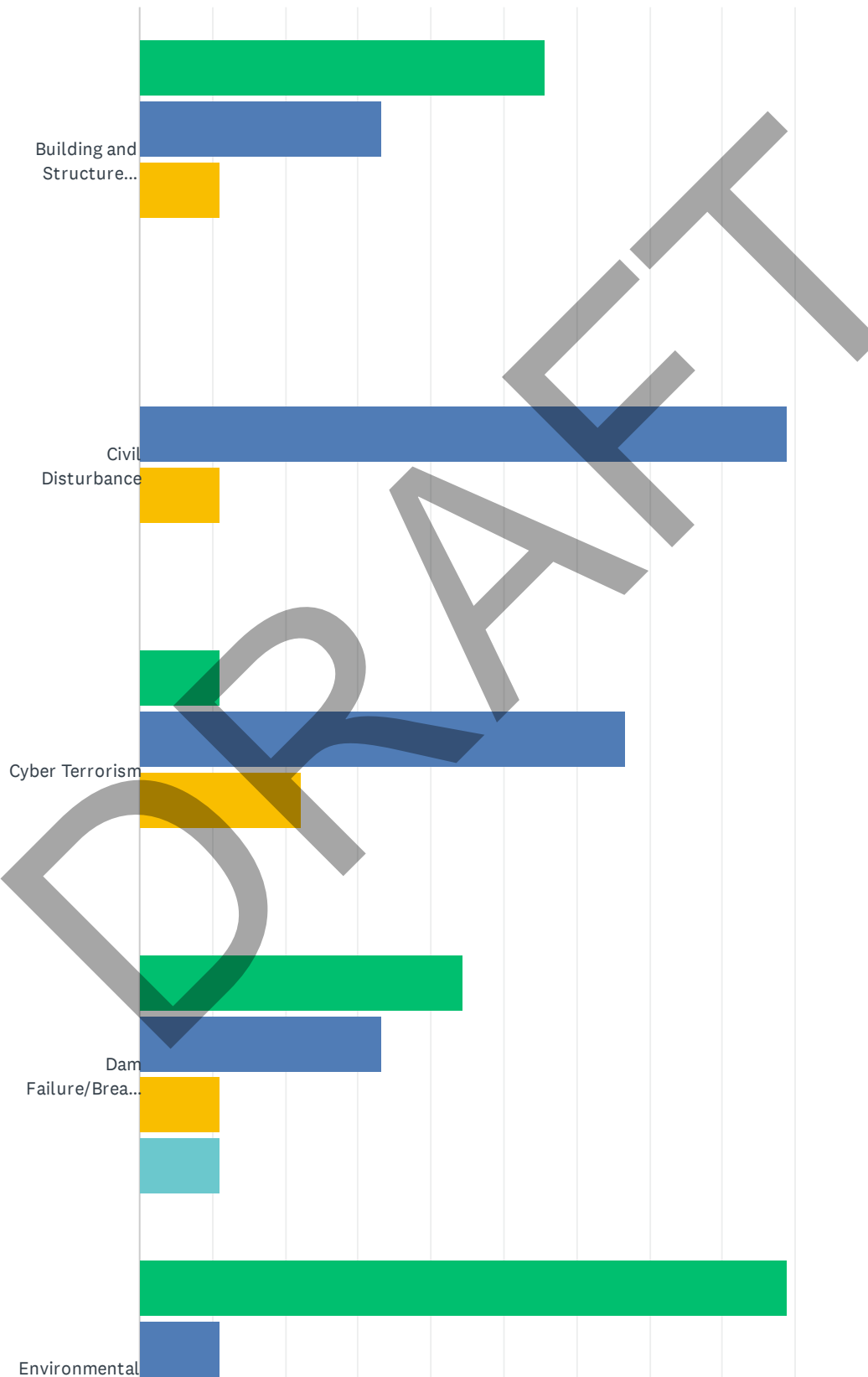
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Have Experienced Have Not Experienced

	HAVE EXPERIENCED	HAVE NOT EXPERIENCED	TOTAL RESPONDENTS
Bu d ng and St uctu e Co apse	11.11% 1	88.89% 8	9
Cv d stu bance	22.22% 2	77.78% 7	9
Cyber Ter o ism	11.11% 1	88.89% 8	9
Dam Fa u e/B eaches	22.22% 2	77.78% 7	9
Env onmental Haza d - Coa M n ng	0.00% 0	100.00% 0	8
Env onmental Haza d - Convent onal O and Gas We s	11.11% 1	88.89% 8	9
Env onmental Haza d - Gas and L qu d P pe nes	22.22% 2	77.78% 7	9
Env onmental Haza d - Haza dous Mate a s Re eases	22.22% 2	77.78% 7	9
Env onmental Haza d - Unconvent ona O and Gas We s	0.00% 0	100.00% 8	8
Levee Fa u e	0.00% 0	100.00% 8	8
Mass Food and An ma Feed Contam n n	0.00% 0	100.00% 8	8
Nuc ea Inc dent	0.00% 0	100.00% 9	9
Opio d Add ct on Respon	11.11% 1	88.89% 8	9
Subs dence, S n e	11.11% 1	88.89% 8	9
Ter o ism	11.11% 1	88.89% 8	9
T anspo tat on Acc dent	25.00% 2	75.00% 6	8
U ban F e and Expos on	0.00% 0	100.00% 9	9
Ut ty Inte upt on	88.89% 8	11.11% 1	9
Othe , nd cate n comment box be ow	0.00% 0	100.00% 1	1

Q4 How concerned are you about the following human-made hazards/disasters impacting the County?

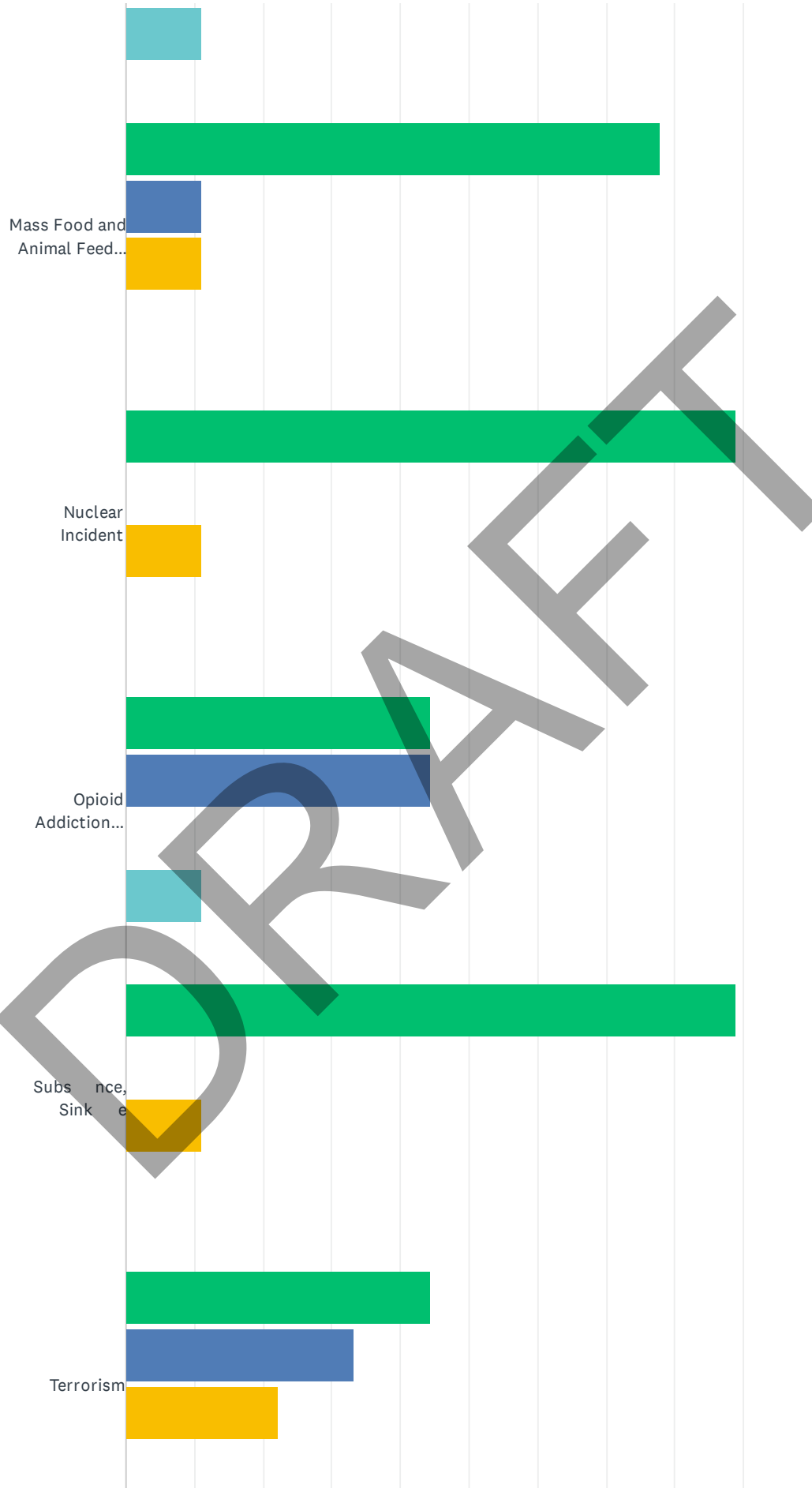
Answered: 9 Skipped: 0



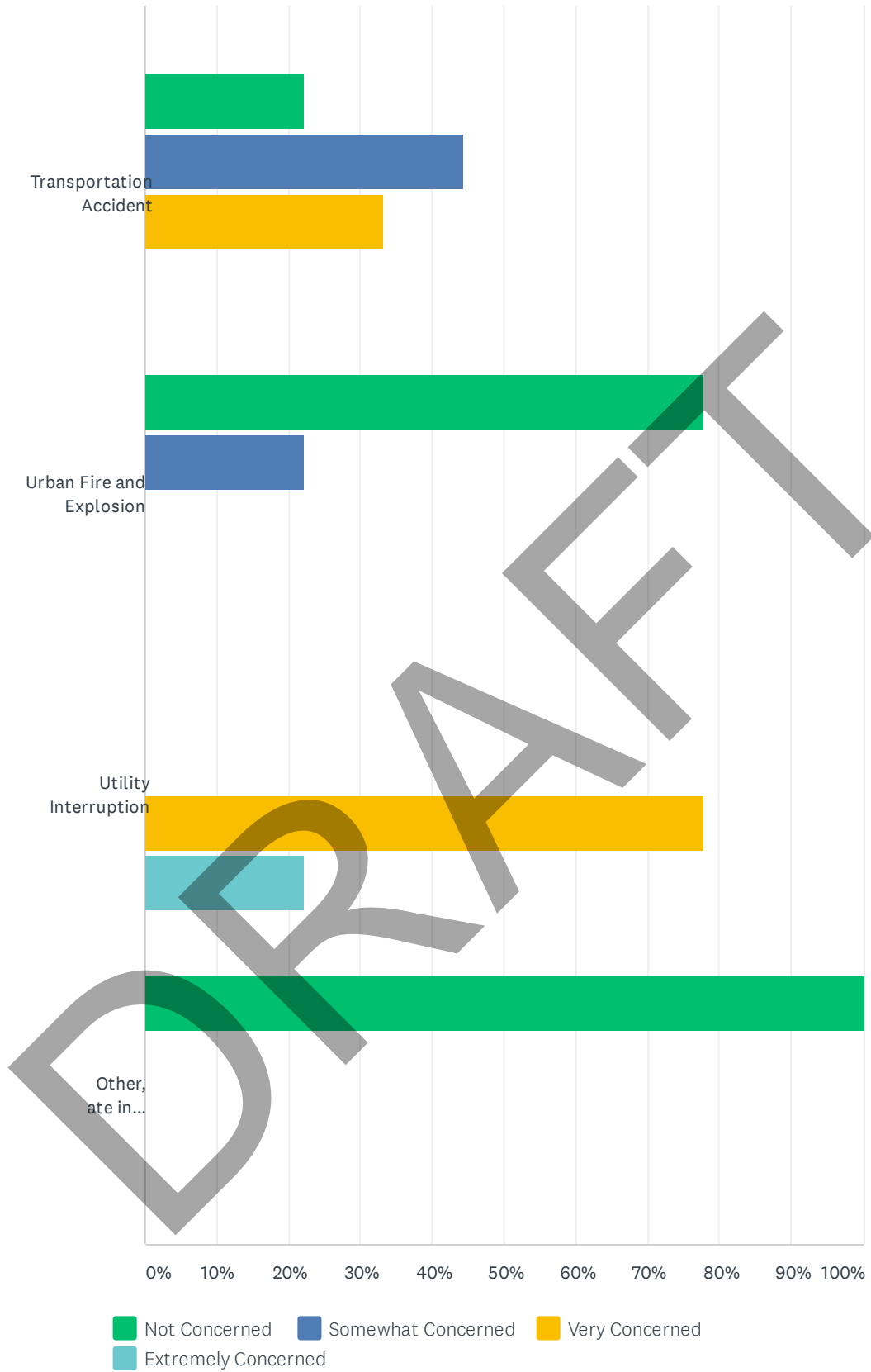
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	NOT CONCERNED	SOMEWHAT CONCERNED	VERY CONCERNED	EXTREMELY CONCERNED	TOTAL RESPONDENTS
Building and Structure Collapse	55.56% 5	33.33% 3	11.11% 1	0.00% 0	9
Civil Disturbance	0.00% 0	88.89% 8	11.11% 1	0.00% 0	9
Cyber Terrorism	11.11% 1	66.67% 6	22.22% 2	0.00% 0	9
Dam Failure/Breaches	44.44% 4	33.33% 3	11.11% 1	11.11% 1	9
Environmental Hazard - Coal Mining	88.89% 8	11.11% 1	0.00% 0	0.00% 0	9
Environmental Hazard - Conventional Oil and Gas Wells	88.89% 8	0.00% 0	11.11% 1	0.00% 0	9
Environmental Hazard - Gas and Liquid Pipelines	66.67% 6	22.22% 2	11.11% 1	0.00% 0	9
Environmental Hazard - Hazardous Materials Releases	55.56% 5	33.33% 3	11.11% 1	0.00% 0	9
Environmental Hazard - Unconventional Oil and Gas Wells	88.89% 8	11.11% 1	0.00% 0	0.00% 0	9
Levee Failure	77.78% 7	11.11% 1	0.00% 0	11.11% 1	9
Mass Food and Animal Feed Contamination	77.78% 7	11.11% 1	11.11% 1	0.00% 0	9
Nuclear Incident	88.89% 8	0.00% 0	11.11% 1	0.00% 0	9
Opioid Addiction Response	44.44% 4	44.44% 4	0.00% 0	11.11% 1	9
Subsidence, Sinkhole	88.89% 8	0.00% 0	11.11% 1	0.00% 0	9
Terrorism	44.44% 4	33.33% 3	22.22% 2	0.00% 0	9
Transportation Accident	22.22% 2	44.44% 4	33.33% 3	0.00% 0	9
Urban Fire and Explosions	77.78% 7	22.22% 2	0.00% 0	0.00% 0	9
Utility Interruption	0.00% 0	0.00% 0	77.78% 7	22.22% 2	9
Other, indicate in comment box below	100.00% 1	0.00% 0	0.00% 0	0.00% 0	1

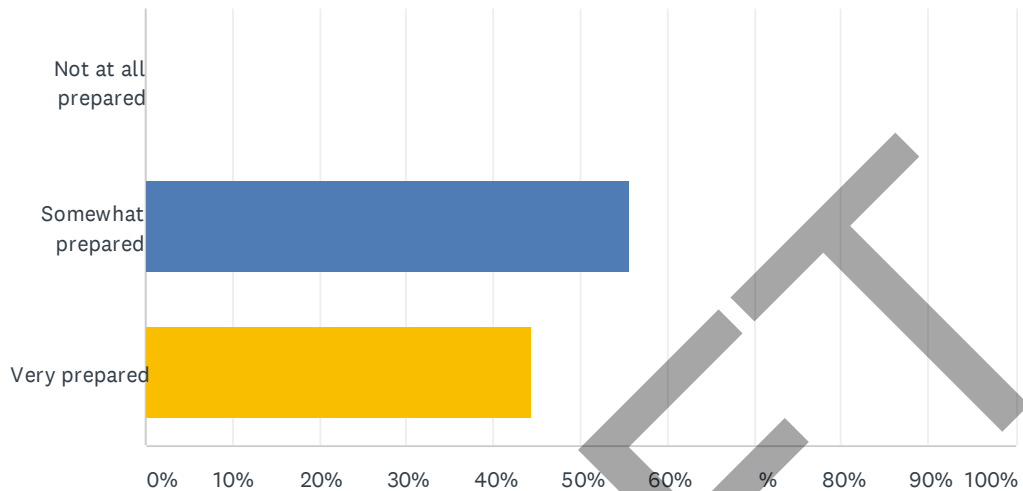
Q5 In the last 5 years, were you evacuated from your home as a result of a disaster (e.g. flooding)? If so, how long were you displaced? Did you go to a shelter?

Answered: 8 Skipped: 1

#	RESPONSES	DATE
1	no	7/16/2021 8:36 AM
2	no	7/12/2021 11:12 AM
3	No	7/10/2021 8:55 PM
4	No	7/9/2021 7:53 AM
5	NO	7/8/2021 3:04 PM
6	Not evacuated. Had no choice but to leave for 9 days due to no power March 2 2018 winter storm	7/8/2021 2:13 PM
7	No	7/8/2021 2:06 PM
8	No.	7/8/2021 1:03 PM

Q6 How prepared is your household to get along without normal power/heat for one to five days?

Answered: 9 Skipped: 0

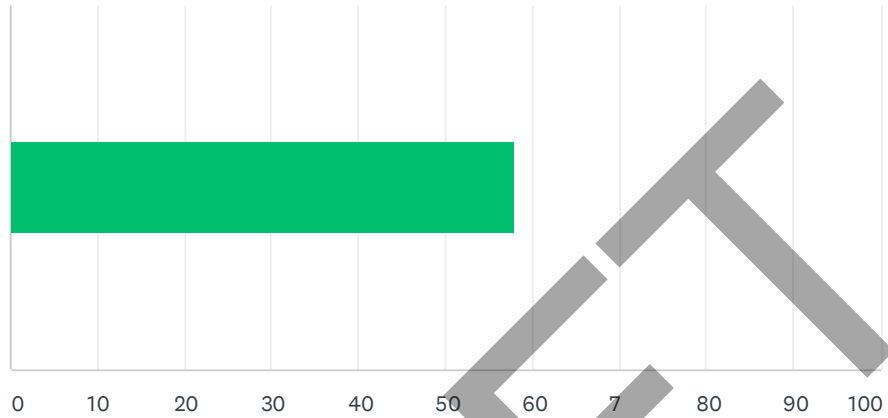


ANSWER CHOICES	PERCENTAGE	RESPONSES
Not at all prepared	0.00%	0
Somewhat prepared	55.56%	5
Very prepared	44.44%	4
TOTAL		9

#	PLEASE EXPLAIN	DATE
1	back up generator, emergency supplies as recommended by FEMA	7/12/2021 11:12 AM
2	Mostly prepared for about 3 days	7/10/2021 8:55 PM
3	We have a wood stove to keep us warm and try to have food on hand to eat without needing to use electricity.	7/9/2021 7:53 AM
4	House generator	7/8/2021 3:04 PM
5	Portable generator, wood stove, emergency food, etc	7/8/2021 2:13 PM
6	We have a generator	7/8/2021 2:06 PM

Q7 Please rank how prepared you feel you and your household are for disaster events likely to occur within your community. Rank on a scale of 1 to 5, with 5 representing the most prepared.

Answered: 8 Skipped: 1



ANSWER CHOICES	AVERAGE NUMBER	TOT NUMBER	RESPONSES
	58	463	8
Total Respondents: 8			

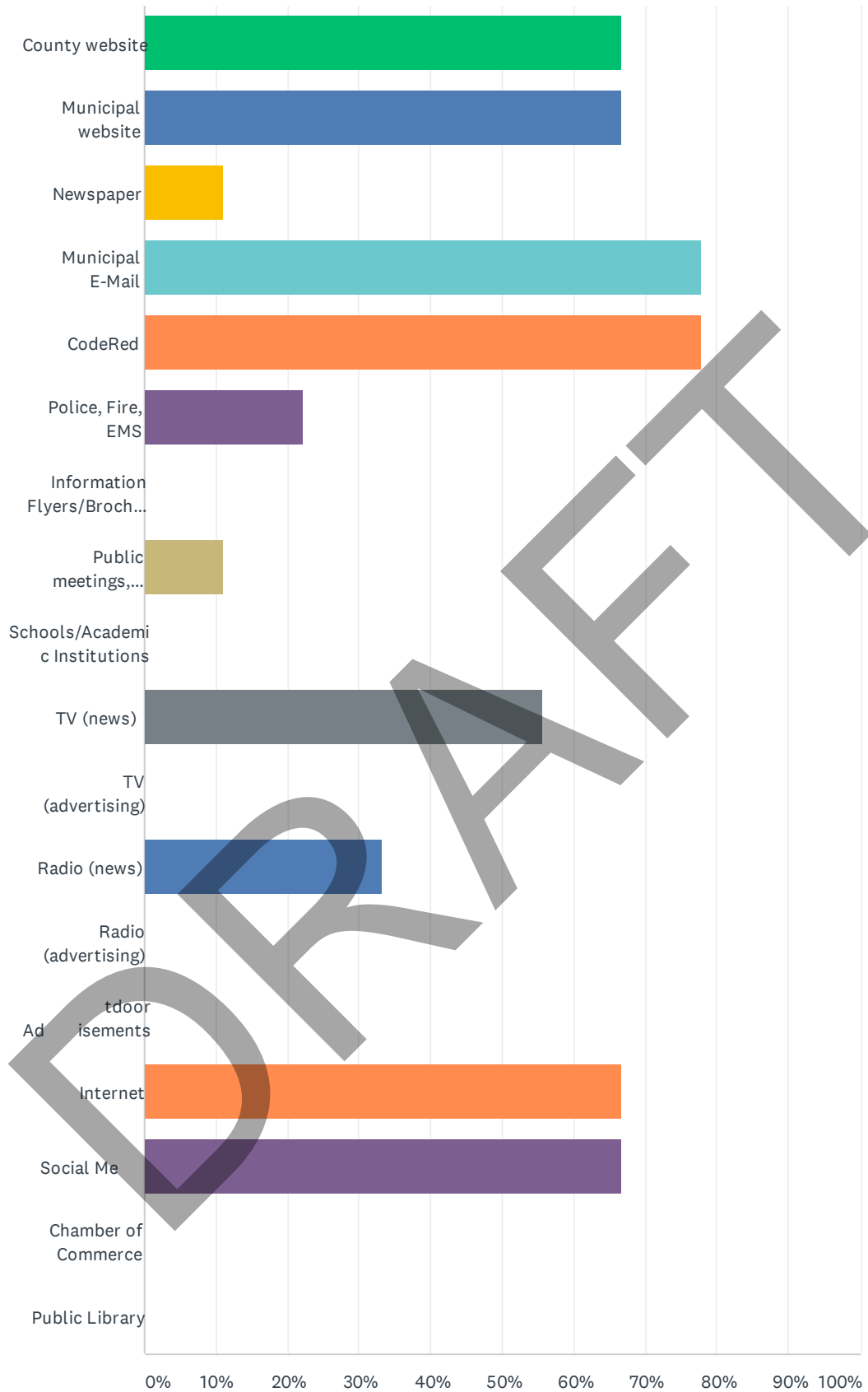
#		DATE
1	74	7/16/2021 8:36 AM
2	27	7/13/2021 7:19 PM
3	96	7/12/2021 11:12 AM
4	50	7/10/2021 8:55 PM
5	48	7/9/2021 7:53 AM
6	51	7/8/2021 3:04 PM
7	58	7/8/2021 2:13 PM
8	59	7/8/2021 1:03 PM

Q8 How do you receive your information concerning a disaster? Check all that apply.

Answered: 9 Skipped: 0

DRAFT

Pike County Multi-Jurisdictional Hazard Mitigation Plan - Public Survey



Pike County Multi-Jurisdictional Hazard Mitigation Plan - Public Survey

ANSWER CHOICES	RESPONSES	
County website	66.67%	6
Municipal website	66.67%	6
Newspaper	11.11%	1
Municipal E-Mail	77.78%	7
CodeRed	77.78%	7
Police, Fire, EMS	22.22%	2
Information Flyers/Brochures	0.00%	0
Public meetings, workshops, public awareness events	11.11%	1
Schools/Academic Institutions	0.00%	0
TV (news)	55.56%	5
TV (advertising)	0.0	0
Radio (news)	33.33%	3
Radio (advertising)	0.00%	0
Outdoor Advertisements	0.00%	0
Internet	66.67%	6
Social Media	66.67%	6
Chamber of Commerce	0.00%	0
Public Library	0.00%	0
Total Respondents: 9		

#	OTHER (PLEASE SPECIFY)	DATE
	There are respons	

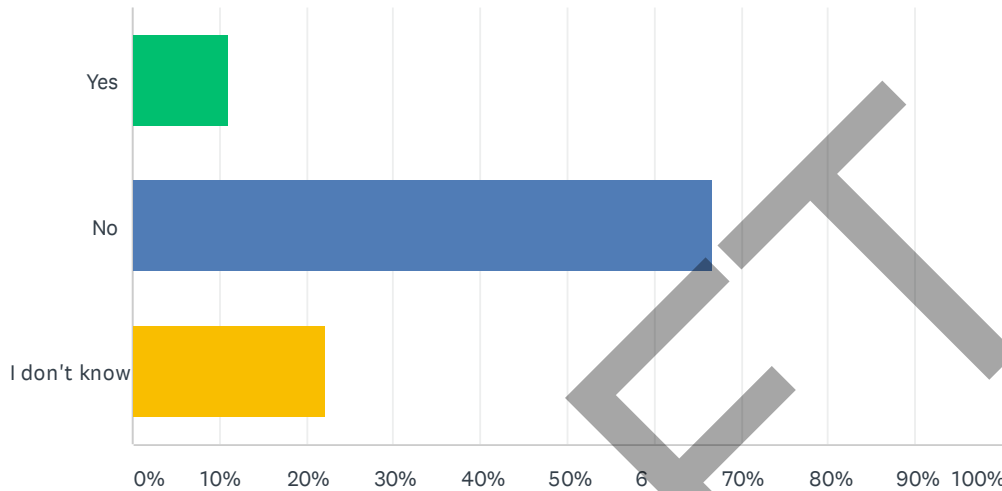
Q9 Of the answers you provided above, what are the top three methods you use?

Answered: 9 Skipped: 0

#	RESPONSES	DATE
1	CodeRed, Social Media and Municipal Email	7/16/2021 8:36 AM
2	Police/Fire/EMS, Municipal Email, Social Media	7/13/2021 7:19 PM
3	code red, police fire ems, tv news	7/12/2021 11:12 AM
4	Code Red (love the emails, calls and texts) TV news Internet News (essential local TV and newspaper sites)	7/10/2021 8:55 PM
5	Internet and TV like the weather channel and local news	7/9/2021 7:53 AM
6	Social media, municipal website, being a Township Supervisor.	7/8/2021 3:04 PM
7	Tv ,county news and social media groups for pike county	7/8/2021 2:13 PM
8	Social Media Municipal Website Municipal E-Mail	7/8/2021 2:06 PM
9	social media internet codeRed	7/8/2021 1:03 PM

Q10 Do you think that the public is aware of, understands, and takes advantage of emergency warning and notification systems and services (e.g. CodeRed alerts)?

Answered: 9 Skipped: 0

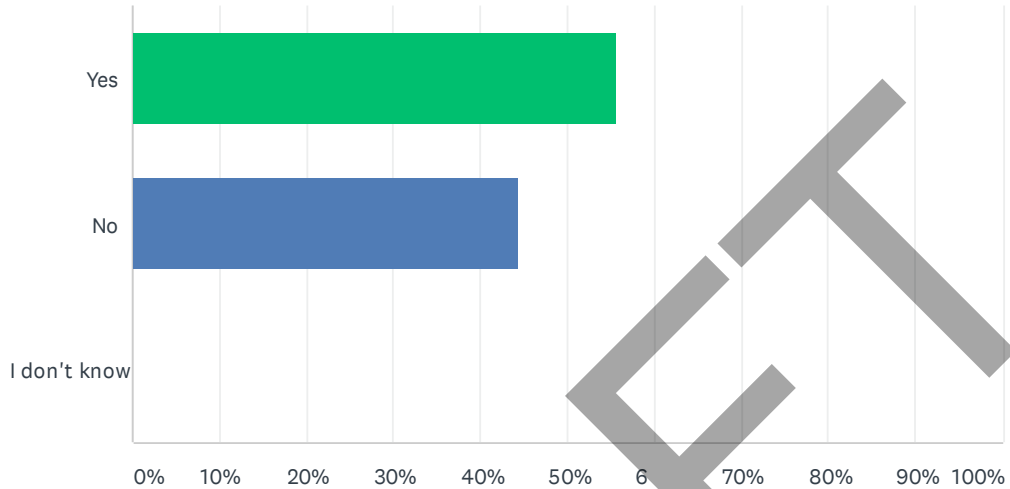


ANSWER CHOICES	RESPONSES
Yes	11% 1
No	66.67% 6
I don't know	22.22% 2
TOTAL	9

#	PLEASE EXPLAIN	DATE
1	recently moved populations unfamiliar with HVA or resources to prepare/react	7/12/2021 11:12 AM
2	More public advertising needed.	7/8/2021 3:04 PM
3	I don't believe enough people have signed up.	7/8/2021 2:06 PM

Q11 Do you think that local public education and awareness programs are effective at informing the public on what they should do to be prepared for and reduce their personal risk to disasters?

Answered: 9 Skipped: 0

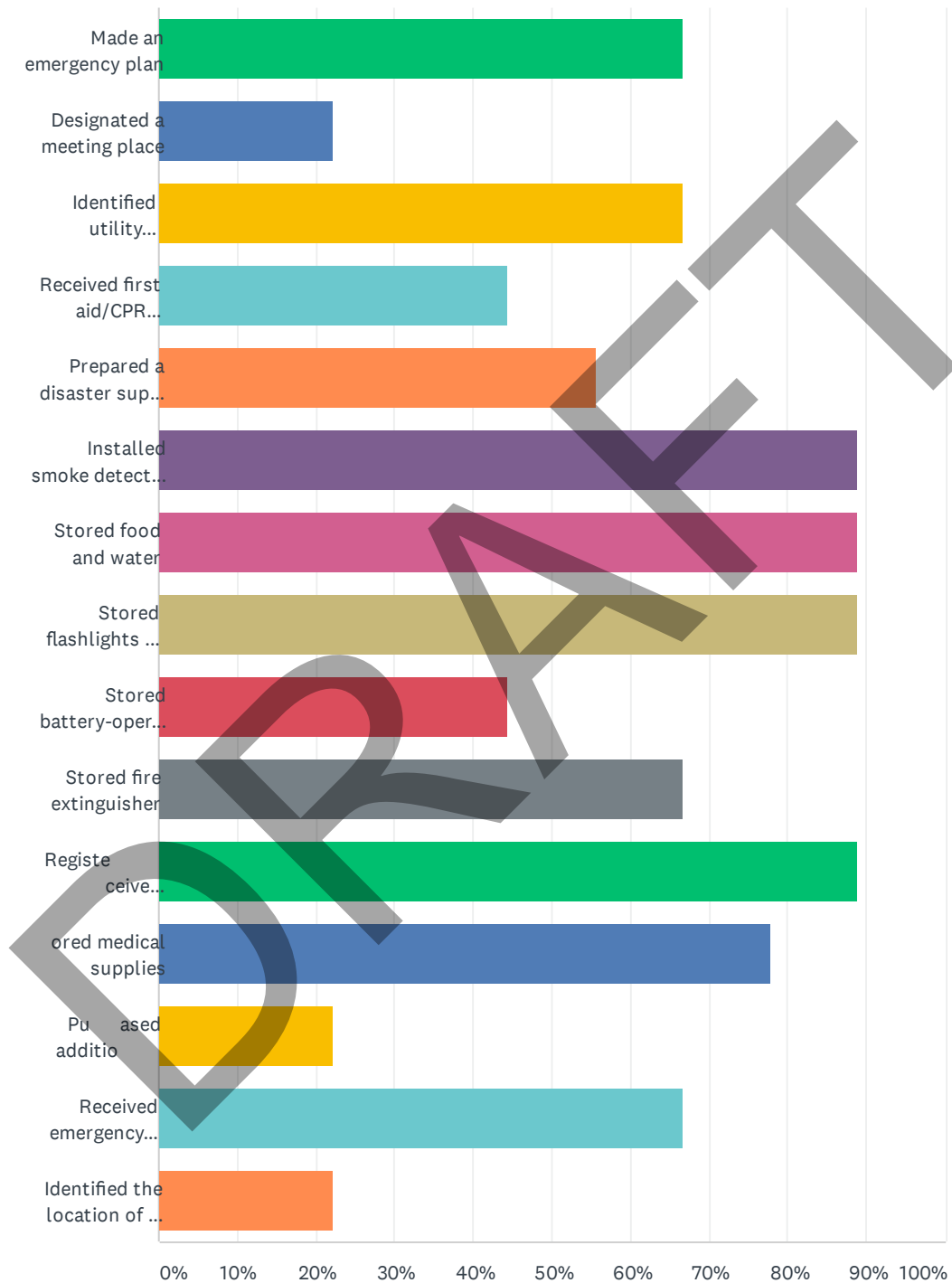


ANSWER CHOICES	RESPONSES
Yes	56% 5
No	44.44% 4
I don't know	0.00% 0
TOTAL	9

#	OTHER (PLEASE EXPLAIN)	DATE
1	same as above, people in modern life are too insular	7/12/2021 11:12 AM
2	I don't think people read the news or take it serious until it is too late.	7/8/2021 2:06 PM

Q12 Which of the following steps has your household taken to prepare for a hazard event? Check all that apply.

Answered: 9 Skipped: 0



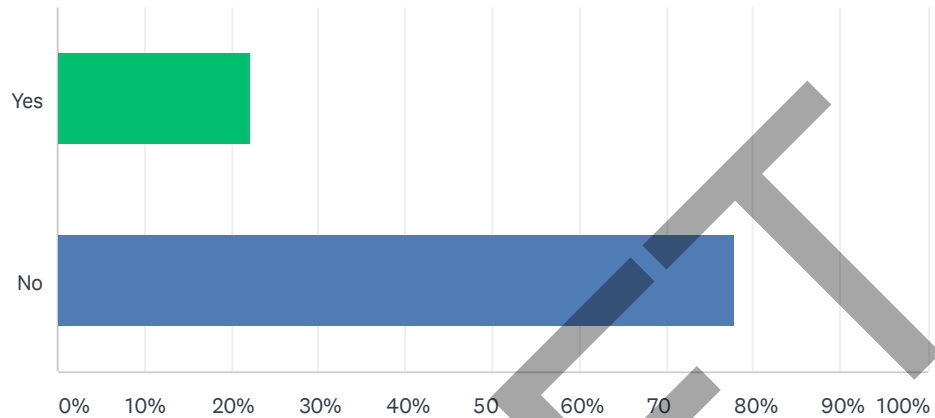
Pike County Multi-Jurisdictional Hazard Mitigation Plan - Public Survey

ANSWER CHOICES	RESPONSES	
Made an emergency plan	66.67%	6
Designated a meeting place	22.22%	2
Identified utility shutoffs	66.67%	6
Received first aid/CPR training	44.44%	4
Prepared a disaster supply kit	55.56%	5
Installed smoke detectors on each level of home	88.89%	8
Stored food and water	88.89%	8
Stored flashlights and batteries	88.89%	8
Stored battery-operated radio	44.44%	4
Stored fire extinguisher	66.67%	6
Registered to receive emergency alerts	88.89%	8
Stored medical supplies	77.78%	7
Purchased additional insurance to cover losses (e.g. flood insurance)	22.22%	2
Received emergency preparedness information from a government source	66.67%	6
Identified the location of the nearest emergency shelter	22.22%	2
Total Respondents: 9		

#	OTHER (PLEASE SPECIFY)	DATE
1	Pet preparedness -- big reason people stay behind!	7/10/2021 8:55 PM
2	No reason to store a radio as we do not have a radio station for Pike County, nor do we have a news paper that is printed locally.	7/8/2021 2:06 PM

Q13 In the past, has your home been damaged by a hazard event? For example, the basement of your home flooded and damaged the hot water heater.

Answered: 9 Skipped: 0

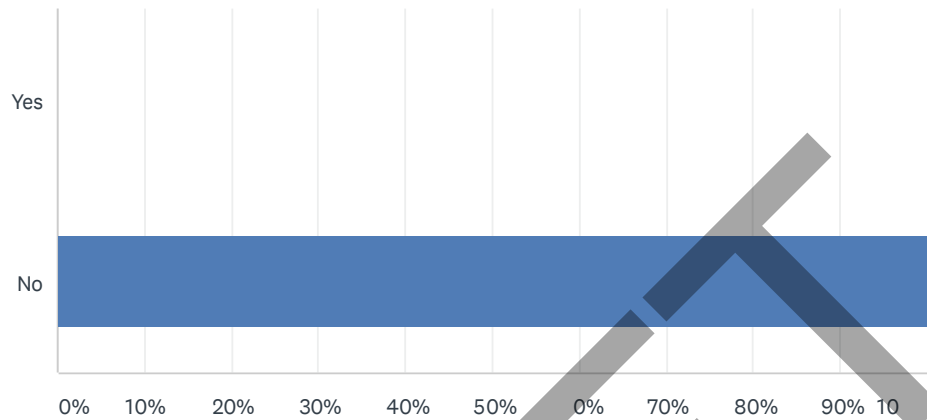


ANSWER CHOICES		RESPONSES	
Yes		22.22%	2
No		77.78%	7
TOTAL			9

#	IF YES, PLEASE EXPLAIN THE DAMAGE YOUR STRUCTURE SUSTAINED AND WHEN IT OCCURRED.	DATE
1	storm damage to house, fence, property	7/10/2021 8:55 PM
2	We had a leak in our basement due to a heavy rain.	7/8/2021 2:06 PM

Q14 If you answered 'yes' above, did you report the damages to your local police, fire, or emergency management departments?

Answered: 2 Skipped: 7

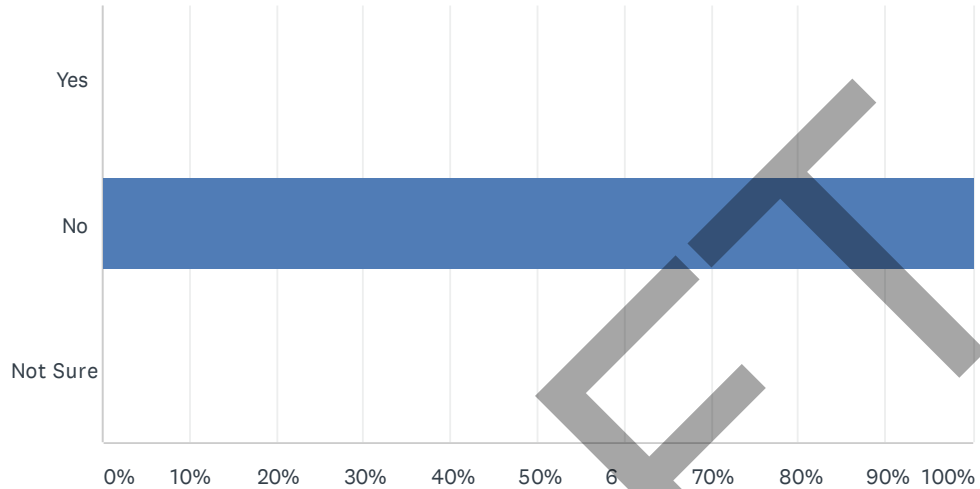


ANSWER CHOICES		RES	ONSES
Yes		0	0
No		100.00	2
TOTAL			2

#	IF YOU ANSWERED 'NO', WHY U NOT RE T THE DAMAGES?	DATE
1	na	7/12/2021 11:12 AM
2	Just took care of them myself -- hired p essionals	7/10/2021 8:55 PM
3	We don't have local police or wou our emergen y management department even handle this and I would never take a volunteer fore department to handle this as they already are short staff d	7/8/2021 2:06 PM

Q15 To the best of your knowledge is your property located in a designated floodplain? If you do not know, or are not sure, please check the FEMA website: <https://msc.fema.gov/portal/home>.

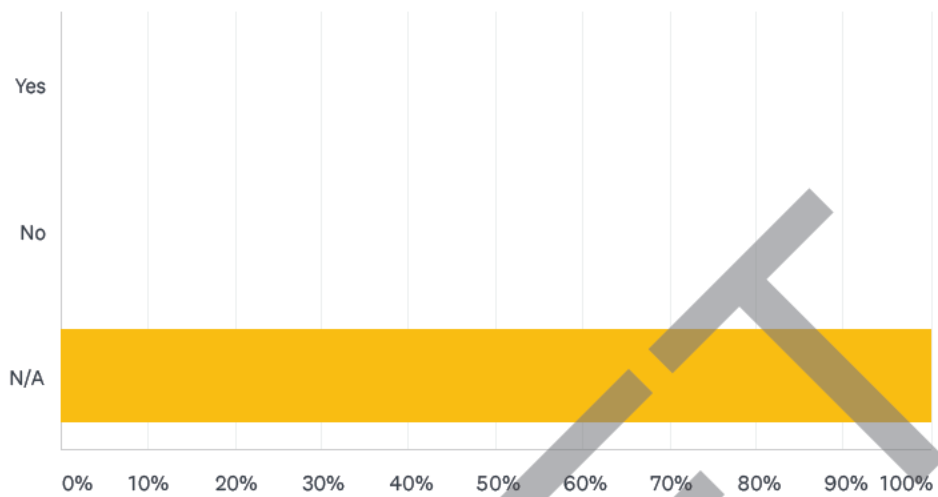
Answered: 9 Skipped: 0



ANSWER CHOICES	RESPONSES
Yes	0
No	9
Not Sure	0
TOTAL	9

Q16 If your property is in the floodplain, do you have flood insurance?

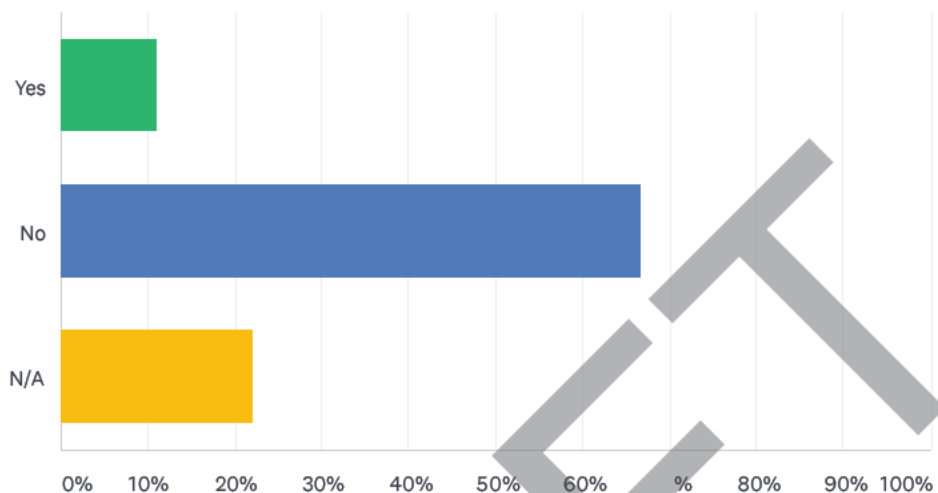
Answered: 7 Skipped: 2



ANSWER CHOICES		PONSES	
Yes		0.0	0
No		0.00%	0
N/A		1 %	7
TOTAL			7

Q17 If your property is located outside of the floodplain, do you have flood insurance?

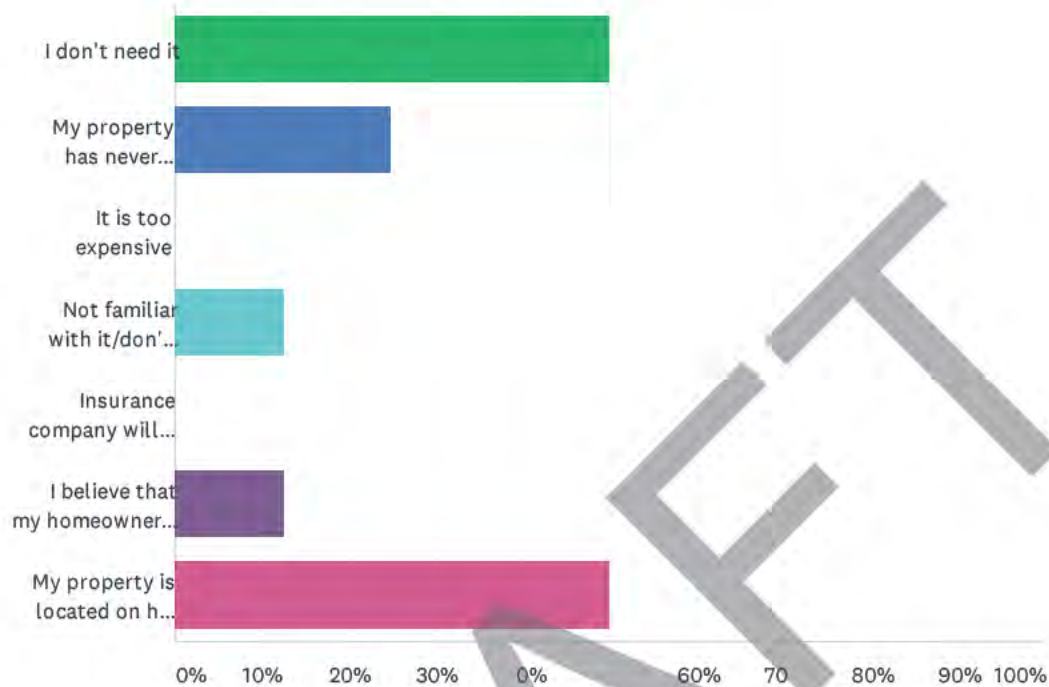
Answered: 9 Skipped: 0



ANSWER CHOICES	PERCENTAGE	COUNT
Yes	11.11%	1
No	66.67%	6
N/A	22.22%	2
TOTAL		9

Q18 If you do NOT have flood insurance, what is the primary reason?

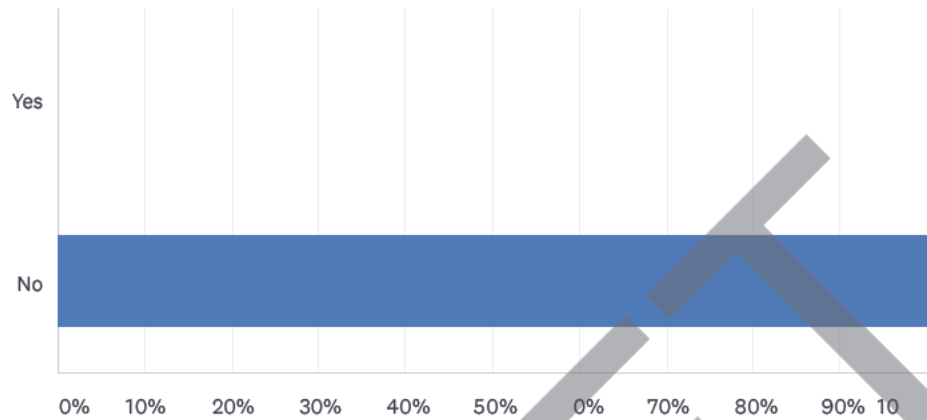
Answered: 8 Skipped: 1



ANSWER CHOICES		RESPONSES	
I don't need it		50.00%	4
My property has never flooded		25.00%	2
It is too expensive		0.00%	0
Not familiar with it/don't know		12.50%	1
Insurance company will not provide		0.00%	0
I believe that my homeowner's insurance will cover me		12.50%	1
My property is located on high ground		50.00%	4
Total Respondents: 8			
#	OTHER (PLEASE SPECIFY)	DATE	
	There are no responses.		

Q19 Do you or did you have problems getting homeowners/renters insurance due to risks from hazards?

Answered: 9 Skipped: 0



ANSWER CHOICES		RESPONSES	
Yes		0%	0
No		100.00	9
TOTAL			9

#	IF YOU ANSWERED "YES", PLEASE IDENTIFY THE HAZARD RISK THAT CAUSED YOU TO HAVE PROBLEMS OBTAINING HOMEOWNERS/RENTERS INSURANCE.	DATE
There are no responses		

Q20 Please identify any specific vulnerabilities that you are aware of in your township/borough (e.g. floodprone areas or specific properties, critical facilities that lack backup power, etc.). Please list street names and other specific identifiers if possible.

Answered: 6 Skipped: 3

#	RESPONSES	DATE
1	Ambulance Station needs back-up generator replaced. There is no designated shelter (specifically where victims of a disaster can sleep) in the municipality.	7/13/2021 7:27 PM
2	delaware river flooding compromising ability to travel out of the area or evacuate numerous high hazard dams in private communities that can impact or lead to flash flooding loss of power due to inadequacy of the grid and transmission lines inadequacy of state and local resources for winter road maintenance vulnerability/ inadequacy of internet access	7/12/2021 11:25 AM
3	More education for the public Planning for pets -- people will stay home if they can't take their pets with them	7/10/2021 9:01 PM
4	Anywhere near rivers and streams	7/9/2021 7:56 AM
5	Our fire department and ambulance corp. has limited volunteers. There is no police force in Dingman Township and to have to rely on the county police is useless. They take forever to show up.	7/8/2021 2:34 PM
6	Lack of resources for power outages, no shelters and pike county is a "forgotten county" of PA. Always last to receive help. Look back to winter storm March 2020 for answers	7/8/2021 2:17 PM

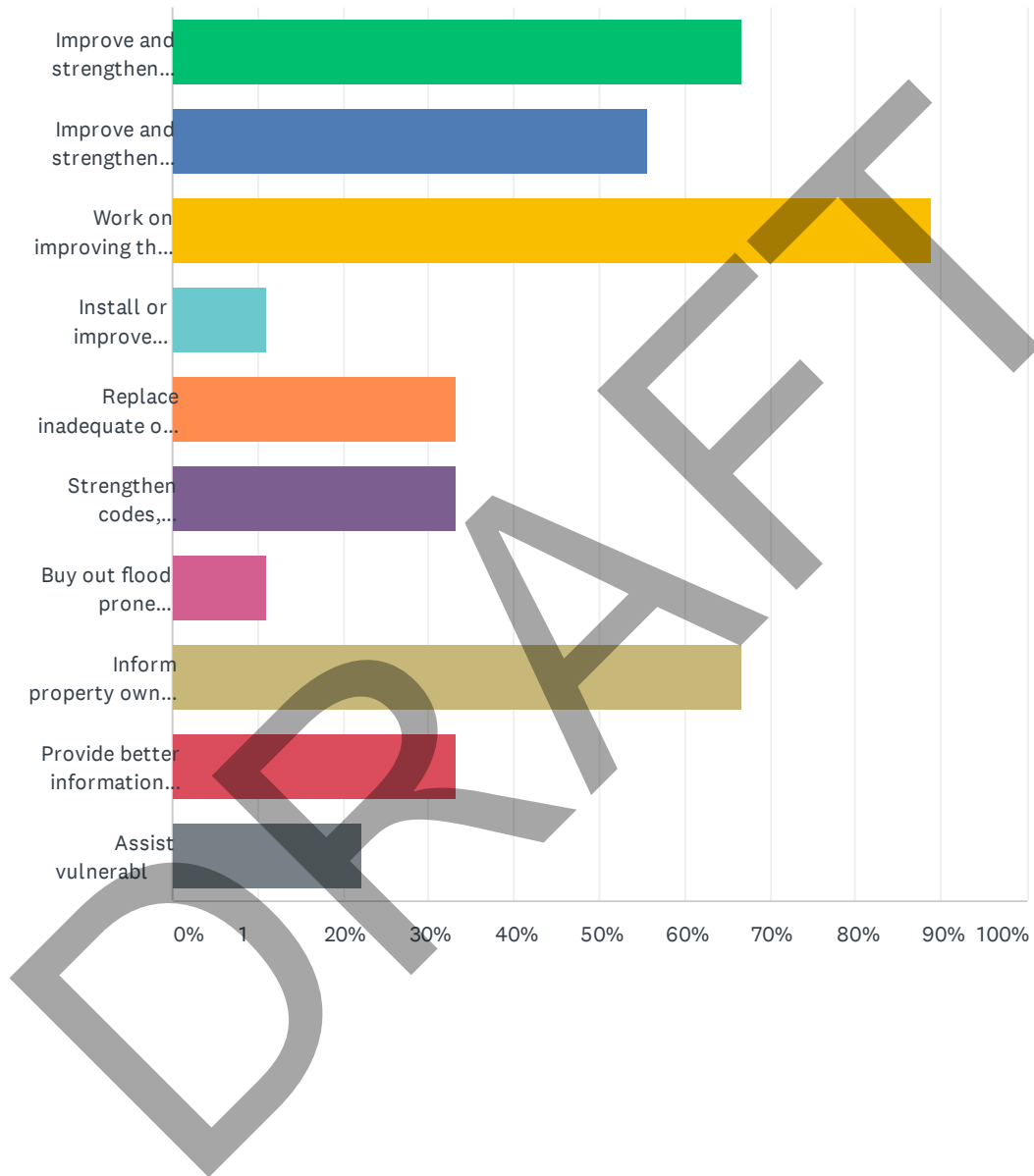
Q21 Please identify any specific vulnerabilities that you are aware of in Pike County outside of your township/borough (e.g. floodprone areas or specific properties, critical facilities that lack backup power, etc.). Please list city/town/village, street names, and other specific identifiers if possible.

Answered: 5 Skipped: 4

#	RESPONSES	DATE
1	Pike County lacks an advanced medical facility such as a hospital to care for its citizens and there is no other support network for medical professionals/supplies during a di	7/13/2021 7:27 PM
2	same as above	7/12/2021 11:25 AM
3	N/A	7/9/2021 7:56 AM
4	All of Pike County municipalities fire departments and ambulance corps have limited volunteers. There is no police force except in Milford Borough and to have to rely on the state police is useless. They take forever to show up.	7/8/2021 2:34 PM
5	Dingmans ferry. See above and also no hospital or urgent care in the township.	7/8/2021 2:17 PM

Q22 What types of projects do you believe local, county, state or federal government agencies could be doing in order to reduce the damage and disruption of hazards in Pike County? Select your top three choices.

Answered: 9 Skipped: 0



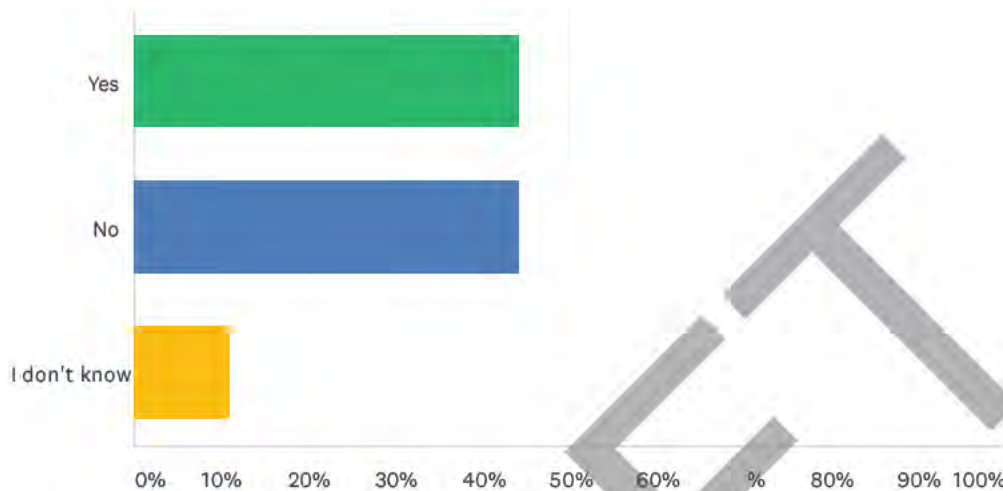
Pike County Multi-Jurisdictional Hazard Mitigation Plan - Public Survey

ANSWER CHOICES		RESPONSES	
Improve and strengthen critical facilities such as police, schools, hospitals		66.67%	6
Improve and strengthen infrastructure, such as elevating roadways and improving drainage systems		55.56%	5
Work on improving the damage resistance of utilities (electricity, communications, water/wastewater facilities etc.)		88.89%	8
Install or improve protective structures, such as bulkheads, floodwalls or levees to protect against flooding		11.11%	1
Replace inadequate or vulnerable bridges and causeways		33.33%	3
Strengthen codes, ordinances and plans to require higher hazard risk management standards and/or provide greater control over development in high hazard areas		33.33%	3
Buy out flood prone properties and maintain as open-space		11.11%	1
Inform property owners of ways they can mitigate damage to their properties		66.67%	6
Provide better information about hazard risks and high-hazard areas		33.33%	3
Assist vulnerable property owners with securing funding to mitigate their property		22.22%	2
Total Respondents: 9			

#	OTHER (PLEASE SPECIFY)	DATE
1	critical infrastructure in rural areas is more than just schools and hospitals there are limited if any law enforcement	7/12/2021 11:25 AM

Q23 Do you feel that Pike County is doing enough towards reducing hazard risks, climate adaptation, or other mitigation/prevention measures?

Answered: 9 Skipped: 0



ANSWER CHOICES	PERCENTAGE	RESPONSES
Yes	44.44%	4
No	44.44%	4
I don't know	11.11%	1
TOTAL		9

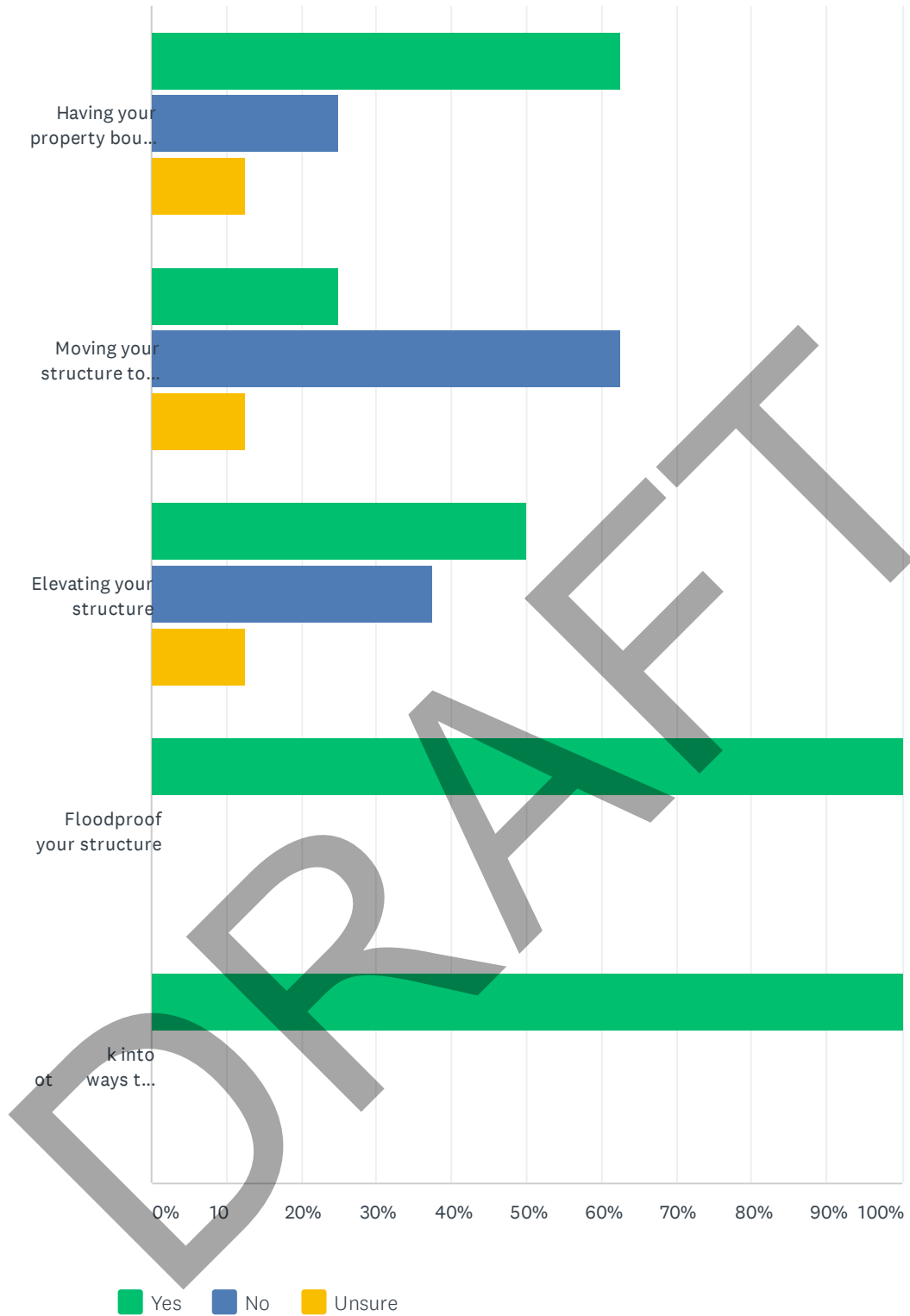
#	PLEASE PROVIDE DETAILS FOR YOUR RESPONSE	DATE
1	county agency staffing to support mitigation initiatives and other emergency preparedness activities is not sufficient with regards to the influx of population and change in character of community from completely rural to suburban/commuter based. expand both county planning and emergency management to correspond with new demands	7/12/2021 11:25 AM
2	I think the county does a good job	7/10/2021 9:01 PM
3	I think they try to remove dead trees and branches from roads and that helps	7/9/2021 7:56 AM
4	They have been working for years to get a centralized ambulance corp. and to date we still do not have one, do we have a hospital or an adequate Urgent Care.	7/8/2021 2:34 PM
5	See above	7/8/2021 2:17 PM

Q24 If your property were located in a designated high-hazard area (for example, NFIP flood zone) or had received repeated damages from a hazard/disaster event, would you consider any of the following options? If your response is dependent on certain factors, such as the funding source, please indicate those factors in the following question.

Answered: 8 Skipped: 1

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Pike County Multi-Jurisdictional Hazard Mitigation Plan - Public Survey



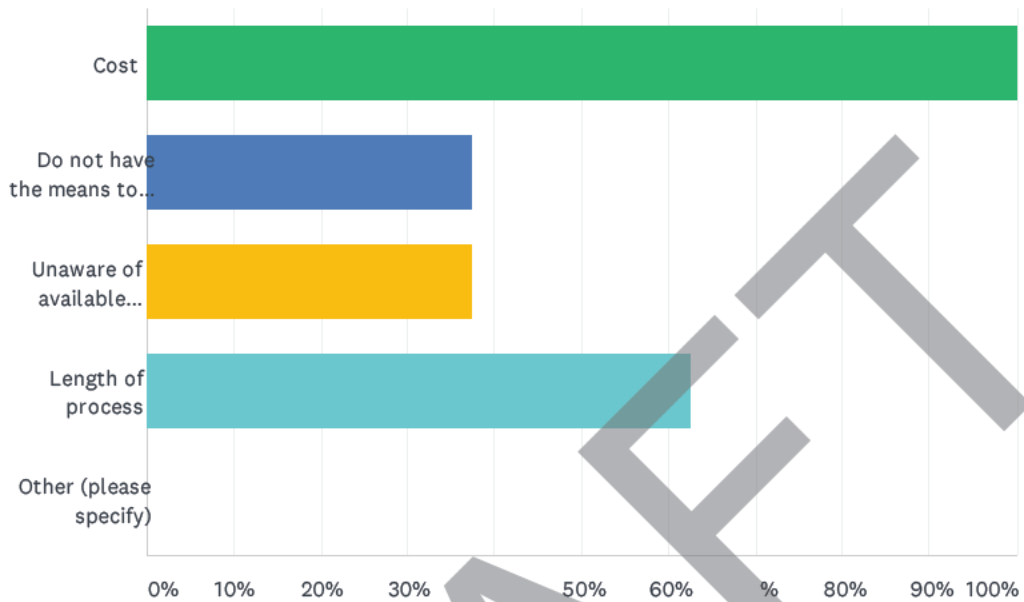
Pike County Multi-Jurisdictional Hazard Mitigation Plan - Public Survey

	YES	NO	UNSURE	TOTAL
Having your property bought out	62.50% 5	25.00% 2	12.50% 1	8
Moving your structure to another property or a less risky part of your property	25.00% 2	62.50% 5	12.50% 1	8
Elevating your structure	50.00% 4	37.50% 3	12.50% 1	8
Floodproof your structure	100.00% 8	0.00% 0	0.00% 0	8
Look into other ways to mitigate	100.00% 8	0.00% 0	0.00% 0	8

DRAFT

Q25 Please select the factor(s) that would influence your decision on the mitigation options listed above (buyout/acquisition, relocation, or elevation).

Answered: 8 Skipped: 1



ANSWER CHOICES		RESPONSES	
Cost		100.00%	8
Do not have the means to move/ relocate		37.50%	3
Unaware of available programs		37.50%	3
Length of process		62.50%	5
Other (please specify)		0.00%	0
Total Respondents: 8			

#	OTHER PLEASE SPECIFY	DATE
	There are 0 responses.	

Q26 If you have already spent money to mitigate your home, how much did you spend and on what measures?

Answered: 3 Skipped: 6

#	RESPONSES	DATE
1	Chose property not in flood plain and with some elevation; Unsure of money, but excavator installed drainage; and I avoid paving to avoid large area that can't hold wetness	7/10/2021 9:01 PM
2	Bought a generator. \$1000.00	7/8/2021 2:34 PM
3	not applicable	7/8/2021 1:06 PM

Q27 Which (if any) incentives would motivate you to spend money to protect your home from the possible impacts of a disaster?

Answered: 5 Skipped: 4

#	RESPONSES	DATE
1	Decent cost and access to services Have no idea what I can do -- particularly for worsening storms both summer and winter	7/10/2021 9:01 PM
2	If I feel it's a real threat to my home.	7/9/2021 7:56 AM
3	Rebate to help off set the cost.	7/8/2021 2:34 PM
4	Tax rebates	7/8/2021 2:17 PM
5	grants	7/8/2021 1:06 PM

Q28 Please list any additional types of projects you believe local, county, state or federal government agencies could be doing to reduce the damage and disruption in Pike County.

Answered: 5 Skipped: 4

#	RESPONSES	DATE
1	Collaboration amount local government, NGOs, and third-party fire/EMS services to help mitigate and prepare for large-scale or prolonged disasters.	7/13/2021 7:27 PM
2	acquire funding to secure additional personnel in agencies outlined above specifically dedicated to the HVA /mitigation and response functions. secure more firm commitments from utilities for upgrade of infrastructure to correspond with current demographics of the county	7/12/2021 11:25 AM
3	Educational programs to mitigate risk and manage disasters	7/10/2021 9:01 PM
4	Continue to remove trees that pose a hazard and take care of snow covered roads as soon as you can.	7/9/2021 7:56 AM
5	Get the County, PennDot and Met-Ed to effectively communicate with local municipalities, so they can provide up to date information quickly.	7/8/2021 2:34 PM

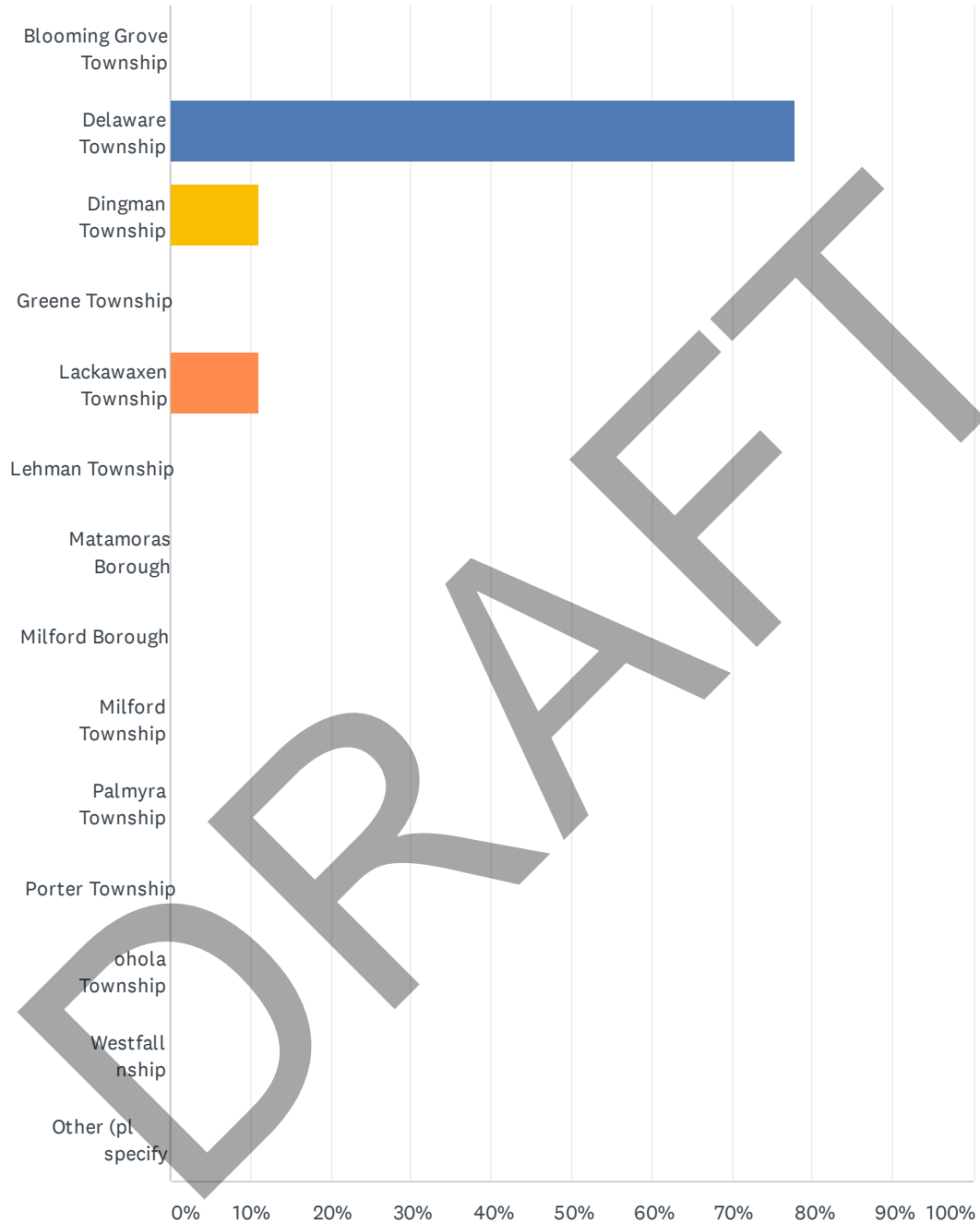
Q29 Do you have any other comments, questions or concerns regarding hazard mitigation in Pike County?

Answered: 2 Skipped: 7

#	RESPONSES	DATE
1	Let us know how we can volunteer to help	7/10/2021 9:01 PM
2	In order to assist the public better the county and Pike County Emergency Management need to make sure that they have communication with the municipalities after a disaster information can be distributed to the public quickly. During Riley and Quinn, Delaware Township was without power for 3 days before contact was made between Pike County Emergency Management and the township.	7/8/2021 2:34 PM

Q30 Please indicate in which municipality you live.

Answered: 9 Skipped: 0



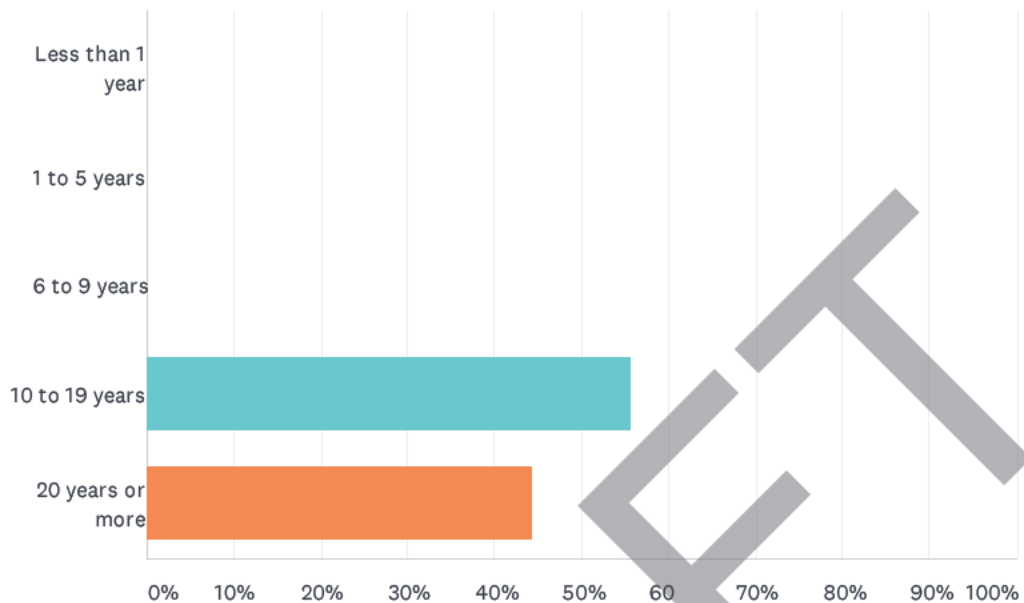
Pike County Multi-Jurisdictional Hazard Mitigation Plan - Public Survey

ANSWER CHOICES	RESPONSES	
Blooming Grove Township	0.00%	0
Delaware Township	77.78%	7
Dingman Township	11.11%	1
Greene Township	0.00%	0
Lackawaxen Township	11.11%	1
Lehman Township	0.00%	0
Matamoras Borough	0.00%	0
Milford Borough	0.00%	0
Milford Township	0.00%	0
Palmyra Township	0.00%	0
Porter Township	0.00%	0
Shohola Township	0.00%	0
Westfall Township	0.00%	0
Other (please specify)	0.00%	0
TOTAL		9

#	OTHER (PLEASE SPECIFY)	DATE
	There are no responses.	

Q31 How long have you lived here?

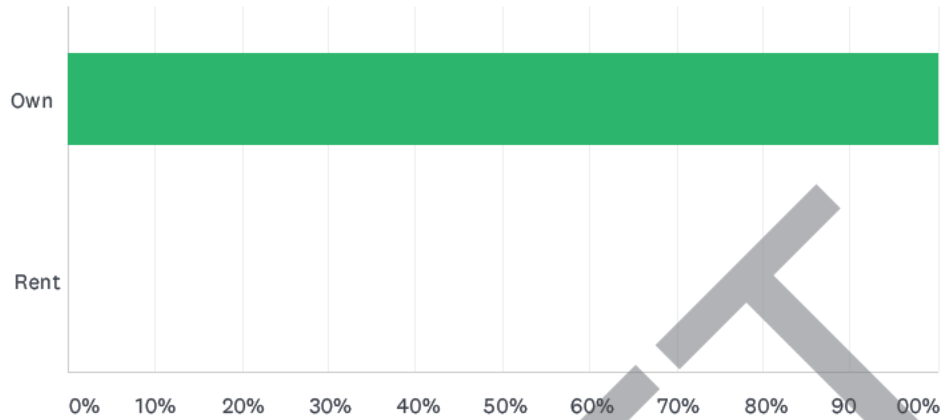
Answered: 9 Skipped: 0



ANSWER CHOICES	RESPONSES
Less than 1 year	0
1 to 5 years	0.00% 0
6 to 9 years	0.00% 0
10 to 19 years	55.56% 5
20 years or more	44.44% 4
TOTAL	9

Q32 Do you own or rent your place of residence?

Answered: 9 Skipped: 0



ANSWER CHOICES	RESPONSES	
Own	100 %	9
Rent	0 %	0
TOTAL		9

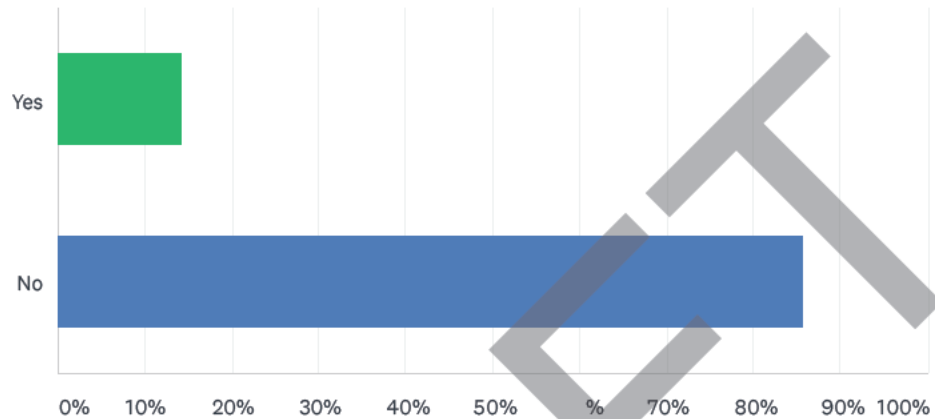
Q33 What street is your property on? This is optional and will be kept confidential - only used to identify hazard areas such as flooding.

Answered: 6 Skipped: 3

#	RESPONSES	DATE
1	Water Forest Drive	7/16/2021 8:42 AM
2	wild acres drive	7/12/2021 11:26 AM
3	Parkwood Drive	7/10/2021 9:02 PM
4	Port Drive	7/8/2021 3:07 PM
5	Mulberry Drive Milford, PA	7/8/2021 2:37 PM
6	Hickory Rd	7/8/2021 2:17 PM

Q34 If you received real estate disclosure information when you moved into your current residence, did your real estate agent or landlord explain the implications of living in a hazard risk zone and did you understand the information they presented?

Answered: 7 Skipped: 2

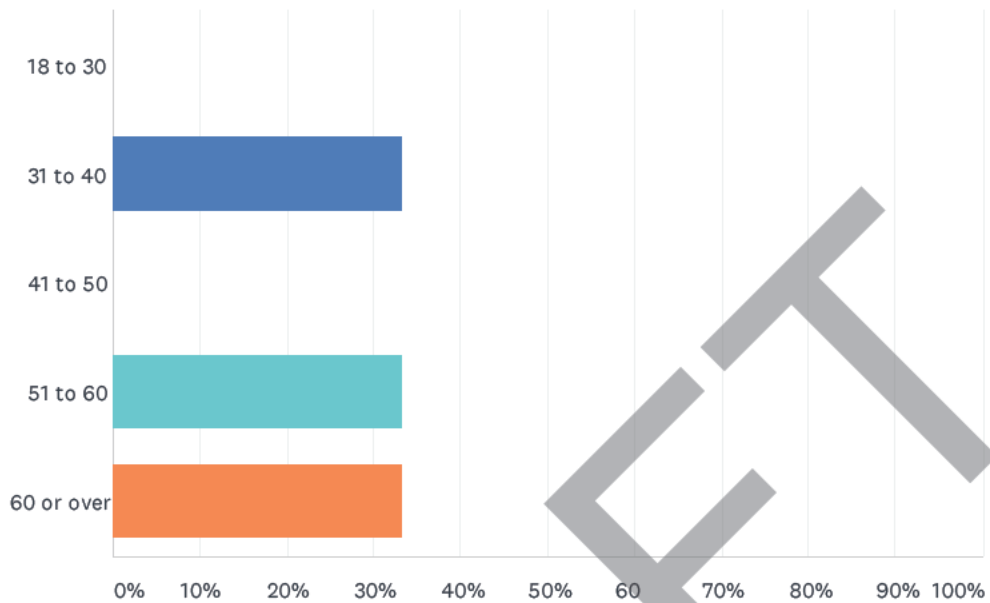


ANSWER CHOICES		RESP	SES
Yes		14.29%	1
No		85.71%	6
TOTAL			7

#	OTHER (PLEASE SPECIFY)	DATE
1	na	7/12/2021 11:26 AM
2	Don't remember receiving any real estate disclosure information	7/8/2021 2:37 PM

Q35 Please indicate your age range:

Answered: 9 Skipped: 0



ANSWER CHOICES	RESPONSES
18 to 30	0
31 to 40	33.33% 3
41 to 50	0.00% 0
51 to 60	33.33% 3
60 or over	33.33% 3
TOTAL	9



APPENDIX G. MUNICIPAL ACTION WORKSHEETS

This appendix includes municipal action worksheets that support the update of the mitigation strategy.

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Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Support the Mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition to protect them from future damage; repetitive loss and severe repetitive loss properties should be a priority, when applicable.
Action Number:	
2022-Pike County-001	
Location (address, lat/long)	County wide
Mitigation Technique Category	SIP
Hazard(s) Addressed	Flood
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMA and local budget (or property owner) for cost share
Timeline	Ongoing support; Long-term DOF (specific project application and implantation)
Lead Agency/Department	County/Municipal Engineering
Support Agency(ies)/Department(s)	PEMA and FEMA
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Work with partner organizations to develop informational releases about hazard mitigation for newspapers, websites, circulars, and property owners' association newsletters and attend Association of Community Associations meetings to discuss hazard mitigation, targeting all residents (full-time, seasonal, renters).
Action Number:	
2022-Pike County-002	
Location (address, lat/long)	County Wide
Mitigation Technique Category	EAP
Hazard(s) Addressed	All Hazards
Priority (High, Medium, Low)	Low
Estimated Cost	Low
Potential Funding Streams	Local budget; HMA programs with local or County match
Timeline	OG – DOF
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/ Department(s)	Pike County Emergency Services and Pike County Commissioners
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Support the compliance with and good standing in the NFIP, including adoption and enforcement of floodplain management requirements (e.g., regulating all new and substantially improved construction in special-hazard flood areas), floodplain identification and mapping, and flood insurance outreach to the community. Further supporting the municipalities in meeting and/or exceeding the minimum NFIP standards and criteria through the following NFIP-related continued compliance actions identified in subsequent initiatives.
Action Number:	
2022-Pike County-003	
Location (address, lat/long)	County Wide
Mitigation Technique Category	LPR
Hazard(s) Addressed	Flood
Priority (High, Medium, Low)	High
Estimated Cost	Low-Medium
Potential Funding Streams	Local budget
Timeline	Ongoing
Lead Agency/Department	NFIP Floodplain Administrators/Municipalities
Support Agency(ies)/ Department(s)	PEMA, ISO, FEMA
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Promote/support the adoption of higher regulatory and zoning standards to manage hazard risk; specifically, through updates to the building codes, flood ordinances, and subdivision and land development ordinances. Goals of increased standards are to ensure new buildings and infrastructure are discouraged or prohibited in high-hazard areas in their jurisdiction.
Action Number:	
2022-Pike County-004	
Location (address, lat/long)	County Wide
Mitigation Technique Category	LPR
Hazard(s) Addressed	Flood
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Local budget
Timeline	Short (DOF)
Lead Agency/Department	Municipal NFIP FPA
Support Agency(ies)/ Department(s)	PEMA, Pike County Conservation District, Pike County office of Community Planning
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Increase awareness of and participation in FEMA's Community Rating System (CRS) Program.
Action Number:	
2022-Pike County-005	
Location (address, lat/long)	County Wide
Mitigation Technique Category	LPR
Hazard(s) Addressed	Flood
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Local budget
Timeline	Short (DOF)
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/ Department(s)	Pike County Conservation District, Pike County EMA
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Pike County EMA will work with electric distribution companies to implement an annual tree-trimming program to minimize storm damage.
Action Number:	
2022-Pike County-006	
Location (address, lat/long)	County Wide
Mitigation Technique Category	LPR, SIP
Hazard(s) Addressed	Utility Interruption; Hurricane/Tropical Storm, Nor'Easter, Winter Storm, Tornado/Windstorm
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Local budget
Timeline	Short (DOF)
Lead Agency/Department	Pike County EMA
Support Agency(ies)/ Department(s)	County/Municipal Elected Officials, Electric Companies, Pike County Office of Community Planning
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Explore the creation of a Pike County Health Department
Action Number:	
2022-Pike County-007	
Location (address, lat/long)	County Wide
Mitigation Technique Category	LPR
Hazard(s) Addressed	Pandemic
Priority (High, Medium, Low)	Medium-High
Estimated Cost	Low-Medium
Potential Funding Streams	Local budget
Timeline	Short (DOF)
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/ Department(s)	Pike County EMA, Pike County Commissioners
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Assess and update the emergency operations center equipment to improve communication. Targeted needs include: Generators, Training Apparatus, Communications, etc.
Action Number:	
2022-Pike County-008	
Location (address, lat/long)	135 Pike County Blvd, Hawley PA 18428
Mitigation Technique Category	EAP, SIP
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Local budget, FEMA HMGP and PDM
Timeline	Ongoing
Lead Agency/Department	Pike County EMA
Support Agency(ies)/ Department(s)	PEMA
Project Point of Contact	
Name	
Title	
Agency/Department	Pike County EMA
Phone	
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Ensure continuity of operations at critical facilities and infrastructure. Options may include purchase and install generators.
Action Number:	
2022-Pike County-009	
Location (address, lat/long)	County Wide
Mitigation Technique Category	SIP
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	Medium-High
Potential Funding Streams	Local budgets; Emergency Management grants as available
Timeline	Ongoing
Lead Agency/Department	Municipality, Pike County EMA
Support Agency(ies)/ Department(s)	Pike County Office of Community Planning
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Work with power companies to identify roads within the municipality considered "critical"; these would be the first priority for clearing after an event involving downed power lines.
Action Number:	
2022-Pike County-010	
Location (address, lat/long)	County Wide
Mitigation Technique Category	SIP
Hazard(s) Addressed	Hurricane/Tropical Storm/Nor'Easter, Tornado and Windstorm, Winter Storm, Flood, Utility Interruption
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Local budget
Timeline	Ongoing
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/ Department(s)	Pike County EMA, Pike County Road Task Force, Municipal Public Works Departments; Local Power Companies
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Work with PEMA and PA DEP to obtain an updated list of dams and ownership; work with Silver Jackets to assist private dam owners with the financial hardship of maintenance.
Action Number:	
2022-Pike County-011	
Location (address, lat/long)	
County Wide	
Mitigation Technique Category	
LPR, SIP	
Hazard(s) Addressed	Hurricane/Tropical Storm/Nor'Easter, Tornado and Windstorm, Winter Storm, Flood
Priority (High, Medium, Low)	High
Estimated Cost	Medium-Low
Potential Funding Streams	Local budget
Timeline	Short (DOF)
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/ Department(s)	Pike County EMA, Pike County Conservation District
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Install dry hydrants
Action Number:	
2022-Pike County-012	
Location (address, lat/long)	County Wide
Mitigation Technique Category	SIP
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	Low-Medium
Potential Funding Streams	Local budget
Timeline	Short (DOF)
Lead Agency/Department	Pike County EMA
Support Agency(ies)/ Department(s)	Municipalities
Project Point of Contact	
Name	
Title	
Agency/Department	Pike County EMA
Phone	
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Identify and monitor transportation routes of hazardous materials.
Action Number:	Establish a communication chain between rail and Fire
2022-Pike County-013	Departments regarding transport of spent fuel rods.
Location (address, lat/long)	County Wide
Mitigation Technique Category	SIP, LPR
Hazard(s) Addressed	Environmental Hazards
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Local budget; Emergency Management grants as available
Timeline	Ongoing
Lead Agency/Department	Pike County EMA
Support Agency(ies)/ Department(s)	Municipalities, PennDOT
Project Point of Contact	
Name	
Title	
Agency/Department	Pike County EMA
Phone	
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Work with PennDOT to implement transportation upgrades to roads and bridges with high flooding vulnerability. Projects could include bridge/culvert enhancement, bridge/culvert replacement, and road/bridge elevation.
Action Number:	
2022-Pike County-014	
Location (address, lat/long)	County Wide
Mitigation Technique Category	SIP
Hazard(s) Addressed	Flood
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Local budget; State; FEMA HMA and BRIC
Timeline	Ongoing
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/Department(s)	Municipality, PennDOT, Pike County Road Task Force, Pike County Conservation District
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Work with PennDOT and the National Park Service to utilize beet juice to supplement brine/salt to treat roads during winter conditions.
Action Number:	
2022-Pike County-015	
Location (address, lat/long)	County Wide
Mitigation Technique Category	NSP
Hazard(s) Addressed	Environmental Hazards, Winter Storm
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Local budget, State
Timeline	Long (DOF)
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/ Department(s)	Pike County Road Task Force, Municipalities, PennDOT, National Park Service
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Purchase Radiac Meters (e.g., UltraRadiac – Personal Radiation Monitor) and thermal detectors for when FD responds to rail incidents
Action Number:	
2022-Pike County-016	
Location (address, lat/long)	County Wide
Mitigation Technique Category	SIP
Hazard(s) Addressed	Environmental Hazards
Priority (High, Medium, Low)	Low
Estimated Cost	High
Potential Funding Streams	Local budget, Emergency Management grants as available
Timeline	Long (DOF)
Lead Agency/Department	Pike County EMA
Support Agency(ies)/ Department(s)	Municipalities
Project Point of Contact	
Name	
Title	
Agency/Department	Pike County EMA
Phone	
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Implement debris-flow projects, including slope stabilization, energy dissipation, or vegetative planting.
Action Number:	
2022-Pike County-017	
Location (address, lat/long)	County Wide
Mitigation Technique Category	NSP, SIP
Hazard(s) Addressed	Landslide, Earthquake, Flooding
Priority (High, Medium, Low)	High
Estimated Cost	High-Medium
Potential Funding Streams	Local budget; FEMA HMA and Bric
Timeline	Ongoing
Lead Agency/Department	Pike County Conservation District
Support Agency(ies)/ Department(s)	Pike County Office of Community Planning, Municipality, PennDOT, National Park Service
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Implement stormwater management projects to facilitate stormwater flow during severe storms.
Action Number:	
2022-Pike County-018	
Location (address, lat/long)	County Wide
Mitigation Technique Category	SIP, NSP
Hazard(s) Addressed	Flood
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Local budget; State; FEMA
Timeline	Ongoing
Lead Agency/Department	Pike County Conservation District
Support Agency(ies)/ Department(s)	Pike County Office of Community Planning, Municipalities, PennDOT
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Work with National Park Service to discuss areas that are in need of stream clearing.
Action Number:	
2022-Pike County-019	
Location (address, lat/long)	Dingman TWP, Delaware TWP, and Lehman TWP
Mitigation Technique Category	EAP, NSP, SIP
Hazard(s) Addressed	Flood
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Local budget
Timeline	Ongoing
Lead Agency/Department	Pike County Conservation District
Support Agency(ies)/ Department(s)	Pike County Office of Community Planning, National Park Service, Municipalities
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Continue to use and improve GIS capability to identify and prioritize hazards and critical infrastructure for mitigation, as well as areas targeted for potential new development.
Action Number:	
2022-Pike County-020	
Location (address, lat/long)	County Wide
Mitigation Technique Category	EAP, LPR
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Local budget; Emergency Management grants as available
Timeline	Ongoing
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/ Department(s)	Pike County EMA
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Explore development of an outreach effort which includes a model ordinance to require boat washing to prevent the spread of aquatic invasive species.
Action Number:	
2022-Pike County-021	
Location (address, lat/long)	County Wide
Mitigation Technique Category	LPR, NSP, EAP
Hazard(s) Addressed	Invasive Species
Priority (High, Medium, Low)	Low
Estimated Cost	Medium
Potential Funding Streams	Local budget
Timeline	Long (DOF)
Lead Agency/Department	Pike County Conservation District
Support Agency(ies)/ Department(s)	Pike County office of Community Planning, Municipalities
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Purchase and install boat washing stations to help prevent the spread of aquatic invasive species.
Action Number:	
2022-Pike County-022	
Location (address, lat/long)	County Wide
Mitigation Technique Category	NSP
Hazard(s) Addressed	Invasive Species
Priority (High, Medium, Low)	Low
Estimated Cost	Medium
Potential Funding Streams	Local budget
Timeline	Long (DOF)
Lead Agency/Department	Pike County Conservation District
Support Agency(ies)/ Department(s)	Wallenpaupack Watershed Management District, National Park Service, PA Fish and Boat Commission
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Provide training to local NFIP Floodplain Administrators to potentially include Certified Floodplain Manager (CFM) course.
Action Number:	
2022-Pike County-023	
Location (address, lat/long)	County Wide
Mitigation Technique Category	LPR, EAP
Hazard(s) Addressed	Flood
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Local budget
Timeline	Short (DOF)
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/ Department(s)	Pike County Conservation District
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Pike County EMA to continue working with Pocono Environmental Education Center and municipalities to encourage participation in Firewise.
Action Number:	
2022-Pike County-024	
Location (address, lat/long)	County Wide
Mitigation Technique Category	EAP, LPR, NSP
Hazard(s) Addressed	Wildfire
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Local budget
Timeline	Short (DOF)
Lead Agency/Department	Pike County EMA
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	Pike County EMA
Phone	
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Continue groundwater level monitoring through at least 2028 to assess potable groundwater levels providing 20 years of data for drought trigger analysis.
Action Number:	
2022-Pike County-025	
<i>Location (address, lat/long)</i>	County Wide
<i>Mitigation Technique Category</i>	LPR, EAP, NSP
<i>Hazard(s) Addressed</i>	Drought
<i>Priority (High, Medium, Low)</i>	High
<i>Estimated Cost</i>	High
<i>Potential Funding Streams</i>	Local budget
<i>Timeline</i>	Ongoing (DOF)
<i>Lead Agency/Department</i>	Pike County Conservation District
<i>Support Agency(ies)/ Department(s)</i>	Pike County Office of Community Planning
Project Point of Contact	
<i>Name</i>	Michele Long
<i>Title</i>	Executive Director
<i>Agency/Department</i>	Pike County Conservation District
<i>Phone</i>	570-226-8220
<i>E-mail</i>	mlong@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.
Action Number:	
2022-Pike County-026	
Location (address, lat/long)	County Wide
Mitigation Technique Category	LPR, EAP
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Local budget
Timeline	Ongoing
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/ Department(s)	Pike County Commissioner, Municipal Elected Officials, School Districts, NEPA Alliance
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Coordinate with the National Weather Service to hold an educational seminar regarding lightning safety.
Action Number:	
2022-Pike County-028	
Location (address, lat/long)	County Wide
Mitigation Technique Category	EAP
Hazard(s) Addressed	Lightning
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Local budget
Timeline	Short (DOF)
Lead Agency/Department	Pike County EMA
Support Agency(ies)/ Department(s)	National Weather Service
Project Point of Contact	
Name	
Title	
Agency/Department	Pike County EMA
Phone	
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Develop a County Task Force to identify ways to incentivize volunteer fire fighting, address equipment and facility upgrades, provide training opportunities for emergency service providers, and upgrade EMS service in Pike County.
Action Number:	
2022-Pike County-029	
Location (address, lat/long)	County Wide
Mitigation Technique Category	EAP, LPR
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Local budget
Timeline	Short (DOF)
Lead Agency/Department	Pike County EMA
Support Agency(ies)/ Department(s)	Municipalities
Project Point of Contact	
Name	
Title	
Agency/Department	Pike County EMA
Phone	
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Work with watershed associations and municipal officials to coordinate water conservation and sewage management programs in local communities.
Action Number:	
2022-Pike County-030	
Location (address, lat/long)	County Wide
Mitigation Technique Category	EAP, LPR
Hazard(s) Addressed	Drought
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Local budget
Timeline	Ongoing
Lead Agency/Department	Pike County Conservation District
Support Agency(ies)/ Department(s)	Pike County Office of Community Planning
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Work with recreation amenities to develop educational materials regarding the risk of drowning to distribute to resorts, hotels, and other vacation areas.
Action Number:	
2022-Pike County-031	
Location (address, lat/long)	County Wide
Mitigation Technique Category	EAP
Hazard(s) Addressed	Drowning
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Local budget
Timeline	Short (DOF)
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/ Department(s)	Pike County EMA, PA Fish & Boat Commission, National Park Service
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Continue working with USDA Natural Resources Conservation Service to design and rehabilitate Kintz Creek Dam.
Action Number:	
2022-Pike County-032	
<i>Location (address, lat/long)</i>	41.281209, -75.231082
<i>Mitigation Technique Category</i>	SIP
<i>Hazard(s) Addressed</i>	Dam Failure, Flood
<i>Priority (High, Medium, Low)</i>	Medium
<i>Estimated Cost</i>	High
<i>Potential Funding Streams</i>	Federal
<i>Timeline</i>	Ongoing
<i>Lead Agency/Department</i>	Pike County Office of Community Planning
<i>Support Agency(ies)/ Department(s)</i>	
Project Point of Contact	
<i>Name</i>	Brian Snyder
<i>Title</i>	Community Planner
<i>Agency/Department</i>	Pike County Office of Community Planning
<i>Phone</i>	570-296-3500
<i>E-mail</i>	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Pike County EMA to continue to work with the three school districts on the following: 1. Annual review of emergency action plans and disaster response plans. 2. Conduct audits and ensure adequate back-up power and water contingencies are in place so they may serve as shelters
Action Number:	
2022-Pike County-033	
Location (address, lat/long)	County Wide
Mitigation Technique Category	LPR
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Local budget
Timeline	Ongoing
Lead Agency/Department	Pike County EMA
Support Agency(ies)/ Department(s)	School Districts
Project Point of Contact	
Name	
Title	
Agency/Department	Pike County EMA
Phone	
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	County to work with municipalities to develop databases to track development in the Special Flood Hazard Area (SFHA).
Action Number:	
2022-Pike County-034	
Location (address, lat/long)	County Wide
Mitigation Technique Category	LPR
Hazard(s) Addressed	Flood, Severe Storm, Hurricane/Tropical Storm, Nor'easter
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Local Budget
Timeline	Long (DOF)
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/ Department(s)	Municipalities
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Work with Westfall Township, Matamoras Borough and Milford Borough to map stormwater facilities, infrastructure, and conveyance systems including pipe sizes, inlets, outlets, and integrate into GIS system.
Action Number:	
2022-Pike County-036	
Location (address, lat/long)	Milford Borough, Matamoras Borough, and Westfall Township
Mitigation Technique Category	LPR
Hazard(s) Addressed	Flood, Severe Storm, Hurricane/Tropical Storm, Nor'easter
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	FEMA, PEMA, State, Local budget
Timeline	Short (DOF)
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/ Department(s)	Pike County Conservation District, Westfall Township, Matamoras Borough and Milford Borough
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Conduct education/outreach among local officials as to the benefits of stormwater management, hazard mitigation and implementation of the Phase II Countywide Stormwater Management Plan (Act 167 Plan).
Action Number:	
2022-Pike County-037	
Location (address, lat/long)	County Wide
Mitigation Technique Category	LPR
Hazard(s) Addressed	Flood, Severe Storm, Hurricane/Tropical Storm, Nor'easter
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Local Budget
Timeline	Ongoing
Lead Agency/Department	Pike County Conservation District
Support Agency(ies)/ Department(s)	Pike County Office of Community Planning
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Identify and coordinate with appropriate partners and agencies to arrange for data collection of flood and structure data necessary to perform a level 2 HAZUS analysis for the next hazard mitigation plan update. Building data may be collected as part of a reassessment of Pike County flood prone properties. (i.e. Building value, Lowest Floor Elevation, Building Type, Occupancy Type, Foundation Type, Number of Stories and square Footage).
Action Number:	
2022-Pike County-038	
Location (address, lat/long)	County Wide
Mitigation Technique Category	LPR
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	High
Potential Funding Streams	FEMA PDM
Timeline	Long (DOF)
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
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E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Conduct education and outreach on municipal stormwater systems and potential impact to flooding/water quality.
Action Number:	
2022-Pike County-039	
Location (address, lat/long)	County Wide
Mitigation Technique Category	EAP
Hazard(s) Addressed	Flood, Severe Storm, Hurricane/Tropical Storm, Nor'easter
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Local budget
Timeline	Short (DOF)
Lead Agency/Department	Pike County Conservation District
Support Agency(ies)/ Department(s)	Pike County Office of Community Planning
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Participate in emergency planning for applicable hazard and emergency response events. Specific types of planning relevant to the County and its municipalities include EAP's for dams, radiological emergency plans for nuclear incidents, winter preparedness plans, evacuation signage plans, Phase II Act 167 Stormwater Management Plan, and commodity flow studies. Additionally, other plans should be reviewed to ensure coordination with hazard mitigation planning techniques.
Action Number:	
2022-Pike County-040	
Location (address, lat/long)	County Wide
Mitigation Technique Category	LPR
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Local budget
Timeline	Ongoing
Lead Agency/Department	Pike County EMA
Support Agency(ies)/ Department(s)	Municipalities
Project Point of Contact	
Name	
Title	
Agency/Department	Pike County EMA
Phone	
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Pike County Office of Community Planning and applicable municipal office will review their comprehensive plans to ensure that designated growth areas are not within high-hazard areas identified in the HMP.
Action Number:	
2022-Pike County-041	
Location (address, lat/long)	County Wide
Mitigation Technique Category	LPR
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Low
Estimated Cost	Low
Potential Funding Streams	Local budget
Timeline	Ongoing
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/ Department(s)	Municipalities
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Encourage all critical government facilities to have COOP and COG plans and to begin implementing appropriate backup systems.
Action Number:	
2022-Pike County-042	
<i>Location (address, lat/long)</i>	County Wide
<i>Mitigation Technique Category</i>	LPR
<i>Hazard(s) Addressed</i>	All
<i>Priority (High, Medium, Low)</i>	High
<i>Estimated Cost</i>	Low
<i>Potential Funding Streams</i>	Local budget
<i>Timeline</i>	Ongoing
<i>Lead Agency/Department</i>	Pike County Office of Community Planning
<i>Support Agency(ies)/ Department(s)</i>	Pike County EMA
Project Point of Contact	
<i>Name</i>	Brian Snyder
<i>Title</i>	Community Planner
<i>Agency/Department</i>	Pike County Office of Community Planning
<i>Phone</i>	570-296-3500
<i>E-mail</i>	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Hold annual meetings to ensure that mitigation, planning, preparedness, and response personnel are (1) cross-trained in each other's area of expertise, (2) aware of ongoing activities, and (3) fostering increased communication.
Action Number:	
2022-Pike County-043	
Location (address, lat/long)	County Wide
Mitigation Technique Category	LPR
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	Local budget
Timeline	Ongoing
Lead Agency/Department	Pike County EMA
Support Agency(ies)/ Department(s)	Municipalities
Project Point of Contact	
Name	
Title	
Agency/Department	Pike County EMA
Phone	
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Hold an education seminar and develop educational materials regarding radon exposure.
Action Number:	
2022-Pike County-044	
<i>Location (address, lat/long)</i>	County Wide
<i>Mitigation Technique Category</i>	LPR
<i>Hazard(s) Addressed</i>	Radon Exposure
<i>Priority (High, Medium, Low)</i>	Medium
<i>Estimated Cost</i>	Low
<i>Potential Funding Streams</i>	Local budget
<i>Timeline</i>	Short (DOF)
<i>Lead Agency/Department</i>	Pike County EMA
<i>Support Agency(ies)/ Department(s)</i>	
Project Point of Contact	
<i>Name</i>	
<i>Title</i>	
<i>Agency/Department</i>	Pike County EMA
<i>Phone</i>	
<i>E-mail</i>	

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Purchase and install weather station to capture meteorological data and communicate to smart phones to utilize information during response/recovery.
Action Number:	
2022-Pike County-045	
Location (address, lat/long)	County Wide
Mitigation Technique Category	LPR
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	National Weather Service, State, Local budget
Timeline	Short (DOF)
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/ Department(s)	Pike County Conservation District, Pike County EMA
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Work with PennDOT to purchase and install cameras on I-84 at the Greentown and Milford exits.
Action Number:	
2022-Pike County-046	
Location (address, lat/long)	Greentown Exit (41.341232, -75.313537) & Milford Exit (41.338472,-74.837494)
Mitigation Technique Category	LPR
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	State budget
Timeline	Short (DOF)
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/ Department(s)	PennDOT, Pike County EMA, Pike County Road Task Force
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Work with Milford Township to address several locations of stream bank erosion along Vandermark Creek and Moon Valley Road between Deep Brook Road and Constitution Ave.
Action Number:	
2022-Pike County-047	
Location (address, lat/long)	41.337284, -74.99996 (Intersection of Moon Valley Road & Deep Brook Road)
Mitigation Technique Category	SIP, NSP
Hazard(s) Addressed	Flood, Severe Storm, Hurricane/Tropical Storm, Nor'easter
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA, PEMA, State, Local budget
Timeline	Short (DOF)
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/Department(s)	Milford Township, Pike County Conservation District
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Development of source water protection plans throughout the county
Action Number:	
2022-Pike County-048	
Location (address, lat/long)	County Wide
Mitigation Technique Category	LPR, NSP, EAP
Hazard(s) Addressed	Drought, Environmental Hazards
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Local budget, grant funding
Timeline	Ongoing
Lead Agency/Department	Pike County Conservation District
Support Agency(ies)/ Department(s)	Pike County Office of Community Planning
Project Point of Contact	
Name	Michele Long
Title	Executive Director
Agency/Department	Pike County Conservation District
Phone	570-226-8220
E-mail	mlong@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Address the following County owner High Hazard dams: Taylor Pond Dam (PA-446) & Sky View Lake Dam (PA-440). These projects will include dam safety inspections, engineering reports, preliminary engineering, final design, and construction of dam improvements.
Action Number:	
2022-Pike County-049	
Location (address, lat/long)	41.2425, -75.330556 (Taylor Pond Dam) & 41.291111, -75.238889 (Sky View Dam)
Mitigation Technique Category	SIP
Hazard(s) Addressed	Dam Failure, Flood
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA, PEMA, Federal, State, Local budget
Timeline	Long (DOF)
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/ Department(s)	Pike County Commissioners, Municipalities, Pike County Conservation District
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Work with Community Associations, Water & Sewer Authorities to develop mapping of areas serviced by community/public water & sewer systems.
Action Number:	
2022-Pike County-050	
Location (address, lat/long)	County Wide
Mitigation Technique Category	LPR
Hazard(s) Addressed	Drought, Utility Interruption
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	State, Local budget
Timeline	Long (DOF)
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/ Department(s)	Municipalities, Municipal Authorities, Community Associations
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Work with municipalities and PennDOT to map/document stormwater flooding events and issues on all publicly owned roads in Pike County.
Action Number:	
2022-Pike County-051	
Location (address, lat/long)	County Wide
Mitigation Technique Category	LPR, SIP, NSP
Hazard(s) Addressed	Flood, Severe Storm, Hurricane/Tropical Storm. Nor'easter, Stormwater
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	FEMA, PEMA, State, Local budget
Timeline	Short (DOF)
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/ Department(s)	Pike County Conservation District, Pike County Road Task Force, Municipalities, PennDOT
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Pike County	Work with utilities, municipalities and PennDOT to implement a (hazardous tree removal/ Day lighting) program on State owned roads in the County.
Action Number:	
2022-Pike County-052	
Location (address, lat/long)	County Wide
Mitigation Technique Category	LPR, SIP, NSP
Hazard(s) Addressed	Severe Storm, Hurricane/Tropical Storm, Nor'easter, Stormwater, Tornado, Utility Interruptions
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA, PEMA, State, Private (Utility Companies), Local budget
Timeline	Short (DOF)
Lead Agency/Department	Pike County Office of Community Planning
Support Agency(ies)/ Department(s)	Pike County Conservation District, Pike County Road Task Force, Municipalities, PennDOT, Utility Companies
Project Point of Contact	
Name	Brian Snyder
Title	Community Planner
Agency/Department	Pike County Office of Community Planning
Phone	570-296-3500
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Blooming Grove Township	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.
Action Number:	
2022-Blooming Grove Township-001	
Location (address, lat/long)	Township Wide
Mitigation Technique Category	LPR
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Local budget
Timeline	Short
Lead Agency/Department	Township Supervisor
Support Agency(ies)/Department(s)	Roadmaster, Pike County Road Task Force
Project Point of Contact	
Name	Joanna Donahue
Title	Secretary/Treasurer
Agency/Department	Blooming Grove Township
Phone	570-775-6461
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Blooming Grove Township	Repair and increase the level of protection of Hemlock Dam on Hemlock Lake in Hemlock Farms (increase to protect to the 500-year flood event as per communication from the State).
Action Number:	
2022-Blooming Grove Township-002	
Location (address, lat/long)	
	41.297119, -75.045703

Mitigation Action Worksheet

Municipality(ies):	Action
Blooming Grove Township	Repair and increase the level of protection for Hemlock Lake in Hemlock Farms (in 2022) after a 100 year flood event as per communication from FEMA.
Action Number:	
2022-Blooming Grove Township-002	
Location (address, lat/long)	41.297119, -75.045703
Mitigation Technique Category	SIP
Hazard(s) Addressed	Flood, Severe Storm, Nor'easter, Severe Winter
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Federal, State
Timeline	Short (DOF)
Lead Agency/Department	Hemlock Farms Community Association
Support Agency(ies)/Department(s)	Township Supervisors
Project Point of Contact	
Name	Joanna Donahue
Title	Secretary/Treasurer
Agency/Department	Blooming Grove Township
Phone	570-775-6461
E-mail	

Mitigation Technique Category	SIP
Hazard(s) Addressed	Flood, Severe Storm, Nor'easter, Severe Winter
Priority (High, Medium, Low)	High
Estimated Cost	High

Potential Funding Streams	Federal, State
Timeline	Short (DOF)
Lead Agency/Department	Hemlock Farms Community Association
Support Agency(ies)/Department(s)	Township Supervisors
Project Point of Contact	
Name	Joanna Donahue
Title	Secretary/Treasurer
Agency/Department	Blooming Grove Township
Phone	570-775-6461
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Blooming Grove Township	Madden Road Bridge that crosses York Creek requires work to ensure safety: Provide approach guide-rails and transitions, Remove debris and sediment from stream bed, Relocate beaver, Repair two areas of spalling at each abutment
Action Number:	
2022-Blooming Grove Township-003	
Location (address, lat/long)	41.357377, -75.069175
Mitigation Technique Category	SIP
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Federal, State
Timeline	On-going
Lead Agency/Department	Township Roadmaster
Support Agency(ies)/Department(s)	Township Supervisors, Township Engineer
Project Point of Contact	
Name	Joanna Donahue
Title	Secretary/Treasurer
Agency/Department	Blooming Grove Township
Phone	570-775-6461
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Blooming Grove Township	Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.
Action Number:	
2022-Blooming Grove Township-004	
Location (address, lat/long)	Township Wide
Mitigation Technique Category	SIP
Hazard(s) Addressed	Flood, Hurricane/Tropical Storm, Nor'easter
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMA, PEMA
Timeline	Short (DOF)
Lead Agency/Department	Township Supervisors
Support Agency(ies)/Department(s)	Township EMA
Project Point of Contact	
Name	Joanna Donahue
Title	Secretary/Treasurer
Agency/Department	Blooming Grove Township
Phone	570-775-6461
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Blooming Grove Township	Enhance the capacity of the current stormwater system in Hemlock Farms Community Association to reduce flooding.
Action Number:	
2022-Blooming Grove Township-005	
Location (address, lat/long)	Hemlock Farms Community Association
Mitigation Technique Category	SIP
Hazard(s) Addressed	Flood, Hurricane/Tropical Storm, Nor'easter
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMA, PEMA
Timeline	Short (DOF)
Lead Agency/Department	Township Supervisors
Support Agency(ies)/Department(s)	Hemlock Farms Community Association
Project Point of Contact	
Name	Joanna Donahue
Title	Secretary/Treasurer
Agency/Department	Blooming Grove Township
Phone	570-775-6461
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Blooming Grove Township	Township building (a Red-Cross shelter) needs technology upgrades to digitize records, upgrades to storage capacity and build a separate barn for storage of mechanical equipment and supplies (e.g. cots, blankets, MREs). The Volunteer Fire Department next to the Township building (also a designated shelter) needs improvements to its property for parking and storage of equipment, renovations to building are needed for sheltering residents.
Action Number:	
2022-Blooming Grove Township-006	
Location (address, lat/long)	488 Route 739, Blooming Grove, PA 18428
Mitigation Technique Category	SIP
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA, PEMA, State, Local budget
Timeline	On-going
Lead Agency/Department	Township Supervisors
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	Joanna Donahue
Title	Secretary/Treasurer
Agency/Department	Blooming Grove Township
Phone	570-775-6461
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Blooming Grove Township	Identify mechanisms to educate and inform Township residents regarding CodeRED for example newsletters, link of Township website to the County Emergency page, social media and other methods of public communication.
Action Number:	
2022-Blooming Grove Township-007	
<i>Location (address, lat/long)</i>	Township Wide
<i>Mitigation Technique Category</i>	EAP
<i>Hazard(s) Addressed</i>	All
<i>Priority (High, Medium, Low)</i>	High
<i>Estimated Cost</i>	High
<i>Potential Funding Streams</i>	Local budget
<i>Timeline</i>	Short (DOF)
<i>Lead Agency/Department</i>	Township Supervisors
<i>Support Agency(ies)/ Department(s)</i>	Township EMA
Project Point of Contact	
<i>Name</i>	Joanna Donahue
<i>Title</i>	Secretary/Treasurer
<i>Agency/Department</i>	Blooming Grove Township
<i>Phone</i>	570-775-6461
<i>E-mail</i>	

Mitigation Action Worksheet

Municipality(ies):	Action
Blooming Grove Township	Utilize the Hazard Mitigation Plan (HMP) when updating the comprehensive Master Plan; consider including hazard zones risk assessment information, and hazard mitigation goals as identified in the HMP.
Action Number:	
2022-Blooming Grove Township-008	
Location (address, lat/long)	Township Wide
Mitigation Technique Category	LPR
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Local budget
Timeline	Short (DOF)
Lead Agency/Department	Township Supervisors
Support Agency(ies)/Department(s)	Contracted Planning Firm
Project Point of Contact	
Name	Joanna Donahue
Title	Secretary/Treasurer
Agency/Department	Blooming Grove Township
Phone	570-775-6461
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Delaware Township	Debris Clearing and Bridge repair on waterways throughout the township to prevent ice jams and flooding over roadways; further damage to critical thoroughways.
Action Number:	
2022-Delaware Twp-001	
Location (address, lat/long)	
Township Wide	
Mitigation Technique Category	
SIP	
Hazard(s) Addressed	
Flood	
Priority (High, Medium, Low)	
High	
Estimated Cost	
Medium	
Potential Funding Streams	
FEMA HMA and local budget	
Timeline	
Ongoing support; Short-Term DOF (Specific project application and implementation)	
Lead Agency/Department	
Township Engineering	
Support Agency(ies)/ Department(s)	
PEMA and FEMA	
Project Point of Contact	
Name	Matthew Light
Title	Emergency Management Coordinator
Agency/Department	Delaware Township EMA
Phone	570-241-9532
E-mail	ema@delawaretownshippa.gov

Mitigation Action Worksheet

Municipality(ies):	Action
Delaware Township	Provide enhanced disinfection/decontamination capability for municipal building in consideration of covid 19 pandemic
Action Number:	
2022-Delaware Twp-002	
Location (address, lat/long)	Township Building
Mitigation Technique Category	LPR
Hazard(s) Addressed	Public Health
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	FEMA HMA and local budget
Timeline	Ongoing support; Short-Term DOF (Specific project application and implementation)
Lead Agency/Department	Township Engineering
Support Agency(ies)/ Department(s)	PEMA and FEMA
Project Point of Contact	
Name	Matthew Light
Title	Emergency Management Coordinator
Agency/Department	Delaware Township EMA
Phone	570-241-9532
E-mail	ema@delawaretownship.pa.gov

Mitigation Action Worksheet

Municipality(ies):	Action
Delaware Township	Improve cell phone and internet capability and access throughout township to insure critical communications reliability during emergencies. Engage in study with county and providers for expanded improved service; consider study for feasibility of communications infrastructure for the addition of a cell tower or repeater located on township/fire/ems property.
Action Number:	
2022-Delaware Twp-003	
Location (address, lat/long)	Township wide
Mitigation Technique Category	LPR
Hazard(s) Addressed	Communications
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	FEMA HMA and local budget
Timeline	Ongoing support; Long-Term DOF (Specific project application and implementation)
Lead Agency/Department	Township Engineering
Support Agency(ies)/ Department(s)	PEMA and FEMA
Project Point of Contact	
Name	Matthew Light
Title	Emergency Management Coordinator
Agency/Department	Delaware Township EMA
Phone	570-241-9532
E-mail	ema@delawaretownship.pa.gov

Mitigation Action Worksheet

Municipality(ies):	Action
Delaware Township	Enhance/ develop relationships with private HOA within township to improve response and communication during emergencies by seeking funding and support from county or state level for establishment of CERT and FIREWISE community programs.
Action Number:	
2022-Delaware Twp-004	
<i>Location (address, lat/long)</i>	Township wide
<i>Mitigation Technique Category</i>	EAP
<i>Hazard(s) Addressed</i>	Public Safety
<i>Priority (High, Medium, Low)</i>	Low
<i>Estimated Cost</i>	Low
<i>Potential Funding Streams</i>	FEMA HMA and local budget
<i>Timeline</i>	Ongoing support; Long-Term DOF (Specific project application and implementation)
<i>Lead Agency/Department</i>	Township Planning
<i>Support Agency(ies)/ Department(s)</i>	PEMA and FEMA
Project Point of Contact	
<i>Name</i>	Matthew Light
<i>Title</i>	Emergency Management Coordinator
<i>Agency/Department</i>	Delaware Township EMA
<i>Phone</i>	570-241-9532
<i>E-mail</i>	ema@delawaretownshippa.gov

Mitigation Action Worksheet

Municipality(ies):	Action
Delaware Township	Improve emergency services provided to the growing population of Pike County. Would need a study conducted of the population increases of the township and implement better trained and equipped facilities for faster response times.
Action Number:	
2022-Delaware Twp-005	
Location (address, lat/long)	
Township wide	
Mitigation Technique Category	
SIP	
Hazard(s) Addressed	
Public Safety	
Priority (High, Medium, Low)	
High	
Estimated Cost	
High	
Potential Funding Streams	
FEMA HMA and local budget	
Timeline	
Ongoing support; Long-Term DOF (Specific project application and implementation)	
Lead Agency/Department	
Township Planning	
Support Agency(ies)/Department(s)	
PEMA and FEMA	
Project Point of Contact	
Name	Matthew Light
Title	Emergency Management Coordinator
Agency/Department	Delaware Township EMA
Phone	570-241-9532
E-mail	ema@delawaretownshippa.gov

Mitigation Action Worksheet

Municipality(ies):	Action
Dingman	Tree Trimming / Removal
Action Number:	
2022	
Location (address, lat/long)	Township Roads
Mitigation Technique Category	SIP
Hazard(s) Addressed	Transportation; Utility
Priority (High, Medium, Low)	Med
Estimated Cost	Budgeted
Potential Funding Streams	Township
Timeline	annual - ongoing
Lead Agency/Department	Township
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	Karen Kleist
Title	
Agency/Department	
Phone	
E-mail	

- Pub outreach? safe generator use etc.
- Floodplain Ord
- culverts inspect, prioritize replace needs
-

Mitigation Action Worksheet

Municipality(ies):	Action
Dingman Twp	New Construction in Floodplain prohibited
Action Number:	Re-construction in accordance w/ UCC
2022-	Floodproof Requirements
Location (address, lat/long)	Township-wide
Mitigation Technique Category	LPR, SEP
Hazard(s) Addressed	Flood
Priority (High, Medium, Low)	High
Estimated Cost	0
Potential Funding Streams	WIA
Timeline	Ongoing
Lead Agency/Department	Dingman Township
Support Agency(ies)/ Department(s)	MA
Project Point of Contact	
Name	Karen Kleist
Title	Sec/Treas
Agency/Department	
Phone	
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Dingman Twp	Inspect, evaluate + prioritize stormwater/stream crossing culverts
Action Number:	
2022-	
Location (address, lat/long)	Township Roads
Mitigation Technique Category	SIP
Hazard(s) Addressed	Flood
Priority (High, Medium, Low)	Medium
Estimated Cost	\$ 750,000 currently
Potential Funding Streams	Pa DOT, Twp
Timeline	ongoing
Lead Agency/Department	Dingman Twp Road Dept
Support Agency(ies)/Department(s)	N/A
Project Point of Contact	
Name	Karen Kleist
Title	Sec/Treas
Agency/Department	
Phone	
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Dingman	Public Outreach
Action Number:	
2022	
Location (address, lat/long)	Facebook Facebook + website
Mitigation Technique Category	Severe weather; Temps; Invasive Species; Disease outbreak
Hazard(s) Addressed	
Priority (High, Medium, Low)	EAP Priority - High
Estimated Cost	0
Potential Funding Streams	N/A
Timeline	Ongoing
Lead Agency/Department	Dingman Twp
Support Agency(ies)/Department(s)	N/A
Project Point of Contact	
Name	Karen Kleist
Title	
Agency/Department	
Phone	
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Dingman Twp	Sawkill Creek Stormwater Mgmt
Action Number:	ORD with Milford Reservoir protections
2000	
Location (address, lat/long)	Sawkill Creek Watershed
Mitigation Technique Category	LPR
Hazard(s) Addressed	Flood, Environmental Hazards
Priority (High, Medium, Low)	Medium
Estimated Cost	0
Potential Funding Streams	
Timeline	Ongoing
Lead Agency/Department	Dingman Twp
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	
Title	
Agency/Department	
Phone	
E-mail	

The ordinance limits hazardous materials stored in the Milford watersupply zone 2 as well as stormwater runoff quality.

Mitigation Action Worksheet

Municipality(ies):	Action
Dingman	DT Fire Protection Ord. Regulates outdoor burning + water sources for fire protection in certain New construction.
Action Number:	
2022-	
Location (address, lat/long)	Township wide
Mitigation Technique Category	LPR
Hazard(s) Addressed	Wild fire
Priority (High, Medium, Low)	High
Estimated Cost	—
Potential Funding Streams	—
Timeline	on going
Lead Agency/Department	Dingman Twp
Support Agency(ies)/Department(s)	DT Fire Dept Milford Fire Dept
Project Point of Contact	
Name	Karen Kleist
Title	Sec/Trees
Agency/Department	
Phone	
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Dingman	Tree Trimming / Removal
Action Number:	
2022	
Location (address, lat/long)	Township Roads
Mitigation Technique Category	SIP
Hazard(s) Addressed	Transportation; Utility
Priority (High, Medium, Low)	Med
Estimated Cost	Budgeted
Potential Funding Streams	Township
Timeline	annual - ongoing
Lead Agency/Department	Township
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	Karen Kleist
Title	
Agency/Department	
Phone	
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Greene Township	Ensure the continuity of operations at critical facilities in the Township. Purchase and install a generator at the Hemlock Grove United Methodist Church which serves as the Township shelter.
Action Number:	
001	
<i>Location (address, lat/long)</i>	491 Roemerville Rd., Greentown, PA
<i>Mitigation Technique Category</i>	SIP
<i>Hazard(s) Addressed</i>	All
<i>Priority (High, Medium, Low)</i>	High
<i>Estimated Cost</i>	Medium
<i>Potential Funding Streams</i>	FEMA HMA with local match
<i>Timeline</i>	Short (depends on funding)
<i>Lead Agency/Department</i>	Emergency Management Coordinator
<i>Support Agency(ies)/ Department(s)</i>	Church staff
Project Point of Contact	
<i>Name</i>	Allen Schiffler
<i>Title</i>	Emergency Management Coordinator
<i>Agency/Department</i>	
<i>Phone</i>	570-982-0129
<i>E-mail</i>	

Mitigation Action Worksheet

Municipality(ies):	Action
Lackawaxen Township	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.
Action Number:	
2022-Lackawaxen-001	
Location (address, lat/long)	Township wide
Mitigation Technique Category	LPR
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Local budget
Timeline	On-going
Lead Agency/Department	Township Supervisors, Township Roadmaster
Support Agency(ies)/ Department(s)	Pike County Road Task Force
Project Point of Contact	
Name	Denise Steuhl
Title	Secretary
Agency/Department	Lackawaxen Township
Phone	570-685-7288
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Lackawaxen Township	Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.
Action Number:	
2022-Lackawaxen-002	
Location (address, lat/long)	Township wide
Mitigation Technique Category	SIP
Hazard(s) Addressed	Flood, Hurricane/Tropical Storm, Nor'easter
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA HMA
Timeline	Short (DOF)
Lead Agency/Department	Township Supervisors
Support Agency(ies)/ Department(s)	Township EMA Coordinator
Project Point of Contact	
Name	Denise Steuhl
Title	Secretary
Agency/Department	Lackawaxen Township
Phone	570-685-7288
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Lackawaxen Township	Ensure the continuity of operations at critical facilities in the Township.
Action Number:	
2022-Lackawaxen-003	
Location (address, lat/long)	Township wide
Mitigation Technique Category	LPR
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	Medium
Potential Funding Streams	Federal, State, Local
Timeline	Short (DOF)
Lead Agency/Department	Township Supervisors
Support Agency(ies)/ Department(s)	Township EMA Coordinator
Project Point of Contact	
Name	Denise Steuhl
Title	Secretary
Agency/Department	Lackawaxen Township
Phone	570-685-7288
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Lackawaxen Township	Identify mechanisms to educate and inform Township residents regarding CodeRED for example newsletters, link to Township website to the County Emergency page, social media and other methods of public communication.
Action Number:	
2022-Lackawaxen-004	
<i>Location (address, lat/long)</i>	Township wide
<i>Mitigation Technique Category</i>	EAP
<i>Hazard(s) Addressed</i>	All
<i>Priority (High, Medium, Low)</i>	High
<i>Estimated Cost</i>	Low
<i>Potential Funding Streams</i>	Local budget
<i>Timeline</i>	Short
<i>Lead Agency/Department</i>	Township Supervisors
<i>Support Agency(ies)/ Department(s)</i>	Township EMA Coordinator
Project Point of Contact	
<i>Name</i>	Denise Steuhl
<i>Title</i>	Secretary
<i>Agency/Department</i>	Lackawaxen Township
<i>Phone</i>	570-685-7288
<i>E-mail</i>	

Mitigation Action Worksheet

Municipality(ies):	Action
Lehman Township	Replace existing failing 7' diameter CMP with a 7' diameter aluminized CMP. Remove & resetting existing guiderail. Remove & reconstruct stone headwalls & wingwalls. Roadway reconstruction. Design life +/- 50-75 years.
Action Number:	
2022-Jurisdiction-001	
Location (address, lat/long)	Brisco Mountain Road. 41.15836 N -75.02105 E
Mitigation Technique Category	Structure and Infrastructure Project
Hazard(s) Addressed	Brisco Mountain Road Culvert Replacement
Priority (High, Medium, Low)	High
Estimated Cost	\$406,000
Potential Funding Streams	Municipal Budget & Possible National Park Service
Timeline	Short
Lead Agency/Department	Lehman Township
Support Agency(ies)/ Department(s)	National Park Service
Project Point of Contact	
Name	Robert H. Rohner, Jr.
Title	Chairman
Agency/Department	Municipal Supervisors
Phone	570-588-9365
E-mail	lehmanpk@ptd.net

Mitigation Action Worksheet

Municipality(ies):	Action
Lehman Township	Install two (2) electronic signs at the municipal building, and at the EMS headquarters located on Winona Falls Road. Signs will be used by Lehman Township EMS to relay emergency notifications to the public, including safety messages for the different seasons. Information will continue to be included on the municipality's website and face book page. Information will be included in the municipality's newsletter when published.
Action Number:	
2022-Jurisdiction-002	
Location (address, lat/long)	5325 Winona Falls Road, East Stroudsburg, PA 18302 & 193 Municipal Drive, Bushkill, PA 18324.
Mitigation Technique Category	EAP
Hazard(s) Addressed	Public Outreach
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Municipal Budget
Timeline	1 year
Lead Agency/Department	Lehman Township
Support Agency(ies)/ Department(s)	Bushkill Fire Company
Project Point of Contact	
Name	Jonathon Dickison
Title	Deputy Coordinator
Agency/Department	Lehman EMA
Phone	570-588-6593
E-mail	Jon.dickison@yahoo.com

Mitigation Action Worksheet

Municipality(ies):	Action
Borough of Matamoras	Enhance public notifications with AM radio station improvements and add web/internet based interactive web-page and social media pages
Action Number:	
Location (address, lat/long)	Borough
Mitigation Technique Category	
Hazard(s) Addressed	Public Notifications
Priority (High, Medium, Low)	High
Estimated Cost	\$20,000
Potential Funding Streams	
Timeline	Short (depends on funding)
Lead Agency/Department	EMA Coordinator
Support Agency(ies)/ Department(s)	Borough Secretary
Project Point of Contact	
Name	Tom Olver
Title	EMA Coordinator
Agency/Department	Matamoras EMA
Phone	570-491-5177
E-mail	ema@matamorasborough.com

Mitigation Action Worksheet

Municipality(ies):	Action
Borough of Matamoras	Improve public access to borough office and annex. Provide ADA compliant bathroom facilities and 2 nd floor office access for ADA
Action Number:	
Location (address, lat/long)	Borough
Mitigation Technique Category	
Hazard(s) Addressed	Public access
Priority (High, Medium, Low)	Medium
Estimated Cost	\$100,000.
Potential Funding Streams	
Timeline	Long
Lead Agency/Department	Borough General Government
Support Agency(ies)/ Department(s)	Borough Secretary
Project Point of Contact	
Name	Marianne Brown
Title	Borough Secretary
Agency/Department	Borough
Phone	570-491-2771
E-mail	secretary@matamoras.com

Mitigation Action Worksheet

Municipality(ies):	Action
Milford Township	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.
Action Number:	
2022-MILFORDTWP-01	
Location (address, lat/long)	Milford Township
Mitigation Technique Category	Planning and Regulations
Hazard(s) Addressed	Severe Winter Weather, Transportation Accidents, Utility Interruptions
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	County of Pike, Milford Township
Timeline	OG
Lead Agency/Department	Pike County
Support Agency(ies)/ Department(s)	all municipalities in the County
Project Point of Contact	
Name	Gary Williams
Title	Roadmaster
Agency/Department	Milford Township
Phone	570-296-5540
E-mail	milfrdtp@ptd.net

Mitigation Action Worksheet

Municipality(ies):	Action
MILFORD TWP	Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage, repetitive loss and severe repetitive loss properties will be a priority, when applicable.
Action Number:	
2022-MILFORDTWP-02	
Location (address, lat/long)	
Mitigation Technique Category	Structure and infrastructure
Hazard(s) Addressed	Flood, Erosion
Priority (High, Medium, Low)	Low (very few properties in this category in Milford Township)
Estimated Cost	High
Potential Funding Streams	FEMA, PEMA
Timeline	DOF
Lead Agency/Department	Pike County Planning
Support Agency(ies)/ Department(s)	Pike County EMA, FEMA, PEMA
Project Point of Contact	
Name	Brian Snyder
Title	
Agency/Department	Pike County Planning
Phone	
E-mail	bsnyder@pikepa.org

Mitigation Action Worksheet

Municipality(ies):	Action
Milford Township	Work with the gas company (formerly Columbia Gas) to develop an evacuation plan to address emergencies related to the compressor station or the pipeline itself.
Action Number:	
2022-MILFORDTWP-03	
Location (address, lat/long)	
Mitigation Technique Category	Local Planning and Regulations
Hazard(s) Addressed	Urban Fire & Explosion, Environmental Hazards, Terrorism
Priority (High, Medium, Low)	Medium
Estimated Cost	Low
Potential Funding Streams	
Timeline	OG
Lead Agency/Department	Milford Twp (EM/Planning Com)
Support Agency(ies)/ Department(s)	Pike EMA
Project Point of Contact	
Name	Bob DiLorenzo
Title	Emergency Management Coordinator
Agency/Department	Milford Twp
Phone	570-296-5540
E-mail	milfrdtp@ptd.net

Mitigation Action Worksheet

Municipality(ies):	Action
Milford Township	Include risk assessment and hazard mitigation principles into comprehensive planning efforts as Milford Township updates its Comprehensive Plan
Action Number:	
2022-MILFORDTWP-04	
Location (address, lat/long)	Milford Township
Mitigation Technique Category	Planning and Regulations
Hazard(s) Addressed	All Hazards
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Pike County Scenic Rural Character Preservation Program, Milford Township
Timeline	Short
Lead Agency/Department	Milford Township Planning Commission
Support Agency(ies)/ Department(s)	Milford Township Board of Supervisors; Pike County Planning Dept.
Project Point of Contact	
Name	Bob DiLorenzo
Title	Chairman
Agency/Department	Milford Township Planning Commission
Phone	570-296-5540
E-mail	milfrdtp@ptd.net

Mitigation Action Worksheet

Municipality(ies):	Action
Milford Township	Develop and implement a multi-hazard public awareness program
Action Number:	
2022-MILFORDTWP-05	
Location (address, lat/long)	Milford Township
Mitigation Technique Category	Education and Outreach
Hazard(s) Addressed	All Hazards
Priority (High, Medium, Low)	Low
Estimated Cost	Low
Potential Funding Streams	Milford Township
Timeline	OG
Lead Agency/Department	Milford Township Planning Commission
Support Agency(ies)/ Department(s)	Milford Township Board of Supervisors; Pike County EMA; Milford Fire Department; Delaware Valley School District
Project Point of Contact	
Name	Bob DiLorenzo
Title	Emergency Management Coordinator
Agency/Department	Milford Township
Phone	570-296-5540
E-mail	milfrdtp@ptd.net

Mitigation Action Worksheet

Municipality(ies):	Action
Milford Township	Install, re-route and increase the capacity of storm drainage infrastructure for Vandermark Drive, may require purchase of easement(s) for privately owned land for water retention and drainage
Action Number:	
2022-MILFORDTWP-06	
Location (address, lat/long)	Milford Township
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Erosion, Flood, Utility Interruptions, Landslides
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	Milford Township; ARP, Water & Environmental Programs, Emergency Management Performance Grant Program; Flood Mitigation Assistance Program
Timeline	Short
Lead Agency/Department	Milford Township
Support Agency(ies)/Department(s)	Pike County Conservation District; Pike County Planning
Project Point of Contact	
Name	Gary Williams
Title	Roadmaster
Agency/Department	Milford Township
Phone	570-296-5540
E-mail	milfrdtp@ptd.net

Mitigation Action Worksheet

Municipality(ies):	Action
Milford Township	Work with Pike County Agencies to create a database of vulnerable persons for priority outreach during emergencies that affect their home or property
Action Number:	
2022-MILFORDTWP-07	
Location (address, lat/long)	Milford Township
Mitigation Technique Category	Education and Awareness Programs
Hazard(s) Addressed	All Hazards
Priority (High, Medium, Low)	Low
Estimated Cost	Low
Potential Funding Streams	
Timeline	Short
Lead Agency/Department	Milford Township
Support Agency(ies)/ Department(s)	Pike County Area Agency on Aging; Pike County EMA, Milford Fire Department
Project Point of Contact	
Name	Bob DiLorenzo
Title	Emergency Management Coordinator
Agency/Department	Milford Township
Phone	570-296-5540
E-mail	milfrdtp@ptd.net

Mitigation Action Worksheet

Municipality(ies):	Action
Milford Township	Purchase a UTV for quick access to remote locations
Action Number:	
2022-MILFORDTWP-08	
Location (address, lat/long)	Milford Fire Department
Mitigation Technique Category	Natural Systems Protection
Hazard(s) Addressed	Wildfire, Environmental Hazards, Severe Winter Weather
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	
Timeline	DOF
Lead Agency/Department	Milford Fire Department
Support Agency(ies)/ Department(s)	Milford Township, Milford Borough, NPS
Project Point of Contact	
Name	Mike Bello
Title	Captain
Agency/Department	Milford Fire Department
Phone	845-662-1663
E-mail	1st.assist.chief@milfordfire33.com

Mitigation Action Worksheet

Municipality(ies):	Action
Milford Township	Purchase an additional ambulance to ensure continuity of operations and increase capacity
Action Number:	
2022-MILFORDTWP-09	
Location (address, lat/long)	Milford Fire Department
Mitigation Technique Category	Local Planning and Regulations
Hazard(s) Addressed	Multiple Hazards including Pandemic, Drowning, Transportation Accidents, Urban Fire & Explosion
Priority (High, Medium, Low)	Medium
Estimated Cost	High
Potential Funding Streams	Local Share Account Program, Milford Borough and Township
Timeline	Short
Lead Agency/Department	Milford Fire Department
Support Agency(ies)/ Department(s)	Milford Township, Milford Borough, Pike County EMA
Project Point of Contact	
Name	Mike Bello
Title	Captain
Agency/Department	Milford Fire Department
Phone	845-662-1663
E-mail	1st.assistant.chief@milfordfire33@gmail.com

Mitigation Action Worksheet

Municipality(ies):	Action
Milford Township	Work with utilities and property owners to implement a hazardous tree removal program on Township roads.
Action Number:	
2022-MILFORDTWP-10	
Location (address, lat/long)	Milford Township
Mitigation Technique Category	LPR, SIP, NSP
Hazard(s) Addressed	Severe storm, Hurricane/Tropical Storm, Nor'easter, Stormwater, Tornado, Utility Interruptions
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA, PEMA, State, Private (Utility Companies, property owners), Local budget
Timeline	DOF, will follow development of the County-wide program
Lead Agency/Department	Milford Township
Support Agency(ies)/Department(s)	Pike County Planning, Pike County Conservation District, Pike County Road Task Force, Utility companies
Project Point of Contact	
Name	Bob DiLorenzo
Title	Emergency Management Coordinator
Agency/Department	Milford Township
Phone	570-296-5540
E-mail	milfrdtp@ptd.net

Mitigation Action Worksheet

Municipality(ies):	Action
Milford Township	Install appropriate infrastructure to protect homes from stream bank erosion along the Vandermark Creek, where previous supports have become less effective over time
Action Number:	
2022-MILFORDTWP-11	
Location (address, lat/long)	Along Vandermark Creek in Moon Valley
Mitigation Technique Category	NSP, SIP
Hazard(s) Addressed	Severe storm, Hurricane/Tropical Storm, Nor'easter, Stormwater, Erosion
Priority (High, Medium, Low)	Medium
Estimated Cost	High
Potential Funding Streams	FEMA, PEMA, State, Private (property owners)
Timeline	DOF
Lead Agency/Department	Pike County Conservation District
Support Agency(ies)/Department(s)	Pike County Planning, Milford Township
Project Point of Contact	
Name	Michele Long
Title	Executive Director
Agency/Department	Pike County Conservation District
Phone	
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Palmyra Township	The stormwater systems in the Township are inadequately sized and due to the age of some of the communities, the systems do not have the capacity to carry the stormwater. The Township will perform an assessment of the stormwater system to identify projects to increase the capacity and improve the stormwater systems. Once projects are identified, the Township will seek funding to implement the projects.
Action Number:	
001	
<i>Location (address, lat/long)</i>	Township-wide
<i>Mitigation Technique Category</i>	Local Planning and Regulations (LPR); Structure and Infrastructure Projects (SIP); and Natural Systems Protection (NSP)
<i>Hazard(s) Addressed</i>	Severe Weather, Flood, Geologic
<i>Priority (High, Medium, Low)</i>	Medium
<i>Estimated Cost</i>	>\$20,000
<i>Potential Funding Streams</i>	EPA Section 319 Grants, PENNVEST, Growing Greener, Municipal Budget
<i>Timeline</i>	Within 5 years
<i>Lead Agency/Department</i>	Township Public Works
<i>Support Agency(ies)/ Department(s)</i>	Township Council
Project Point of Contact	
<i>Name</i>	Nick Spinelli
<i>Title</i>	EMC
<i>Agency/Department</i>	
<i>Phone</i>	570-226-3420
<i>E-mail</i>	

Mitigation Action Worksheet

Municipality(ies):	Action
Palmyra Township	Stormwater erosion and stormwater management issues are a major source of nutrient pollution into the lakes, leading to Harmful Algal Bloom (HAB) growth in the lakes. The Township will identify different measures to reduce runoff and potential HABs in the lakes. This includes planting vegetation in areas adjacent to surface waters to serve as a buffer between the water and pollution sources (e.g. stormwater runoff).
Action Number:	
002	
Location (address, lat/long)	
Township lakes and waterbodies	
Mitigation Technique Category	
Structural and Infrastructure Project (SIP), Natural Systems Protection (NSP)	
Hazard(s) Addressed	Invasive Species – Harmful Algal Bloom, Flood, Severe Weather
Priority (High, Medium, Low)	Medium
Estimated Cost	>\$20,000
Potential Funding Streams	319 Nonpoint Source Grant, PA DEP Growing Greener, Township Budget
Timeline	Within 5 years
Lead Agency/Department	Township Board of Supervisors
Support Agency(ies)/Department(s)	Pike County Conservation District, PA DEP
Project Point of Contact	
Name	Nick Spinelli
Title	EMC
Agency/Department	
Phone	570-226-3420
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Palmyra Township	The Tanglewood Lake Dam is classified as a high hazard dam located on Lake Tanglewood. It is privately owned, and the Township does not have jurisdiction over it. The Township will work with the dam owner to complete a survey to determine structural and engineering deficiencies and identify corrective measures. Once identified, the Township will work with the dam owner to implement the corrective measures.
Action Number:	
003	
<i>Location (address, lat/long)</i>	41.371345, -75.239849
<i>Mitigation Technique Category</i>	Structure and Infrastructure Projects (SIP) and Natural Systems Protections (NSP)
<i>Hazard(s) Addressed</i>	Severe Weather, Flood, Dam Failure
<i>Priority (High, Medium, Low)</i>	Medium
<i>Estimated Cost</i>	\$50,000+
<i>Potential Funding Streams</i>	USACE Small Flood Control, National Dam Safety Program, PA Private Dam Financial Assurance Program, H2O PA, FEMA HHPD
<i>Timeline</i>	Within 5 years; depends on funding
<i>Lead Agency/Department</i>	Township Board
<i>Support Agency(ies)/ Department(s)</i>	Pike County and PADEP
Project Point of Contact	
<i>Name</i>	Nick Spinelli
<i>Title</i>	EMC
<i>Agency/Department</i>	
<i>Phone</i>	570-226-3420
<i>E-mail</i>	

Mitigation Action Worksheet

Municipality(ies):	Action
Porter Township	Increase capacity of the existing stormwater system to include the following areas: <ul style="list-style-type: none"> • Snow Hill Road • Whittaker Road
Action Number:	
Porter Township - 001	
Location (address, lat/long)	
Snow Hill Road, Whittaker Road	
Mitigation Technique Category	
SIP	
Hazard(s) Addressed	
All	
Priority (High, Medium, Low)	
High	
Estimated Cost	
High	
Potential Funding Streams	
FEMA, PEMA	
Timeline	
Short (DOF)/In-progress	
Lead Agency/Department	
Porter Township Supervisors	
Support Agency(ies)/Department(s)	
Pike County Office of Community Planning	
Project Point of Contact	
Name	Terri Koch
Title	Township Secretary
Agency/Department	Porter Township
Phone	(570)223-0447
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Porter Township	Support mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.
Action Number:	
Porter Township - 002	
Location (address, lat/long)	Township Wide
Mitigation Technique Category	SIP
Hazard(s) Addressed	Flood, Hurricane, Tropical Storm, Nor'Easter
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA, PEMA
Timeline	Short (DOF)
Lead Agency/Department	Porter Township Supervisors
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	Terri Koch
Title	Township Secretary
Agency/Department	Porter Township
Phone	(570)223-0447
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Porter Township	Develop a customized communication plan for Porter Township to convey risk in multiple formats due to unique conditions in Porter Township (e.g. poor cell phone coverage, several small private communities and properties without electricity), increase usage of social media, leverage County communication system (CodeRED and reverse 911) and regularly update points of contact in the Township's Emergency Plan to distribute information.
Action Number:	
Porter Township - 003	
<i>Location (address, lat/long)</i>	Township Wide
<i>Mitigation Technique Category</i>	SIP
<i>Hazard(s) Addressed</i>	All
<i>Priority (High, Medium, Low)</i>	High
<i>Estimated Cost</i>	Low-Medium
<i>Potential Funding Streams</i>	FEMA, PEMA
<i>Timeline</i>	Short (DOF)
<i>Lead Agency/Department</i>	Porter Township Supervisors
<i>Support Agency(ies)/ Department(s)</i>	
Project Point of Contact	
<i>Name</i>	Terri Koch
<i>Title</i>	Township Secretary
<i>Agency/Department</i>	Porter Township
<i>Phone</i>	(570)223-0447
<i>E-mail</i>	

Mitigation Action Worksheet

Municipality(ies):	Action
Porter Township	Bushkill Bridge (steel bridge) is Township owned and gets inspected by the County. This bridge gets washed out at both ends and water goes over the bridge deck, Ice has also damaged the bridge. A study needs to be completed to determine the best solution to prevent the bridge from flooding during heavy rain events. The bridge needs to be replaced/elevated. This bridge is the primary road during road closers and serves as an evacuation route.
Action Number:	
Porter Township - 004	
<i>Location (address, lat/long)</i>	Bushkill Bridge on Snow Hill Road
<i>Mitigation Technique Category</i>	SIP
<i>Hazard(s) Addressed</i>	All
<i>Priority (High, Medium, Low)</i>	High
<i>Estimated Cost</i>	High
<i>Potential Funding Streams</i>	FEMA, PEMA, State
<i>Timeline</i>	Short (DOF)/In-progress
<i>Lead Agency/Department</i>	Porter Township Supervisors
<i>Support Agency(ies)/ Department(s)</i>	
Project Point of Contact	
<i>Name</i>	Terri Koch
<i>Title</i>	Township Secretary
<i>Agency/Department</i>	Porter Township
<i>Phone</i>	(570)223-0447
<i>E-mail</i>	

Mitigation Action Worksheet

Municipality(ies):	Action
Porter Township	Ensure continuity of operations at Township critical facilities such as: <ul style="list-style-type: none"> Township building does not have back-up power
Action Number:	
Porter Township - 005	
Location (address, lat/long)	2186 Route 402 (Township building)
Mitigation Technique Category	SIP
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	High
Potential Funding Streams	FEMA, PEMA, State
Timeline	Short (DOF)/In-progress
Lead Agency/Department	Porter Township Supervisors
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	Terri Koch
Title	Township Secretary
Agency/Department	Porter Township
Phone	(570)223-0447
E-mail	

Mitigation Action Worksheet

Municipality(ies):	Action
Porter Township	Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials.
Action Number:	
Porter Township - 006	
<i>Location (address, lat/long)</i>	Township Wide
<i>Mitigation Technique Category</i>	LPR
<i>Hazard(s) Addressed</i>	All
<i>Priority (High, Medium, Low)</i>	High
<i>Estimated Cost</i>	Low
<i>Potential Funding Streams</i>	Local budget
<i>Timeline</i>	In-progress
<i>Lead Agency/Department</i>	Porter Township Supervisors
<i>Support Agency(ies)/ Department(s)</i>	Pike County Road Task Force
Project Point of Contact	
<i>Name</i>	Terri Koch
<i>Title</i>	Township Secretary
<i>Agency/Department</i>	Porter Township
<i>Phone</i>	(570)223-0447
<i>E-mail</i>	

Mitigation Action Worksheet

Municipality(ies):	Action
Shohola Township	Develop a plan between Emergency Management and Fire & Rescue Dept. to provide education and awareness to citizens of the township, through the use of StormReady and Firewise programs.
Action Number:	
2022 Shohola 002	
Location (address, lat/long)	325 Rt. 434, Shohola, Pa 18458
Mitigation Technique Category	EAP
Hazard(s) Addressed	Education of how to prepare for disasters/emergencies
Priority (High, Medium, Low)	High
Estimated Cost	Low
Potential Funding Streams	Grants, Township
Timeline	Short
Lead Agency/Department	Shohola Emergency Management/ Shohola Fire & Rescue
Support Agency(ies)/ Department(s)	Shohola Township
Project Point of Contact	
Name	Clinton Malzahn
Title	Emergency Management Coordinator/ President- Shohola Fire
Agency/Department	Shohola Township/ Shohola Fire & Rescue
Phone	570-618-2010
E-mail	malzahnps@yahoo.com

Mitigation Action Worksheet

Municipality(ies):	Action
Shohola Township	Address the need of an Emergency Shelter, via upgrade to the Shohola Fire Station to be able to provide for food, shelter and comfort during emergencies or natural disasters in the township.
Action Number:	
2022 Shohola 001	
Location (address, lat/long)	325 Rt 434, Shohola, Pa 18458
Mitigation Technique Category	SIP
Hazard(s) Addressed	Power outages, Natural disasters
Priority (High, Medium, Low)	Medium
Estimated Cost	Medium
Potential Funding Streams	Grants, Appeal letter, and tax income.
Timeline	Short
Lead Agency/Department	Shohola Fire & Rescue
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	Clinton Malzahn
Title	Emergency Manangement Coordinator/ President Shohola Fire
Agency/Department	Shohola Township/ Shohola Fire & Rescue
Phone	570-618-2010 cell
E-mail	malzahnp@yahoo.com

Mitigation Action Worksheet

Municipality(ies):	Action
Westfall Township	Installation of two mechanical warning sirens for use for severe weather events, flooding, any other widespread hazard that poses a great risk to the health and safety of individuals in the township.
Action Number:	
0001	
Location (address, lat/long)	101 Mountain Ave. and the area of Green Acres Trailer Park.
Mitigation Technique Category	Structure and infrastructure projects.
Hazard(s) Addressed	Flooding and severe weather events.
Priority (High, Medium, Low)	Medium
Estimated Cost	\$5,000-\$8,000.00 (Low)
Potential Funding Streams	General Fund or the possibility of a FEMA Grant.
Timeline	3 years
Lead Agency/Department	Westfall EMA
Support Agency(ies)/ Department(s)	
Project Point of Contact	
Name	Michael Fischetta
Title	Coordinator
Agency/Department	Westfall Township EMA
Phone	(570) 426-0388
E-mail	westfallema@gmail.com

Guidance to Complete the Mitigation Action Worksheet

The following provides additional guidance on how to complete the mitigation action worksheet. **A minimum of one mitigation action must be identified for each hazard. Each participating jurisdiction in the planning process must identify at least one specific mitigation action for which it will be responsible.**

Hazard Identification and Risk Evaluation Worksheet

Name: MICHAEL MCCAFFERY
 Jurisdiction: BLOOMING GROVE TWP.

Title: ZONING & CODE ENFORCEMENT OFFICER
 Email: MICHAEL.MCCAFFERY@BLOOMINGGROVE
TOWNSHIP.COM

PART I

Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC = No Change; I = Increase; D = Decrease (Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)	Additional Comments
Natural Hazards		
Dam Failure	NC	
Disease Outbreak/ Pandemic	NC I	
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	NC	
Flood (riverine, flash, stormwater, and ice jam)	NC	
Hurricane, Tropical Storm, Nor'easter	NC	
Invasive Species and Harmful Algal Bloom	NC	
Geologic Hazards (landslides, subsidence/sinkholes)	NC	
Radon Exposure	NC	
Severe Weather (thunderstorms, lightning, hail, wind)	NC	
Wildfire	NC	
Severe Winter Weather (heavy snow, blizzards, ice)	NC	
Human-made Hazards		



Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Drowning		
Environmental Hazards (Hazardous Materials Release, Oil and Gas Wells, Pyrite)	NC	
Nuclear Incidents	NC	
Terrorism	NC	
Transportation Accidents	NC	
Urban Fire and Explosions	NC	
Utility Interruptions	NC	

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- | | |
|--|--|
| <input type="checkbox"/> Avalanche/Glacier | <input type="checkbox"/> Expansive Soils |
| <input type="checkbox"/> Coastal Erosion | <input type="checkbox"/> Tsunami |
| <input type="checkbox"/> Dust, Sand Storm | <input type="checkbox"/> Volcano |

Human-Caused

- | | |
|---|--|
| <input type="checkbox"/> Building or Structure Collapse | <input type="checkbox"/> Environmental Hazard - Gas and Liquid Pipelines |
| <input type="checkbox"/> Civil Disturbance | <input type="checkbox"/> Levee Failure |
| <input type="checkbox"/> Cyber Terrorism | <input type="checkbox"/> Mass Food/Animal Feed Contamination |
| <input type="checkbox"/> Disorientation | <input checked="" type="checkbox"/> Opioid Addiction Response |
| <input type="checkbox"/> Environmental Hazard - Coal Mining | <input type="checkbox"/> War and Criminal Activity |

Additional Comments:

Capability Assessment Survey

Name: Michael McAttery

Title: Enforcing Code Enforcement Officer

Jurisdiction: Bloomington Grove Twp.

Email: michael.mcattery@bloomingtongrovetwp.com

Phone Number: 570-775-6461

1. **Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	X			County	
Emergency Operations Plan					
Disaster Recovery Plan					
Evacuation Plan					
Continuity of Operations Plan					
NFIP					
NFIP - Community Rating System					
Floodplain Regulations (spec. NFIP Flood Damage Prevention Ordinance)					
Floodplain Management Plan					

Capability Assessment Survey

Tool / Program	Status			Dept./Agency Responsible	Comments
	In place	Date Adopted or Updated	Under Development		
Zoning Regulations	X	2011			
Subdivision Regulations	X	2011			
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	X				
Open Space Management Plan (or Parks/Rec or Greenways Plan)					
Stormwater Management Plan / Ordinance					
Natural Resource Protection Plan					
Capital Improvement Plan					
Economic Development Plan					
Historic Preservation Plan					
Farmland Preservation					
Building Code	X				
Fire Code					
Other					



2. **Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)		X		
Planners or engineers (with natural and/or human caused hazards knowledge)		X		
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X			
Emergency Manager	X			
NFIP Floodplain Administrator		X		
Land Surveyors		X		
Scientists or staff familiar with the hazards of the community		X		
Personnel skilled in GIS and/or FEMA's HAZUS program		X		
Grant writers or fiscal staff to handle large or complex grants	X		Contractors	
Staff with expertise or training in benefit-cost analysis		X		
Other				

3. **Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources *for hazard mitigation purposes* (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming				
Community Development Block Grants (CDBG)		X		
Special Purpose Taxes		X		
Gas / Electric Utility Fees		X		
Water / Sewer Fees		X		
Stormwater Utility Fees		X		
Development Impact Fees		X		
General Obligation, Revenue, and/or Special Tax Bonds				
Partnering Arrangements or Intergovernmental Agreements				
Other				

4. **Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification	X		Hemlock Farms	
StormReady certification		X		
Natural disaster or safety related school programs		X		
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)		X		
Public-private partnership initiatives addressing disaster-related issues		X		
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	X		Hemlock Farm Conserv.	
Other				

5. Self-Assessment of Capability: Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "X" in the box marking the most appropriate degree of capability (limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability			X
Administrative and Technical Capability		X	
Financial Capability			
Education and Outreach	X		

Mitigation Strategy 5-Year Mitigation Plan Review

Name: _____

Title: _____

Jurisdiction: _____

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.



Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing HMP. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Existing Goals and Objectives		Comments
Goal 1	Provide for properly managed and environmentally sound growth and disaster-resistant development.	
Goal 2	Reduce the potential impact of natural and human made hazards on property.	
Goal 3	Enhance and improve emergency services provided to the growing population of Pike County.	

Existing Goals and Objectives		Comments
Goal 4	Reduce vulnerability including loss of life and damage to assets and the environment from natural and human-made hazards.	
Goal 5	Conserve, protect, restore and enhance existing natural systems and water resources that serve a natural hazard mitigation function.	
Goal 6	Increase awareness, understanding, and preparedness across all sectors by encouraging hazard risk, preparedness, and mitigation related education, training and outreach activities.	

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing HMP and identify its status as "No Progress / Unknown, In Progress / Not Yet Complete, Continuous, Completed, or Discontinued." Include review comments for each action.

Existing Mitigation Action	Status					Review Comments
	No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials			X			
Repair and increase the level of protection of Hemlock Dam on Hemlock Lake in Hemlock (increase to protect to the 500-year flood event as per communication from the State).	X					working on funding
Madden Road Bridge that crosses York Creek requires work to ensure safety:						out for bids
<ul style="list-style-type: none"> • Provide approach guide-rails and transitions • Remove debris and sediment from stream bed • Relocate beaver 		X				
Repair two areas of spalling under the bridge at each abutment						
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	X					
Enhance the capacity of the current stormwater system in the Hemlock Farms Community Association to reduce flooding.			X			
Township building (a designated Red-Cross shelter) needs to be upgraded to include handicap bathrooms, showers, kitchen, technology upgrades to digitize records, and build a separate barn for storage of mechanical equipment and supplies (e.g., cots, blankets, MREs). Purchase additional property to accommodate parking for Township personnel, first-responders reporting to the Volunteer Fire Department next to the Township building (also a designated shelter) and sheltering residents.				YES		
Identify mechanisms to educate and inform Township residents regarding CODERED for example newsletters, link of Township website to the County Emergency page, social media and other methods of public communication.			X			Township web site of social media

Mitigation Strategy 5-Year Mitigation Plan Review

Existing Mitigation Action	Status					Review Comments
	No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Utilize the Hazard Mitigation Plan (HMP) when updating the Comprehensive Master Plan; consider including hazard identification, hazard zones risk assessment information, and hazard mitigation goals as identified in the HMP.	X					





Pike County Planning Team Risk Assessment Review Meeting

Jurisdictional Risk - BLOOMING GROVE TWP.
(Municipality Name)

What is a Risk Ranking?

Risk Ranking is used to understand the vulnerabilities to hazards and to prioritize projects and activities for mitigation. The risk ranking was determined by quantitative and qualitative factors including:

- Probability of occurrence – likelihood of a hazard event occurring in any given year
- Impact – in terms of injuries, damages, or fatalities, what are the impacts?
- Spatial Extent – how large of an area would be impacted from an event?
- Warning Time – what is the warning time for the hazard?
- Duration – how does the hazard event usually last?

The following table represents the calculated rankings for the hazards of concern in Pike County. Please review the table and indicate whether your municipality's risk is greater than, less than, or about the same as the county's overall risk. Use the following to show your answers:

- > Your municipality's risk from this hazard is greater than the county's risk as a whole
- < Your municipality's risk from this hazard is less than the county's risk as a whole
- = Your municipality's risk from this hazard is about the same as the county's risk as a whole

Municipality	Disease Outbreak	Drought	Drowning	Earthquake	Environmental Hazards	Extreme Temperatures	Flood	Geologic	Hurricane, /Nor' Easter	Invasive Species	Nuclear Incidents	Radon	Severe Weather	Severe Winter Weather	Terrorism	Transportation	Urban Fire	Utility	Wildfire
	2.6	2.9	2.2	1.9	2.1	2.8	3.2	1.6	2.2	1.1	2	3.1	3.1	2.4	2.1	2.5	2	3.1	3.4
	=	=	=	=	=	=	<	=	=	=	=	=	=	=	<	=	=	=	=

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)

Name: Michael McCaffreyTitle: Bovins & Code Enforcement OfficerJurisdiction: Blooming Grove Twp.Email: Michael.McCaffrey@Bloominggrove.gov

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	Recommended Action	Yes/No	Comments
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.		
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.		
c. Does the municipality support requests for map updates?	If yes, specify how.		
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.	No	
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.	No	
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.	No	

2. FLOODPLAIN MANAGEMENT			
Requirement	Recommended Action	Yes/No	Comments
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.		

CHECKLIST TO IDENTIFY LOCAL COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

2. FLOODPLAIN MANAGEMENT

Requirement	Recommended Action	Yes/No	Comments
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.	No	
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.		
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.		
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.		
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.		
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include:	If yes, specify activities.		
<ul style="list-style-type: none"> • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA 			

3. FLOOD INSURANCE

Requirement	Recommended Action	Yes/No	Comments
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	No	



CHECKLIST TO IDENTIFY LOCAL COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

3. FLOOD INSURANCE

Requirement	Recommended Action	Yes/No	Comments
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	No	
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.	No	

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources			Comments
Topic	Source of Information		
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)		
Is the floodplain management an auxiliary function?	Community FPA		
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA		
What are the barriers to running an effective NFIP program in the community?	Community FPA		
Compliance History			Comments
Topic	Source of Information		
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records		
Are there any outstanding compliance issues (i.e., current violations)?			
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book		https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book



CHECKLIST TO IDENTIFY LOCAL COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

Is a CAV or CAC scheduled or needed?

Regulation	
Topic	Comments

Are the FIRMS digital or paper?

Community FPA

Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?

Community FPA

Provide an explanation of the permitting process.

Community FPA, State, FEMA, NFIP

Insurance Summary	
Topic	Comments

How many NFIP policies are in the community? What is the total premium and coverage?

State NFIP Coordinator or FEMA NFIP Specialist

How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?

FEMA NFIP or Insurance Specialist

How many structures are exposed to flood risk within the community?

Community FPA or GIS Analyst

Describe any areas of flood risk with limited NFIP policy coverage.

Community FPA or FEMA Insurance Specialist

Community Rating System	
Topic	Comments

Does the community participate in CRS?

Community FPA, State, FEMA NFIP

If so, what is the community's CRS Class Ranking? What categories and activities provide CRS points and how can the class be improved?

Flood Insurance Manual

Does the plan include CRS planning requirements?

Community FPA, FEMA CRS Coordinator, ISO representative



Hazard Identification and Risk Evaluation Worksheet

Name: George F. Beodeker

Title: EMC

Jurisdiction: Delaware Township

Email: Gfbeo28@hotmail.com

PART I

Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Natural Hazards		
Dam Failure	N/C	
Disease Outbreak/ Pandemic	I	SELF EXPLANATORY- COVID19
Drought	I	CHANGING WEATHER PATTERNS IN NE AND CLIMATE CHANGE
Earthquake	N/C	
Extreme Temperatures (heat and cold)	I	WEATHER PATTERNS AS ABOVE AND DURATION OF EXTREME TEMP IN A ROW(FREQUENCY)
Flood (riverine, flash, stormwater, and ice jam)	I	FLASH AND STORMWATER DUE TO WEATHER AND INCREASED DEVELOPMENT
Hurricane, Tropical Storm, Nor'easter	I	REGIONAL AND NATIONAL- IMPACT IS INCREASED DUE TO POPULATION INFLUX WHEN THIS OCCURS
Invasive Species and Harmful Algal Bloom	I	SPOTTED LANTERNFLY AND CERTAIN PLANT SPECIES
Geologic Hazards (landslides, subsidence/sinkholes)	I	INCREASED LAND DEVELOPMENT, AGING ROADS AND DRAINAGE SYSTEMS
Radon Exposure	N/C	
Severe Weather (thunderstorms, lightning, hail, wind)	I	FREQUENCY – AS WITH ALL OTHER WEATHER HAZARDS

Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Wildfire	N/C	
Severe Winter Weather (heavy snow, blizzards, ice)	I	FREQUENCY AND INCREASED POPULATION ALONG WITH DECREASED LOCAL AND REGIONAL RESOURCES FOR SNOW CONTROL
Human-made Hazards		
Drowning	N/C	
Environmental Hazards (Hazardous Materials Release, Oil and Gas Wells, Pyrite)	N/C	
Nuclear Incidents	N/A	
Terrorism	N/C	
Transportation Accidents	N/C	
Urban Fire and Explosions	N/C	
Utility Interruptions	I	AGE OF UTILITY INFRASTRUCTURE

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- | | |
|--|--|
| <input type="checkbox"/> Avalanche/Glacier | <input type="checkbox"/> Expansive Soils |
| <input type="checkbox"/> Coastal Erosion | <input type="checkbox"/> Tsunami |
| <input type="checkbox"/> Dust, Sand Storm | <input type="checkbox"/> Volcano |

Human-Caused

- | | |
|---|--|
| <input type="checkbox"/> Building or Structure Collapse | <input type="checkbox"/> Environmental Hazard - Gas and Liquid Pipelines |
| <input type="checkbox"/> Civil Disturbance | <input type="checkbox"/> Levee Failure |
| <input type="checkbox"/> Cyber Terrorism | <input type="checkbox"/> Mass Food/Animal Feed Contamination |
| <input type="checkbox"/> Disorientation | <input type="checkbox"/> Opioid Addiction Response |
| <input type="checkbox"/> Environmental Hazard - Coal Mining | <input type="checkbox"/> War and Criminal Activity |

Additional Comments:

Capability Assessment Survey

Name: George F. BeodekerTitle: EMCJurisdiction: Delaware TownshipEmail: Gfbeo28@hotmail.comPhone Number: 570-872-1122

- 1. Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
<i>EXAMPLE: Hazard Mitigation Plan</i>	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	X	2017		EMC/ BOARD OF SUPERVISORS	ADOPTED COUNTY PLAN
Emergency Operations Plan	X	2018		EMC/BOARD OF SUPERVISORS	CURRENTLY UNDER REVISION FOR ADOPTION BY 12/21
Disaster Recovery Plan	X			EMC/BOARD OF SUPERVISORS	INCLUDED WITHIN CONTENT OF TOWNSHIP EOP
Evacuation Plan	X			EMC/BOARD OF SUPERVISORS	INCLUDED WITHIN CONTENT OF TOWNSHIP EOP
Continuity of Operations Plan	X			EMC/BOARD OF SUPERVISORS	INCLUDED WITHIN CONTENT OF TOWNSHIP EOP
NFIP	?			?	ALL ISSUES RELATED TO NFIP OR CONSTRUCTION WITHIN FLOODPLAIN NOT COVERED UNDER ZONING AND LAND DEVELOPMENT REFERENCE FEMA STANDARDS AND PROGRAMS
NFIP – Community Rating System	?			?	

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
Floodplain Regulations (spec. NFIP Flood Damage Prevention Ordinance)	X	2001		PLANNING COMMISSION/BOARD OF SUPERVISORS	
Floodplain Management Plan	N/A				
Zoning Regulations	X	2013		PLANNING COMMISSION/BOARD OF SUPERVISORS	
Subdivision Regulations	X	2018		PLANNING COMMISSION/BOARD OF SUPERVISORS	
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	X	2006		PLANNING COMMISSION/BOARD OF SUPERVISORS	
Open Space Management Plan (or Parks/Rec or Greenways Plan)	X *		X *		ADDRESSED WITHIN CONTENT/CONTEXT OF TOWNSHIP COMPREHENSIVE PLAN
Stormwater Management Plan / Ordinance	X *				ADDRESSED WITHIN CONTENT/CONTEXT OF TOWNSHIP COMPREHENSIVE PLAN
Natural Resource Protection Plan	X *				ADDRESSED WITHIN CONTENT/CONTEXT OF TOWNSHIP COMPREHENSIVE PLAN
Capital Improvement Plan	X	2021		BOARD OF SUPERVISORS	
Economic Development Plan					
Historic Preservation Plan	X *				ADDRESSED WITHIN CONTENT/CONTEXT OF TOWNSHIP COMPREHENSIVE PLAN
Farmland Preservation	X *				ADDRESSED WITHIN CONTENT/CONTEXT OF TOWNSHIP COMPREHENSIVE PLAN
Building Code	X	2015		3 RD PARTY CODE ENFORCEMENT	TOWNSHIP HAS ADOPTED STATEWIDE BUILDING CODE REQUIREMENTS- ADMINISTERED BY 3 RD PARTY CONTRACTOR
Fire Code ***	X	2015		3RD PARTY	***ONLY AS DELINEATED WITHIN BUILDING CODE

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
Other					N/A

- 2. Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an “X” in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
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 (includes building inspectors)				
Emergency Manager				
NFIP Floodplain Administrator				
Land Surveyors				
Scientists or staff familiar with the hazards of the community				
Personnel skilled in GIS and/or FEMA’s HAZUS program				
Grant writers or fiscal staff to handle large or complex grants				
Staff with expertise or training in benefit-cost analysis				
Other				

- 3. Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources *for hazard mitigation purposes* (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming				
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				

- 4. Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
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				

- 5. Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "X" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability			
Administrative and Technical Capability			
Financial Capability			
Education and Outreach			

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)Name: George F. BeodekerTitle: EMCJurisdiction: Delaware TownshipEmail: Gfbeo28@hotmail.com

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	Recommended Action	Yes/No	Comments
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.	NO	INQUIRIES ARE REFERRED TO FEMA WEBSITE
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.	NO	LAST UPDATE TO ORDINANCE WAS 2001- UNLIKELY CURRENT
c. Does the municipality support requests for map updates?	If yes, specify how.	YES	RESIDENTS ARE REFERRED TO FEMA SITE
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.	NO	
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.	UNKNOWN	ZONING AND BUILDING OFFICIAL MAY POSSIBLY PROVIDE GUIDANCE WHERE OR WHEN REQUESTED
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.		

2. FLOODPLAIN MANAGEMENT			
Requirement	Recommended Action	Yes/No	Comments
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.	YES	LAST UPDATED 2001

2. FLOODPLAIN MANAGEMENT			
Requirement	Recommended Action	Yes/No	Comments
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.	YES	ZONING OFFICIAL
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.	UNKNOWN	
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.	YES	ZONING AND BUILDING OFFICIALS
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.	YES?	PRIOR TO AND WITHIN PERMITS ISSUED BY OFFICIALS ABOVE
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.	YES?	ROUTINE INSPECTION PRIOR TO AND THROUGHOUT THE CONSTRUCTION PROCESS
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: <ul style="list-style-type: none"> • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA 	If yes, specify activities.	YES?	PROHIBITIONS WOULD BE OR ARE INCLUDED IN EXISTING SUBDIVISION AND LAND USE ORDINANCE

3. FLOOD INSURANCE			
Requirement	Recommended Action	Yes/No	Comments
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	YES	TOWNSHIP FACEBOOK PAGE AND WEBSITE

3. FLOOD INSURANCE			
Requirement	Recommended Action	Yes/No	Comments
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	NO	
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.	NO	NOT ON A ROUTINE OR REGULAR BASIS

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	Source of Information	Comments
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	N/A
Is the floodplain management an auxiliary function?	Community FPA	INCLUDED WITHIN EXISTING CODES AND ORDINANCES
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	PERMIT REVIEW IS FUNCTION OF PLANNING COMMISSION AND CODE ENFORCEMENT
What are the barriers to running an effective NFIP program in the community?	Community FPA	STAFFING- FUNDING
Compliance History		
Topic	Source of Information	Comments
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	UNKNOWN
Are there any outstanding compliance issues (i.e., current violations)?		NONE AT THIS TIME
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book UNKNOWN- NOT DURING MY TENURE AS EMC

Is a CAV or CAC scheduled or needed?		POSSIBLY/UNKNOWN
Regulation		
Topic	Source of Information	Comments
Are the FIRMs digital or paper?	Community FPA	BOTH?
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	UNKNOWN
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	UNABLE TO PROVIDE- NO PERMITS REQUESTED IN RECENT HISTORY
Insurance Summary		
Topic	Source of Information	Comments
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	UNKNOWN- STAFFING IS NOT AVAILABLE TO MONITOR OR REGULARLY CONSULT THESE POINTS OF REFERENCE OR DATA
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	UNKNOWN STAFFING IS NOT AVAILABLE TO MONITOR OR REGULARLY CONSULT THESE POINTS OF REFERENCE OR DATA
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	UNKNOWN/ NOT DETERMINED- STAFFING IS NOT AVAILABLE TO MONITOR OR REGULARLY CONSULT THESE POINTS OF REFERENCE OR DATA
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	UNKNOWN/NOT DETERMINED- STAFFING IS NOT AVAILABLE TO MONITOR OR REGULARLY CONSULT THESE POINTS OF REFERENCE OR DATA
Community Rating System		
Topic	Source of Information	Comments
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	UNKNOWN -STAFFING IS NOT AVAILABLE TO MONITOR OR REGULARLY CONSULT THESE POINTS OF REFERENCE OR DATA
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual	UNKNOWN -STAFFING IS NOT AVAILABLE TO MONITOR OR REGULARLY CONSULT THESE POINTS OF REFERENCE OR DATA
What categories and activities provide CRS points and how can the class be improved?		UNKNOWN- STAFFING IS NOT AVAILABLE TO MONITOR OR REGULARLY CONSULT THESE POINTS OF REFERENCE OR DATA
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative	UNKNOWN- STAFFING IS NOT AVAILABLE TO MONITOR OR REGULARLY CONSULT THESE POINTS OF REFERENCE OR DATA

Mitigation Strategy 5-Year Mitigation Plan Review

Name: __George Beodeker_____ **Title:** _EMC_____ **Jurisdiction:** Delaware Township

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing HMP. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Existing Goals and Objectives		Comments
Goal 1	Provide for properly managed and environmentally sound growth and disaster-resistant development.	
Goal 2	Reduce the potential impact of natural and human made hazards on property.	
Goal 3	Enhance and improve emergency services provided to the growing population of Pike County.	

Existing Goals and Objectives		Comments
Delaware Township is considering a municipal level engineering study on the feasibility of co-locating fire and ems units in a more central location to improve response times versus current distance from some sections of the township		
Goal 4	Reduce vulnerability including loss of life and damage to assets and the environment from natural and human-made hazards.	

Existing Goals and Objectives		Comments
Goal 5	Conserve, protect, restore and enhance existing natural systems and water resources that serve a natural hazard mitigation function.	
Goal 6	Increase awareness, understanding, and preparedness across all sectors by encouraging hazard risk, preparedness, and mitigation related education, training and outreach activities.	Consider county wide development of cert, citizens corps, etc to enhance response and recovery especially during weather related event which often create extended periods of isolation from normal emergency services of extended periods of time



Suggested Additional Goals and/or Objectives		Comments
Goal	Provide enhanced disinfection/decontamination capability for municipal building in consideration of covid 19 pandemic	
Objective	Purchase and install continuous flow “ionization”/uv air disinfection units	Increased health and safety for employees and the public utilizing the space. Improves continuity of operations and resiliency of emergency services during outbreaks
Objective	Purchase and provide this technology to emergency services (fire and ems)	
Objective	Increase inventory of PPE	
Goal	Improve cell phone and internet capability and access throughout township to insure critical communications reliability during emergencies	
Objective	Engage in study with county and providers for expanded improved service	Population increase and business growth in township require improved communications reliability for alerting the public and providing critical updates during disasters. Many gaps in coverage throughout the township and county that are not be addressed by service providers
Objective	Consider study for feasibility of communications infrastructure (cell tower) located on public(township) or fire or ems property	
Objective		
Goal	Enhance/ develop relationships with private HOA within township to improve response and communication during emergencies	
Objective	Seek funding and support from county or state level for establishment of CERT in these developments	Considerable increase to the year round population in these communities has increased vulnerability and human impacts particularly during weather related
Objective	Introduce and adopt FIREWISE Community program to these associations	

Objective	Brief private community leadership/residents annually on emergency preparedness and emergency management activities	events. Concurrently, existing volunteer emergency response resources are being overwhelmed when this occurs. Better understanding of the EM process and some “intermediate” local level of response is needed.
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Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing HMP and identify its status as “No Progress / Unknown, In Progress / Not Yet Complete, Continuous, Completed, or Discontinued.” Include review comments for each action.

Existing Mitigation Action	Status					Review Comments
	No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Conduct a feasibility study to size and correctly design a backup-power system for the two buildings at Camp Akenac Recreation Hall and Maintenance building (Township-owned).				X		STUDY COMPLETED PROJECT TABLED FOR FURTHER CONSIDERATION
Identify locations in the Township where emergency sirens should be staged for all hazard emergency notification to residents and responders.		X				POPULATION INFLUX CHANGING DEMOGRAPHICS MAY INCREASE PRIORITY- COST BENEFIT ANALYSIS NEEDED
Roads used to be interconnected but are no longer due to maintenance and right of ways. Conduct a geospatial study to identify roads that used to be connected that are needed to facilitate emergency service access to communities; and prioritize rehabilitation of these roads.		X	X			SUBSEQUENT TO WINTER STORMS RILEY/QUINN SOME ALTERNATIVE ACCESS POINTS WERE RE- ESTABLISHED. OTHERS STILL NEED REVIEW
Assess the bridge on Log and Twig Road's current status; determine if bridge can be mitigated to clear dam failure; and determine alternate route for emergency access, rehabilitate the dam headwalls.				X		REPAIRED TO MEET CURRENT STANDARDS
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials			X			RESOURCE ALLOCATION FROM STATE LEVEL FOR LOCAL SUPPORT DURING WEATHER EVENTS NOT CONSISTENT WITH CHANGE IN POPULATION OF THE AREA

Existing Mitigation Action	Status					Review Comments
	No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Ensure the continuity of operations at critical facilities. This may include backup power or staging equipment in the Township to respond/recover more quickly.			X			DUE TO LIMITED RESOURCES/STAFFING ASSESSMENT IS DONE PRIOR TO AND THROUGHOUT EVENTS TO ACHIEVE BEST ALLOCATION. MANY NEEDS ARE UNMET WITHIN EXISTING PLANS
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.			X			INCLUDED IN NORMAL PERMIT OR COMPREHENSIVE PLANNING PROCESS WHERE APPLICABLE



Jurisdictional Risk - delaware township
(Municipality Name)

What is a Risk Ranking?

Risk Ranking is used to understand the vulnerabilities to hazards and to prioritize projects and activities for mitigation. The risk ranking was determined by quantitative and qualitative factors including:

- Probability of occurrence – likelihood of a hazard event occurring in any given year
- Impact – in terms of injuries, damages, or fatalities, what are the impacts?
- Spatial Extent – how large of an area would be impacted from an event?
- Warning Time – what is the warning time for the hazard?
- Duration – how does the hazard event usually last?

The following table represents the calculated rankings for the hazards of concern in Pike County. Please review the table and indicate whether your municipality's risk is greater than, less than, or about the same as the county's overall risk. Use the following to show your answers:

- > Your municipality's risk from this hazard is greater than the county's risk as a whole
- < Your municipality's risk from this hazard is less than the county's risk as a whole
- = Your municipality's risk from this hazard is about the same as the county's risk as a whole

Municipality	Disease Outbreak	Drought	Drowning	Earthquake	Environmental Hazards	Extreme Temperatures	Flood	Geologic	Hurricane, /Nor'Easter	Invasive Species	Nuclear Incidents	Radon	Severe Weather	Severe Winter Weather	Terrorism	Transportation	Urban Fire	Utility	Wildfire
	2.6	2.8	2.2	1.9	3	2.8	3.2	1.6	2.2	2.8	2	3.1	3.1	3	2.1	2.5	2	3	2.8
	=	=	>	=	=	=	=	=	=	=	<	=	=	=	<	<	<	=	>



Pike County Planning Team Risk Assessment Review Meeting

Hazard Risk	Hazards	Risk Assessment Category					Risk Factor (RF)
		Probability	Impact	Spatial Extent	Warning Time	Duration	
High	Flood	4	3	3	2	3	3.2
	Radon	4	2	4	1	4	3.1
	Severe Weather	4	2	4	3	2	3.1
	Environmental Hazards	4	2	3	4	2	3
	Severe Winter Weather	4	2	4	2	2	3
	Utility	4	2	2	4	4	3
	Drought	3	2	4	1	4	2.8
	Extreme Temperatures	3	2	4	2	3	2.8
	Invasive Species	4	1	4	1	4	2.8
	Wildfire	4	1	3	4	3	2.8
	Disease Outbreak	2	3	3	1	4	2.6
	Transportation	4	2	1	4	1	2.5
Moderate	Drowning	4	1	1	4	1	2.2
	Hurricane/Nor'Easter	2	2	3	1	3	2.2
	Terrorism	2	1	2	4	4	2.1
	Nuclear Incidents	1	1	3	4	4	2
	Urban Fire	2	2	1	4	2	2
Low	Earthquake	1	1	4	4	1	1.9
	Geologic	2	1	1	4	1	1.6



Pike County Planning Team Risk Assessment Review Meeting

Summary of Risk Factor (RF) Methodology				
Risk Assessment Category	Degree of Risk			Weight Value
	Level	Criteria	Index	
PROBABILITY <i>What is the likelihood of a hazard event occurring in a given year?</i>	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 PROBABILITY	4	
IMPACT <i>In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?</i>	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 <i>How large of an area could be impacted by a hazard event? Are impacts localized or regional?</i>	NEGLECTIBLE	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 <i>Is there usually some lead time associated with the hazard event? Have warning measures been implemented?</i>	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 <i>How long does the hazard event usually last?</i>	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	

Risk Factor Methodology Equation

$$\text{RF Value} = [(\text{Probability} \times .30) + (\text{Impact} \times .30) + (\text{Spatial Extent} \times .20) + (\text{Warning Time} \times .10) + (\text{Duration} \times .10)]$$

Hazard Identification and Risk Evaluation Worksheet

Name: Karen Kleist

Title: Sec/Treas

Jurisdiction: Dingman Township

Email: dingman@ptd.net

PART I

Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Natural Hazards		
Dam Failure	NC	
Disease Outbreak/ Pandemic	I	
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	NC	
Flood (riverine, flash, stormwater, and ice jam)	NC	
Hurricane, Tropical Storm, Nor'easter	NC	
Invasive Species and Harmful Algal Bloom	NC	
Geologic Hazards (landslides, subsidence/sinkholes)	NC	
Radon Exposure	NC	
Severe Weather (thunderstorms, lightning, hail, wind)	NC	
Wildfire	NC	
Severe Winter Weather (heavy snow, blizzards, ice)	NC	
Human-made Hazards		



Identified Hazards 2022 HMP	<p>How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community?</p> <p><i>NC = No Change; I = Increase; D = Decrease</i></p> <p><i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i></p>	Additional Comments
Drowning	NC	
Environmental Hazards (Hazardous Materials Release, Oil and Gas Wells, Pyrite)	NC	
Nuclear Incidents	NC	
Terrorism	NC	
Transportation Accidents	NC	
Urban Fire and Explosions	NC	
Utility Interruptions	NC	

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- | | |
|--|--|
| <input type="checkbox"/> Avalanche/Glacier | <input type="checkbox"/> Expansive Soils |
| <input type="checkbox"/> Coastal Erosion | <input type="checkbox"/> Tsunami |
| <input type="checkbox"/> Dust, Sand Storm | <input type="checkbox"/> Volcano |

Human-Caused

- | | |
|---|--|
| <input type="checkbox"/> Building or Structure Collapse | <input type="checkbox"/> Environmental Hazard - Gas and Liquid Pipelines |
| <input type="checkbox"/> Civil Disturbance | <input type="checkbox"/> Levee Failure |
| <input type="checkbox"/> Cyber Terrorism | <input type="checkbox"/> Mass Food/Animal Feed Contamination |
| <input type="checkbox"/> Disorientation | <input type="checkbox"/> Opioid Addiction Response |
| <input type="checkbox"/> Environmental Hazard - Coal Mining | <input type="checkbox"/> War and Criminal Activity |

Additional Comments:

Capability Assessment Survey

Name: Karen KleistTitle: Sec/TreasJurisdiction: Dingman TownshipEmail: dingman@ptd.netPhone Number: 570-296-8455

- 1. Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
<i>EXAMPLE: Hazard Mitigation Plan</i>	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	X			County EMA	
Emergency Operations Plan	X			Board of Supervisors	
Disaster Recovery Plan					
Evacuation Plan					
Continuity of Operations Plan	X	2021		Board of Supervisors	
NFIP					
NFIP – Community Rating System					
Floodplain Regulations (spec. NFIP Flood Damage Prevention Ordinance)	X	1999		Board of Supervisors	Contained in Zoning Ordinance
Floodplain Management Plan					

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
Zoning Regulations	x	2020		Board of Supervisors	
Subdivision Regulations	X	2019		Board of Supervisors	
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	x				
Open Space Management Plan (or Parks/Rec or Greenways Plan)					
Stormwater Management Plan / Ordinance	x	2012		Board of Supervisors	
Natural Resource Protection Plan					
Capital Improvement Plan					
Economic Development Plan					
Historic Preservation Plan					
Farmland Preservation					
Building Code	x			Board of Supervisors	
Fire Code	x			Board of Supervisors	
Other					

- 2. Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an “X” in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)		x		
Planners or engineers (with natural and/or human caused hazards knowledge)	x		Board of Supervisors	Appointed Twp engineers
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	x		Board of Supervisors	Appointed Twp engineers
Emergency Manager	x		Board of Supervisors	
NFIP Floodplain Administrator	x		Board of Supervisors	
Land Surveyors		x		
Scientists or staff familiar with the hazards of the community	x		Board of Supervisors	
Personnel skilled in GIS and/or FEMA’s HAZUS program		x		
Grant writers or fiscal staff to handle large or complex grants	x		Board of Supervisors	
Staff with expertise or training in benefit-cost analysis		x		
Other				

- 3. Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources *for hazard mitigation purposes* (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming	x		Board of Supervisors	
Community Development Block Grants (CDBG)		x		
Special Purpose Taxes	x		Board of Supervisors	
Gas / Electric Utility Fees		x		
Water / Sewer Fees		x		
Stormwater Utility Fees		x		
Development Impact Fees		x		
General Obligation, Revenue, and/or Special Tax Bonds	x		Board of Supervisors	
Partnering Arrangements or Intergovernmental Agreements	x		Board of Supervisors	
Other				

- 4. Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification	x		Dingman Twp Fire Dept	
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)	x		Dingman Twp Fire Dept	
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				

- 5. Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "X" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability			x
Administrative and Technical Capability		x	
Financial Capability		x	
Education and Outreach		x	

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)Name: Chris WoodTitle: Code Enforcement OfficerJurisdiction: Dingman TownshipEmail: dtseo@ptd.net

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	Recommended Action	Yes/No	Comments
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.	YES	Floodmaps are superimposed on County GIS available to public for free on internet
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.	YES	
c. Does the municipality support requests for map updates?	If yes, specify how.		
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how. N/A	N/A	Newest maps have not been completed yet. However, township ordinance automatically adopts the most current maps whenever change occurs
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how. YES		Township prohibits development in 100 year flood plain. However, should such be warranted, the applicant's engineer would work with Township engineer to determine flood elevations and proper means to mitigate.
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office. N/A		Have made no map changes.

2. FLOODPLAIN MANAGEMENT			
Requirement	Recommended Action	Yes/No	Comments
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.		
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.	no	No construction allowed in 100 year flood zone
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.	no	No subdivisions have been approved around any flood zones
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.	no	No construction is allowed in the 100 year flood zone. Last construction in flood zone was a rebuild of a fire destroyed house 25 years ago and house was elevated 18 inches higher than flood level with break away foundation
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.	no	Except as noted above, no construction has been permitted in flood zone. Said structure was checked after the 3 Delaware River floods and elevation in relation to house was recorded.
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.	Yes.	The only violator built a deck on a house that was previously constructed in a flood zone. He was required to pay an \$11,000.00 fine and rip the deck off
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: <ul style="list-style-type: none"> • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA 	If yes, specify activities.	yes	Prohibit new construction in 100 year flood zone and all the other items on the list .

3. FLOOD INSURANCE			
Requirement	Recommended Action	Yes/No	Comments
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	no	
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	no	No changes
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.	No	

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	Source of Information	Comments
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	No not necessary when an ordinance has a total prohibition.
Is the floodplain management an auxiliary function?	Community FPA	No. it is considered when issuing zoning/building/sewage permits etc. and when patrolling for ordinance violations.
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	Review all permits, patrol township for violations, maps are on county gis and available over internet. Maps are also on township gis. Ordinance is on internet.
What are the barriers to running an effective NFIP program in the community?	Community FPA	No problems
Compliance History		
Topic	Source of Information	Comments
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	yes
Are there any outstanding compliance issues (i.e., current violations)?		

When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book
Is a CAV or CAC scheduled or needed?		
Regulation		
Topic	Source of Information	Comments
Are the FIRMs digital or paper?	Community FPA	Paper but also on county gis
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	exceed
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	Applicant applies for a sewage or zoning permit. If the activity will be taking place in a 100 year flood zone, the permit will be denied
Insurance Summary		
Topic	Source of Information	Comments
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	Don't know
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	Don't know, but in the last three Delaware Rive floods, only one home was water damaged – no structural damage
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	4 private and a couple owned by National Park Service
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	Don't know
Community Rating System		
Topic	Source of Information	Comments
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	Don't know
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual	Don't know
What categories and activities provide CRS points and how can the class be improved?		Don't know
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative	

Mitigation Strategy 5-Year Mitigation Plan Review

Name: _____ Title: _____ Jurisdiction: _____

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing HMP. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Existing Goals and Objectives		Comments
Goal 1	Provide for properly managed and environmentally sound growth and disaster-resistant development.	
Goal 2	Reduce the potential impact of natural and human made hazards on property.	
Goal 3	Enhance and improve emergency services provided to the growing population of Pike County.	

Existing Goals and Objectives		Comments
Goal 4	Reduce vulnerability including loss of life and damage to assets and the environment from natural and human-made hazards.	
Goal 5	Conserve, protect, restore and enhance existing natural systems and water resources that serve a natural hazard mitigation function.	
Goal 6	Increase awareness, understanding, and preparedness across all sectors by encouraging hazard risk, preparedness, and mitigation related education, training and outreach activities.	

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing HMP and identify its status as “No Progress / Unknown, In Progress / Not Yet Complete, Continuous, Completed, or Discontinued.” Include review comments for each action.

Existing Mitigation Action	Status					Review Comments
	No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Tunnel Road height and width restrictions prevent emergency vehicles and plows to utilize the road. This road is also subject to flooding. The elevation of Interstate-84 would alleviate the access issues. Work with PennDOT to address.		X				Tunnel to be enlarged during next phase of i-84 reconstruction
Rattlesnake Bridge on Spring Brook Road, a single-lane bridge (County-owned), with weight limit; 50 houses may have limited access to emergency services due to the weight restrictions causing an isolated population. Stormwater runoff on both sides have caused the abutments to the bridge to move on the sandy soils. Work with County Engineering to replace the bridge as a two-lane and realign as needed.		X				Design/permit work progressing per County Engineer
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.			X			
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials					X	Most other entities have discontinued participation; no longer worthwhile investment of time.
Expand the Dingman Township Volunteer Fire Department which is the Township’s designated shelter and EMC office to include showers that are ADA-compliant to take in more people during emergencies.	X					
Ensure continuity of operations at Township critical facilities: ● Township Garage by installing a permanent generator, ● Municipal Office generator is old and requires an update; Fire House may need an upgrade				X		



Pike County Planning Team Risk Assessment Review Meeting

Hazard Risk	Hazards	Risk Assessment Category					Risk Factor (RF)
		Probability	Impact	Spatial Extent	Warning Time	Duration	
High	Flood	4 3	3 2	3 2	2	3	3.2
	Radon	4	2	4	1	4	3.1
	Severe Weather	4	2	4	3	2	3.1
	Environmental Hazards	4	2	3	4	2	3
	Severe Winter Weather	4	2 3	4	2	2	3
	Utility	4	2 3	2 3	4	4	3
	Drought	3	2	4	1	4	2.8
	Extreme Temperatures	3	2	4	2	3	2.8
	Invasive Species	4	1	4	1	4	2.8
	Wildfire	4 ?	1	3	4	3	2.8
	Disease Outbreak	2	3	3	1	4	2.6
	Transportation	4	2	1	4	1	2.5
Moderate	Drowning	4	1	1	4	1	2.2
	Hurricane/Nor'Easter	2 3	2 3	3	1	3	2.2
	Terrorism	2	1	2	4	4	2.1
	Nuclear Incidents	1	1	3	4	4	2
	Urban Fire	2	2	1	4	2	2
Low	Earthquake	1	1	4	4	1	1.9
	Geologic	2	1	1	4	1	1.6



Pike County Planning Team Risk Assessment Review Meeting

Summary of Risk Factor (RF) Methodology				
Risk Assessment Category	Degree of Risk			Weight Value
	Level	Criteria	Index	
PROBABILITY <i>What is the likelihood of a hazard event occurring in a given year?</i>	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 PROBABILITY	4	
IMPACT <i>In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?</i>	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 <i>How large of an area could be impacted by a hazard event? Are impacts localized or regional?</i>	NEGLECTIBLE	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 <i>Is there usually some lead time associated with the hazard event? Have warning measures been implemented?</i>	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 <i>How long does the hazard event usually last?</i>	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	

Risk Factor Methodology Equation

$$\text{RF Value} = ((\text{Probability} \times .30) + (\text{Impact} \times .30) + (\text{Spatial Extent} \times .20) + (\text{Warning Time} \times .10) + (\text{Duration} \times .10))$$

Capability Assessment Survey

Name: Gary Grelton Title: Supervisor

Jurisdiction: _____ Email: _____

Phone Number: 370-499-9658

1. Planning and Regulatory Capability: Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan			X	Greene Twp	
Emergency Operations Plan	X			Greene Twp	
Disaster Recovery Plan					
Evacuation Plan			X		
Continuity of Operations Plan					
NFIP					
NFIP – Community Rating System					
Floodplain Regulations (spec. NFIP Flood Damage Prevention Ordinance)					
Floodplain Management Plan					



Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
Zoning Regulations					
Subdivision Regulations	X			Greene Twp	
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)					
Open Space Management Plan (or Parks/Rec or Greenways Plan)	X			Greene Twp	Park update
Stormwater Management Plan / Ordinance	X				
Natural Resource Protection Plan					
Capital Improvement Plan					
Economic Development Plan					
Historic Preservation Plan					
Farmland Preservation	X			County (Pike)	
Building Code	X			Greene Twp	
Fire Code					
Other					



2. **Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)		X		
Planners or engineers (with natural and/or human caused hazards knowledge)		X		
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X			
Emergency Manager	X		PL	
NFIP Floodplain Administrator		X		
Land Surveyors		X		
Scientists or staff familiar with the hazards of the community		X		
Personnel skilled in GIS and/or FEMA's HAZUS program		X		
Grant writers or fiscal staff to handle large or complex grants		X		
Staff with expertise or training in benefit-cost analysis		X		
Other		X		



3. **Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources **for hazard mitigation purposes** (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming		X		
Community Development Block Grants (CDBG)		X		
Special Purpose Taxes		X		
Gas / Electric Utility Fees		X		
Water / Sewer Fees		X		
Stormwater Utility Fees		X		
Development Impact Fees		X		
General Obligation, Revenue, and/or Special Tax Bonds		X		
Partnering Arrangements or Intergovernmental Agreements		X		
Other				

4. **Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification		X		
StormReady certification		X		
Natural disaster or safety related school programs		X		
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)		X		
Public-private partnership initiatives addressing disaster-related issues		X		
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.		X		
Other				

5. **Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "X" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability	X		
Administrative and Technical Capability	X		
Financial Capability	X		
Education and Outreach	X		

Hazard Identification and Risk Evaluation Worksheet

Name: GARY CARLTON Title: SUPERVISOR
 Jurisdiction: GREENE Twp Email: _____

PART I

Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Natural Hazards		
Dam Failure	NC	
Disease Outbreak/ Pandemic	COVID 19 I	
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	NC	
Flood (riverine, flash, stormwater, and ice jam)	NC	
Hurricane, Tropical Storm, Nor'easter	NC	
Invasive Species and Harmful Algal Bloom	NC	
Geologic Hazards (landslides, subsidence/sinkholes)	NC	
Radon Exposure	NC	
Severe Weather (thunderstorms, lightning, hail, wind)	NC	
Wildfire	NC	
Severe Winter Weather (heavy snow, blizzards, ice)	NC	
Human-made Hazards		

Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Drowning		
Environmental Hazards (Hazardous Materials Release, Oil and Gas Wells, Pyrite)	NC	
Nuclear Incidents	NC	
Terrorism	NC	
Transportation Accidents	NC	
Urban Fire and Explosions	NC	
Utility Interruptions	NC	

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- | | |
|--|--|
| <input type="checkbox"/> Avalanche/Glacier | <input type="checkbox"/> Expansive Soils |
| <input type="checkbox"/> Coastal Erosion | <input type="checkbox"/> Tsunami |
| <input type="checkbox"/> Dust, Sand Storm | <input type="checkbox"/> Volcano |

Human-Caused

- | | |
|---|--|
| <input type="checkbox"/> Building or Structure Collapse | <input type="checkbox"/> Environmental Hazard - Gas and Liquid Pipelines |
| <input type="checkbox"/> Civil Disturbance | <input type="checkbox"/> Levee Failure |
| <input type="checkbox"/> Cyber Terrorism | <input type="checkbox"/> Mass Food/Animal Feed Contamination |
| <input type="checkbox"/> Disorientation | <input type="checkbox"/> Opioid Addiction Response |
| <input type="checkbox"/> Environmental Hazard - Coal Mining | <input type="checkbox"/> War and Criminal Activity |

None

Additional Comments:



Jurisdictional Risk - Greene Township
(Municipality Name)

What is a Risk Ranking?

Risk Ranking is used to understand the vulnerabilities to hazards and to prioritize projects and activities for mitigation. The risk ranking was determined by quantitative and qualitative factors including:

- Probability of occurrence – likelihood of a hazard event occurring in any given year
- Impact – in terms of injuries, damages, or fatalities, what are the impacts?
- Spatial Extent – how large of an area would be impacted from an event?
- Warning Time – what is the warning time for the hazard?
- Duration – how does the hazard event usually last?

The following table represents the calculated rankings for the hazards of concern in Pike County. Please review the table and indicate whether your municipality's risk is greater than, less than, or about the same as the county's overall risk. Use the following to show your answers:

- > Your municipality's risk from this hazard is greater than the county's risk as a whole
- < Your municipality's risk from this hazard is less than the county's risk as a whole
- = Your municipality's risk from this hazard is about the same as the county's risk as a whole

Municipality	Disease Outbreak	Drought	Drowning	Earthquake	Environmental Hazards	Extreme Temperatures	Flood	Geologic	Hurricane, /Nor'Easter	Invasive Species	Nuclear Incidents	Radon	Severe Weather	Severe Winter Weather	Terrorism	Transportation	Urban Fire	Utility	Wildfire
	2.6	2.8	2.2	1.9	3	2.8	3.2	1.6	2.2	2.8	2	3.1	3.1	3	2.1	2.5	2	3	2.8
	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=



Pike County Planning Team Risk Assessment Review Meeting

Hazard Risk	Hazards	Risk Assessment Category					Risk Factor (RF)
		Probability	Impact	Spatial Extent	Warning Time	Duration	
High	Flood	4	3	3	2	3	3.2
	Radon	4	2	4	1	4	3.1
	Severe Weather	4	2	4	3	2	3.1
	Environmental Hazards	4	2	3	4	2	3
	Severe Winter Weather	4	2	4	2	2	3
	Utility	4	2	2	4	4	3
	Drought	3	2	4	1	4	2.8
	Extreme Temperatures	3	2	4	2	3	2.8
	Invasive Species	4	1	4	1	4	2.8
	Wildfire	4	1	3	4	3	2.8
	Disease Outbreak	2	3	3	1	4	2.6
	Transportation	4	2	1	4	1	2.5
Moderate	Drowning	4	1	1	4	1	2.2
	Hurricane/Nor'Easter	2	2	3	1	3	2.2
	Terrorism	2	1	2	4	4	2.1
	Nuclear Incidents	1	1	3	4	4	2
	Urban Fire	2	2	1	4	2	2
Low	Earthquake	1	1	4	4	1	1.9
	Geologic	2	1	1	4	1	1.6



Pike County Planning Team Risk Assessment Review Meeting

Summary of Risk Factor (RF) Methodology				
Risk Assessment Category	Degree of Risk			Weight Value
	Level	Criteria	Index	
PROBABILITY <i>What is the likelihood of a hazard event occurring in a given year?</i>	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 PROBABILITY	4	
IMPACT <i>In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?</i>	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 <i>How large of an area could be impacted by a hazard event? Are impacts localized or regional?</i>	NEGLECTIBLE	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 <i>Is there usually some lead time associated with the hazard event? Have warning measures been implemented?</i>	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 <i>How long does the hazard event usually last?</i>	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	

Risk Factor Methodology Equation

$$\text{RF Value} = [(\text{Probability} \times .30) + (\text{Impact} \times .30) + (\text{Spatial Extent} \times .20) + (\text{Warning Time} \times .10) + (\text{Duration} \times .10)]$$

Hazard Identification and Risk Evaluation Worksheet

Name: _____

Title: _____

Jurisdiction: _____

Email: _____

PART I

Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Natural Hazards		
Dam Failure	NC	
Disease Outbreak/ Pandemic	I	Covid
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	I	
Flood (riverine, flash, stormwater, and ice jam)	I	
Hurricane, Tropical Storm, Nor'easter	NC	
Invasive Species and Harmful Algal Bloom	I	Gypsy moths, spotted lanternfly, emerald ash borer, hemlock wooly adelgid
Geologic Hazards (landslides, subsidence/sinkholes)	NC	
Radon Exposure	NC	
Severe Weather (thunderstorms, lightning, hail, wind)	I	Increase in thunderstorms and intensity
Wildfire	NC	
Severe Winter Weather (heavy snow, blizzards, ice)	I	



Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Human-made Hazards		
Drowning	NC	
Environmental Hazards (Hazardous Materials Release, Oil and Gas Wells, Pyrite)	NC	
Nuclear Incidents	NC	
Terrorism	NC	
Transportation Accidents	NC	
Urban Fire and Explosions	NC	
Utility Interruptions	I	More frequent; small/quick outages Poor cell service throughout the Township

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- | | |
|--|--|
| <input type="checkbox"/> Avalanche/Glacier | <input type="checkbox"/> Expansive Soils |
| <input type="checkbox"/> Coastal Erosion | <input type="checkbox"/> Tsunami |
| <input type="checkbox"/> Dust, Sand Storm | <input type="checkbox"/> Volcano |

Human-Caused

- | | |
|---|--|
| <input type="checkbox"/> Building or Structure Collapse – run-downed building that needs to come down | <input type="checkbox"/> Environmental Hazard - Gas and Liquid Pipelines |
| <input type="checkbox"/> Civil Disturbance | <input type="checkbox"/> Levee Failure |
| <input type="checkbox"/> Cyber Terrorism | <input type="checkbox"/> Mass Food/Animal Feed Contamination |
| <input type="checkbox"/> Disorientation | <input type="checkbox"/> Opioid Addiction Response |
| <input type="checkbox"/> Environmental Hazard - Coal Mining | <input type="checkbox"/> War and Criminal Activity |

Additional Comments:

- Don't include disorientation

Capability Assessment Survey

Name: _____

Title: _____

Jurisdiction: Lackawaxen

Email: _____

Phone Number: _____

- 1. Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
<i>EXAMPLE: Hazard Mitigation Plan</i>	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	X				
Emergency Operations Plan	X			Township EMC	
Disaster Recovery Plan	X			Township EMC	Part of the EOP
Evacuation Plan	X			Township EMC	Part of the EOP
Continuity of Operations Plan	X			Township EMC	Part of the EOP
NFIP	X				
NFIP – Community Rating System					
Floodplain Regulations (spec. NFIP Flood Damage Prevention Ordinance)	X				Within their building codes
Floodplain Management Plan					

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
Zoning Regulations	X				
Subdivision Regulations	X				
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	X				
Open Space Management Plan (or Parks/Rec or Greenways Plan)	X				
Stormwater Management Plan / Ordinance					
Natural Resource Protection Plan	X				Part of the Township's Comprehensive Plan
Capital Improvement Plan	X				Part of the annual budget
Economic Development Plan	X				Part of the Township's Comprehensive Plan
Historic Preservation Plan	X				Part of the Township's Comprehensive Plan
Farmland Preservation	X			County	
Building Code	X				Part of the Upper Delaware River Basin – specific codes
Fire Code	X				Part of the building code
Other					

- 2. Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an “X” in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	X		Township and County Planning Commission	
Planners or engineers (with natural and/or human caused hazards knowledge)	X		Engineer contractor	
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X		Engineer contractor	
Emergency Manager	X			
NFIP Floodplain Administrator	X		Township Supervisor	
Land Surveyors	X		Contractors	
Scientists or staff familiar with the hazards of the community		X		
Personnel skilled in GIS and/or FEMA’s HAZUS program		X		
Grant writers or fiscal staff to handle large or complex grants	X		Contractor	
Staff with expertise or training in benefit-cost analysis		X		
Other		X		

- 3. Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources *for hazard mitigation purposes* (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming	X		Within annual budget	
Community Development Block Grants (CDBG)		X		
Special Purpose Taxes		X		
Gas / Electric Utility Fees		X		
Water / Sewer Fees		X		
Stormwater Utility Fees		X		
Development Impact Fees		X		
General Obligation, Revenue, and/or Special Tax Bonds		X		
Partnering Arrangements or Intergovernmental Agreements		X		
Other		X		

- 4. Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification		X		
StormReady certification		X		
Natural disaster or safety related school programs		X		
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)		X		
Public-private partnership initiatives addressing disaster-related issues		X		
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.		X		
Other		X		

- 5. Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "X" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability		X	
Administrative and Technical Capability		X	
Financial Capability		X	
Education and Outreach		X	

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)

Name: _____

Title: _____

Jurisdiction: Lackawaxen

Email: _____

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	Recommended Action	Yes/No	Comments
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.	No	The maps and FIS are available online
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.	Yes	FIRMs are from 2000
c. Does the municipality support requests for map updates?	If yes, specify how.	Yes	When this happens, the Township will participate
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.	No	N/A
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.	No	
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.	No	

2. FLOODPLAIN MANAGEMENT			
Requirement	Recommended Action	Yes/No	Comments
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.	Yes	

Commented [AH1]: Code book online...check on the twp website



CHECKLIST TO IDENTIFY LOCAL COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

2. FLOODPLAIN MANAGEMENT			
<i>Requirement</i>	<i>Recommended Action</i>	<i>Yes/No</i>	<i>Comments</i>
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.	Yes	
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.		
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.		
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.		
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.		
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: <ul style="list-style-type: none"> • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA 	If yes, specify activities.		

Commented [AH1]: Code book online...check on the twp website

3. FLOOD INSURANCE			
<i>Requirement</i>	<i>Recommended Action</i>	<i>Yes/No</i>	<i>Comments</i>
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	No	



CHECKLIST TO IDENTIFY LOCAL COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

3. FLOOD INSURANCE			
Requirement	Recommended Action	Yes/No	Comments
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	No	
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.	Yes	If homeowners ask, then Township will tell them how to go about doing so

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	Source of Information	Comments
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	No
Is the floodplain management an auxiliary function?	Community FPA	No
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	Permit reviews and inspections
What are the barriers to running an effective NFIP program in the community?	Community FPA	Minimal flooding in the community
Compliance History		
Topic	Source of Information	Comments
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	Yes
Are there any outstanding compliance issues (i.e., current violations)?		No
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book



CHECKLIST TO IDENTIFY LOCAL COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

Is a CAV or CAC scheduled or needed?		
Regulation		
Topic	Source of Information	Comments
Are the FIRMs digital or paper?	Community FPA	Digital
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	Conditional use process – permitting, inspections, etc.
Insurance Summary		
Topic	Source of Information	Comments
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	Properties along the Lackawaxen River towards the Kimbel's Bridge
Community Rating System		
Topic	Source of Information	Comments
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	No
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual	
What categories and activities provide CRS points and how can the class be improved?		
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative	

Mitigation Strategy 5-Year Mitigation Plan Review

Name: _____ Title: _____ Jurisdiction: Lackawaxen

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing HMP. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Existing Goals and Objectives		Comments
Goal 1	Provide for properly managed and environmentally sound growth and disaster-resistant development.	
Goal 2	Reduce the potential impact of natural and human made hazards on property.	
Goal 3	Enhance and improve emergency services provided to the growing population of Pike County.	

Existing Goals and Objectives		Comments
Goal 4	Reduce vulnerability including loss of life and damage to assets and the environment from natural and human-made hazards.	
Goal 5	Conserve, protect, restore and enhance existing natural systems and water resources that serve a natural hazard mitigation function.	
Goal 6	Increase awareness, understanding, and preparedness across all sectors by encouraging hazard risk, preparedness, and mitigation related education, training and outreach activities.	

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing HMP and identify its status as “No Progress / Unknown, In Progress / Not Yet Complete, Continuous, Completed, or Discontinued.” Include review comments for each action.

Existing Mitigation Action	Status					Review Comments
	No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials			X			Ongoing capability – Township participates on the task force and attends meetings
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.			X			Ongoing capability
Stabler Road entrance needs to be widened and engineering design is required to ensure the safety of vehicles. Currently the road is too narrow and requires a 180-degree turn and with growing traffic this is a safety concern. If the road is closed due to downed trees or vehicular accidents, there is no alternate route for emergency services and this creates an isolated and vulnerable population.				X		Stabler Road entrance is complete; road is a dead end street Renewable bond with PennDOT – if the road is good in 5 years, then don't need to pay the bond
Improvements to Case Bridge to ensure it can handle flood waters: paving, rails, wing-walls, new bridge span and decking, beams,				X		
Ensure the continuity of operations at critical facilities in the Township.			X			Ongoing capability
Identify mechanisms to educate and inform Township residents regarding CodeRED for example newsletters, link of Township website to the County Emergency page, social media and other methods of public communication.			X			Ongoing capability – the Township provided outreach to residents to sign up

- Hergoz Bridge – bridge needs to be replaced
- Outreach program – increase outreach materials for their website and social media accounts – include info on hazards, preparing for upcoming storms, safe generator use



Jurisdictional Risk - LACKAWAYEN Township
(Municipality Name)

What is a Risk Ranking?

Risk Ranking is used to understand the vulnerabilities to hazards and to prioritize projects and activities for mitigation. The risk ranking was determined by quantitative and qualitative factors including:

- Probability of occurrence – likelihood of a hazard event occurring in any given year
- Impact – in terms of injuries, damages, or fatalities, what are the impacts?
- Spatial Extent – how large of an area would be impacted from an event?
- Warning Time – what is the warning time for the hazard?
- Duration – how does the hazard event usually last?

The following table represents the calculated rankings for the hazards of concern in Pike County. Please review the table and indicate whether your municipality's risk is greater than, less than, or about the same as the county's overall risk. Use the following to show your answers:

- > Your municipality's risk from this hazard is greater than the county's risk as a whole
- < Your municipality's risk from this hazard is less than the county's risk as a whole
- = Your municipality's risk from this hazard is about the same as the county's risk as a whole

Municipality	Disease Outbreak	Drought	Drowning	Earthquake	Environmental Hazards	Extreme Temperatures	Flood	Geologic	Hurricane, /Nor'East	Invasive Species	Nuclear Incidents	Radon	Severe Weather	Severe Winter Weather	Terrorism	Transportation	Urban Fire	Utility	Wildfire
	2.6	2.8	2.2	1.9	3	2.8	3.2	1.6	2.2	2.8	2	3.1	3.1	3	2.1	2.5	2	3	2.8
	=	<	=	=	=	=	=	=	=	=	<	=	=	=	<	=	=	>	=

Hazard Identification and Risk Evaluation Worksheet

Name: Robert H. Rohner, Jr.

Title: Chairman

Jurisdiction: Lehman Township

Email: lehmanpk@ptd.net

PART I

Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Natural Hazards		
Dam Failure	NC	
Disease Outbreak/ Pandemic	I	Covid 19 Pandemic
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	NC	
Flood (riverine, flash, stormwater, and ice jam)	NC	
Hurricane, Tropical Storm, Nor'easter	NC	
Invasive Species and Harmful Algal Bloom	I	Spotted Lantern Fly
Geologic Hazards (landslides, subsidence/sinkholes)	NC	
Radon Exposure	NC	
Severe Weather (thunderstorms, lightning, hail, wind)	I	Heavy rains, more than usual.
Wildfire	NC	
Severe Winter Weather (heavy snow, blizzards, ice)	NC	
Human-made Hazards		



Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Drowning	NC	
Environmental Hazards (Hazardous Materials Release, Oil and Gas Wells, Pyrite)	NC	
Nuclear Incidents	NC	
Terrorism		
Transportation Accidents	NC	
Urban Fire and Explosions	NC	
Utility Interruptions	I	Inadequate cell coverage by Verizon.

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- | | |
|--|--|
| <input type="checkbox"/> Avalanche/Glacier | <input type="checkbox"/> Expansive Soils |
| <input type="checkbox"/> Coastal Erosion | <input type="checkbox"/> Tsunami |
| <input type="checkbox"/> Dust, Sand Storm | <input type="checkbox"/> Volcano |

Human-Caused

- | | |
|---|---|
| <input type="checkbox"/> Building or Structure Collapse | <input checked="" type="checkbox"/> Environmental Hazard - Gas and Liquid Pipelines |
| <input type="checkbox"/> Civil Disturbance | <input type="checkbox"/> Levee Failure |
| <input checked="" type="checkbox"/> Cyber Terrorism | <input type="checkbox"/> Mass Food/Animal Feed Contamination |
| <input type="checkbox"/> Disorientation | <input checked="" type="checkbox"/> Opioid Addiction Response |
| <input type="checkbox"/> Environmental Hazard - Coal Mining | <input type="checkbox"/> War and Criminal Activity |

Additional Comments:

Capability Assessment Survey

Name: Robert H. Rohner, Jr.Title: ChairmanJurisdiction: Lehman TownshipEmail: lehmanpk@ptd.netPhone Number: 570-588-9365

- 1. Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
<i>EXAMPLE: Hazard Mitigation Plan</i>	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	x	06/2017		County EMA	
Emergency Operations Plan	x	06/2017		Lehman Township	
Disaster Recovery Plan					
Evacuation Plan					
Continuity of Operations Plan					
NFIP					
NFIP – Community Rating System					
Floodplain Regulations (spec. NFIP Flood Damage Prevention Ordinance)	x	2/7/2001		Lehman Township	
Floodplain Management Plan	x	Various		County EMA & Lehman Twp.	

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
Zoning Regulations	x	6/17/2004		Lehman Township	Presently under revision.
Subdivision Regulations	x	10/6/2005		Lehman Township	Presently under revision.
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	x	10/3/2001		Lehman Township	An revised/updated Plan will be enacted on 9/9/2021.
Open Space Management Plan (or Parks/Rec or Greenways Plan)	x	Various		Lehman Township	
Stormwater Management Plan / Ordinance	x	10/6/2005		Lehman Township	
Natural Resource Protection Plan					
Capital Improvement Plan					
Economic Development Plan					
Historic Preservation Plan					
Farmland Preservation					
Building Code	x	2004		Lehman Township	
Fire Code					
Other					

- 2. Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an “X” in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	x		Simone Collins Landscape Architects	
Planners or engineers (with natural and/or human caused hazards knowledge)		x		
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	x		McGoey, Hauser & Edasll	
Emergency Manager	x		Kyle Rohner	
NFIP Floodplain Administrator	x		Stanley Whittaker	
Land Surveyors		x		
Scientists or staff familiar with the hazards of the community		x		
Personnel skilled in GIS and/or FEMA’s HAZUS program		x		
Grant writers or fiscal staff to handle large or complex grants	x		Robert H. Rohner, Jr. & Simone Collins Landscape Architects	
Staff with expertise or training in benefit-cost analysis	x		Robert H. Rohner, Jr.	
Other				

- 3. Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources *for hazard mitigation purposes* (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming	x		Lehman Township	
Community Development Block Grants (CDBG)		x		
Special Purpose Taxes	x		Lehman Township	
Gas / Electric Utility Fees		x		
Water / Sewer Fees		x		
Stormwater Utility Fees		x		
Development Impact Fees		x		
General Obligation, Revenue, and/or Special Tax Bonds		x		
Partnering Arrangements or Intergovernmental Agreements	x		Lehman, Middle Smithfield & Smithfield Townships	Oak Grove Compost Sote
Other				

- 4. Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification		x		
StormReady certification			Pike County EMA	
Natural disaster or safety related school programs		x		
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)		x		
Public-private partnership initiatives addressing disaster-related issues		x		
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.		x		
Other				

- 5. Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "X" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability			x
Administrative and Technical Capability			x
Financial Capability			x
Education and Outreach			x

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)Name: Robert H. Rohner, Jr.Title: ChairmanJurisdiction: Lehman TownshipEmail: lehmanpk@ptd.net

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	Recommended Action	Yes/No	Comments
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.	Yes	
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.	No	
c. Does the municipality support requests for map updates?	If yes, specify how.	Yes	
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.	No	
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.	Yes	
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.	Yes	

2. FLOODPLAIN MANAGEMENT			
Requirement	Recommended Action	Yes/No	Comments
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.	Yes	

2. FLOODPLAIN MANAGEMENT			
Requirement	Recommended Action	Yes/No	Comments
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.	Yes	Lehman Township Zoning Office
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.	Yes	
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.	Yes	
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.	Yes	For new construction.
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.	Yes	
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: <ul style="list-style-type: none"> • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA 	If yes, specify activities.	No	

3. FLOOD INSURANCE			
Requirement	Recommended Action	Yes/No	Comments
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	Yes	

3. FLOOD INSURANCE			
Requirement	Recommended Action	Yes/No	Comments
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	No	
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.	No	

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	Source of Information	Comments
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	No
Is the floodplain management an auxiliary function?	Community FPA	Yes
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	Permit review and issuance. Use a GIS system. Inspection of the property by the township's Zoning Enforcement Officer.
What are the barriers to running an effective NFIP program in the community?	Community FPA	None
Compliance History		
Topic	Source of Information	Comments
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	Yes
Are there any outstanding compliance issues (i.e., current violations)?		No
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book

Is a CAV or CAC scheduled or needed?		
Regulation		
Topic	Source of Information	Comments
Are the FIRMs digital or paper?	Community FPA	Paper
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	Meet
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	
Insurance Summary		
Topic	Source of Information	Comments
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	Not known.
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	Not known.
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	Not known
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	
Community Rating System		
Topic	Source of Information	Comments
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	No
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual	
What categories and activities provide CRS points and how can the class be improved?		
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative	

Mitigation Strategy 5-Year Mitigation Plan Review

Name: Robert H. Rohner, Jr. _____ **Title:** _Chairman_____ **Jurisdiction:** _Lehman
Township_____

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing HMP. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Existing Goals and Objectives		Comments
Goal 1	Provide for properly managed and environmentally sound growth and disaster-resistant development.	
This is currently be implemented in the township's revised/updated Zoning Ordinance and Subdivision and Land Development Ordinance. Anticipate adoption by the end of 2021.		
Goal 2	Reduce the potential impact of natural and human made hazards on property.	
See above.		
Goal 3	Enhance and improve emergency services provided to the growing population of Pike County.	

Existing Goals and Objectives		Comments
<p>Lehman Township is forming its own ambulance service to be in operation by January 2022. It will be known as the Lehman Pike Emergency Medical Services. Bushkill Fire Company continues to expand its services for fire protection.</p>		
Goal 4	Reduce vulnerability including loss of life and damage to assets and the environment from natural and human-made hazards.	
<p>See above.</p>		

Existing Goals and Objectives		Comments
Goal 5	Conserve, protect, restore and enhance existing natural systems and water resources that serve a natural hazard mitigation function.	
Is being implemented in the township's revised/updated Zoning Ordinance and Subdivision and Land Development Ordinance.		
Goal 6	Increase awareness, understanding, and preparedness across all sectors by encouraging hazard risk, preparedness, and mitigation related education, training and outreach activities.	
Yes.		

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing HMP and identify its status as “No Progress / Unknown, In Progress / Not Yet Complete, Continuous, Completed, or Discontinued.” Include review comments for each action.

Existing Mitigation Action	Status					Review Comments
	No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials			x			
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.			x			<i>Ongoing action – when residents show an interest, the town will help</i>
Increase the capacity of the existing culverts along Broadhead Road in Lehman Township which regularly floods due to rain events and further harden the road embankments there are vulnerable to landslides.				x		<i>Project is complete and it does work – no issues after the recent storms</i>
Raspberry Run Road is an emergency route for responders and a secondary route to evacuate camps and three private communities. If Minks Pond Road is not accessible (main road), this road needs to be used and more direct route. The Township would like to have Raspberry Run Road drivable during times of disaster as an emergency access route and requires subsurface stone and tar and chip to keep the road in useable shape.		x				<i>DCNR owns to the gate of the Lehman Lake Rod & Gun Club from the Bushkill Falls Road. Lehman Lake owns the rest.</i>

- Raspberry Run Road – part falls on state land and the other part falls on private land
 - Minks Pond Road does close and the Raspberry Run Road needs to be used; Lehman Lake doesn't like it but they do let the township uses it
 - Could be a concern for traffic if used during an emergency
 - Keep action in as worded
- Dams – use general actions for each high hazard dam
 - LEHMAN LAKE
 - LAKE MASKENOZHA – dam was repaired but still a high hazard
 - MINK POND
 - MILL POND

- MAPLE LAKE – no longer an issue
 - POCONO MOUNTAIN LAKE
 - FIRST POND
- Stormwater issues – old culverts and pipes, cannot handle the capacity; no stream or creek maintenance
 - Sunset Lake Road
 - Brisco – replacing culvert in September
 - ACTION – implement a stream maintenance program to maintain the creeks and streams to reduce flooding, etc.
 - Conservation District – they can issue emergency permits and permits might not be needed for maintenance if they leave part of the tree
- Fire house is a shelter with generator installed
- Bushkill Outreach and Community Center – being constructed and will have a generator and serve as a shelter
- Communications between NPS and Township – road closures (Rt 209)
 - NPS does use CodeRED through their system so the county and munis will get the notification
 - Prolong closures go directly into the 911 center and pushed out to the appropriate people and a CodeRED message to the general public
 - When the NPS is going to close 209, the Township would like to know so they can close the road that goes down to 209 – it should be more than one call though (multiple people notified) – develop a chain of command so more people are informed
- Issue – lack of cell service throughout; when power goes out, cell service goes out; generators don't seem to turn on the cell towers (lack of battery backup or generators)
- Lehman Pike EMS will be in place in January 2022 – located in southern part of town
 - Need to purchase building
 - Retrofit to be a shelter – renovate bathrooms/showers, install backup generator, kitchen facilities, sleeping quarters
- Emergency Services Building – will be used as a fire station and EMS station and potential shelter – located in northern part of the town
 - Retrofit to be a shelter – needs bathrooms/showers, backup generator, kitchen facilities
-



Pike County Planning Team
Risk Assessment Review Meeting

Jurisdictional Risk -

Lehman Township

(Municipality Name)

What is a Risk Ranking?

Risk Ranking is used to understand the vulnerabilities to hazards and to prioritize projects and activities for mitigation. The risk ranking was determined by quantitative and qualitative factors including:

- Probability of occurrence – likelihood of a hazard event occurring in any given year
- Impact – in terms of injuries, damages, or fatalities, what are the impacts?
- Spatial Extent – how large of an area would be impacted from an event?
- Warning Time – what is the warning time for the hazard?
- Duration – how does the hazard event usually last?

The following table represents the calculated rankings for the hazards of concern in Pike County. Please review the table and indicate whether your municipality's risk is greater than, less than, or about the same as the county's overall risk. Use the following to show your answers:

- > Your municipality's risk from this hazard is greater than the county's risk as a whole
- < Your municipality's risk from this hazard is less than the county's risk as a whole
- = Your municipality's risk from this hazard is about the same as the county's risk as a whole

Municipality	Disease Outbreak	Drought	Drowning	Earthquake	Environmental Hazards	Extreme Temperatures	Flood	Geologic	Hurricane, Nor'Easter	Invasive Species	Nuclear Incidents	Radon	Severe Weather	Severe Winter Weather	Terrorism	Transportation	Urban Fire	Utility	Wildfire
	2.5	2.8	2.2	1.9	3	3.8	3.2	1.6	2.2	2.6	2	3.1	3.1	3	2.1	2.5	2	3	2.8
<i>Lehman</i>	=	=	=	=	=	=	=	=	>	=	=	<	=	=	=	=	=	>	<

Hazard Identification and Risk Evaluation Worksheet

Name: Thomas Oliver

Title: EM Coordinator

Jurisdiction: Matamoras Borough

Email: Ema@matamorasborough.com

PART I

Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Natural Hazards		
Dam Failure	NC	
Disease Outbreak/ Pandemic	Increase	
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	NC	
Flood (riverine, flash, stormwater, and ice jam)	NC	
Hurricane, Tropical Storm, Nor'easter	NC	
Invasive Species and Harmful Algal Bloom	NC	
Geologic Hazards (landslides, subsidence/sinkholes)	NC	
Radon Exposure	NC	
Severe Weather (thunderstorms, lightning, hail, wind)	NC	
Wildfire	NC	
Severe Winter Weather (heavy snow, blizzards, ice)	NC	
Human-made Hazards		



Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Drowning		
Environmental Hazards (Hazardous Materials Release, Oil and Gas Wells, Pyrite)	NC	
Nuclear Incidents	NC	
Terrorism	NC	
Transportation Accidents	NC	
Urban Fire and Explosions	NC	
Utility Interruptions	NC	

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- | | |
|--|--|
| <input type="checkbox"/> Avalanche/Glacier | <input type="checkbox"/> Expansive Soils |
| <input type="checkbox"/> Coastal Erosion | <input type="checkbox"/> Tsunami |
| <input type="checkbox"/> Dust, Sand Storm | <input type="checkbox"/> Volcano |

Human-Caused

- | | |
|---|--|
| <input type="checkbox"/> Building or Structure Collapse | <input type="checkbox"/> Environmental Hazard - Gas and Liquid Pipelines |
| <input type="checkbox"/> Civil Disturbance | <input checked="" type="checkbox"/> Levee Failure |
| <input checked="" type="checkbox"/> Cyber Terrorism | <input type="checkbox"/> Mass Food/Animal Feed Contamination |
| <input type="checkbox"/> Disorientation | <input type="checkbox"/> Opioid Addiction Response |
| <input type="checkbox"/> Environmental Hazard - Coal Mining | <input type="checkbox"/> War and Criminal Activity |

Additional Comments:

These new items have always been concerns and were always in our current plans.

Capability Assessment Survey

Name: Tom OlverTitle: EM CoordinatorJurisdiction: Matamoras BoroughEmail: Ema@matamorasborough.comPhone Number: 570-491-2771

- 1. Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
<i>EXAMPLE: Hazard Mitigation Plan</i>	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	X	2012		Pike county office of community planning	
Emergency Operations Plan	X				Revised 7/11/2019, no changes 2020, review set for Sept 2021
Disaster Recovery Plan			X		
Evacuation Plan			X		
Continuity of Operations Plan			X		
NFIP	X				
NFIP – Community Rating System					
Floodplain Regulations (spec. NFIP Flood Damage Prevention Ordinance)					
Floodplain Management Plan					

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
Zoning Regulations	Y				
Subdivision Regulations	Y				
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	Y				
Open Space Management Plan (or Parks/Rec or Greenways Plan)	Y				
Stormwater Management Plan / Ordinance	N				
Natural Resource Protection Plan	N				
Capital Improvement Plan	N				
Economic Development Plan					
Historic Preservation Plan	N				
Farmland Preservation	N				
Building Code	Y				
Fire Code	Y				
Other					

- 2. Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an “X” in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)		X		
Planners or engineers (with natural and/or human caused hazards knowledge)		X		
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X		Kiley Associates, BIU of PA	
Emergency Manager	X		Matamoras EMA	
NFIP Floodplain Administrator				
Land Surveyors	X		Kiley Associates	
Scientists or staff familiar with the hazards of the community		x		
Personnel skilled in GIS and/or FEMA’s HAZUS program		x		
Grant writers or fiscal staff to handle large or complex grants	x			
Staff with expertise or training in benefit-cost analysis	x			
Other				

- 3. Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources *for hazard mitigation purposes* (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming		x		
Community Development Block Grants (CDBG)	x			
Special Purpose Taxes	x			
Gas / Electric Utility Fees		X		
Water / Sewer Fees		X		
Stormwater Utility Fees		X		
Development Impact Fees		X		
General Obligation, Revenue, and/or Special Tax Bonds	X			
Partnering Arrangements or Intergovernmental Agreements	x			
Other				

- 4. Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification		x		
StormReady certification		X		
Natural disaster or safety related school programs		x		
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	x			
Public-private partnership initiatives addressing disaster-related issues		X		
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.		x		
Other				

- 5. Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "X" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability		x	
Administrative and Technical Capability		x	
Financial Capability		x	
Education and Outreach		x	

Mitigation Strategy 5-Year Mitigation Plan Review

Name: _____ Title: _____ Jurisdiction: _____

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
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- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
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Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing HMP. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Existing Goals and Objectives		Comments
Goal 1	Provide for properly managed and environmentally sound growth and disaster-resistant development.	
Goal 2	Reduce the potential impact of natural and human made hazards on property.	
Goal 3	Enhance and improve emergency services provided to the growing population of Pike County.	

Existing Goals and Objectives		Comments
Goal 4	Reduce vulnerability including loss of life and damage to assets and the environment from natural and human-made hazards.	
Goal 5	Conserve, protect, restore and enhance existing natural systems and water resources that serve a natural hazard mitigation function.	
Goal 6	Increase awareness, understanding, and preparedness across all sectors by encouraging hazard risk, preparedness, and mitigation related education, training and outreach activities.	

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing HMP and identify its status as “No Progress / Unknown, In Progress / Not Yet Complete, Continuous, Completed, or Discontinued.” Include review comments for each action.

Existing Mitigation Action	Status					Review Comments
	No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.				X		
Develop a public phone, web, media dialer, email notification system for all hazard communications Borough-wide.	X					
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials			X			



Jurisdictional Risk - Matamoras, PA 18336

(Municipality Name)

What is a Risk Ranking?

Risk Ranking is used to understand the vulnerabilities to hazards and to prioritize projects and activities for mitigation. The risk ranking was determined by quantitative and qualitative factors including:

- Probability of occurrence – likelihood of a hazard event occurring in any given year
- Impact – in terms of injuries, damages, or fatalities, what are the impacts?
- Spatial Extent – how large of an area would be impacted from an event?
- Warning Time – what is the warning time for the hazard?
- Duration – how does the hazard event usually last?

The following table represents the calculated rankings for the hazards of concern in Pike County. Please review the table and indicate whether your municipality's risk is greater than, less than, or about the same as the county's overall risk. Use the following to show your answers:

- > Your municipality's risk from this hazard is greater than the county's risk as a whole
- < Your municipality's risk from this hazard is less than the county's risk as a whole
- = Your municipality's risk from this hazard is about the same as the county's risk as a whole

Municipality	Disease Outbreak	Drought	Drowning	Earthquake	Environmental Hazards	Extreme Temperatures	Flood	Geologic	Hurricane, /Nor'Easter	Invasive Species	Nuclear Incidents	Radon	Severe Weather	Severe Winter Weather	Terrorism	Transportation	Urban Fire	Utility	Wildfire
	2.6	2.8	2.2	1.9	3	2.8	3.2	1.6	2.2	2.8	2	3.1	3.1	3	2.1	2.5	2	3	2.8
	=	>	>	<	=	=	>	<	>	<	<	<	>	>	<	<	=	>	=



Pike County Planning Team Risk Assessment Review Meeting

Hazard Risk	Hazards	Risk Assessment Category					Risk Factor (RF)
		Probability	Impact	Spatial Extent	Warning Time	Duration	
High	Flood	4	3	3	2	3	3.2
	Radon	4	2	4	1	4	3.1
	Severe Weather	4	2	4	3	2	3.1
	Environmental Hazards	4	2	3	4	2	3
	Severe Winter Weather	4	2	4	2	2	3
	Utility	4	2	2	4	4	3
	Drought	3	2	4	1	4	2.8
	Extreme Temperatures	3	2	4	2	3	2.8
	Invasive Species	4	1	4	1	4	2.8
	Wildfire	4	1	3	4	3	2.8
	Disease Outbreak	2	3	3	1	4	2.6
	Transportation	4	2	1	4	1	2.5
Moderate	Drowning	4	1	1	4	1	2.2
	Hurricane/Nor'Easter	2	2	3	1	3	2.2
	Terrorism	2	1	2	4	4	2.1
	Nuclear Incidents	1	1	3	4	4	2
	Urban Fire	2	2	1	4	2	2
Low	Earthquake	1	1	4	4	1	1.9
	Geologic	2	1	1	4	1	1.6



Pike County Planning Team Risk Assessment Review Meeting

Summary of Risk Factor (RF) Methodology				
Risk Assessment Category	Degree of Risk			Weight Value
	Level	Criteria	Index	
PROBABILITY <i>What is the likelihood of a hazard event occurring in a given year?</i>	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 PROBABILITY	4	
IMPACT <i>In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?</i>	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 <i>How large of an area could be impacted by a hazard event? Are impacts localized or regional?</i>	NEGLECTIBLE	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 <i>Is there usually some lead time associated with the hazard event? Have warning measures been implemented?</i>	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 <i>How long does the hazard event usually last?</i>	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	

Risk Factor Methodology Equation

$$\text{RF Value} = [(\text{Probability} \times .30) + (\text{Impact} \times .30) + (\text{Spatial Extent} \times .20) + (\text{Warning Time} \times .10) + (\text{Duration} \times .10)]$$

Capability Assessment Survey

Name: DAVID E. RUBY

Title: EMA COORDINATOR MILFORD BOROUGH

Jurisdiction: MILFORD BOROUGH

Email: _____

Phone Number: _____

- 1. Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	X			COUNTY EMA	
Emergency Operations Plan	X			" "	
Disaster Recovery Plan					
Evacuation Plan					
Continuity of Operations Plan					
NFIP					
NFIP – Community Rating System					
Floodplain Regulations (spec. NFIP Flood Damage Prevention Ordinance)					
Floodplain Management Plan					

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
Zoning Regulations	X	2019		MILFORD BOROUGHS	
Subdivision Regulations	X	2019		" "	
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	X			PIKE COUNTY	
Open Space Management Plan (or Parks/Rec or Greenways Plan)					
Stormwater Management Plan / Ordinance					
Natural Resource Protection Plan					
Capital Improvement Plan					
Economic Development Plan					
Historic Preservation Plan	X			MILFORD BOROUGHS	
Farmland Preservation					
Building Code	X			MILFORD BOROUGHS	
Fire Code	X			MILFORD BOROUGHS	INCORPORATED W/ BUILDING CODE
Other					

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- | | | |
|--|-----------|--|
| <input type="checkbox"/> Avalanche/Glacier | <i>No</i> | <input type="checkbox"/> Expansive Soils |
| <input type="checkbox"/> Coastal Erosion | | <input type="checkbox"/> Tsunami |
| <input type="checkbox"/> Dust, Sand Storm | | <input type="checkbox"/> Volcano |

Human-Caused

- | | | |
|---|-----------|--|
| <input type="checkbox"/> Building or Structure Collapse | <i>No</i> | <input type="checkbox"/> Environmental Hazard - Gas and Liquid Pipelines |
| <input type="checkbox"/> Civil Disturbance | | <input type="checkbox"/> Levee Failure |
| <input type="checkbox"/> Cyber Terrorism | | <input type="checkbox"/> Mass Food/Animal Feed Contamination |
| <input type="checkbox"/> Disorientation | | <input type="checkbox"/> Opioid Addiction Response |
| <input type="checkbox"/> Environmental Hazard - Coal Mining | | <input type="checkbox"/> War and Criminal Activity |

Additional Comments:

Hazard Identification and Risk Evaluation Worksheet

Name: DAVID E. RUBY

Title: EMER MNGT COORD

Jurisdiction: MILFORD BOROUGH

Email: _____

PART I

Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Natural Hazards		
Dam Failure	NC	
Disease Outbreak/ Pandemic	I	COVID 19 2020 OUTBREAK
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	NC	
Flood (riverine, flash, stormwater, and ice jam)	NC	
Hurricane, Tropical Storm, Nor'easter	NC	
Invasive Species and Harmful Algal Bloom	NC	
Geologic Hazards (landslides, subsidence/sinkholes)	NC	
Radon Exposure	NC	
Severe Weather (thunderstorms, lightning, hail, wind)	NC	
Wildfire	NC	
Severe Winter Weather (heavy snow, blizzards, ice)	NC	
Human-made Hazards		



Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Drowning	NC	
Environmental Hazards (Hazardous Materials Release, Oil and Gas Wells, Pyrite)	NC	
Nuclear Incidents	NC	
Terrorism	NC	
Transportation Accidents	NC	
Urban Fire and Explosions	NC	
Utility Interruptions	NC	

2. **Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)		X		
Planners or engineers (with natural and/or human caused hazards knowledge)		X		
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)		X		SUB CONTRACTED
Emergency Manager		X		
NFIP Floodplain Administrator		X		
Land Surveyors		X		
Scientists or staff familiar with the hazards of the community		X		
Personnel skilled in GIS and/or FEMA's HAZUS program		X		PROVIDED BY COUNTY
Grant writers or fiscal staff to handle large or complex grants	X			CONTRACTED TO THIRD PARTY
Staff with expertise or training in benefit-cost analysis	X		MILFORD BOROUGH FINANCE COMMITTEE	
Other				



3. **Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources *for hazard mitigation purposes* (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming		X		
Community Development Block Grants (CDBG)		X		
Special Purpose Taxes		X		
Gas / Electric Utility Fees		X		
Water / Sewer Fees		X		
Stormwater Utility Fees		X		
Development Impact Fees		X		
General Obligation, Revenue, and/or Special Tax Bonds		X		
Partnering Arrangements or Intergovernmental Agreements		X		
Other				

4. **Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification		X		
StormReady certification		X		
Natural disaster or safety related school programs		X		
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)		X		
Public-private partnership initiatives addressing disaster-related issues		X		
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.		X		
Other				

5. **Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "X" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability	X		
Administrative and Technical Capability	X		
Financial Capability	X		
Education and Outreach	X		

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)

Name: DAVID B. RUSY Title: FEMA COORDINATOR

Jurisdiction: MILFORD TOWNSHIP Email: _____

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	Recommended Action	Yes/No	Comments
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.	NO	AVAILABLE THROUGH COUNTY
b. Has the municipality adopted the most current DFIRM/ FIRM and FIS?	State the date of adoption, if approved.	N/A	
c. Does the municipality support requests for map updates?	If yes, specify how.	YES	TARRANT COUNTY
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.	NO	
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.	NO	WOULD ASSIST IF REQUESTED
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.	NO	

2. FLOODPLAIN MANAGEMENT			
Requirement	Recommended Action	Yes/No	Comments
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.	NO	



CHECKLIST TO IDENTIFY LOCAL COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

2. FLOODPLAIN MANAGEMENT			
Requirement	Recommended Action	Yes/No	Comments
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.	NO	
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.	NO	
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.	NO	NO IN ANY
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.	NO	FLOOD PLAINS
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.	NO	
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: <ul style="list-style-type: none"> • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA 	If yes, specify activities.		

3. FLOOD INSURANCE			
Requirement	Recommended Action	Yes/No	Comments
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	NO	



CHECKLIST TO IDENTIFY LOCAL COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

3. FLOOD INSURANCE		
Requirement	Recommended Action	Yes/No
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	No
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.	No

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	Source of Information	Comments
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	
Is the floodplain management an auxiliary function?	Community FPA	N/A
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	
What are the barriers to running an effective NFIP program in the community?	Community FPA	
Compliance History		
Topic	Source of Information	Comments
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	PRESERVE
Are there any outstanding compliance issues (i.e., current violations)?		
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book



CHECKLIST TO IDENTIFY LOCAL COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

Is a CAV or CAC scheduled or needed?	
Regulation	
Topic	Source of Information
Are the FIRMs digital or paper?	Community FPA
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP
Insurance Summary	
Topic	Source of Information
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist
Community Rating System	
Topic	Source of Information
Does the community participate in CRS?	Community FPA, State, FEMA NFIP
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual
What categories and activities provide CRS points and how can the class be improved?	
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative

Mitigation Strategy 5-Year Mitigation Plan Review

Name: DAVID E. RUBY Title: EMA Coordinator Jurisdiction: MILFED REGION

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing HMP. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Existing Goals and Objectives		Comments
Goal 1	Provide for properly managed and environmentally sound growth and disaster-resistant development.	
		LIMITED DEVELOPMENT AVAILABLE - OVERSEEN BY BOARD PLANNING BOARD
Goal 2	Reduce the potential impact of natural and human made hazards on property.	
		ZONING BOARD ROUTINELY PROVIDES OVERSIGHT
Goal 3	Enhance and improve emergency services provided to the growing population of Pike County.	
		LIMITED TO BUREAU OF MUTUALS - NO COUNTY WIDE PROGRAM

Existing Goals and Objectives		Comments
Goal 4	Reduce vulnerability including loss of life and damage to assets and the environment from natural and human-made hazards.	Zoning Enforcement AND WORKS WITH BUREAU EMERGENCY SERVICE PERSONS
Goal 5	Conserve, protect, restore and enhance existing natural systems and water resources that serve a natural hazard mitigation function.	N/A
Goal 6	Increase awareness, understanding, and preparedness across all sectors by encouraging hazard risk, preparedness, and mitigation related education, training and outreach activities.	ON A D LDC BASIS PROVIDES INFORMATION TO RESIDENTS.

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing HMP and identify its status as “No Progress / Unknown, In Progress / Not Yet Complete, Continuous, Completed, or Discontinued.” Include review comments for each action.

Existing Mitigation Action	Status					Review Comments
	No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials			✓			
Work with the Pike County Office of Community Planning to map and/or update maps/plans for stormwater conveyance systems including pipe sizes, inlets, outlets, and integrate into GIS system			✓			
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	✓					
The Borough will continue to monitor and track rain events to determine if the stormwater system capacities are sufficient or if upgrades are needed to handle storm events.			✓			
Work to identify emergency shelters that could be utilized in times of weather event and natural disasters; obtain emergency backup power and supplies if so needed.			✓			
Identify mechanisms to educate and inform Borough residents regarding hazards events which could potentially impact the health and safety for example newsletters, social media and other methods of public communication.			✓			



Mifflord Township

Pike County Planning Team Risk Assessment Review Meeting

Hazard Risk	Hazards	Risk Assessment Category					Risk Factor (RF)	
		Probability	Impact	Spatial Extent	Warning Time	Duration		
High	Flood	4	3	3	2	3	3.2	<
	Radon	4	2	4	1	4	3.1	=
	Severe Weather	4	2	4	3	2	3.1	=
	Environmental Hazards	4	2	3	4	2	3	>
	Severe Winter Weather	4	2	4	2	2	3	=
	Utility	4	2	2	4	4	3	=
	Drought	3	2	4	1	4	2.8	=
	Extreme Temperatures	3	2	4	2	3	2.8	=
	Invasive Species	4	1	4	1	4	2.8	=
	Wildfire	4	1	3	4	3	2.8	=
	Disease Outbreak	2	3	3	1	4	2.6	=
	Transportation	4	2	1	4	1	2.5	=
Moderate	Drowning	4	1	1	4	1	2.2	<
	Hurricane/Nor'Easter	2	2	3	1	3	2.2	=
	Terrorism	2	1	2	4	4	2.1	=
	Nuclear Incidents	1	1	3	4	4	2	=
	Urban Fire	2	2	1	4	2	2	>
Low	Earthquake	1	1	4	4	1	1.9	=
	Geologic	2	1	1	4	1	1.6	=

Question - which category includes erosion impacts as many of our roads are steep slope

Hazard Identification and Risk Evaluation Worksheet

Name: _____ Title: _____

Jurisdiction: Milford Township Email: _____

PART I

Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community?	
	NC = No Change; I = Increase; D = Decrease	
	(Please provide an explanation for any hazards marked I or D in the “Additional Comments” column)	Additional Comments
Natural Hazards		
Dam Failure	I	Infrastructure is increasing in age
Disease Outbreak/ Pandemic	I	The community has experienced a reduction of medical services and facilities. The COVID 19 pandemic has caused a more rapid reduction of EMS Volunteers.
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	NC	
Flood (riverine, flash, stormwater, and ice jam)	NC	
Hurricane, Tropical Storm, Nor’easter	I	Intensity and frequency of storms has increased. Coordination from public utilities needs improvement.
Invasive Species and Harmful Algal Bloom	I	Algae blooms in ponds are intensifying; spotted lanternfly and purple ashbore are hitting the area.
Geologic Hazards (landslides, subsidence/sinkholes)	NC	
Radon Exposure	NC	

Commented [LK1]: Flooding on private property – 25 feet sockhill power rt 6



Severe Weather (thunderstorms, lightning, hail, wind)	I	Intensity and frequency of storms has increased.
Wildfire	NC	
Severe Winter Weather (heavy snow, blizzards, ice)	I	Increasing frequency of ice as precipitation from winter storms does more damage. The use of generators by residents has increased heavily and presents its own challenges/risks.
Human-made Hazards		
Drowning	NC	If the lifeguard shortages continue this risk has the potential to increase.
Environmental Hazards (Hazardous Materials Release, Oil and Gas Wells, Pyrite)	NC	
Nuclear Incidents	NC	Lack of information on how much nuclear waste travels through the County of 84 makes this risk difficult to assess or mitigate.
Terrorism	NC	
Transportation Accidents	NC	Bus and multi-vehicular accidents present a significant challenge for adequate emergency response.
Urban Fire and Explosions	NC	
Utility Interruptions	I	Duration of outages has increased as has the number of outages and accordingly the use of generators by residents. There is much room for improvement in coordination with the utility companies.

Commented [LK2]: Bridge may be undersized for amount of water – complaint from IDA
One roadway getting a significant amount of water that floods nearby cabins
Washouts on edges of roads, lots of hills, gullies form on sides of pavement and cause erosion, happen with every rainstorm

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- | | |
|---------------------|-------------------|
| • Avalanche/Glacier | • Expansive Soils |
| • Coastal Erosion | • Tsunami |
| • Dust, Sand Storm | • Volcano |

Human-Caused

- | | |
|--------------------------------------|---|
| • Building or Structure Collapse | • Environmental Hazard - Gas and Liquid Pipelines |
| • Civil Disturbance | • Levee Failure |
| • Cyber Terrorism | • Mass Food/Animal Feed Contamination |
| • Disorientation | • Opioid Addiction Response |
| • Environmental Hazard - Coal Mining | • War and Criminal Activity |

Additional Comments:

X Building or Structure Collapse (specifically bridges)

X Environmental Hazard - Gas and Liquid Pipelines has increased as there is more gas in area pipelines now. Risk is greater for challenging evacuation particularly at Econopak as the number of employees is significantly higher than ever before and with their plans to double the plant size will likely increase even more.

X Opioid Addiction Response



Capability Assessment Survey

Name: _____

Title: _____

Jurisdiction: Milford Township

Email: _____

Phone Number: _____

- 1. Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
<i>EXAMPLE: Hazard Mitigation Plan</i>	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	x			County EMA	
Emergency Operations Plan			X		Planning commission working on emergency management plan September 2021
Disaster Recovery Plan					
Evacuation Plan			X		Will be part of EM plan
Continuity of Operations Plan					
NFIP					
NFIP – Community Rating System					
Floodplain Regulations (spec. NFIP Flood Damage Prevention Ordinance)					

Floodplain Management Plan					
Zoning Regulations	x	6/5/17			
Subdivision Regulations	x	8/20/18			
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	x				Township Comprehensive Plan was adopted in 2006. A new plan is about to begin.
Open Space Management Plan (or Parks/Rec or Greenways Plan)	x			County Planning Agency	
Stormwater Management Plan / Ordinance					Included in SALDO
Natural Resource Protection Plan					
Capital Improvement Plan					
Economic Development Plan	x			County EDA	
Historic Preservation Plan					
Farmland Preservation	x			County Ag Preservation Board	
Building Code	x	2/7/05		PA Statewide Bldg Code	
Fire Code	x			Commonwealth of PA	
Other	x	12/1/03			Fire Damage Ordinance
Other	x	11/18/85			Bldg & Floodplain Regulations Ordinance
Other	x	3/15/04			Well Ordinance

- 2. Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an “X” in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	x		Twp Planning Commission and Planning Consultant	
Planners or engineers (with natural and/or human caused hazards knowledge)	x		Twp Planning Commission and Planning Consultant	
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	x		Twp Engineer	
Emergency Manager	x		Twp EMC	
NFIP Floodplain Administrator				
Land Surveyors				
Scientists or staff familiar with the hazards of the community	x		Twp EMC & Roadmaster	
Personnel skilled in GIS and/or FEMA’s HAZUS program	x		County staff	
Grant writers or fiscal staff to handle large or complex grants	x		County staff	
Staff with expertise or training in benefit-cost analysis				
Other				

- 3. Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources *for hazard mitigation purposes* (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming				
Community Development Block Grants (CDBG)	x		County	
Special Purpose Taxes	x		EMS Tax	
Gas / Electric Utility Fees		x		
Water / Sewer Fees		x		Plan pending approval with DEP may change this over the life of this plan.
Stormwater Utility Fees		x		
Development Impact Fees		x		This is an item to be considered in coming comprehensive plan update.
General Obligation, Revenue, and/or Special Tax Bonds		x		
Partnering Arrangements or Intergovernmental Agreements	x			FD/EMS is a cooperative partnership with the Borough and Dingman Twp. We have a cooperative agreement with the Water Authority for emergency

Financial Resources	Yes	No	Department/Agency	Comments
				assistance. We have an intergovernmental agreement regarding the Eastern Pike Sewer Plan.
Other	x			Cable franchise tax

- 4. Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification			County	
StormReady certification			County	
Natural disaster or safety related school programs	x		Fire Department, School Police Department, County EMA	FD does school fire safety drills and runs school shooting safety drills. County is now running an EMS summer camp for youth.
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	x		County Conservation District, Fire Dept., County EMA, PEMA, Tick Born Disease Task Force	

Program/Organization	Yes	No	Department/Agency	Comments
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.	x		Fire Dept & EMS, OVR, Area Agency on Aging, PEEC, Delaware Riverkeeper Network, DRBC, Tick Born Disease Task Force, Penn St Cooperative Extension	
Other				Stop the Bleed Training would be valuable to have available locally particularly because of the limited EMS capacity and potential response times for a mass casualty event.

- 5. Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "X" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability			
Administrative and Technical Capability			
Financial Capability			
Education and Outreach			

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)

Name: _____	Title: _____
Jurisdiction: <u>Milford Township</u>	Email: _____

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate **comments**.

Commented [LK1]: Floodplain regs adopted in 1980s?
Unsure how to be compliant

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	Recommended Action	Yes/No	Comments
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.	Yes	
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.	Yes	
c. Does the municipality support requests for map updates?	If yes, specify how.		
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.		
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.		
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.		

CHECKLIST TO IDENTIFY LOCAL COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

2. FLOODPLAIN MANAGEMENT			
<i>Requirement</i>	<i>Recommended Action</i>	<i>Yes/No</i>	<i>Comments</i>
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.		
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.		
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.		
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.		
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.		
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.		
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: <ul style="list-style-type: none"> • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA 	If yes, specify activities.	No	No RL Properties

CHECKLIST TO IDENTIFY LOCAL COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

3. FLOOD INSURANCE			
Requirement	Recommended Action	Yes/No	Comments
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	No	
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.		
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.		

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	Source of Information	Comments
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	
Is the floodplain management an auxiliary function?	Community FPA	
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	
What are the barriers to running an effective NFIP program in the community?	Community FPA	
Compliance History		
Topic	Source of Information	Comments
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	
Are there any outstanding compliance issues (i.e., current violations)?		

CHECKLIST TO IDENTIFY LOCAL COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book
Is a CAV or CAC scheduled or needed?		
Regulation		
Topic	Source of Information	Comments
Are the FIRMs digital or paper?	Community FPA	
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	
Insurance Summary		
Topic	Source of Information	Comments
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	
Community Rating System		
Topic	Source of Information	Comments
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual	
What categories and activities provide CRS points and how can the class be improved?		
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative	

Mitigation Strategy 5-Year Mitigation Plan Review

Name: _____ Title: _____ Jurisdiction: _Milford Township_____

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing HMP. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Existing Goals and Objectives		Comments
Goal 1	Provide for properly managed and environmentally sound growth and disaster-resistant development.	
Goal 2	Reduce the potential impact of natural and human made hazards on property.	
Goal 3	Enhance and improve emergency services provided to the growing population of Pike County.	
<p>Improve collaboration with neighboring municipalities and EMS providers to increase hours of paid EMS service (as opposed to continued reliability on a rapidly decreasing pool of volunteers).</p>		

Goal 4	Reduce vulnerability including loss of life and damage to assets and the environment from natural and human-made hazards.
<p>Improve stormwater management systems supporting steep slope roadways where storm damage from high runoff has the potential to damage the roads and road shoulders and private property. These steep slope roadways include Vandermark Drive, Schocopee Road, sections of Foster Hill, and Schoolhouse Drive.</p>	
Goal 5	Conserve, protect, restore and enhance existing natural systems and water resources that serve a natural hazard mitigation function.
Goal 6	Increase awareness, understanding, and preparedness across all sectors by encouraging hazard risk, preparedness, and mitigation related education, training and outreach activities.
<p>Educate residents regarding safe and proper installation and use of generators in collaboration with County EMA and the Milford FD.</p>	

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective	Increase collaboration with the Borough and Milford Water Authority to make potable water available to Township residents in the event of long term power outages and to communicate this to residents, decreasing the displacement of residents during such emergencies.	
Objective	Increase collaboration with the power company and the Milford FD/EMS to coordinate storm and outage response so that safe tree removal is prioritized in areas with additional emergency needs (ie highly vulnerable residents or active EMS calls).	
Objective		
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		

Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing HMP and identify its status as “No Progress / Unknown, In Progress / Not Yet Complete, Continuous, Completed, or Discontinued.” Include review comments for each action.

Existing Mitigation Action	Status					Review Comments
	No Progress / Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials			X			
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.			X			
Work with the gas company (formerly Columbia Gas) to develop an evacuation plan to address emergencies related to the compressor station or the pipeline itself.		X				
Purchase a storage unit and shelter supplies including cots, blankets, MREs for the Township municipal hall that serves as a shelter					X	The Firehouse, located in Milford Borough, serves as a shelter and indications are that the municipal building is inadequate for this use and unnecessary.



Mifflord Township

Pike County Planning Team Risk Assessment Review Meeting

Hazard Risk	Hazards	Risk Assessment Category					Risk Factor (RF)	
		Probability	Impact	Spatial Extent	Warning Time	Duration		
High	Flood	4	3	3	2	3	3.2	<
	Radon	4	2	4	1	4	3.1	=
	Severe Weather	4	2	4	3	2	3.1	=
	Environmental Hazards	4	2	3	4	2	3	>
	Severe Winter Weather	4	2	4	2	2	3	=
	Utility	4	2	2	4	4	3	=
	Drought	3	2	4	1	4	2.8	=
	Extreme Temperatures	3	2	4	2	3	2.8	=
	Invasive Species	4	1	4	1	4	2.8	=
	Wildfire	4	1	3	4	3	2.8	=
	Disease Outbreak	2	3	3	1	4	2.6	=
	Transportation	4	2	1	4	1	2.5	=
Moderate	Drowning	4	1	1	4	1	2.2	<
	Hurricane/Nor'Easter	2	2	3	1	3	2.2	=
	Terrorism	2	1	2	4	4	2.1	=
	Nuclear Incidents	1	1	3	4	4	2	=
	Urban Fire	2	2	1	4	2	2	>
Low	Earthquake	1	1	4	4	1	1.9	=
	Geologic	2	1	1	4	1	1.6	=

Question - which category includes erosion impacts as many of our roads are steep slope

Hazard Identification and Risk Evaluation Worksheet

Name: _____

Title: _____

Jurisdiction: **Palmyra Twp.**

Email: _____

PART I

Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Natural Hazards		
Dam Failure		
Disease Outbreak/ Pandemic		
Drought		
Earthquake		
Extreme Temperatures (heat and cold)		
Flood (riverine, flash, stormwater, and ice jam)		
Hurricane, Tropical Storm, Nor'easter		
Invasive Species and Harmful Algal Bloom		
Geologic Hazards (landslides, subsidence/sinkholes)		
Radon Exposure		
Severe Weather (thunderstorms, lightning, hail, wind)		
Wildfire		
Severe Winter Weather (heavy snow, blizzards, ice)		
Human-made Hazards		



Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Drowning		
Environmental Hazards (Hazardous Materials Release, Oil and Gas Wells, Pyrite)		
Nuclear Incidents		
Terrorism		
Transportation Accidents		
Urban Fire and Explosions		
Utility Interruptions		

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- | | |
|--|--|
| <input type="checkbox"/> Avalanche/Glacier | <input type="checkbox"/> Expansive Soils |
| <input type="checkbox"/> Coastal Erosion | <input type="checkbox"/> Tsunami |
| <input type="checkbox"/> Dust, Sand Storm | <input type="checkbox"/> Volcano |

Human-Caused

- | | |
|---|--|
| <input type="checkbox"/> Building or Structure Collapse | <input type="checkbox"/> Environmental Hazard - Gas and Liquid Pipelines |
| <input type="checkbox"/> Civil Disturbance | <input type="checkbox"/> Levee Failure |
| <input type="checkbox"/> Cyber Terrorism | <input type="checkbox"/> Mass Food/Animal Feed Contamination |
| <input type="checkbox"/> Disorientation | <input type="checkbox"/> Opioid Addiction Response |
| <input type="checkbox"/> Environmental Hazard - Coal Mining | <input type="checkbox"/> War and Criminal Activity |

Additional Comments:

Capability Assessment Survey

Name: _____

Title: _____

Jurisdiction: Palmyra Twp

Email: _____

Phone Number: _____

- 1. Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
<i>EXAMPLE: Hazard Mitigation Plan</i>	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	X			County Planning	
Emergency Operations Plan	X	10/2013		Twp EMA	Plan in need of updating; should be updated every 5 years
Disaster Recovery Plan					Portions of EOP cover this
Evacuation Plan					Portions of EOP cover this
Continuity of Operations Plan					Portions of EOP cover this
NFIP					
NFIP – Community Rating System					
Floodplain Regulations (spec. NFIP Flood Damage Prevention Ordinance)					
Floodplain Management Plan					

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
Zoning Regulations	X	2019			
Subdivision Regulations	X	2013			
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	X				
Open Space Management Plan (or Parks/Rec or Greenways Plan)					
Stormwater Management Plan / Ordinance	X	1991			
Natural Resource Protection Plan					
Capital Improvement Plan					
Economic Development Plan					
Historic Preservation Plan					
Farmland Preservation	X			Pike County Plan	
Building Code	X				Use the PA State Building Codes
Fire Code	X				Use the PA State Building Codes
Other					

- 2. Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an “X” in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	X		Contracted planner	
Planners or engineers (with natural and/or human caused hazards knowledge)	X		Contracted planner	
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X		Contracted engineering firm	
Emergency Manager	X			
NFIP Floodplain Administrator				
Land Surveyors	X		Contracted engineering firm	
Scientists or staff familiar with the hazards of the community		X		
Personnel skilled in GIS and/or FEMA’s HAZUS program		X		
Grant writers or fiscal staff to handle large or complex grants	X		Contracted grant writers	
Staff with expertise or training in benefit-cost analysis		X		
Other		X		

- 3. Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources *for hazard mitigation purposes* (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming	X			Long-range planning related to sewers
Community Development Block Grants (CDBG)	X			
Special Purpose Taxes	X			Ambulance tax
Gas / Electric Utility Fees		X		
Water / Sewer Fees		X		
Stormwater Utility Fees		X		
Development Impact Fees	X			
General Obligation, Revenue, and/or Special Tax Bonds				
Partnering Arrangements or Intergovernmental Agreements	X			Emergency services – mutual aid agreements with Green Twp and Blooming Grove Twp for response in areas closer to their borders
Other		X		

- 4. Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification		X		
StormReady certification		X		
Natural disaster or safety related school programs	X			Fire prevention programs in the school
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	X			Fire prevention events held through the fire companies
Public-private partnership initiatives addressing disaster-related issues		X		
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	X			Lake Wallenpalpack Administration
Other		X		

- 5. Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "X" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability		X	
Administrative and Technical Capability		X	
Financial Capability		X	
Education and Outreach		X	

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)

Name: _____

Title: _____

Jurisdiction: Palmyra Twp

Email: _____

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	Recommended Action	Yes/No	Comments
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.		
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.		
c. Does the municipality support requests for map updates?	If yes, specify how.		
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.		
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.		
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.		

2. FLOODPLAIN MANAGEMENT			
Requirement	Recommended Action	Yes/No	Comments
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.		

2. FLOODPLAIN MANAGEMENT			
Requirement	Recommended Action	Yes/No	Comments
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.		
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.		
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.		
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.		
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.		
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: <ul style="list-style-type: none"> • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA 	If yes, specify activities.		

3. FLOOD INSURANCE			
Requirement	Recommended Action	Yes/No	Comments
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.		

3. FLOOD INSURANCE			
Requirement	Recommended Action	Yes/No	Comments
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.		
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.		

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	Source of Information	Comments
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	
Is the floodplain management an auxiliary function?	Community FPA	
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	
What are the barriers to running an effective NFIP program in the community?	Community FPA	
Compliance History		
Topic	Source of Information	Comments
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	
Are there any outstanding compliance issues (i.e., current violations)?		
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book

Is a CAV or CAC scheduled or needed?		
Regulation		
Topic	Source of Information	Comments
Are the FIRMs digital or paper?	Community FPA	
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	
Insurance Summary		
Topic	Source of Information	Comments
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	
Community Rating System		
Topic	Source of Information	Comments
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual	
What categories and activities provide CRS points and how can the class be improved?		
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative	

Mitigation Strategy 5-Year Mitigation Plan Review

Name: _____ Title: _____ Jurisdiction: _____

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing HMP. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Existing Goals and Objectives		Comments
Goal 1	Provide for properly managed and environmentally sound growth and disaster-resistant development.	
Goal 2	Reduce the potential impact of natural and human made hazards on property.	
Goal 3	Enhance and improve emergency services provided to the growing population of Pike County.	

Existing Goals and Objectives		Comments
Goal 4	Reduce vulnerability including loss of life and damage to assets and the environment from natural and human-made hazards.	
Goal 5	Conserve, protect, restore and enhance existing natural systems and water resources that serve a natural hazard mitigation function.	
Goal 6	Increase awareness, understanding, and preparedness across all sectors by encouraging hazard risk, preparedness, and mitigation related education, training and outreach activities.	

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing HMP and identify its status as “No Progress / Unknown, In Progress / Not Yet Complete, Continuous, Completed, or Discontinued.” Include review comments for each action.

Existing Mitigation Action	Status					Review Comments
	No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials			X			<i>Maintenance staff attends all meetings related to this. This is an ongoing action that the township does on a day-to-day basis</i>
Township to facilitate outreach to private communities to obtain access rights to connecting roads for emergency services. This would provide increased access to both communities during hazard events such as storms that cause downed trees to provide multiple access points to populations and avoid isolated population. Construct gate with lock for Township and emergency services use only.			X			<i>Ongoing action – the Township is in communication with the communities; many roads are not gated anymore and provide access if needed</i>
Enhance education and awareness to seasonal population (lakeside communities) which increases population by greater than 50% on all hazards including the following: 1- Emergency communication systems (e.g., CodeRED) 2. Invasive species 3. Radon exposure		X				<i>Difficulty reaching out to the part time population</i> <i>The Township uses the portable message boards to make announcements</i>

- Stormwater issues – residential and municipal standpoints – largest threat in the Township; need to perform an assessment of stormwater management and identify remediation projects
 - Inadequate stormwater management and systems – lots of older communities that do not have the capacity to carry the stormwater, very minimal maintenance, limited spacing, and no funding
 - Steep slopes, terrible soils
 - Leads to basement flooding in some areas but majority of damages is related to roadway damages, stormwater systems in place are constantly being damaged, ponding in roadways
 - Private community/township road/state road – stormwater issues (ponding, consistent damage) – Rt 507 (state road) and Pellet Road (township road) and Kellem Park (community)

- Community association roads and other township roads that are impacted during severe storm events as a result of the stormwater systems
- Stormwater erosion and stormwater management issues leads to HAB issues in the lakes – major source of nutrient pollution to the lake
 - Received grant to do dirt/gravel roads on community roads to show them how to manage the roads
- Fire departments need more portable pumps to assist with basement flooding of homes in the township
- Tanglewood Dam – high hazard dam but not owned by the township (privately owned)
- Boat fires on the lake – increase in occurrence – what kind of grants and funding are available?
 - Assess firefighting capabilities for responding to boat fires on the lake
 - Need proper equipment to respond – a boat to put the fire out, run sonar and hold scuba divers
- Stream bank protection
- Wetland protection
- Rehabilitation for stormwater - wetlands



Pike County Planning Team Risk Assessment Review Meeting

Jurisdictional Risk -

Palmira
(Municipality Name)

What is a Risk Ranking?

Risk Ranking is used to understand the vulnerabilities to hazards and to prioritize projects and activities for mitigation. The risk ranking was determined by quantitative and qualitative factors including:

- Probability of occurrence – likelihood of a hazard event occurring in any given year
- Impact – in terms of injuries, damages, or fatalities, what are the impacts?
- Spatial Extent – how large of an area would be impacted from an event?
- Warning Time – what is the warning time for the hazard?
- Duration – how does the hazard event usually last?

The following table represents the calculated rankings for the hazards of concern in Pike County. Please review the table and indicate whether your municipality's risk is greater than, less than, or about the same as the county's overall risk. Use the following to show your answers:

- > Your municipality's risk from this hazard is greater than the county's risk as a whole
- < Your municipality's risk from this hazard is less than the county's risk as a whole
- = Your municipality's risk from this hazard is about the same as the county's risk as a whole

Municipality	Disease Outbreak	Drought	Drowning	Earthquake	Environmental Hazards	Extreme Temperatures	Flood	Geologic	Hurricane, /Nor' Easter	Invasive Species	Nuclear Incidents	Radon	Severe Weather	Severe Winter Weather	Terrorism	Transportation	Urban Fire	Utility	Wildfire
	2.6	2.8	2.2	1.9	3	2.8	3.2	1.6	2.2	2.8	2	3.1	3.1	3	2.1	2.5	2	3	2.8
	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=

Hazard Identification and Risk Evaluation Worksheet

Name: Rob Hellyer Title: Emergency Management
 Jurisdiction: Porter Twp, Pike County Email: info@portertownship.net ^{coordinator}

PART I

Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? NC = No Change; I = Increase; D = Decrease (Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)	Additional Comments
Natural Hazards		
Dam Failure	NC	
Disease Outbreak/ Pandemic	I	
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	NC	
Flood (riverine, flash, stormwater, and ice jam)	NC	
Hurricane, Tropical Storm, Nor'easter	I	
Invasive Species and Harmful Algal Bloom	I	gypsy moths spotted lantern fly
Geologic Hazards (landslides, subsidence/sinkholes)	NC	
Radon Exposure	NC	
Severe Weather (thunderstorms, lightning, hail, wind)	I	
Wildfire	I	
Severe Winter Weather (heavy snow, blizzards, ice)	I	ice and polar vortex
Human-made Hazards		



Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Drowning	NC	
Environmental Hazards (Hazardous Materials Release, Oil and Gas Wells, Pyrite)	NC	
Nuclear Incidents	NC	
Terrorism	NC	
Transportation Accidents	NC	
Urban Fire and Explosions	NC	
Utility Interruptions	NC	

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- | | |
|--|--|
| <input type="checkbox"/> Avalanche/Glacier | <input type="checkbox"/> Expansive Soils |
| <input type="checkbox"/> Coastal Erosion | <input type="checkbox"/> Tsunami |
| <input type="checkbox"/> Dust, Sand Storm | <input type="checkbox"/> Volcano |

Human-Caused

- | | |
|---|--|
| <input type="checkbox"/> Building or Structure Collapse | <input type="checkbox"/> Environmental Hazard - Gas and Liquid Pipelines |
| <input type="checkbox"/> Civil Disturbance | <input type="checkbox"/> Levee Failure |
| <input type="checkbox"/> Cyber Terrorism | <input type="checkbox"/> Mass Food/Animal Feed Contamination |
| <input type="checkbox"/> Disorientation | <input type="checkbox"/> Opioid Addiction Response |
| <input type="checkbox"/> Environmental Hazard - Coal Mining | <input type="checkbox"/> War and Criminal Activity |

Additional Comments:

Capability Assessment Survey

Name: Bob Hellyer Title: Emergency Management Coordinator
 Jurisdiction: Porter Twp Email: info@portertownship.net
 Phone Number: 570-234-8223

1. **Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	X			Porter Twp Supervisors/EMA	
Emergency Operations Plan	X			Porter Twp Supervisors/EMA	need to update
Disaster Recovery Plan					
Evacuation Plan	X			Porter Twp Supervisors/EMA	
Continuity of Operations Plan	X			Porter Twp Supervisors/EMA	
NFIP	X			Porter Twp Supervisors/EMA	
NFIP - Community Rating System					
Floodplain Regulations (spec. NFIP Flood Damage Prevention Ordinance)	X			Porter Twp Supervisors/EMA FEMA	
Floodplain Management Plan	X			Porter Twp Supervisors/EMA	



Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
Zoning Regulations	X			Porter Twp Supervisor / EMA	
Subdivision Regulations	X			Porter Twp Supervisor / EMA	
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	X			Porter Twp Supervisor / EMA	
Open Space Management Plan (or Parks/Rec or Greenways Plan)	X			Porter Twp Supervisor / EMA	
Stormwater Management Plan / Ordinance	X			Porter Twp Supervisor / EMA	
Natural Resource Protection Plan	X			Porter Twp Supervisor / EMA	
Capital Improvement Plan					
Economic Development Plan					
Historic Preservation Plan					
Farmland Preservation					
Building Code	X			Porter Twp Supervisor / EMA	
Fire Code	X			Porter Twp Supervisor / OITU	
Other					

2. **Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	X			Planning Commission
Planners or engineers (with natural and/or human caused hazards knowledge)		X		
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X		BIU Inspection	
Emergency Manager	X		EMA Coordinator	
NFIP Floodplain Administrator		X		
Land Surveyors		X		
Scientists or staff familiar with the hazards of the community		X		
Personnel skilled in GIS and/or FEMA's HAZUS program		X		
Grant writers or fiscal staff to handle large or complex grants		X		
Staff with expertise or training in benefit-cost analysis		X		
Other				

3. **Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources **for hazard mitigation purposes** (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming		X		
Community Development Block Grants (CDBG)		X		
Special Purpose Taxes		X		
Gas / Electric Utility Fees		X		
Water / Sewer Fees		X		
Stormwater Utility Fees		X		
Development Impact Fees		X		
General Obligation, Revenue, and/or Special Tax Bonds		X		
Partnering Arrangements or Intergovernmental Agreements		X		
Other				

- 4. Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification	X		Hemlock Farms Community	
StormReady certification		X		
Natural disaster or safety related school programs		X		
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)		X		
Public-private partnership initiatives addressing disaster-related issues		X		
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.		X		
Other				

5. **Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "X" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability	X		
Administrative and Technical Capability	X		
Financial Capability	X		
Education and Outreach	X		

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)

Name: Rob HellyerTitle: EMCJurisdiction: Porter Township, Pike CountyEmail: info@portertownship.vt

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING				
Requirement	Recommended Action	Yes/No	Comments	
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.	Yes		
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.	Yes		
c. Does the municipality support requests for map updates?	If yes, specify how.	NO		
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.	NO		
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.	Yes	Through planning/zoning	
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.	Yes	Township Secretary	
2. FLOODPLAIN MANAGEMENT				
Requirement	Recommended Action	Yes/No	Comments	
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.			



CHECKLIST TO IDENTIFY LOCAL COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

2. FLOODPLAIN MANAGEMENT

Requirement	Recommended Action	Yes/No	Comments
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.	Yes	Planning
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.	No	
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.	No	
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.	No	
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.	No	

c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include:	If yes, specify activities.		
<ul style="list-style-type: none"> Participation in the Community Rating System Prohibition of production or storage of chemicals in SFHA Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA Prohibition of certain types of residential housing (manufactured homes) in SFHA Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA 		No	

3. FLOOD INSURANCE

Requirement	Recommended Action	Yes/No	Comments
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	No	



CHECKLIST TO IDENTIFY LOCAL COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

3. FLOOD INSURANCE			
Requirement	Recommended Action	Yes/No	Comments
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	No	
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.	No	

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources			
Topic	Source of Information	Comments	
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	N/A	
Is the floodplain management an auxiliary function?	Community FPA	N/A	
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	N/A	
What are the barriers to running an effective NFIP program in the community?	Community FPA	N/A	
Compliance History			
Topic	Source of Information	Comments	
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	Yes	
Are there any outstanding compliance issues (i.e., current violations)?		No	
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book	



CHECKLIST TO IDENTIFY LOCAL COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

Is a CAV or CAC scheduled or needed?		N/A	
Regulation			
Topic	Source of Information		Comments
Are the FIRMs digital or paper?	Community FPA	Paper	
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	N/A	
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	Planning/Zoning	
Insurance Summary			
Topic	Source of Information		Comments
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	N/A	
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	N/A	
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	10 +	look at dam plans
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	N/A	
Community Rating System			
Topic	Source of Information		Comments
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	N/A	
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual		
What categories and activities provide CRS points and how can the class be improved?			
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative		

Mitigation Strategy 5-Year Mitigation Plan Review

Name: Keb Heiliger

Title: EMC

Jurisdiction: Porter Township, Pike County

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing HMP. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Existing Goals and Objectives		Comments
Goal 1	Provide for properly managed and environmentally sound growth and disaster-resistant development.	
Goal 2	Reduce the potential impact of natural and human made hazards on property.	
Goal 3	Enhance and improve emergency services provided to the growing population of Pike County.	

Existing Goals and Objectives		Comments
Goal 4	<ul style="list-style-type: none"> Reduce vulnerability including loss of life and damage to assets and the environment from natural and human-made hazards. 	
Goal 5	Conserve, protect, restore and enhance existing natural systems and water resources that serve a natural hazard mitigation function.	
Goal 6	Increase awareness, understanding, and preparedness across all sectors by encouraging hazard risk, preparedness, and mitigation related education, training and outreach activities.	

Mitigation Strategy 5-Year Mitigation Plan Review

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing HMP and identify its status as "No Progress / Unknown, In Progress / Not Yet Complete, Continuous, Completed, or Discontinued." Include review comments for each action.

Existing Mitigation Action	Status					Review Comments
	No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Increase capacity of the existing stormwater system to include the following areas: <ul style="list-style-type: none"> • Old Route 402 – subject to flooding and erosion • Snow Hill Road Whittaker Road 		X				
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	X					
Develop a customized communication plan for Porter Township to convey risk in multiple formats due unique conditions in Porter Township (e.g., poor cell phone coverage, several small private communities and properties without electricity), increase usage of social media, leverage County communication system (CodedRED and reverse 911) and regularly update points of in the Township's Emergency Plan (primary and secondary points of contact) to distribute information.		X				
Bushkill Bridge (steel bridge) is Township owned and gets inspected by the County. This bridge gets washed out at both ends and water goes over the bridge deck; major scouring has occurred and damage of guidrails. Ice has also damaged the bridge. Elevate the bridge or investigate other methods to ensure flood waters can pass.			X			Problems will be picked up with inspections
Ensure continuity of operations at Township critical facilities such as: 1) Township building does not have back-up power 2) Township-designated shelter (General Store - Pickeral Inn) needs to be replaced		X				
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials		X				



Jurisdictional Risk - Porter Township
(Municipality Name)

What is a Risk Ranking?

Risk Ranking is used to understand the vulnerabilities to hazards and to prioritize projects and activities for mitigation. The risk ranking was determined by quantitative and qualitative factors including:

- Probability of occurrence – likelihood of a hazard event occurring in any given year
- Impact – in terms of injuries, damages, or fatalities, what are the impacts?
- Spatial Extent – how large of an area would be impacted from an event?
- Warning Time – what is the warning time for the hazard?
- Duration – how does the hazard event usually last?

The following table represents the calculated rankings for the hazards of concern in Pike County. Please review the table and indicate whether your municipality's risk is greater than, less than, or about the same as the county's overall risk. Use the following to show your answers:

- > Your municipality's risk from this hazard is greater than the county's risk as a whole
- < Your municipality's risk from this hazard is less than the county's risk as a whole
- = Your municipality's risk from this hazard is about the same as the county's risk as a whole

Municipality	Disease Outbreak	Drought	Drowning	Earthquake	Environmental Hazards	Extreme Temperatures	Flood	Geologic	Hurricane, /Nor'Easter	Invasive Species	Nuclear Incidents	Radon	Severe Weather	Severe Winter Weather	Terrorism	Transportation	Urban Fire	Utility	Wildfire
	1.6	2.3	2.2	1.9	3	2.5	3.2	1.6	2.2	2.5	2	3.2	2.5	3	2.1	2.5	2	3	2.5
	=	=	<	=	<	=	<	=	=	>	<	=	=	>	<	>	<	=	>

Hazard Identification and Risk Evaluation Worksheet

Name: _____

Title: _____

Jurisdiction: Shohola

Email: _____

PART I

Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Natural Hazards		
Dam Failure	NC	
Disease Outbreak/ Pandemic	I	COVID-19 pandemic
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	NC	
Flood (riverine, flash, stormwater, and ice jam)	NC	
Hurricane, Tropical Storm, Nor'easter	NC	
Invasive Species and Harmful Algal Bloom	NC	
Geologic Hazards (landslides, subsidence/sinkholes)	NC	
Radon Exposure	NC	
Severe Weather (thunderstorms, lightning, hail, wind)	NC	
Wildfire	NC	
Severe Winter Weather (heavy snow, blizzards, ice)	NC	
Human-made Hazards		



Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Drowning	NC	
Environmental Hazards (Hazardous Materials Release, Oil and Gas Wells, Pyrite)	NC	
Nuclear Incidents	NC	
Terrorism	NC	
Transportation Accidents	NC	
Urban Fire and Explosions	NC	
Utility Interruptions	NC	Utility companies are moving power lines out of the woods and putting them closer to roadways; tree trimming

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- | | |
|--|--|
| <input type="checkbox"/> Avalanche/Glacier | <input type="checkbox"/> Expansive Soils |
| <input type="checkbox"/> Coastal Erosion | <input type="checkbox"/> Tsunami |
| <input type="checkbox"/> Dust, Sand Storm | <input type="checkbox"/> Volcano |

Human-Caused

- | | |
|---|--|
| <input type="checkbox"/> Building or Structure Collapse | <input type="checkbox"/> Environmental Hazard - Gas and Liquid Pipelines |
| <input type="checkbox"/> Civil Disturbance | <input type="checkbox"/> Levee Failure |
| <input type="checkbox"/> Cyber Terrorism | <input type="checkbox"/> Mass Food/Animal Feed Contamination |
| <input type="checkbox"/> Disorientation | <input type="checkbox"/> Opioid Addiction Response |
| <input type="checkbox"/> Environmental Hazard - Coal Mining | <input type="checkbox"/> War and Criminal Activity |

Additional Comments:

Capability Assessment Survey

Name: _____

Title: _____

Jurisdiction: Shohola

Email: _____

Phone Number: _____

- 1. Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
<i>EXAMPLE: Hazard Mitigation Plan</i>	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	X			County Planning	
Emergency Operations Plan	X			Emergency Management	
Disaster Recovery Plan					
Evacuation Plan					
Continuity of Operations Plan					
NFIP					
NFIP – Community Rating System					
Floodplain Regulations (spec. NFIP Flood Damage Prevention Ordinance)					
Floodplain Management Plan					

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
Zoning Regulations	X				
Subdivision Regulations	X				
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)					
Open Space Management Plan (or Parks/Rec or Greenways Plan)					
Stormwater Management Plan / Ordinance					
Natural Resource Protection Plan					
Capital Improvement Plan					
Economic Development Plan					
Historic Preservation Plan					
Farmland Preservation					
Building Code	X				PA State Building Code
Fire Code					
Other					

- 2. Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an “X” in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	X		Municipal Planning Board, Zoning Hearing Board, County Planning	
Planners or engineers (with natural and/or human caused hazards knowledge)				
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)				
Emergency Manager	X			
NFIP Floodplain Administrator				
Land Surveyors				
Scientists or staff familiar with the hazards of the community		X		
Personnel skilled in GIS and/or FEMA’s HAZUS program		X		
Grant writers or fiscal staff to handle large or complex grants	X		Fire Department has a grant writer for their grants	
Staff with expertise or training in benefit-cost analysis		X		
Other		X		

- 3. Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources *for hazard mitigation purposes* (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming	X		Part of the municipal budget	
Community Development Block Grants (CDBG)	X			
Special Purpose Taxes	X			Fire tax, Ambulance tax in the future
Gas / Electric Utility Fees		X		
Water / Sewer Fees		X		Municipal permit needed for well drilling
Stormwater Utility Fees		X		
Development Impact Fees		X		
General Obligation, Revenue, and/or Special Tax Bonds		X		
Partnering Arrangements or Intergovernmental Agreements		X		
Other		X		

- 4. Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification		X		Municipality would like to become a Firewise community
StormReady certification		X		Municipality would like to become a StormReady certification
Natural disaster or safety related school programs		X		
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	X			Fire safety programs to schools
Public-private partnership initiatives addressing disaster-related issues		X		
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.		X		Catskill Search and Rescue – fire department is associated with
Other		X		

- 5. Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "X" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability		X	
Administrative and Technical Capability		X	
Financial Capability		X	
Education and Outreach		X	

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)

Name: _____

Title: _____

Jurisdiction: Shohola

Email: _____

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	Recommended Action	Yes/No	Comments
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.	Yes	The maps and the flood insurance study are available online
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.	Yes	2000
c. Does the municipality support requests for map updates?	If yes, specify how.	Yes	During the next update, the Township will support the process
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.	No	While the Township has not done this, they would provide information if they had it
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.	Yes	The Township lets homeowners know how to find this information
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.	No	The Township does not have these

2. FLOODPLAIN MANAGEMENT			
Requirement	Recommended Action	Yes/No	Comments
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.		

Commented [AH1]: Check online to answer these questions – codes are online



CHECKLIST TO IDENTIFY LOCAL COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

2. FLOODPLAIN MANAGEMENT			
<i>Requirement</i>	<i>Recommended Action</i>	<i>Yes/No</i>	<i>Comments</i>
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.		
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.		
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.		
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.		
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.	Yes	
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: <ul style="list-style-type: none"> • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA 	If yes, specify activities.	No	

3. FLOOD INSURANCE			
<i>Requirement</i>	<i>Recommended Action</i>	<i>Yes/No</i>	<i>Comments</i>
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	No	

CHECKLIST TO IDENTIFY LOCAL COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

3. FLOOD INSURANCE			
Requirement	Recommended Action	Yes/No	Comments
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	Yes	When new maps are prepared, the Township will present them to the public
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.	Yes	Addressed as needed

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	Source of Information	Comments
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	No
Is the floodplain management an auxiliary function?	Community FPA	No
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	Permit reviews and inspections as needed
What are the barriers to running an effective NFIP program in the community?	Community FPA	None
Compliance History		
Topic	Source of Information	Comments
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	Yes
Are there any outstanding compliance issues (i.e., current violations)?		No
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book



CHECKLIST TO IDENTIFY LOCAL COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

Is a CAV or CAC scheduled or needed?		
Regulation		
Topic	Source of Information	Comments
Are the FIRMs digital or paper?	Community FPA	
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	
Insurance Summary		
Topic	Source of Information	Comments
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	
Community Rating System		
Topic	Source of Information	Comments
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual	
What categories and activities provide CRS points and how can the class be improved?		
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative	

Mitigation Strategy 5-Year Mitigation Plan Review

Name: _____ Title: _____ Jurisdiction: _Shohola_

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing HMP. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Existing Goals and Objectives		Comments
Goal 1	Provide for properly managed and environmentally sound growth and disaster-resistant development.	
Goal 2	Reduce the potential impact of natural and human made hazards on property.	
Goal 3	Enhance and improve emergency services provided to the growing population of Pike County.	

Existing Goals and Objectives		Comments
Goal 4	Reduce vulnerability including loss of life and damage to assets and the environment from natural and human-made hazards.	
Goal 5	Conserve, protect, restore and enhance existing natural systems and water resources that serve a natural hazard mitigation function.	
Goal 6	Increase awareness, understanding, and preparedness across all sectors by encouraging hazard risk, preparedness, and mitigation related education, training and outreach activities.	

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing HMP and identify its status as “No Progress / Unknown, In Progress / Not Yet Complete, Continuous, Completed, or Discontinued.” Include review comments for each action.

Existing Mitigation Action	Status					Review Comments
	No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials			X			<i>The Township participates in the task force meetings</i>
Ensure continuity of operations at Township buildings. The Town Barn that houses all equipment and vehicles (dump trucks, snow removal equipment, tractors) is in need of a backup generator to ensure continuity of operations during hazard events.			X	X		<i>Ongoing capability; the town barn did install a backup generator</i>
Sheltering: During Hurricane Irene, Twin Cedars (senior home) was evacuated to the Fire Department but it is not a suitable shelter; inadequate space; no handicap bathrooms and no shelter supplies. Construct an extension on the Fire Department to become a suitable shelter. Update the Township EOP to have the Township Building be primary shelter. It has larger rooms and handicap-accessible bathrooms. Purchase a storage unit and shelter supplies including cots, blankets, MREs for the Township to access when shelters open.		X	X			<i>Keep this in the plan – Include both fire stations (one station will house the ambulance) – outfit the two stations to be able to be used as shelters – there is already backup power but will need items for accommodations</i>
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.			X			<i>Ongoing capability that the township will address as needed</i>

- Become a FireWise Community
- Become a certified StormReady Community
- Enhance public outreach materials used on the website and facebook
- Walker Lake Dam – privately owned; high hazard dam
- Old Shohola Road/Rt 434 – water comes down the mountain and causes flooding – something needs to be done; it's a state road but nothing is being done

Capability Assessment Survey

Name: JEFF CAMMERINO
 Jurisdiction: WESTFALL TWP.
 Phone Number: 570-491-4065

Title: ZONING OFFICER
 Email: WESTFALLCEO@OPTONLINE.NET

- 1. Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
EXAMPLE: Hazard Mitigation Plan	X	1/1/2008		County EMA	Interim update in 2008 re completed
Hazard Mitigation Plan					
Emergency Operations Plan					
Disaster Recovery Plan					
Evacuation Plan					
Continuity of Operations Plan					
NFIP					
NFIP – Community Rating System					
Floodplain Regulations (spec. NFIP Flood Damage Prevention Ordinance)					
Floodplain Management Plan	X	1/2/01		ZONING	
Zoning Regulations	X	4/21/05		ZONING	
Subdivision Regulations	X	8/1/08		ZONING	
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	X			SUPERVISORS	
Open Space Management Plan (or Parks/Rec or Greenways Plan)	X	4/21/05		ZONING	
Stormwater Management Plan / Ordinance	X	8/1/08		ZONING	
Natural Resource Protection Plan					

Tool / Program	Status			Dept./Agency Responsible	Com
	In Place	Date Adopted or Updated	Under Development		
Capital Improvement Plan					
Economic Development Plan					
Historic Preservation Plan					
Farmland Preservation					
Building Code	X	7/3/90		BUILDING	
Fire Code					
Other					

- 2. Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an "X" in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	X		PLANNING COMMISSION	
Planners or engineers (with natural and/or human caused hazards knowledge)				
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X		KILEY ENGINEERS	
Emergency Manager	X		MIKE FICHTTA	
NFIP Floodplain Administrator	X		ZONING	
Land Surveyors				
Scientists or staff familiar with the hazards of the community				
Personnel skilled in GIS and/or FEMA's HAZUS program				
Grant writers or fiscal staff to handle large or complex grants				
Staff with expertise or training in benefit-cost analysis				
Other				

- 3. Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources *for hazard mitigation purposes* (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming				
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				

- 4. Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
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				

- 5. Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "X" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	
Planning and Regulatory Capability			
Administrative and Technical Capability			
Financial Capability			
Education and Outreach			

Checklist to Identify Local Compliance with the National Flood Insurance Program (NFIP)

Name: JEFF CAMMERINOTitle: ZONING OFFICERJurisdiction: WESTFALL TWPEmail: WESTFALLCEO@OPTONLINE.NET

Participation in the NFIP is based on a voluntary agreement between a community and FEMA. Compliance with the NFIP, however, extends beyond mere participation in the program. The three basic components of the NFIP include 1) floodplain identification and mapping risk, 2) responsible floodplain management and 3) flood insurance. The requirements of the program are listed below. Please state whether or not your jurisdiction takes the following actions and provide appropriate comments.

1. FLOODPLAIN IDENTIFICATION AND MAPPING			
Requirement	Recommended Action	Yes/No	Comments
a. Does the municipality maintain accessible copies of an effective Flood Insurance Rate Map (FIRM)/Digital Flood Insurance Rate Map (DFIRM)? Does the municipality maintain accessible copies of the most recent Flood Insurance Study (FIS)?	Place these documents in the local libraries or make available publicly.	Y	PAPER COPY ONLY
b. Has the municipality adopted the most current DFIRM/FIRM and FIS?	State the date of adoption, if approved.	Y	10/6/2000
c. Does the municipality support requests for map updates?	If yes, specify how.		
d. Does the municipality share with Federal Emergency Management Agency (FEMA) any new technical or scientific data that could result in map revisions within 6 months of creation or identification of new data?	If yes, specify how.	N	
e. Does the municipality provide assistance with local floodplain determinations?	If yes, specify how.	N	
f. Does the municipality maintain a record of approved Letters of Map Change?	If yes, specify the responsible office.	N	

2. FLOODPLAIN MANAGEMENT			
Requirement	Recommended Action	Yes/No	Comments
a. Has the municipality adopted a compliant floodplain management ordinance that, at a minimum, regulates the following:	If yes, answer questions (1) through (4) below.	Y	
(1) Does the municipality issue permits for all proposed development in the Special Flood Hazard Areas (SFHA)?	If yes, specify the office responsible.	Y	ZONING
(2) Does the municipality obtain, review, and utilize any base flood elevation (BFE) and floodway data, and/or require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres?	If yes, specify the office responsible.	Y	KILEY ENGINEERS

2. FLOODPLAIN MANAGEMENT			
Requirement	Recommended Action	Yes/No	Comments
(3) Does the municipality identify measures to keep all new and substantially improved construction reasonably safe from flooding to or above the BFE, including anchoring, using flood-resistant materials, and designing or locating utilities and service facilities to prevent water damage?	If yes, specify the office responsible.	Y	BUILDING DEPT.
(4) Does the municipality document and maintain records of elevation data that document lowest floor elevation for new or substantially improved structures?	If yes, specify the office responsible.	Y	ZONING
b. If a compliant floodplain ordinance was adopted, does the municipality enforce the ordinance by monitoring compliance and taking remedial action to correct violations?	If yes, specify how.	Y	COMPLIANCE TO ORDINANCE OR VIOLATION NOTICE
c. Has the municipality considered adopting activities that extend beyond the minimum requirements? Examples include: <ul style="list-style-type: none"> • Participation in the Community Rating System • Prohibition of production or storage of chemicals in SFHA • Prohibition of certain types of structures, such as hospitals, nursing homes, and jails in SFHA • Prohibition of certain types of residential housing (manufactured homes) in SFHA • Floodplain ordinances that prohibit any new residential or nonresidential structures in SFHA 	If yes, specify activities.	N	

3. FLOOD INSURANCE			
Requirement	Recommended Action	Yes/No	Comments
a. Does the municipality educate community members about the availability and value of flood insurance?	If yes, specify how.	N	
b. Does the municipality inform community property owners about changes to the DFIRM/FIRM that would impact their insurance rates?	If yes, specify how.	N	
c. Does the municipality provide general assistance to community members regarding insurance issues?	If yes, specify how.	N	

Please fill in the table below that will help provide specific information on the NFIP program in your community. This includes resources, compliance history, regulation, insurance summary, and the Community Rating System.

Staff Resources		
Topic	Source of Information	Comments
Is the Community FPA or NFIP Coordinator certified?	Community Floodplain Administrator (FPA)	N
Is the floodplain management an auxiliary function?	Community FPA	Y
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	Community FPA	ISSUING OF PERMITS
What are the barriers to running an effective NFIP program in the community?	Community FPA	
Compliance History		
Topic	Source of Information	Comments
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	YES
Are there any outstanding compliance issues (i.e., current violations)?	N	
When was the most recent Community Assistance Visits (CAV) or Community Assistance Contact (CAC)?	Community Status Book	https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book
Is a CAV or CAC scheduled or needed?		
Regulation		
Topic	Source of Information	Comments
Are the FIRMs digital or paper?	Community FPA	
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	DO NOT HAVE INFORMATION
Provide an explanation of the permitting process.	Community FPA, State, FEMA, NFIP	
Insurance Summary		
Topic	Source of Information	Comments
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	N/A
How many claims have been paid in the community? What is the total amount of paid claims? How many substantial damage claims have there been?	FEMA NFIP or Insurance Specialist	N/A
How many structures are exposed to flood risk within the community?	Community FPA or GIS Analyst	N/A
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA or FEMA Insurance Specialist	N/A
Community Rating System		
Topic	Source of Information	Comments

Does the community participate in CRS?	Community FPA, State, FEMA NFIP	
If so, what is the community's CRS Class Ranking?	Flood Insurance Manual	
What categories and activities provide CRS points and how can the class be improved?		
Does the plan include CRS planning requirements?	Community FPA, FEMA CRS Coordinator, ISO representative	

Hazard Identification and Risk Evaluation Worksheet

Name: Michael Fischetta

Title: Coordinator – Westfall EMA

Jurisdiction: Westfall Twp.

Email: westfallema@gmail.com

PART I

Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Natural Hazards		
Dam Failure	NC	
Disease Outbreak/ Pandemic	I	Global Pandemic – Covid-19
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	NC	
Flood (riverine, flash, stormwater, and ice jam)	I	We live in a flood prone area. A substantial amount of new construction has changed the geography in certain areas which may lead to greater damage during floods or ice jams.
Hurricane, Tropical Storm, Nor'easter	I	
Invasive Species and Harmful Algal Bloom	I	Lantern Flies
Geologic Hazards (landslides, subsidence/sinkholes)	NC	
Radon Exposure	NC	
Severe Weather (thunderstorms, lightning, hail, wind)	I	Severe Weather is a continuously growing threat.

Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Wildfire	NC	
Severe Winter Weather (heavy snow, blizzards, ice)	I	Mar. 2017 our area experienced a crippling blizzard that left people stranded on Interstate 84 for an extended period. Neighboring municipalities were without power for more than a few days.
Human-made Hazards		
Drowning	I	Heavily Increased with 7 drownings on the Delaware River this year.
Environmental Hazards (Hazardous Materials Release, Oil and Gas Wells, Pyrite)	NC	
Nuclear Incidents	NC	
Terrorism	I	As the terrorism risk grows National/Global along with cyberterrorism.
Transportation Accidents	NC	
Urban Fire and Explosions	NC	
Utility Interruptions	I	Westfall Twp. has experienced a vast increase in electrical interruptions.

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- | | |
|--|--|
| <input type="checkbox"/> Avalanche/Glacier | <input type="checkbox"/> Expansive Soils |
| <input type="checkbox"/> Coastal Erosion | <input type="checkbox"/> Tsunami |
| <input type="checkbox"/> Dust, Sand Storm | <input type="checkbox"/> Volcano |

Human-Caused

- | | |
|--|---|
| <input checked="" type="checkbox"/> Civil Disturbance | <input checked="" type="checkbox"/> Pipelines |
| <input checked="" type="checkbox"/> Cyber Terrorism | <input type="checkbox"/> Levee Failure |
| <input type="checkbox"/> Disorientation | <input type="checkbox"/> Mass Food/Animal Feed Contamination |
| <input type="checkbox"/> Environmental Hazard - Coal Mining | <input checked="" type="checkbox"/> Opioid Addiction Response |
| <input type="checkbox"/> Environmental Hazard - Gas and Liquid | <input checked="" type="checkbox"/> War and Criminal Activity |

Additional Comments:

Mitigation Strategy 5-Year Mitigation Plan Review

Name: _Michael Fischetta_____ **Title:** _Coordinator_____ **Jurisdiction:** _Westfall Township____

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing HMP. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Existing Goals and Objectives		Comments
Goal 1	Provide for properly managed and environmentally sound growth and disaster-resistant development.	
Goal 2	Reduce the potential impact of natural and human made hazards on property.	
Goal 3	Enhance and improve emergency services provided to the growing population of Pike County.	

Existing Goals and Objectives		Comments
Goal 4	Reduce vulnerability including loss of life and damage to assets and the environment from natural and human-made hazards.	
Goal 5	Conserve, protect, restore and enhance existing natural systems and water resources that serve a natural hazard mitigation function.	
Goal 6	Increase awareness, understanding, and preparedness across all sectors by encouraging hazard risk, preparedness, and mitigation related education, training and outreach activities.	

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing HMP and identify its status as “No Progress / Unknown, In Progress / Not Yet Complete, Continuous, Completed, or Discontinued.” Include review comments for each action.

Existing Mitigation Action	Status					Review Comments
	No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Reduce flood impacts to critical facilities and emergency access roads. 1. Relocate the Township Highway Department 2. Relocate the Eastern Pike Regional Police Department 3. Emergency access road LaBar Lane and Decker Drive. 4. Westfall Township Fire Department			X			
Conduct a feasibility study to evaluate mitigation alternatives to reduce flood impacts in Westfall Township and Matamoras Borough along the Route 6 corridor.	X					
Conduct education and outreach to Township residents regarding the option of purchasing NFIP flood insurance.		X				
The access road (Riverview Terrace) to the Milford Senior Care & Rehabilitation Center, located between Route 6/209 and the Delaware River, floods causing ingress/egress challenges for the vulnerable population. Increase the capacity of the existing concrete pipes and culverts and explore connecting the driveway to the Delaware Valley School next door.		X				
Purchase portable/deployable flood walls to mitigate flooding at the Township Municipal Building and the Westfall Fire Department located in the floodplain.						
Westfall Sewage Treatment Plant is located in the floodplain; electrical equipment is high enough but need to explore options to flood-proof the doors.		X				
Install backflow prevention or water-tight door or flap at the southerly side of the pedestrian crossing. The water pressure from the flood water would seal the opening and alleviate flooding in the Township of Matamoras.					X	
Install backflow prevention valves on remaining pipes to reduce flooding along the Route 209 Commercial Area.	X					

Existing Mitigation Action	Status					Review Comments
	No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties will be a priority, when applicable.	X					
Construct an emergency access road at the end of the cul-de-sac at the end of Mountain Avenue to access I-84 (westbound) to provide increased access/egress in emergencies.	X					
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials			X			
Promote or adopt higher regulatory and zoning standards to manage hazard risk; specifically, through updates to the building codes, flood ordinances, and subdivision and land development ordinances. Goals of increased standards are to ensure new buildings and infrastructure are discouraged or prohibited in high-hazard areas in their jurisdiction.	X					
The Bush Kill Creek traverses under Bluestone Boulevard. The channel runs very close to the edge of the road and is eroding the slope. There is debris in the channel backing up. Review the study currently being conducted to determine best mitigation action to implement.	X					



Pike County Planning Team Risk Assessment Review Meeting

Jurisdictional Risk -

Westfall Township

(Municipality Name)

What is a Risk Ranking?

Risk Ranking is used to understand the vulnerabilities to hazards and to prioritize projects and activities for mitigation. The risk ranking was determined by quantitative and qualitative factors including:

- Probability of occurrence – likelihood of a hazard event occurring in any given year
- Impact – in terms of injuries, damages, or fatalities, what are the impacts?
- Spatial Extent – how large of an area would be impacted from an event?
- Warning Time – what is the warning time for the hazard?
- Duration – how does the hazard event usually last?

The following table represents the calculated rankings for the hazards of concern in Pike County. Please review the table and indicate whether your municipality's risk is greater than, less than, or about the same as the county's overall risk. Use the following to show your answers:

- > Your municipality's risk from this hazard is greater than the county's risk as a whole
- < Your municipality's risk from this hazard is less than the county's risk as a whole
- = Your municipality's risk from this hazard is about the same as the county's risk as a whole

	Disease Outbreak	Drought	Drowning	Earthquake	Environmental Hazards	Extreme Temperatures	Flood	Geologic	Hurricane, /Nor'Easter	Invasive Species	Nuclear Incidents	Radon	Severe Weather	Severe Winter Weather	Terrorism	Transportation	Urban Fire	Utility	Wildfire
Municipality	2.6	2.8	2.2	1.9	3	2.8	3.2	1.6	2.2	2.8	2	3.1	3.1	3	2.1	2.5	2	3	2.8
	=	=	=	=	=	=	>	=	=	=	=	=	=	=	=	=	=	=	=



Pike County Planning Team Risk Assessment Review Meeting

Hazard Risk	Hazards	Risk Assessment Category					Risk Factor (RF)
		Probability	Impact	Spatial Extent	Warning Time	Duration	
High	Flood	4	3	3	2	3	3.2
	Radon	4	2	4	1	4	3.1
	Severe Weather	4	2	4	3	2	3.1
	Environmental Hazards	4	2	3	4	2	3
	Severe Winter Weather	4	2	4	2	2	3
	Utility	4	2	2	4	4	3
	Drought	3	2	4	1	4	2.8
	Extreme Temperatures	3	2	4	2	3	2.8
	Invasive Species	4	1	4	1	4	2.8
	Wildfire	4	1	3	4	3	2.8
	Disease Outbreak	2	3	3	1	4	2.6
	Transportation	4	2	1	4	1	2.5
Moderat	Drowning	4	1	1	4	1	2.2
	Hurricane/Nor'Easter	2	2	3	1	3	2.2
	Terrorism	2	1	2	4	4	2.1
	Nuclear Incidents	1	1	3	4	4	2
	Urban Fire	2	2	1	4	2	2
Low	Earthquake	1	1	4	4	1	1.9
	Geologic	2	1	1	4	1	1.6



Pike County Planning Team Risk Assessment Review Meeting

Summary of Risk Factor (RF) Methodology				
Risk Assessment Category	Degree of Risk			Weight Value
	Level	Criteria	Index	
PROBABILITY <i>What is the likelihood of a hazard event occurring in a given year?</i>	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 PROBABILITY	4	
IMPACT <i>In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?</i>	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 <i>How large of an area could be impacted by a hazard event? Are impacts localized or regional?</i>	NEGLECTIBLE	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 <i>Is there usually some lead time associated with the hazard event? Have warning measures been implemented?</i>	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 <i>How long does the hazard event usually last?</i>	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	

Risk Factor Methodology Equation

$$\text{RF Value} = [(\text{Probability} \times .30) + (\text{Impact} \times .30) + (\text{Spatial Extent} \times .20) + (\text{Warning Time} \times .10) + (\text{Duration} \times .10)]$$

Hazard Identification and Risk Evaluation Worksheet

Name: Brian Snyder

Title: Community Planner

Jurisdiction: Pike County

Email: bsnyder@pikepa.org

PART I

Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Natural Hazards		
Dam Failure	NC	
Disease Outbreak/ Pandemic	I	Covid-19 Tick Borne Diseases
Drought	NC	
Earthquake	NC	
Extreme Temperatures (heat and cold)	I	We have seen an increase in the number of days with extreme Temperatures
Flood (riverine, flash, stormwater, and ice jam)	I	Increase in Stormwater (Roadway damage)
Hurricane, Tropical Storm, Nor'easter	NC	
Invasive Species and Harmful Algal Bloom	I	Spotted Lantern Fly Lake Wallenpaupack Study Needed
Geologic Hazards (landslides, subsidence/sinkholes)	NC	
Radon Exposure	NC	
Severe Weather (thunderstorms, lightning, hail, wind)	I	Increase in Thunderstorms/intensity of storms
Wildfire	NC	
Severe Winter Weather (heavy snow, blizzards, ice)	I	March 2018 Storm Receiving larger snow events



Identified Hazards 2022 HMP	How has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community? <i>NC = No Change; I = Increase; D = Decrease</i> <i>(Please provide an explanation for any hazards marked I or D in the "Additional Comments" column)</i>	Additional Comments
Human-made Hazards		
Drowning	I	5 already in 2021
Environmental Hazards (Hazardous Materials Release, Oil and Gas Wells, Pyrite)	NC	
Nuclear Incidents	NC	
Terrorism	NC	
Transportation Accidents	NC	
Urban Fire and Explosions	NC	
Utility Interruptions	I	Increase in power/cell service outages

PART II

Other Hazards:

Do any of the following hazards (not previously profiled in the County's hazard mitigation plan) have the potential to affect your municipality significantly? If so, please check the box(es) below.

Natural

- | | |
|--|--|
| <input type="checkbox"/> Avalanche/Glacier | <input type="checkbox"/> Expansive Soils |
| <input type="checkbox"/> Coastal Erosion | <input type="checkbox"/> Tsunami |
| <input type="checkbox"/> Dust, Sand Storm | <input type="checkbox"/> Volcano |

Human-Caused

- | | |
|---|--|
| <input type="checkbox"/> Building or Structure Collapse | <input type="checkbox"/> Environmental Hazard - Gas and Liquid Pipelines |
| * <input type="checkbox"/> Civil Disturbance | <input type="checkbox"/> Levee Failure |
| <input type="checkbox"/> Cyber Terrorism | <input type="checkbox"/> Mass Food/Animal Feed Contamination |
| <input type="checkbox"/> Disorientation | <input type="checkbox"/> Opioid Addiction Response |
| <input type="checkbox"/> Environmental Hazard - Coal Mining | <input type="checkbox"/> War and Criminal Activity |

Additional Comments:

Pike County has seen an increase in protesting/public demonstrations over the last 5 years

Capability Assessment Survey

Name: Brian SnyderTitle: Community PlannerJurisdiction: Pike CountyEmail: bsnyder@pikepa.orgPhone Number: 570-296-3500

- 1. Planning and Regulatory Capability:** Please indicate whether the following planning or regulatory tools and programs are currently in place or under development for your jurisdiction by placing an "X" in the appropriate box, followed by the date of adoption/update. Then, for each particular item in place, identify the department or agency responsible for its implementation. Finally, please provide additional comments or explanations in the space provided.

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
<i>EXAMPLE: Hazard Mitigation Plan</i>	X	1/1/2008		County EMA	Interim update in 2008 revised mitigation strategy; completed one action.
Hazard Mitigation Plan	X	9/19/2017		County Planning	Currently updating
Emergency Operations Plan	X			County EMA/Commissioners	
Disaster Recovery Plan					Check with Pike EMA
Evacuation Plan					Check with Pike EMA
Continuity of Operations Plan	X			County Commissioners	
NFIP					Municipal
NFIP – Community Rating System					Municipal
Floodplain Regulations (spec. NFIP Flood Damage Prevention Ordinance)					Municipal
Floodplain Management Plan					

Tool / Program	Status			Dept./Agency Responsible	Comments
	In Place	Date Adopted or Updated	Under Development		
Zoning Regulations	X			Local Municipality	Greene Township does not have a Zoning Ordinance
Subdivision Regulations	X			Local Municipality	
Comprehensive Land Use Plan (or General, Master, or Growth Mgt. Plan)	X	11/2006		County Planning/ Local Municipality	Each municipality has its own Plan in addition to County Plan
Open Space Management Plan (or Parks/Rec or Greenways Plan)	X	8/2008			
Stormwater Management Plan / Ordinance			X	Pike County Conservation District	On hold- No Funding
Natural Resource Protection Plan					
Capital Improvement Plan					
Economic Development Plan					
Historic Preservation Plan					
Farmland Preservation	X			County Planning	County has Preservation Program
Building Code	X			Local Municipality	
Fire Code				Local Municipality	
Other					

- 2. Administrative and Technical Capability:** Please indicate whether your jurisdiction maintains the following staff members within its current personnel resources by placing an “X” in the appropriate box. Then, if YES, please identify the department or agency they work under and provide any other comments you may have in the space provided or with attachments.

Staff/Personnel Resources	Yes	No	Department/Agency	Comments
Planners (with land use / land development knowledge)	X		County Planning	
Planners or engineers (with natural and/or human caused hazards knowledge)	X		County Planning	
Engineers or professionals trained in building and/or infrastructure construction practices (includes building inspectors)	X		County Engineer	
Emergency Manager	X		County EMA	
NFIP Floodplain Administrator		X		
Land Surveyors		X		
Scientists or staff familiar with the hazards of the community		X		
Personnel skilled in GIS and/or FEMA’s HAZUS program	X		County GIS	
Grant writers or fiscal staff to handle large or complex grants	X		County Planning	
Staff with expertise or training in benefit-cost analysis		X		
Other				

- 3. Financial Capability:** Please indicate whether your jurisdiction has access to or is eligible to use the following local financial resources *for hazard mitigation purposes* (including as match funds for state or federal mitigation grant funds). Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Financial Resources	Yes	No	Department/Agency	Comments
Capital Improvement Programming	X		County Commissioners	
Community Development Block Grants (CDBG)	X		County Human Service	
Special Purpose Taxes	X		County SRCPP	
Gas / Electric Utility Fees		X		
Water / Sewer Fees		X		
Stormwater Utility Fees		X		
Development Impact Fees		X		
General Obligation, Revenue, and/or Special Tax Bonds	X		County Commissioners	
Partnering Arrangements or Intergovernmental Agreements	X		Eastern Pike Regional 537 Plan	
Other				

- 4. Education and Outreach:** Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information. Then, identify the primary department or agency responsible for its administration or allocation and provide any additional comments you may have in the space provided or with attachments.

Program/Organization	Yes	No	Department/Agency	Comments
Firewise Communities Certification	X		County EMA	
StormReady certification				Check with County EMA
Natural disaster or safety related school programs				Check with School Districts
Ongoing public education or information program (e.g. responsible water use, fire safety, household preparedness, environmental education)	X		County EMA	
Public-private partnership initiatives addressing disaster-related issues		X		
Local citizen groups or nonprofit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	X			
Other				

- 5. Self-Assessment of Capability:** Please provide an approximate measure of your jurisdiction's capability to effectively implement hazard mitigation strategies to reduce hazard vulnerabilities. Using the following table, please place an "X" in the box marking the most appropriate degree of capability (Limited, Moderate, or High) based on best available information and the responses provided in Sections 1-4 of this survey.

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability		X	
Administrative and Technical Capability		X	
Financial Capability		X	
Education and Outreach			X

Mitigation Strategy 5-Year Mitigation Plan Review

Name: Brian Snyder Title: Community Planner Jurisdiction: Pike County

Purpose: To fulfill the requirement that maintenance of the hazard mitigation plan (HMP) has been completed since the publication of the original or previous version, and to obtain early feedback from the planning team to incorporate into the update process.

Instructions: Complete the *Goal and Objective Review Worksheet* and *Mitigation Action Plan Review Worksheet* on the next pages keeping the following questions in mind:

- Do the goals, objectives, and actions address current and expected conditions?
- Should each goal be carried forward into the updated plan? Should a goal be changed based on current conditions in the community? Should a goal be discontinued, and if so, why?
- What is the status of each action? What progress has been made? Should an action be continued in the updated plan? Should an action be discontinued, and if so, why?
- Has the nature or magnitude of hazard risk changed?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazard threats?
- Are there any issues that have limited the current implementation schedule?
- Have the implementation of identified mitigation actions resulted in expected outcomes?
- Has the Steering Committee measured the effectiveness of completed hazard mitigation projects in terms of specific dollar losses avoided?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?
- Are there other concerns that should be identified?

Before completing the worksheets, the group may wish to discuss the above questions in a round-robin format, using a flip chart. The questions are standard; however it is important to check the existing HMP maintenance section for additional questions that may need to be considered.

Goal and Objective Review Worksheet

Instructions: Write each goal and objective identified in the existing HMP. Use the comment boxes to provide feedback or to suggest modification of any of the proposed goals or objectives. You may suggest additional objectives below each goal, or new goals and objectives on the last page of this exercise.

Existing Goals and Objectives		Comments
Goal 1	Provide for properly managed and environmentally sound growth and disaster-resistant development.	
No Comment/Good		
Goal 2	Reduce the potential impact of natural and human made hazards on property.	
No Comment/Good		
Goal 3	Enhance and improve emergency services provided to the growing population of Pike County.	
No Comment/Good		

Existing Goals and Objectives		Comments
Goal 4	Reduce vulnerability including loss of life and damage to assets and the environment from natural and human-made hazards.	
No Comment/Good		
Goal 5	Conserve, protect, restore and enhance existing natural systems and water resources that serve a natural hazard mitigation function.	
No Comment/Good		
Goal 6	Increase awareness, understanding, and preparedness across all sectors by encouraging hazard risk, preparedness, and mitigation related education, training and outreach activities.	
No Comment/Good		

Suggested Additional Goals and/or Objectives		Comments
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		
Goal		
Objective		
Objective		
Objective		

Mitigation Action Plan Review Worksheet

Instructions: List each mitigation action from the existing HMP and identify its status as “No Progress / Unknown, In Progress / Not Yet Complete, Continuous, Completed, or Discontinued.” Include review comments for each action.

Existing Mitigation Action	Status					Review Comments
	No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Support the mitigation of vulnerable structures via retrofit (e.g. elevation, flood-proofing) or acquisition/relocation to protect them from future damage; repetitive loss and severe repetitive loss properties should be a priority, when applicable.			X			
Work with partner organizations to develop informational releases about hazard mitigation for newspapers, websites, circulars, and property owners' association newsletters and attend Association of Community Associations meetings to discuss hazard mitigation, targeting all residents (full-time, seasonal, renters).			X			
Maintain compliance with and good standing in the NFIP, including adoption and enforcement of floodplain management requirements (e.g., regulating all new and substantially improved construction in special-hazard flood areas), floodplain identification and mapping, and flood insurance outreach to the community. Further meet and/or exceed the minimum NFIP standards and criteria through the following NFIP-related continued compliance actions identified in subsequent initiatives.	X					
Promote or adopt higher regulatory and zoning standards to manage hazard risk; specifically, through updates to the building codes, flood ordinances, and subdivision and land development ordinances. Goals of increased standards are to ensure new buildings and infrastructure are discouraged or prohibited in high-hazard areas in their jurisdiction.			X			
Increase awareness of and participation in FEMA's Community Rating System (CRS) Program.	X					
Pike County EMA will work with electric distribution companies to implement an annual tree-trimming program to minimize storm damage.	X					
Explore the creation of a Pike County Health Department	X					

Existing Mitigation Action	Status					Review Comments
	No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Assess and update emergency operations center equipment to improve communication. Targeted needs include: • Generators, • Training Apparatus Communications	X					
Ensure continuity of operations at critical facilities and infrastructure. Options may include purchase and install generators.			X			
Work with County and power companies to identify roads within the municipality considered “critical;” these would be the first priority for clearing after an event involving downed power lines.	X					
Work with PEMA and PA DEP to obtain an updated list of dams and ownership; work with Silver Jackets to assist private dam owners and the financial hardship of maintenance.		X				
Install dry hydrants	X					
Identify and monitor transportation routes of hazardous materials. Establish a communication chain between rail and Fire Departments regarding transport of spent fuel rods. Interstate 84 and rail lines			X			
Work with PennDOT to implement transportation upgrades to roads with high flooding vulnerability. Projects could include culvert enhancement, culvert replacement, and road elevation.	X					
Work with PennDOT and the National Park Service to utilize beet juice to supplement brine/salt to treat roads during winter conditions	X					
Purchase Radiac Meters (e.g., UltraRadiac – Personal Radiation Monitor) and thermal detectors for when FD responds to rail incidents	X					
Implement debris-flow projects, including slope stabilization, energy dissipation, or vegetative plantings.	X					
Implement stormwater management projects to facilitate stormwater flow during severe storms.	X					
Pike County to work with the National Park Service to discuss areas that are in need of stream clearing	X					
Continue to use and improve GIS capability to identify and prioritize hazards and critical infrastructure for mitigation, as well as areas targeted for potential new development.	X					

Existing Mitigation Action	Status					Review Comments
	No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Explore development of an outreach effort which includes a model ordinance to require boat washing to prevent the spread of aquatic invasive species	X					
Purchase and install boat washing stations to help prevent the spread of aquatic invasive species	X					
Provide training to local NFIP Floodplain Administrators to potentially include Certified Floodplain Manager (CFM) course.	X					
Pike County EMA to continue working with Pocono Environmental Education Center and municipalities to participate in Firewise.			X			
Continue groundwater level monitoring through at least 2018 to assess potable groundwater levels providing 10 years of data for drought trigger analysis.		X				
Continue activities of the Pike County Road Task Force to address emergency preparedness, winter preparedness, and coordination of winter operations with school district officials			X			
Utilize the County's Marcellus Shale task force to prepare for and educate municipalities about updating ordinances and proper permitting for Marcellus Shale gas wells					X	
Coordinate with the National Weather Service to hold an educational seminar regarding lightning safety	X					
Develop a County Task Force to identify ways to incentivize volunteer fire fighting, address equipment and facility upgrades, provide training opportunities for emergency service providers, and upgrade EMS service in eastern and central areas of Pike County			X			County EMS Plan Municipalities Meet Monthly
Work with watershed associations and municipal officials to coordinate water conservation and sewage management programs in local communities.	X					
Work recreation amenities to develop educational materials regarding the risk of drowning to distribute to resorts, hotels, and other vacation areas	X					
Pike County to continue working with USDA Natural Resources Conservation Service to design and rehabilitate Kintz Creek Dam.		X				
Pike County EMA to continue to work with the three school districts on the following: 1. Annual review of emergency action plans and disaster response plans 2. Conduct audits and ensure adequate back-power and water contingencies are in place so they may serve as shelters			X			

Existing Mitigation Action	Status					Review Comments
	No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
County to work with municipalities to develop databases to track development in the Special Flood Hazard Area (SFHA).	X					
Hold a workshop to educate and train municipalities about annual FEMA funding sources and the grant application process.	X					
Work with Westfall Township, Matamoras Borough and Milford Borough to map stormwater facilities, infrastructure, and conveyance systems including pipe sizes, inlets, outlets, and integrate into GIS system.	X					
Conduct education/outreach among local officials as to the benefits of stormwater management, hazard mitigation and implementation of the Phase II Countywide Stormwater Management Plan. (Act 167 Plan)	X					
Identify and coordinate with appropriate partners and agencies to arrange for data collection of flood and structure data necessary to perform a level 2 HAZUS analysis for the next hazard mitigation plan update. Building data may be collected as part of reassessment of Pike County properties. (i.e. Building Value, Lowest Floor Elevation, Building Type, Occupancy Type, Foundation Type, Number of Stories and Square Footage).	X					
Conduct education and outreach on municipal stormwater systems and potential impact to flooding/water quality.	X					
Participate in emergency planning for applicable hazard and emergency response events. Specific types of planning relevant to the County and its municipalities include EAPs for dams, radiological emergency plans for nuclear incidents, winter preparedness plans, evacuation signage plans, Phase II Act 167 Stormwater Management Plan, and commodity flow studies. Additionally, other plans should be reviewed to ensure coordination with hazard mitigation planning techniques.	X					
Pike County Office of Community Planning and applicable municipal offices will review their comprehensive plans to ensure that designated growth areas are not within high-hazard areas identified in the HMP.			X			
Encourage all critical government facilities to have COOP and COG plans and to begin implementing appropriate backup systems.			X			
Hold annual meetings to ensure that mitigation, planning, preparedness, and response personnel are (1) cross-trained in each other's area of expertise, (2) aware of ongoing activities, and (3) fostering increased communication.	X					

<i>Existing Mitigation Action</i>	Status					Review Comments
	No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
Hold an education seminar and develop educational materials regarding radon exposure	X					
Purchase and install weather station to capture meteorological data and communicate to smart phones to utilize information during response/recovery	X					
Pike County EMA to work with PennDOT to purchase and install cameras on I-84 at the Greentown and Milford exits	X					



APPENDIX H. MUNICIPAL ADOPTIONS

By adopting the Pike 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 Pike County and each participating jurisdiction legitimizes the HMP and authorizes responsible agencies to execute their responsibilities.

Each participating jurisdiction in Pike 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. A copy of each formal adoption is included in this appendix.