Mifflin County 2019 Multi-Jurisdictional Hazard Mitigation Plan

Approved Pending Adoption on January 28, 2020

Prepared for:
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Certification of Annual Review Meetings

The Mifflin County Multi-Jurisdictional Hazard Mitigation Steering Committee has reviewed this Hazard Mitigation Plan. The Director of the Mifflin County Planning and Development Department hereby certifies the review.

Year	Date of Meeting	*Public Outreach Addressed?	Signature
2015	N/A	N/A	Based on discussions with William A. Gomes, Mifflin County Planning and Development Department, the primary reasons why the 2014 MJHMP was not updated annually were that the 2014 actions were not identified by municipality or responsible party and that there was no mitigation action tracking table in the 2014 MJHMP.**
2016	N/A	N/A	
2017	N/A	N/A	
2018	N/A	N/A	
2019	See Section 3.3	See Section 3.4	
2020			
2021			
2022			
2023			
2024			
*Confirm yes here annually and describe on Record of Changes page.			

** In the 2019 MJHMP the mitigation actions have now been clearly identified by municipality and responsible party in Table 6.4-1, and a directory of responsible municipal Emergency Management Coordinators (EMC) has been added as Table 7.2-1, per County request. A mitigation action tracking table has been added in the 2019 MJHMP as Table 7.2-2. Likewise, a table was added in order to facilitate tracking of plan adoption dates as Table 8.0-1, and a table of MJHMP Update Mechanisms was added as Table 7.2-3.

Record of Changes

Date	Description of Change, Mitigation Action Completed, or Public Outreach Performed	Change Made By (Print Name)	Change Made By (Signature)
2014	Five-year update of MJHMP was completed, including all changes to demographics, hazard trends, disaster/incident history, mitigation strategy, and other standard informational requests.	William A. Gomes	
2015-2018	No changes, mitigation actions, or public outreach were completed. Although not specifically referenced in the 2014 MJHMP, progress was made on one mitigation project in Brown Township (see Section 6.1).	N/A	N/A
2019	Five-year update of MJHMP was completed, including all changes to demographics, hazard trends, disaster/incident history, mitigation strategy, and other standard informational requests.	William A. Gomes	
REMINDER:** ***Please attach all associated meeting agendas, sign-in sheets, handouts, and summaries.			

Executive Summary

The Federal Disaster Mitigation Act of 2000 (DMA 2000) and implementing regulations (44 CFR §201.6) requires state and local governments to prepare multi-hazard mitigation plans every five-years as a precondition for receiving Federal Emergency Management Agency (FEMA) mitigation project grants. The 2019 Mifflin County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) is the five-year (2019 – 2024) update to the 2014 MJHMP and serves as a countywide strategy to prevent or reduce the long-term risks to life and property from the following natural and human-caused hazards:

Natural Hazards

- Drought
- Extreme Temperature
- Flood, Flash Flood, Ice Jam
- Hurricane, Tropical Storm, Nor'easter
- Invasive Species
- Landslide
- Lightning Strike
- Pandemic and Infectious Disease
- Radon Exposure
- Subsidence, Sinkhole
- Tornado, Wind Storm
- Wildfire
- Winter Storm

Human-Made Hazards

- Building or Structure Collapse
- Civil Disturbance
- Dam Failure
- Drowning
- Environmental Hazards
- Transportation Accidents
- Urban Fire and Explosion
- Utility Interruption

The Mifflin County MJHMP was developed in partnership with Mifflin County and its 16 municipalities, plus various public and private stakeholders, and it serves as a living document that communities use to reduce their vulnerability to the above hazards. It is anticipated that all 16 municipalities, plus the County, will adopt the MJHMP following FEMA's Approval Pending Adoption notice and be eligible for mitigation funding and technical assistance.

The MJHMP specifies six goals and 55 actions to address the above hazards. The goals and actions focus on the following mitigation techniques and approaches:

- **Local Plan and Regulations** (i.e., actions related to government authorities, policies, or codes that influence the way land and buildings are developed)
- **Structure and Infrastructure Projects** (i.e., actions modifying existing structures or infrastructure to remove from a hazard area or construction of new structures to reduce impacts of hazards)
- **Natural Systems Protection** (i.e., actions that minimize damage and losses and also preserve or restore the functions of natural systems, including stream restoration, riparian buffers, wetland restoration, forest habitat, etc.)
- **Education and Awareness Programs** (i.e., sustained programs to educate the public and decision-makers about hazard risks and community mitigation programs)

Monitoring, evaluating, and updating the MJHMP is critically important to maintaining its value and to progressing countywide hazard mitigation efforts. Hazard mitigation planning in Mifflin County is the

responsibility of all levels of government (i.e., county and local), as well as the citizens of the County. As specified in FEMA's *Hazard Mitigation Planning How-to Guide*, Publication 386-4, the Mifflin County Multi-Jurisdictional Hazard Mitigation Steering Committee must continuously monitor and document the progress of the MJHMP's recommended actions. The Steering Committee, under the auspices of the Mifflin County Commissioners, will meet annually and following each emergency declaration, with the purpose of reviewing and updating the plan accordingly. All updates will be documented by the Steering Committee and used as a basis for the MJHMP's next five-year cycle beginning in 2024.

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APPENDICES

1. INTRODUCTION

1.1. BACKGROUND

Across the United States, natural and human-caused disasters have led to increasing levels of deaths, injuries, property damage, and interruption of business and government services. The time, money, and efforts to recover from these disasters exhaust resources, diverting attention from important public programs and private agendas. With over 100 statewide or county-specific gubernatorial and presidential disaster declarations since 1954, the emergency management community, citizens, elected officials, and other stakeholders in Mifflin County, Pennsylvania, recognized the impact of disasters on their community and concluded that proactive efforts were needed to reduce the impact of natural and human-caused hazards.

Federal and state governments have utilized mitigation concepts to minimize environmental degradation and to reduce loss of life and property associated with natural hazards. However, mitigation was most often applied in a post-disaster environment. In an effort to increase public awareness and to reduce the costs associated with disaster preparedness, the Federal Emergency Management Agency (FEMA) developed a National Mitigation Strategy. The National Mitigation Strategy was an outgrowth of changing perceptions of hazards and their relationship to development. It represents a sustained effort to reduce hazard vulnerabilities through public outreach and partnership development, and was created with input from federal agencies, state and local governments, and the general public.

Hazard mitigation is a phrase that describes actions taken to prevent or reduce the long-term risks to life and property from hazards. 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.

Accordingly, the Mifflin County Multi-Jurisdictional Hazard Mitigation Steering Committee (Steering Committee), composed of County officials, municipal representatives, emergency responders, and critical facility representatives, have updated the 2014 Multi-Jurisdictional Hazard Mitigation Plan (MJHMP). The team of Michael Baker International (MBI) was selected through a competitive process and contracted with the County to complete the update of Mifflin County's MJHMP.

The updated MJHMP is the result of several months of work by the citizens and officials of the County and representatives from MBI to update a pre-disaster multi-hazard mitigation plan that will not only guide the County toward greater disaster resistance but will also respect the character and needs of the community.

1.2. PURPOSE

The purpose of this updated MJHMP is to minimize the effects that natural, technological, and human-caused hazards have on the people, property, environment, and business operations within Mifflin

County. This document exists to provide the background information and rationale for the mitigation actions that the Steering Committee and municipal representatives have chosen to implement.

The document is governed by the Disaster Mitigation Act of 2000 (DMA 2000) and the implementing regulations (44 CFR §201.6, published on February 26, 2002). Local jurisdictions must comply with the DMA 2000 and these regulations in order to remain eligible for funding and technical assistance from state and federal hazard mitigation programs. Local mitigation plans must include, at a minimum, (1) an action plan to mitigate hazards, risks, and vulnerabilities, and (2) a strategy to implement those actions.

1.3. SCOPE

The implementation actions within this updated MJHMP apply to Mifflin County and any municipalities that adopt this MJHMP as their own. However, only those municipalities that have participated in the Plan's creation process will remain eligible for state and federal mitigation funding. For the purpose of this planning process, municipal participation was defined as attendance at one or more meetings, completion of one or more worksheets, and provision of one or more New Actions. Using these criteria, all 16 municipalities are considered active participants in the 2019 MJHMP update process.

1.4. AUTHORITY AND REFERENCES

Authority for this plan originates from the following federal sources:

- Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C., Section 322, as amended;
- Code of Federal Regulations (CFR), Title 44, Parts 201 and 206;
- Disaster Mitigation Act of 2000, Public Law 106-390, as amended; and
- National Flood Insurance Act of 1968, as amended, 42 U.S.C. 4001 et seq.

Authority for this plan originates from the following Commonwealth of Pennsylvania sources:

- Pennsylvania Emergency Management Services Code. Title 35, Pa C.S. Section 101.
- Pennsylvania Municipalities Planning Code of 1968, Act 247 as reenacted and amended by Act 170 of 1988.
- Pennsylvania Stormwater Management Act of October 4, 1978. P.L. 864, No. 167

The following FEMA guides and reference documents were used to prepare this document:

- FEMA 386-1: Getting Started. September 2002.
- FEMA 386-2: Understanding Your Risks: Identifying Hazards and Estimating Losses. August 2001.
- FEMA 386-3: Developing the Mitigation Plan. April 2003.
- FEMA 386-4: Bringing the Plan to Life. August 2003.
- FEMA 386-5: Using Benefit-Cost Review in Mitigation Planning. May 2007.
- FEMA 386-6: Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning. May 2005.

- FEMA 386-7: Integrating Manmade Hazards into Mitigation Planning. September 2003.
- FEMA 386-8: Multijurisdictional Mitigation Planning. August 2006.
- FEMA 386-9: Using the Hazard Mitigation Plan to Prepare Successful Mitigation Projects. August 2008.
- FEMA. Local Mitigation Planning Handbook. March 2013.
- FEMA. Local Mitigation Plan Review Guide. October 1, 2011.
- FEMA National Fire Incident Reporting System 5.0: Complete Reference Guide. January, 2008.
- FEMA Hazard Mitigation Assistance Unified Guidance. September 11, 2013.

The following PEMA guides and reference documents were used to prepare this document:

- PEMA: Hazard Mitigation Planning Made Easy!
- PEMA Mitigation Ideas: Potential Mitigation Measures by Hazard Type; A Mitigation Planning Tool for Communities. March 6, 2009.
- PEMA Pennsylvania's Hazard Mitigation Planning Standard Operating Guide. October 2013.

The following additional guidance document produced by the National Fire Protection Association (NFPA) was used to update this plan:

NFPA 1600: Standard on Disaster/Emergency Management and Business Continuity Programs. 2007.

Many federal and state databases were queried to compile data cited throughout this plan. Existing County and municipal plans and studies were also reviewed and integrated into the updated MJHMP. The County Comprehensive Plan was incorporated into multiple aspects of this MJHMP such as to formulate the County profile, to detail the population projections, to identify medical facilities, to consider plan integration, and more. The County Comprehensive Plan was most recently updated in 2014. Parenthetical citations throughout the text refer to the Bibliography included as Appendix A[1].

[1] This appendix will be publicly available at http://www.co.mifflin.pa.us/dept/PlanningDev/Pages/HazardMitigation.aspx

2. COMMUNITY PROFILE

2.1. GEOGRAPHY AND ENVIRONMENT

Mifflin County is located in the center of the Commonwealth of Pennsylvania, encompassing approximately 411.03 square miles. It is bordered to the north by Centre County, northeast by Union County, to the east by Snyder County, to the south by Juniata County, and to the west by Huntingdon County.

The Koppen-Geiger Climate Areas map classifies Mifflin County, and the rest of Pennsylvania, as Humid Continental. While the state shares many weather similarities, there are also a few unique characteristics to certain regions. Mifflin County is labeled as part of the central region, which transitions between the more continental Appalachian Plateaus to the west and north and the relatively more marine southeast. The mountain and ridge top regions have more extreme climates than the valley bottoms. On average, these mountaintop areas have much lower temperatures, more wind, and more total precipitation. Table 2.1-1 shows the average temperatures and precipitation, captured by the Lewistown Land-Based Weather Station, for the year. The record high and low temperatures are also shown in Table 2.1-1.

Table 2.1-1: Lewistown Area Climate – Averages and Records (NCEI, 2019)

Month	Average High	Average Low	Mean Temperature	Average Precipitation	Record High	Record Low
January	35°F	16°F	26°F	2.78 in.	72°F (1967)	-17°F (1994)
February	43°F	27°F	35°F	2.42 in.	78°F (2017)	-14°F (1948)
March	44°F	27°F	36°F	3.52 in.	87°F (1998)	3°F (1993)
April	57°F	36°F	46°F	3.35 in.	94°F (2009)	15°F (1982)
May	78°F	54°F	66°F	4.23 in.	97°F (1962)	26°F (1983)
June	79°F	58°F	69°F	5.01 in.	93°F (1952)	48°F (1986)
July	86°F	63°F	74°F	3.91 in.	106°F (2011)	41°F (1960)
August	84°F	65°F	75°F	3.54 in.	103°F (1948)	38°F (1976)
September	77°F	61°F	69°F	3.84 in.	103°F (1953)	28°F (1995)
October	65°F	46°F	56°F	3.37 in.	95°F (1953)	21°F (1988)
November	46°F	33°F	39°F	3.55 in.	85°F (1950)	8°F (1976)
December	43°F	29°F	36°F	2.97 in.	75°F (1984)	-16°F (1960)

Weather patterns and climatic conditions in Mifflin County present a reasonable risk. The County's weather extremes are a primary contributor to many of the County's natural hazard events, such as winter storms, flooding, high winds, and severe temperatures. According to the National Climatic Data Center (NCDC), weather-related events recorded from 1997-2018 have caused 285 deaths, 747 injuries, more than $2 billion in property damage and approximately $5 million in crop damage in the Commonwealth of Pennsylvania. Table 2.1-2 shows the number of fatalities, injuries, and damage for the last 15 years for the Commonwealth of Pennsylvania.

Table 2.1-2: Fatalities, Injuries, and Damages in Pennsylvania from 2004 – 2018 (NOAA NWS, 2004 – 2018)				
Year	**Fatalities**	**Injuries**	**Property Damage (Millions)**	**Crop Damage (Millions)**
2018	5	16	30.66	0.39
2017	4	10	45.7	0.0
2016	6	9	60.63	0.49
2015	15	17	21.13	0.0
2014	2	17	23.39	0.0
2013	5	14	25.06	0.02
2012	23	43	43.34	0.0
2011	57	92	356.32	0.71
2010	27	9	47.91	0.32
2009	3	82	57.15	0.45
2008	31	63	52.73	0.01
2007	6	14	45.3	3.0
2006	46	55	541.53	0.0
2005	35	73	166.0	0.0
2004	20	233	484.2	0.0

In addition to monetary damage and loss of life or injury, weather can impede emergency response to disasters, thus worsening the damage caused by a natural disaster. Because of weather's potential impact on mobility, the County is most vulnerable to severe winter weather and flooding. Regardless of the incident, weather will always play a large part in any disaster response, requiring emergency planning to account for all possible weather variations.

The County also lies within the Susquehanna River Basin, one of four major drainage basins in Pennsylvania. Many of the fertile valleys along the river and its local tributary streams were settled long before land use controls and floodplain regulations were in place. This has led to a need to mitigate against riverine flooding. Elevations above sea level in the County range from a low of 430 feet along the Juniata River to a high of 2,340 feet on Jacks Mountain. Other areas above 2,100 feet are Stone Mountain, Shade Mountain, and Blue Mountain. Big Valley, Ferguson Valley and the Juniata River Valley are the major valleys between the main ridge Lines (Mifflin County Commissioners, 2000).

Mifflin County is located in the tightly folded and faulted Ridge-and-Valley region of Pennsylvania. This geologic region is characterized by large amounts of sandstone, shale, and limestone, dolomite, and sandstone-based geographic formations. Landforms in this region are most often parallel ridges and valleys eroded from the folded rock. Limestone formations are highly soluble and can create caverns and cause subsidence and sinkholes (also known as karst topography). Karst topography is sensitive to environmental degradation. The most severe form is the depletion and contamination of groundwater supplies.

2.2. COMMUNITY FACTS

Mifflin County was created in 1789 by a legislative act. The County seat is in the Borough of Lewistown which was first settled in 1795. During the 19th Century, the County was a central hub for transportation and economic development activities between Philadelphia and Pittsburgh both in terms of the main line of the Pennsylvania Canal and the Pennsylvania Railroad (Mifflin County Planning Commission, 2014). Today Mifflin County is known for its rich manufacturing base, much like the rest of Pennsylvania. However, the Geisinger-Lewistown Hospital and the Mifflin County School District contribute a number of jobs to the workforce. Wholesale and retail trade are the other major areas of employment for Mifflin County.

According to data from the Pennsylvania Department of Labor and Industry, manufacturing remains the largest industry in Mifflin County, accounting for over 24 percent of the total workforce, with Healthcare services shortly behind at 23 percent. Wholesale/retail trade employs the next largest amount of Mifflin County workers at about 15 percent.

Historically, the unemployment rate in Mifflin County has been higher than that of the state (William Gomes, personal communication, August 5, 2019). In May 2019, the unemployment rate in Mifflin County was 4.1% (seasonally adjusted), which is slightly higher than the PA state average of 3.8% (PA Department of Labor and Industry, 2019).

Table 2.2-1 presents the employment by industry breakdown for Mifflin County, according to the Pennsylvania Department of Labor and Industry's 2019 data. Table 2.2-2 presents the major employers in Mifflin County, as listed by the Pennsylvania Department of Labor and Industry in 2018. This data is updated seasonally by the PA Department of Labor and Industry and data was updated using 4th Quarter, 2018 results.

Table 2.2-1: Employment by Industry (PA Department of Labor and Industry, 2019)			
Sector	**Number of Establishments**	**Number of Paid Employees**	**Percent of Paid Employees**
Agriculture, forestry, fishing and hunting	20	184	1.2%
Mining, quarrying, and oil and gas extraction	0	0	0%
Utilities	5	75	0.5%
Construction	89	601	3.9%
Manufacturing	83	3,776	24.2%
Wholesale trade	41	391	2.5%
Retail trade	170	2,049	13.1%
Transportation and warehousing	58	690	4.4%
Information	12	139	0.9%
Finance and insurance	47	384	2.5%
Real estate and rental and leasing	19	59	0.4%
Professional, scientific, and technical services	35	140	0.9%
Management of companies and enterprises	7	49	0.3%
Administrative and support and waste management and remediation services	43	226	1.4%
Educational services	28	973	6.2%
Health care and social assistance	182	3,652	23.4%
Arts, entertainment, and recreation	9	60	0.4%
Accommodation and food services	88	1,263	8.1%
Other services (except public administration)	73	380	2.4%
Public Administration	38	503	3.2%

Table 2.2-2: Top 10 Mifflin County Employers in 2018 (PA Department of Labor and Industry, 2018)	
Employer	**Sector**
Geisinger-Lewistown Hospital	Healthcare and Social Assistance
Mifflin County School District	Educational Services
Philips Ultrasound, Inc.	Manufacturing
Standard Steel, LLC	Manufacturing
First Quality Baby Products, LLC	Manufacturing
Trinity Plastics Inc	Manufacturing
Valley View Haven	Healthcare and Social Assistance
Geisinger Clinic	Healthcare and Social Assistance
United Cerebral Palsy of Central PA	Healthcare and Social Assistance
Overhead Door Corp	Manufacturing

According to the County Comprehensive Plan, transportation has played a prominent role in the growth of the County and the region. Specific roadways vary in the degree to which they provide mobility and access. Mifflin County has several major roadways, including U.S. Route 322, U.S. Route 522, and PA Route 655.

2.3. POPULATION AND DEMOGRAPHICS

Population and demographic information provide baseline data about residents. Changes in demographics or populations may be used to identify higher-risk populations. Maintaining up-to-date data on demographics will allow the County to better assess magnitudes of hazards and develop more specific mitigation plans. Baseline demographic information for Mifflin County is provided in Table 2.3-1.

Table 2.3-1: Baseline Demographic Information (U.S. Census Bureau, 2017)	
Demographics	**2017 Estimates**
Total population	46,452
Male	22,748 *(49%)*
Female	23,704 *(51%)*
Median age (years)	43.6
Under 5 years	2,819 *(6.1%)*
18 years and over	35,932 *(77.4%)*
65 years and over	9,501 *(20.5%)*

Based on figures from the 2013-2017 American Community Survey, Mifflin County has a population of 46,452 persons. According to the 2013-2017 American Community Survey, the municipal population figures indicate the highest populated municipality in Mifflin County is Lewistown Borough (8,264). Derry Township (7,324), Granville Township (5,029), Brown Township (4,073), and Armagh Township (3,820) are the most highly populated of the remaining municipalities in the County. Newton Hamilton Borough (141) is the least populated municipality, followed by Kistler Borough (359), McVeytown Borough (364), and Juniata Terrace Borough (625).

Nearly 21 percent of Mifflin County's population is 65 or older. These residents may have access and functional needs. For example, many may be unable to drive; therefore, special evacuation plans may need to be created for them. They may also have hearing or vision impairments that could make receiving emergency instructions difficult. Both older and younger populations have higher risks for contracting certain communicable diseases. The County's combined populations who are under 5 years of age and over 65 years represent approximately 26.6 percent of its total population.

As detailed in Table 2.3-2, Mifflin County has a population density of 113 persons per square mile, which is substantially lower than the Pennsylvania statewide average of 284 persons per square mile. The boroughs have the highest population densities in Mifflin County, with the densest concentrations in Lewistown Borough, McVeytown Borough, and Juniata Terrace Borough, respectively. The lowest population densities are in Armagh Township and Bratton Township.

A low population density indicates that people are spread throughout the County rather than clustered in groups. Dispersing information, instructions, and resources in a low-density area is more difficult than in a more densely populated area because individuals are not centralized.

However, a low population density also helps prevent hazards from affecting as many people. For example, diseases may not spread as quickly because there is less contact among 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. Table 2.3-2 shows the respective populations and population densities for Mifflin County and its municipalities.

Table 2.3-2: Population Density for Mifflin County (U.S. Census Bureau, 2017)			
Municipality	**Area (Sq. Mi.)**	**Population**	**Population Density (Persons per square mile) (Figures have been rounded up to nearest whole number)**
Armagh Township	92.8	3,820	41
Bratton Township	32.8	1,550	47
Brown Township	32.8	4,073	124
Burnham Borough	1.1	1,981	1,801
Decatur Township	45.1	3,102	69
Derry Township	30.7	7,324	239
Granville Township	40.2	5,029	125
Juniata Terrace Borough	0.2	625	3,125
Kistler Borough	0.3	359	1,197
Lewistown Borough	2.0	8,264	4,132
McVeytown Borough	0.1	364	3,640
Menno Township	23.7	1,762	74
Newton Hamilton Borough	0.2	141	705
Oliver Township	35.0	2,065	59
Union Township	25.5	3,461	136
Wayne Township	48.7	2,532	52
Mifflin County	**411.2**	**46,452**	**113**

Table 2.3-3 below provides population estimates for each municipality in Mifflin County and in the County as a whole. According to the 2013-2017 American Community Survey population estimates, the population of Mifflin County decreased very slightly (-0.07%) between 2000 and 2017. The population is expected to increase in the future, and by the year 2030, it is estimated that the entire County will have a population of about 48,282, which is approximately 3.86% percent greater than the 2000 Census population totals for the County. Mifflin County will gain nearly 60 people, on average, annually from 2000 to 2030. However, several municipalities are expecting to experience population loss instead. As illustrated in Figure 2.3-1, there is an upward trend for township populations and a downward trend for borough populations between the years 2000 and 2030. Especially for boroughs with declining populations, some structures may become vacant and infrastructure will age, since there will be little new development that would require infrastructure updates. It is important that the County properly maintains its existing infrastructure and has plans to manage or redevelop vacant properties.

Table 2.3-3: Population by Municipality in Mifflin County (U.S Census Bureau, 2000, 2010, 2017; Mifflin County Comprehensive Plan, 2014)

Municipality	2000 Census	2010 Census	2017 Estimate	Population Change 2000-2017 (%)	2020 Projection	2030 Projection	Projected Population Change 2000-2030 (%)
Armagh Township	3,988	3,863	3,820	-4.21	4,082	4,202	5.37
Bratton Township	1,259	1,317	1,550	23.11	1,336	1,338	6.27
Brown Township	3,852	4,053	4,073	5.74	4,668	5,168	34.16
Burnham Borough	2,144	2,054	1,981	-7.60	1,866	1,724	-19.59
Decatur Township	3,021	3,137	3,102	2.68	3,429	3,664	21.28
Derry Township	7,256	7,339	7,324	0.94	7,357	7,360	1.43
Granville Township	4,895	5,104	5,029	2.74	5,186	5,260	7.46
Juniata Terrace Borough	502	542	625	24.50	434	378	-24.70
Kistler Borough	344	320	359	4.36	306	293	-14.83
Lewistown Borough	8998	8338	8,264	-8.16	7,704	7,129	-20.77
McVeytown Borough	405	342	364	-10.12	316	280	-30.86
Menno Township	1,763	1,883	1,762	-0.06	2,033	2,165	22.80
Newton Hamilton Borough	272	205	141	-48.16	213	192	-29.41
Oliver Township	2,060	2,175	2,065	0.24	2,346	2,504	21.55
Union Township	3,313	3,460	3,461	4.47	3,588	3,715	12.13
Wayne Township	2,414	2,550	2,532	4.89	2,773	2,910	20.55
Mifflin County	**46,486**	**46,682**	**46,452**	**-0.07**	**47,637**	**48,282**	**3.86**

Figure 2.3-1: Population and Future Projections in Mifflin County (U.S Census Bureau, 2000, 2010, 2017; Mifflin County Planning Commission, 2014).

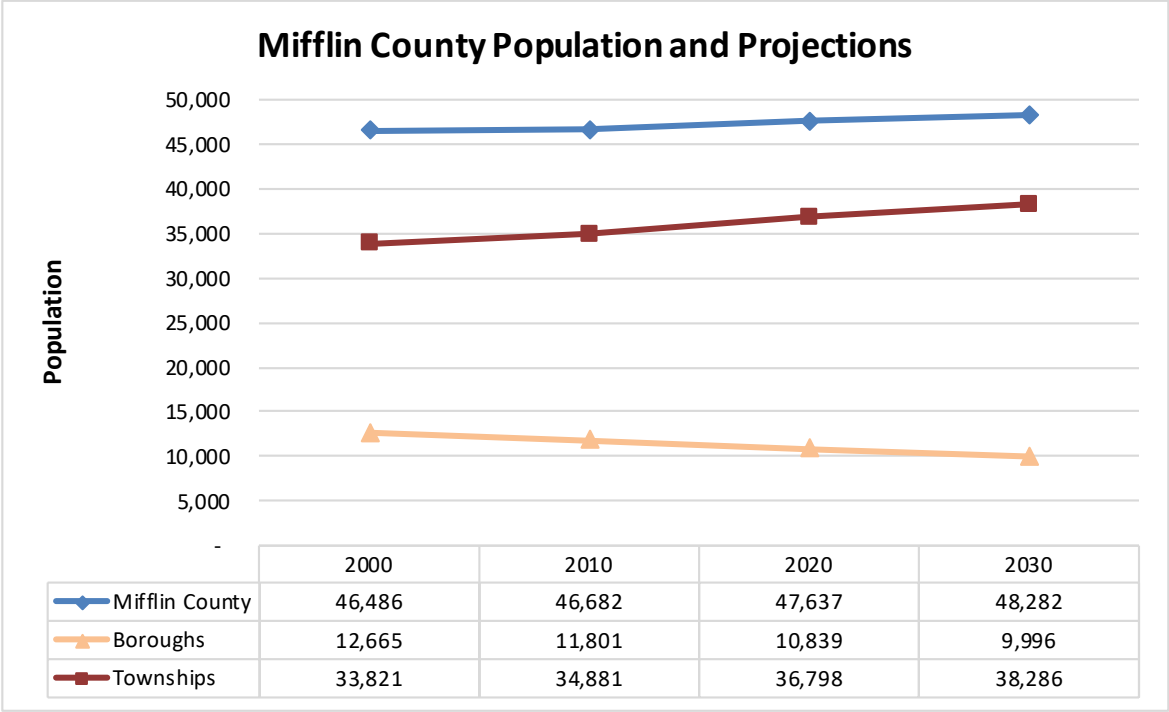


Table 2.3-4: Race and Ethnicity in Mifflin County (U.S. Census Bureau, 2018)

Race and Ethnicity	2010 (%)
White alone, not Hispanic or Latino	95.8
White	97.2
Black or African American	0.9
American Indian and Alaska Native	0.2
Asian or Pacific Islander	0.6
Native Hawaiian and Other Pacific Islander alone	0.0
Two or more races	1.1
Foreign born	1.0
Speak a language other than English	8.5
Hispanic or Latino	1.7

The percent of population over 18 years of age that speaks a language other than English is 8.5 percent in Mifflin County. Potential hazard mitigation strategies may need to address language barriers to ensure that all residents can receive emergency instructions (See Table 2.3-4).

Mifflin County is home to the second largest Amish settlement in Pennsylvania and the ninth largest in North America with an estimated population of 2,790, which represent 5.9 percent of the County's total

population. According to Elizabethtown College (2018), Pennsylvania's estimated Amish population increased approximately 34 percent from 2009 through 2018. Typically, 85 percent of Amish children will join the church as young adults, this along with sizeable families (typically five or more children) is responsible for the growth in the Amish population. Due to a decreased use of modern technology, the Amish require special planning and mitigation strategies to address needs specific to their community.

Mifflin County has over 21,000 residential properties. These properties may be vulnerable to various natural hazards, particularly flooding and windstorms. Damage to residential properties is not only expensive to repair or rebuild, but also devastating to the displaced family.

Approximately 13 percent of the County's residential properties are vacant. Vacant buildings are particularly vulnerable to arson and criminal activity. Since vacant properties have not been maintained, many are structurally deficient and at risk of collapsing.

About 30 percent of the County's population rents. Renters are more transient than homeowners; therefore, communicating with renters may be more difficult than communicating with homeowners. Similarly, tourists are a harder population to communicate with during an emergency incident. Communication strategies should be developed to ensure that these populations can be given proper notification (See Table 2.3-5). The median household income in the County is $46,286, which is lower than the Commonwealth of Pennsylvania's median household income of $56,951. The County's per capita income of $37,469 is also lower than the Commonwealth's per capita income of $53,300 (See Table 2.3-6).

Table 2.3-5: Housing Characteristics in Mifflin County (U.S. Census Bureau, 2017)

Housing Characteristics	2017 Estimates
Total housing units	21,763
Owner-occupied housing units	13,299
Renter-occupied housing units	5,640
Vacant housing units	2,824
Median value (dollars)	103,700

Table 2.3-6: Economic Characteristics in Mifflin County (PA Department of Labor and Industry, 2018)

Economic Characteristics	2008 Estimates ($)
Median household income	46,286
Median family income	52,894
Per capita income	37,469

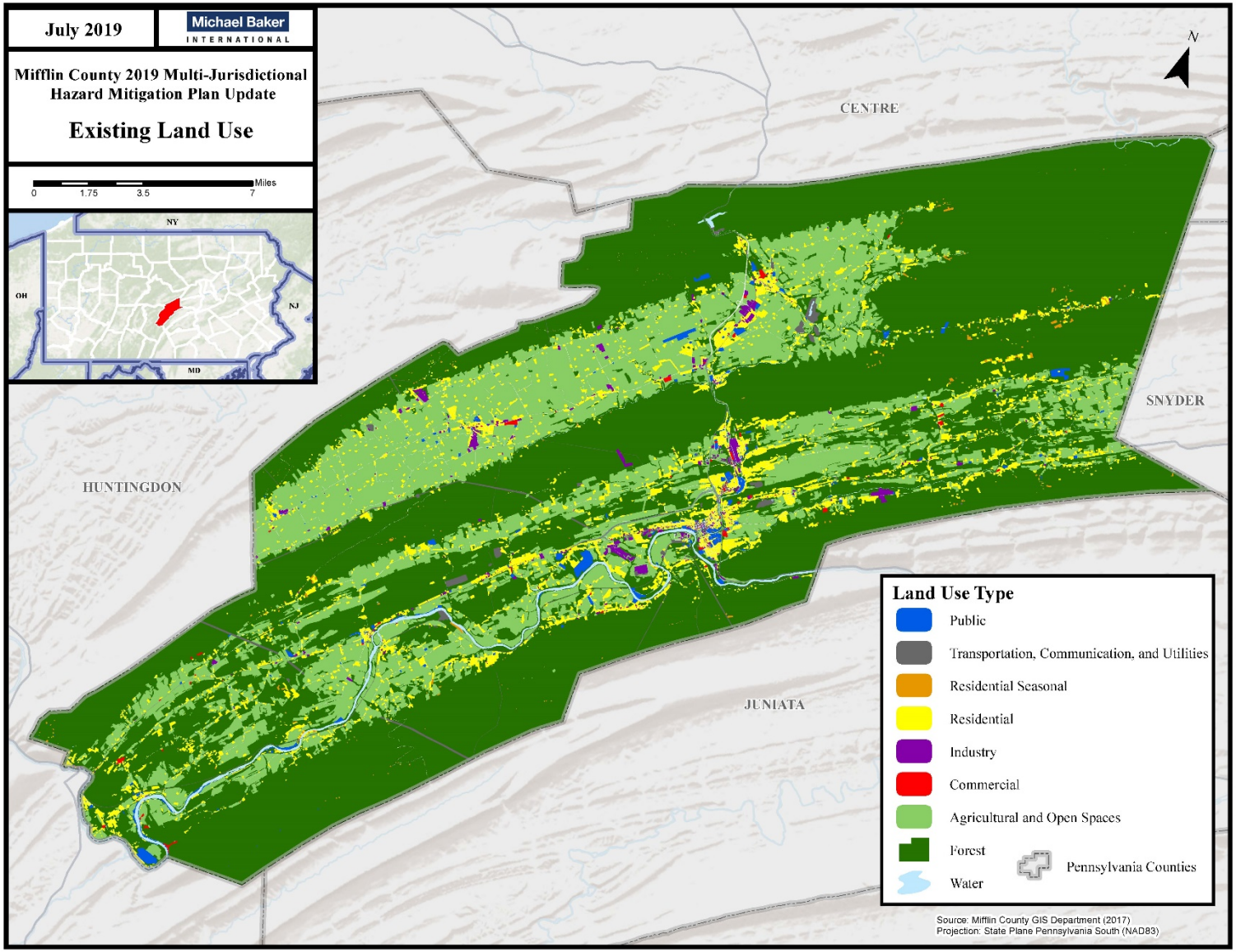
2.4. LAND USE AND DEVELOPMENT

Mifflin County's existing land use pattern is greatly influenced and shaped by surrounding natural features, such as mountain ranges, valleys, and waterways. These features have to a great extent determined the location of transportation corridors and development activities, as well as agricultural practices. Table 2.4-1 presents the land use categories in Mifflin County, as presented in the County Comprehensive Plan. A small percentage of Mifflin County has been developed, with 65.82 percent of the land being forest and 25.95 percent being agricultural/open space. Steep terrain and soils that are not suitable for on-lot septic contribute to the challenges of development. Additionally, over half of the land in Mifflin County lies in Special Protection Watersheds. According to the Center for Rural Pennsylvania (2017), Mifflin County has 66,484 acres of farmland. That equals 25% of all land in the county.

Table 2.4-1: Mifflin County Land Use Distribution 2010 (Mifflin County Planning Commission, 2014)

Land Use Category	% of Total Acres
Water	< 1%
Residential	6%
Commercial	< 1%
Industrial	< 1%
Public/Quasi-Public	< 1%
Agriculture/Open Space	25%
Transportation, Communication and Utilities	1%
Forest	65%
Total Acres	**265,818**

Figure 2.4-1: Existing Land Use



2.5. DATA SOURCES AND LIMITATIONS

Information for the Community Profile was developed by using information from the following sources:

1. Mifflin County Commissioners. 2000. Mifflin County Water Supply Plan. Retrieved at: http://www.co.mifflin.pa.us/dept/PlanningDev/Documents/Mifflin%20County%20Water%20Supply%20Plan%20DRAFT.pdf.
2. Mifflin County Planning Commission. 2014. Mifflin County Comprehensive Plan 2014 Update. http://mifflincompplan.com/planandmaps.html.
3. National Centers for Environmental Information (NCEI). 2019. Global Summary of the Month. Retrieved at: https://www.ncdc.noaa.gov/cdo-web/datasets/GSOM/stations/GHCND:USC00364992/detail
4. Pennsylvania Department of Labor and Industry. 2019. PAWorkStats County Profile. Retrieved at: https://www.workstats.dli.pa.gov/Documents/County%20Profiles/Mifflin%20County.pdf
5. Pennsylvania Department of Labor and Industry. 2018. PAWorkStats Mifflin County 4th Quarter, 2018. Retrieved at: https://www.workstats.dli.pa.gov/Documents/Top%2050/Mifflin_County_Top_50.pdf
6. The Center for Rural Pennsylvania. 2017. County Profile. Retrieved at: http://www.ruralpa2.org/county_profiles.cfm.
7. U.S Census Bureau. 2018. QuickFacts. Retrieved at: https://www.census.gov/quickfacts/mifflincountypennsylvania
8. United States Census Bureau (U.S. Census Bureau). 2017. 2013-2017 American Community Survey 5-Year Estimates. Retrieved at: https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml
9. U.S. Census Bureau (U.S. Census Bureau). 2010. 2010 Census.
10. United States Census Bureau (U.S. Census Bureau). 2000. Census 2000 Summary File 1 (SF 1) 100-Percent Data. Retrieved at: https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml
11. Young Center for Anabaptist and Pietist Studies, Elizabethtown College. 2018. "Amish Population Change 2009-2018." Retrieved at: https://groups.etown.edu/amishstudies/files/2018/08/Population_Change_2009-2018.pdf.

Guides and reference documents used to develop the MJHMP in general are listed in Section 1.4. Specific data sources are listed throughout this MJHMP via parenthetical citation, referring to the Bibliography in Appendix A. These sources were key in understanding the current demographic makeup of the community as well as in framing the foundation of the Plan. The sources provided the underlying context of the Plan and allowed the Steering Committee 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 Plan. The Steering Committee also acquired numerous existing jurisdictional documents (e.g., Mifflin County Emergency Operations Plan, Mifflin County Comprehensive Plan, All-Hazards District/Schools Plan for Mifflin County School District and other relevant information).

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 how the community will prepare for and respond to the hazards that are most likely to occur. Applying a comprehensive and transparent process adds validity to the Plan. Those involved gain a better understanding of the problem or issue and how solutions and actions were devised. The result is a revised set of common community values and widespread support for directing financial, technical, and human resources to an agreed-upon action. The planning process was an integral part of updating the Mifflin County MJHMP. This section describes the planning process used to update Mifflin County's MJHMP, gaining participation from all of the County's 16 municipalities, as well as from other stakeholders.

3.1. UPDATE PROCESS AND PARTICIPATION SUMMARY

An update to the 2014 MJHMP was initiated in November 2018. With funding support through PEMA and Mifflin County, the County chose Michael Baker International, a full-service engineering firm that provides hazard mitigation planning guidance and technical support, to assist the County through the update process.

In accordance with the 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
- PEMA and FEMA approval

The standard planning process used in Pennsylvania to create and update MJHMPs is described in the *Standard Operating Guide* (Michael Baker Jr., Inc., 2013) and was followed during the 2019 update of the Mifflin County MJHMP. Some sections of the 2014 MJHMP were renamed or reorganized in order to align with the standardized outline provided in the *Standard Operating Guide*.

Public participation and planning meetings served as the main forums for gathering locally reported information to update the MJHMP. The Steering Committee and consultants were afforded access to the information in relevant and approved plans, policies, and procedures for Mifflin County. Opportunities for participation included attending meetings, completing written worksheets and forms, and reviewing and commenting on the 2019 MJHMP. Meetings, worksheets/forms, and teleconferences were used to gather input from County, municipal, and other stakeholders to develop all sections of the Plan. Additionally, FEMA's recommendations for future improvements, provided in the 2014 MJHMP approval letter, were incorporated into the 2019 MJHMP Update. Through this process, the County was able to establish a comprehensive approach to reducing the effects of hazards on the County and its municipalities.

The 2019 MJHMP was completed for submission to PEMA on September 30, 2019. Based on comments received from PEMA, revisions were made, and the plan was submitted to FEMA on October 7, 2019. The Local Mitigation Plan Review Tool is included as Appendix B[2].

3.2. THE PLANNING TEAM

William Gomes, Mifflin County Planning and Development Department, served as the County's primary point of contact for both the 2014 and 2019 mitigation planning processes. Mr. Gomes initiated the 2019 MJHMP Update with the goal of expanding the Steering Committee as well as the Additional Stakeholders group, compared to the 2014 MJHMP Update. Several additional municipalities, municipal authorities, critical facilities, schools, and businesses were added. A listing of membership is provided below in Tables 3.2-1 and 3.2-2.

The Steering Committee was invited to participate in the kick-off meeting held on January 15, 2019. Both the Steering Committee and the Additional Stakeholders were invited to participate in the Risk Assessment-Mitigation Solutions Workshop held on February 26, 2019, with follow up phone interviews in March and April 2019 to complete the *National Flood Insurance Program (NFIP) Compliance and Capabilities Worksheet*. In addition, detailed WebEx conference calls were also held in March and April 2019, to present the presentation and answer questions from those municipal officials who were not available to attend the live meetings. The Steering Committee, Additional Stakeholders, and the public were invited to attend the Plan Review meeting on August 6, 2019. All 16 municipalities, as well as numerous other stakeholders, attended meetings and completed worksheets, providing meaningful feedback from diverse viewpoints. The Steering Committee was supported in the 2019 MJHMP Update effort by MBI.

[2] This appendix will be publicly available at http://www.co.mifflin.pa.us/dept/PlanningDev/Pages/HazardMitigation.aspx

Table 3.2-1: Steering Committees: 2014 and 2019

Organization	2014 Representative	2019 Representative
Mifflin County Planning and Development Dept.	William Gomes	William Gomes and Chastity Fultz
Mifflin County Office of Public Safety	Phil Lucas	Phil Lucas
Mifflin County School District	John Czerniakowski and Steve Schaaf	Paul Maidens
Mifflin County Council of Governments	John McCullough	--
Shelter Services, Inc.	Wilda Fisher	*
Juniata Valley Chamber of Commerce	Jim Tunall	*
Juniata Valley Behavioral and Development Services	Bob Henry	Bob Henry
Lewistown Borough	Rex Fink	Rex Fink
Geisinger-Lewistown Hospital	Craig Wheeler	Ronald Napikoski
FAME Emergency Medical Services	Pat Shoop	Pat Shoop
Delta Development Group	David Nitsch and Alysse Stehli	--
Armagh Township	--	Brenda Aumiller
Bratton Township	--	Sharina Harshbarger
Derry Township	--	Ron Napikoski
Union Township	--	Ann Thompson
McVeytown Borough, Oliver Township	--	Matt Stringer
Municipal Authority of the Borough of Lewistown	--	Craig Bubb
Valley View Retirement Community	--	Matt Moore
Michael Baker International	--	Troy Truax and Angela Bard Welt

*Included in the 2019 MJHMP Update as Additional Stakeholders.

Table 3.2-2: Additional Stakeholders: 2019	
Organization	**Representative**
Brown Township	Teresa King
Burnham Borough	Lisa Jyl Hayes
Decatur Township	Michelle Snook
Granville Township	Lisa Swisher
Juniata Terrace Borough	Brooke Knable
Kistler Borough	Cynthia Hobbs
Menno Township	Harold E. Johnson, Jr.
Newton Hamilton Borough	Laura Johnson
Wayne Township	Denise Coder
Centre County	Robert Jacobs
Huntingdon County	Mark Colussy
Juniata County	Bradley Kerstetter
Snyder County	Lincoln Kaufman
Union County	Shawn McLaughlin
American Red Cross	Chriss Schultz
Harrisburg Area Community College	Jennifer N. Baar
Highland Park Hose Company	Bill Fike
Juniata Valley Chamber of Commerce	Rhonda Moore
Mifflin County Industrial Development Corp.	Nick Felice
Shelter Services, Inc.	Jane Neff
South Hills School of Business & Technology	Barbara Harer
Reeds Gap State Park	Josh Bruce
PennDOT Regional Traffic Management Center	Denny Prestash

3.3. MEETINGS AND DOCUMENTATION

The Steering Committee held the following meetings during the update process:

Table 3.3-1: Planning and Public Meetings

Date	Description of Meeting
January 15, 2019	Kick-off meeting for the Steering Committee
February 26, 2019	Risk Assessment-Mitigation Solutions Workshop for the Steering Committee and Additional Stakeholders; Follow up phone interviews to obtain input for the *National Flood Insurance Program (NFIP) Compliance and Capabilities Worksheet*
March 1, 2019	WebEx conference call to present the Risk Assessment-Mitigation Solutions Workshop to Menno Township
March 6, 2019	Webex conference call to present the Risk Assessment-Mitigation Solutions Workshop to Newton Hamilton Borough
April 11, 2019	Webex conference call to present the Risk Assessment-Mitigation Solutions Workshop to Granville Township, Decatur Township, and Juniata Terrace Borough
April 23, 2019	Webex conference call to present the Risk Assessment-Mitigation Solutions Workshop to Kistler Borough
August 6, 2019	Public meeting to review the 2019 MJHMP Update and for the Steering Committee to approve its submission to PEMA and FEMA for formal review
December 2019	As-needed meetings between MBI and municipalities, to promote municipal adoption of the MJHMP following FEMA issuance of approval-pending-adoption

The kick-off meeting for the Steering Committee was held at the Mifflin County Courthouse on January 15, 2019 to introduce hazard mitigation and the planning process; discuss the project scope, schedule, and goals; request data; and solicit response to the *Evaluation of Identified Hazards and Risk* worksheet. Requests were made at the meeting for photographs of historic hazard events and other administrative items, and the request to complete the *Evaluation of Identified Hazards and Risk* worksheet was reiterated in an email on January 22, 2019 as well as in subsequent meetings and calls. The Steering Committee was invited to the meeting via email on December 18, 2018, with a reminder emailed on January 7, 2019. There were 15 meeting attendees, some of whom are visible in Figure 3.3-1.

Figure 3.3-1: Steering Committee Meeting held on January 15, 2019.

The Risk Assessment-Mitigation Solutions Workshop for the Steering Committee and Additional Stakeholders was held at the Mifflin County Courthouse on February 26, 2019, after being postponed due to extreme winter weather. The purpose of the meeting was to introduce the project to the Additional Stakeholders; to provide a recap of the kick-off meeting; and to solicit response to the *Evaluation of Identified Hazards and Risk* worksheet, the *Jurisdictional Risk Evaluation* worksheet, and the *New Mitigation Action* form. The *Mitigation Action Progress Report Form* was discussed, but there was widespread confusion about how to update this form, as the actions were not assigned by municipality in the 2014 MJHMP. Finally, the *National Flood Insurance Program (NFIP) Compliance and Capabilities Worksheet* was introduced, with a decision to follow up via individual phone interviews to complete this worksheet; these phone interviews were conducted by MBI in March and April 2019. A request by Bob Henry, Juniata Valley Behavioral & Developmental Services, to update the special needs database, later resulted in submittal of a *New Mitigation Action* form by Phil Lucas, Mifflin County Public Safety, concerning this topic. The Steering Committee and Additional Stakeholders were invited to the rescheduled meeting via email on February 12, 2019, with a reminder emailed on February 19, 2019. There were 28 meeting attendees.

The Risk Assessment-Mitigation Solutions Workshop was repeated via WebEx for several municipalities in March and April 2019. These four WebEx conference calls were conducted in order to enable participation by municipal representatives who were unavailable to attend a live meeting. John Allison, who works in Rothrock State Forest, cited his biggest concern for Menno Township as wildfire, as the Emerald Ash Borer and other pests result in a lot of dead trees in the forest. Mayor John Wagner,

Juniata Terrace Borough, explained that the Borough has many row homes, so an outbreak of flu or other contagious disease could spread very rapidly. Mayor John Wagner also explained that the Borough is surrounded by Norfolk Southern. With the prevailing winds from the west, the Borough could be susceptible to air-borne contaminants in the event of a train accident involving hazardous materials. Mayor John Wagner suggested a mitigation action to update stormwater management systems, thereby mitigating against sinkholes, and he did subsequently provide a *New Mitigation Action* form on this topic. The Mayor also indicated concerns about wildfire, as there are many downed trees in the Borough. In each instance, conversation ensued about how these concerns could be translated into *New Mitigation Action* forms, but forms on most of these topics were not submitted.

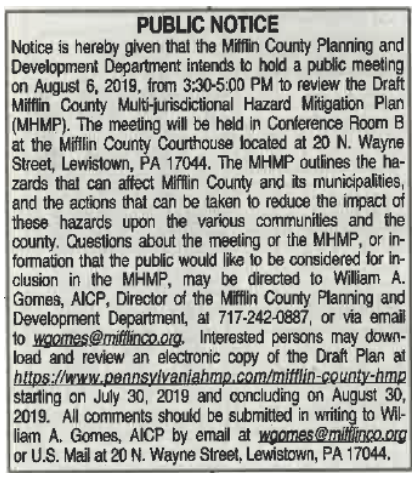
A public Plan Review meeting was held on August 6, 2019, at the Mifflin County Courthouse to review the MJHMP. The meeting presentation provided an overview of the MJHMP Update process and outcomes. Attendees were invited to review the entire MJHMP and to provide comments by August 30, 2019. In addition to being available on the project website since July 30, 2019, a CD with the MJHMP was provided to each municipality in attendance, and a CD was subsequently mailed to each remaining municipality. One new mitigation action was suggested during the meeting, by Mifflin County Commissioner Rob Postal, to increase municipal participation in the CRS Program by working with the municipalities to achieve the program requirements; this action was subsequently added to the MJHMP. A public notice announcing this meeting was published in *The Lewistown Sentinel* three weeks in advance of the event (see Figure 3.3-2). The meeting announcement was also posted to the project website at https://www.pennsylvaniahmp.com/mifflin-county-hmp and to the Mifflin County 9-1-1 Facebook page. In addition, email invitations were sent directly to the Steering Committee and to all municipalities in Mifflin County. There were nine meeting attendees.

All meeting invitations and worksheet requests were followed up with several reminders, to encourage full participation. Each meeting was followed by detailed meeting summaries that documented discussion, decisions, and action items identified during the meetings. These meeting summaries were shared with meeting invitees. Invitations, notices, agendas, sign-in sheets, and meeting summaries for these meetings can be found in Appendix C[3].

MBI plans to meet with municipalities in December 2019, as needed, to promote adoption of the updated MJHMP, following FEMA issuance of approval-pending-adoption.

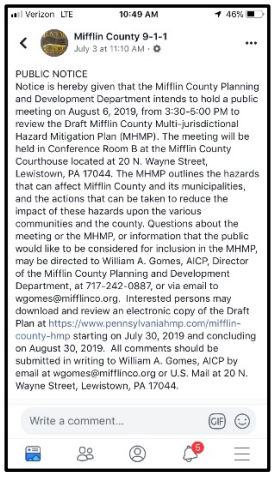
[3] This appendix will be publicly available at http://www.co.mifflin.pa.us/dept/PlanningDev/Pages/HazardMitigation.aspx

Figure 3.3-2: Announcements for the public planning session held on August 6, 2019. The newspaper Public Notice was published by The Sentinel on July 17, 2019 (See Appendix C for Proof of Publication).



PUBLIC NOTICE

Notice is hereby given that the Mifflin County Planning and Development Department intends to hold a public meeting on August 6, 2019, from 3:30-5:00 PM to review the Draft Mifflin County Multi-jurisdictional Hazard Mitigation Plan (MHMP). The meeting will be held in Conference Room B at the Mifflin County Courthouse located at 20 N. Wayne Street, Lewistown, PA 17044. The MHMP outlines the hazards that can affect Mifflin County and its municipalities, and the actions that can be taken to reduce the impact of these hazards upon the various communities and the county. Questions about the meeting or the MHMP, or information that the public would like to be considered for inclusion in the MHMP, may be directed to William A. Gomes, AICP, Director of the Mifflin County Planning and Development Department, at 717-242-0887, or via email to wgomes@mifflinco.org. Interested persons may download and review an electronic copy of the Draft Plan at https://www.pennsylvaniahmp.com/mifflin-county-hmp starting on July 30, 2019 and concluding on August 30, 2019. All comments should be submitted in writing to William A. Gomes, AICP by email at wgomes@mifflinco.org or U.S. Mail at 20 N. Wayne Street, Lewistown, PA 17044.

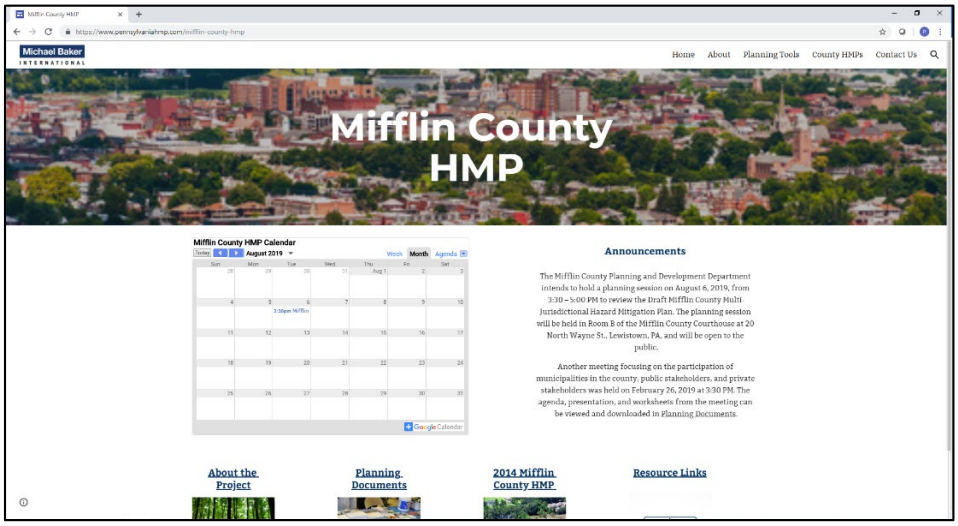


Verizon LTE 10:49 AM 46%

Mifflin County 9-1-1
July 3 at 11:10 AM

PUBLIC NOTICE
Notice is hereby given that the Mifflin County Planning and Development Department intends to hold a public meeting on August 6, 2019, from 3:30-5:00 PM to review the Draft Mifflin County Multi-jurisdictional Hazard Mitigation Plan (MHMP). The meeting will be held in Conference Room B at the Mifflin County Courthouse located at 20 N. Wayne Street, Lewistown, PA 17044. The MHMP outlines the hazards that can affect Mifflin County and its municipalities, and the actions that can be taken to reduce the impact of these hazards upon the various communities and the county. Questions about the meeting or the MHMP, or information that the public would like to be considered for inclusion in the MHMP, may be directed to William A. Gomes, AICP, Director of the Mifflin County Planning and Development Department, at 717-242-0887, or via email to wgomes@mifflinco.org. Interested persons may download and review an electronic copy of the Draft Plan at https://www.pennsylvaniahmp.com/mifflin-county-hmp starting on July 30, 2019 and concluding on August 30, 2019. All comments should be submitted in writing to William A. Gomes, AICP by email at wgomes@mifflinco.org or U.S. Mail at 20 N. Wayne Street, Lewistown, PA 17044.

Write a comment...



3.4. PUBLIC & STAKEHOLDER PARTICIPATION

The Steering Committee and Additional Stakeholders represented county and municipal government, critical facilities, local businesses and industries, and recreational resources. These parties were given many opportunities to participate in the 2019 MJHMP update process through invitations to meetings and WebEx conference calls and via completion of worksheets and forms. All participants were also given the opportunity to review and comment on the MJHMP. The tools listed below were posted to the project website and were also distributed via live meetings and email to successfully solicit data, information, and comments from all 16 municipalities and several other stakeholders in Mifflin County. Completed worksheets and forms are included as Appendix C.

1) ***Evaluation of Identified Hazards and Risk Worksheet***: Requests feedback from municipal officials regarding perceived changes to hazards in terms of frequency of occurrence, magnitude of impact, and/or geographic extent and solicits additional comments as well.

2) ***Jurisdictional Risk Evaluation Worksheet***: Identifies the most significant hazards in each municipality in terms of probability, severity, spatial extent, warning time, and duration.

3) ***National Flood Insurance Program (NFIP) Worksheet***: Collects information on each municipality's participation in and continued compliance with the NFIP and identifies areas for improvement that could be potential mitigation actions.

4) ***Mitigation Action Progress Report Form***: Evaluates previous mitigation actions for the purpose of determining whether they should be continued, modified, or removed from updated plan. This worksheet also aims to record progress made on actions contained in the 2014 MJHMP and to suggest new actions for inclusion in the 2019 plan.

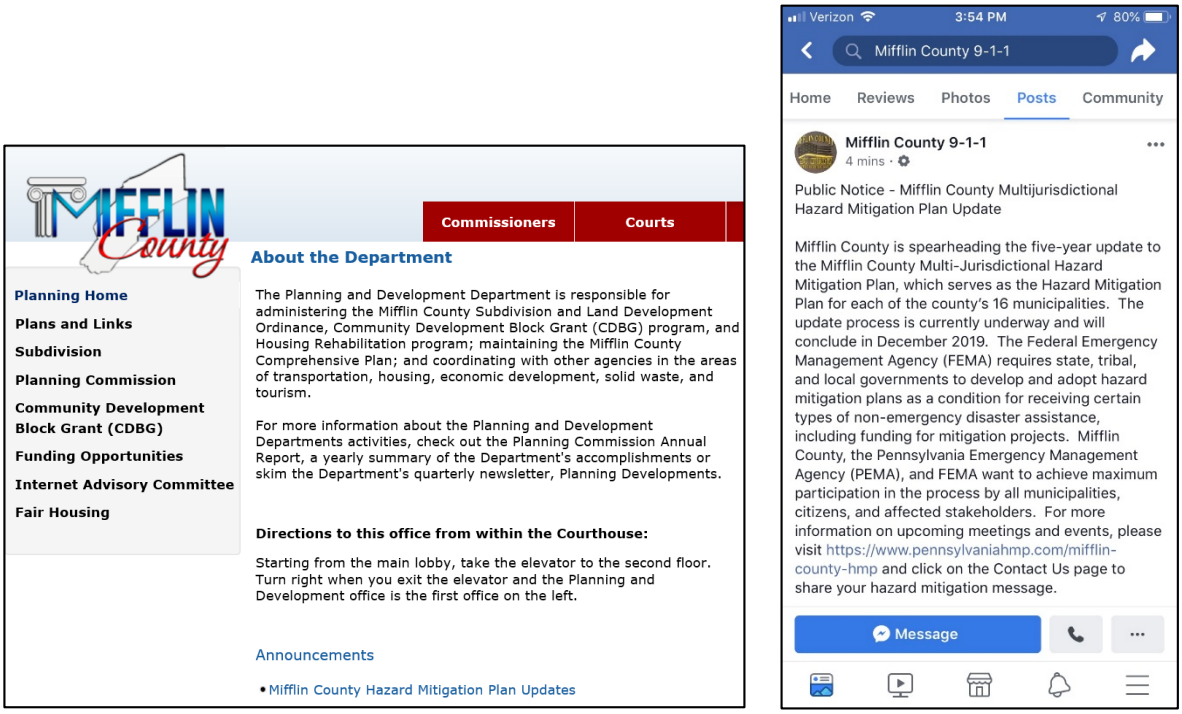
5) ***New Mitigation Action Form*****:** Requests information for proposed new mitigation actions.

The project website was discussed at each of the meetings. The website includes a calendar and announcements with meeting information, as well as a library with the 2019 meeting materials, the 2014 MJHMP, the 2019 MJHMP (posted on July 30, 2019), and resource links. The website also includes a "contact us" feature to submit comments or questions directly via the website. This website is available at https://www.pennsylvaniahmp.com/mifflin-county-hmp.

In addition to the intensive effort to involve municipalities and other stakeholders in the 2019 MJHMP Update, public participation was encouraged. On January 30, 2019, Mifflin County listed the 2019 MJHMP Update in the Announcements section of their Planning Department website, at http://www.co.mifflin.pa.us/dept/PlanningDev/Pages/default.aspx, with a link to the project website. Also on January 30, 2019, a more detailed notice was posted to the Mifflin County 9-1-1 Facebook page at https://www.facebook.com/MifflinCountyPublicSafety/, describing the project, providing a link to the project website, and explaining the Contact Us feature on the project website. These notices are shown in Figure 3.4-1. On July 17, 2019, a newspaper notice was published in *The Lewistown Sentinel* to notify the citizens of Mifflin County of the planning session on August 6, 2019, and the plan review. The notice was also posted to the project website and to the Mifflin County 9-1-1 Facebook page. A copy of this notice is included in Section 3.3 as Figure 3.3-2. On July 25, 2019, MBI presented the project at a regular meeting of the Mifflin County Planning Commission in the Mifflin County Courthouse; this meeting was open to the public.

Via meetings, emails, letters with enclosed CDs, website postings, and newspaper notice, the Steering Committee, stakeholders, and the public were invited to review the entire 2019 MJHMP and to provide comments by August 30, 2019. Comments were received from only two parties: William Gomes of the Mifflin County Planning and Development Department and Mifflin County Commissioner Rob Postal. This input was incorporated into the MJHMP prior to PEMA submittal.

Figure 3.4-1: Announcements of the 2019 MJHMP Update on the County website and on the Public Safety Facebook page.



3.5. MULTI-JURISDICTIONAL PLANNING

Mifflin County took a multi-jurisdictional approach to updating its MJHMP, in that the MJHMP will apply to the County and to all participating municipalities. The County was able to provide resources (funding, data, GIS, etc.) to which the municipalities may not have had access. However, the County was dependent on municipal support, since the municipalities have the legal authority to enforce compliance of land use planning and development issues. The County, together with MBI, undertook an intensive effort to successfully involve all 16 municipalities in the 2019 MJHMP Update process via meetings or calls, worksheets, and new mitigation actions. This involvement was critical to the collection of local knowledge related to hazard events. Participation culminates in formal adoption of the MJHMP; template adoption resolutions are found in Section 8. A 2019 municipal participation matrix is included as Table 3.5-1. All 16 municipalities also participated in the 2014 MJHMP Update via meetings and worksheets, but the 2019 MJHMP Update included a more diverse group of other stakeholders and garnered many more new mitigation actions. The 2014 MJHMP Update included 2 new mitigation actions, while the 2019 MJHMP Update includes 55 new mitigation actions. Of the 55 new mitigation actions in the 2019 MJHMP Update, 36 were provided via *New Mitigation Action* forms, and 19 were generated by MBI based on conversations throughout the update process, to ensure that the 2019 MJHMP includes at least 1 action for each hazard profiled, to promote outreach with the County's sizeable Amish population, and to encourage follow through with annual MJHMP update meetings and plan integration.

Table 3.5-1: Summary of Participation from Local Municipalities During the 2019 MJHMP Update as of July 17, 2019

Municipality	Meetings						Worksheets/Surveys/Forms				
	SC KICK-OFF January 15, 2019	RISK ASSESSMENT/ MITIGATION WORKSHOP February 26, 2019	RISK ASSESSMENT/ MITIGATION WORKSHOP CALLS March-April 2019	PLAN REVIEW MEETING August 6, 2019	MUNIC. MTG. A Dec. Xx, 2019	MUNIC. MTG. B Dec. Xx, 2019	HAZARDS AND RISK	JURISDICTIONAL RISK EVALUATION	NFIP WORKSHEET	MITIGATION ACTION PROGRESS FORM	NEW MITIGATION ACTION FORM*
Armagh Township	✓	✓					✓	✓	✓		✓✓
Bratton Township	✓	✓		✓			✓	✓	✓		✓
Brown Township		✓		✓			✓	✓	✓	✓	✓
Burnham Borough		✓					✓	✓			✓✓
Decatur Township			✓				✓				✓✓✓✓ ✓✓✓✓✓
Derry Township	✓	✓					✓	✓		✓	✓✓✓
Granville Township			✓				✓				✓
Juniata Terrace Borough			✓								✓
Kistler Borough			✓								✓
Lewistown Borough	✓	✓		✓			✓	✓	✓		✓
McVeytown Borough	✓	✓		✓			✓	✓	✓		✓
Menno Township			✓				✓	✓			✓
Newton Hamilton Borough			✓				✓				✓
Oliver Township	✓	✓		✓			✓	✓	✓		✓
Union Township	✓						✓				✓✓✓✓
Wayne Township		✓					✓	✓	✓		✓✓
Mifflin County	✓	✓		✓			✓	✓			✓✓✓✓

*In addition to 36 *New Mitigation Action* forms provided by the municipalities and County, MBI generated 19 new actions, for a total of 55 new actions.

4. RISK ASSESSMENT

4.1. UPDATE PROCESS SUMMARY

This risk assessment provides a factual basis for activities proposed by the County in its mitigation strategy. Hazards that may affect Mifflin County are identified and defined in terms of location and geographic extent, magnitude of impact, previous events, and likelihood of future occurrence.

The Steering Committee identified natural and human-caused hazards that have the potential to impact Mifflin County. The occurrence of a past hazard event in the County provided an indication of future possible incidence, but the fact that a hazard event has not previously occurred did not exclude the hazard from further investigation. Similarly, limited past occurrences of hazard events did not by themselves warrant a hazard's inclusion in the Plan.

All 34 hazards listed in PEMA's *Standard List of Hazards* from the Commonwealth of Pennsylvania's All-Hazard Mitigation Planning *Standard Operating Guide* that might affect Mifflin County were listed on the *Evaluation of Identified Hazards and Risk* form that was provided to stakeholders. The purpose of the form is to collect information from municipal officials and other stakeholders on what hazards affect their community and the frequency of incidents. Based on the results of this exercise, feedback from the HMSC, information from the 2018 Pennsylvania State HMP update, and past disaster declarations, the hazards most prevalent to Mifflin County that were selected for inclusion in the 2019 Mifflin County MJHMP Update include 13 natural hazards (drought; extreme temperature; flood, flash flood, and ice jam; hurricane, tropical storm, and Nor'easter; invasive species; landslide; lightning strike; pandemic and infectious disease; radon exposure; subsidence and sink hole; tornado and windstorm; wildfire; and winter storm) and 8 human-caused hazards (building and structure collapse, civil disturbance, dam failure, drowning, environmental hazard – hazardous materials release, transportation accidents, urban fire and explosion, and utility interruption). All of the hazards profiled in the 2014 MJHMP were updated, and two new hazards were added in the 2019 Update: hurricane, tropical storm, and Nor'easter; and building and structure collapse. Respondents to the *Evaluation of Identified Hazards and Risk* form (see Appendix C) indicated that, of the hazards not previously profiled, hurricane, tropical storm, and Nor'easter; and building and structure collapse have the greatest potential to significantly affect their communities. A lesser number of respondents indicated heightened concern about climate change and terrorism, with Mifflin County Commissioner Rob Postal and Derry Township Supervisor Ron Napikoski specifically citing growing threats to cyber security. Phil Lucas, Mifflin County Public Safety, cited concern about opioid addiction, and William Gomes, Mifflin County Planning and Development Department, cited concern about stormwater management.

For the 2019 MJHMP Update, the terminology used for some hazard profiles and the document organization was revised to align with PEMA's *Standard Operating Guide* and model plan outline (Michael Baker Jr., Inc., 2013). Likewise, the hazard definitions provided in Section 4.2.2 were replaced to comply with the *Standard Operation Guide*.

Additionally, the identifying information about critical facilities, such as addresses and mapping, was relocated during the 2019 MJHMP Update. This information was previously included in the flood hazard profile and has now been relocated and updated as Appendix D, which is not for public distribution.

Also, local photos of past occurrences of disasters were added during the 2019 Update. Several photos were provided by the County, and numerous photos were obtained from local news sources and from organization and individual Facebook pages.

The 2019 update of Section 4 required extensive verification and update of all text and tables, as well as replacement of all mapping. Many additions were also made such as detailed descriptions of past occurrences in the drought profile, a table of past occurrences in the extreme temperature profile, and discussion of Biggert-Waters in the flood profile. The invasive species profile was updated with a new threat: the spotted lanternfly, a table of karst feature occurrence was added to the sinkhole profile, and a table of past events was added to the utility interruption profile. At the County's request, a GIS analysis of historical structures in the Special Flood Hazard Area (SFHA) was conducted, resulting in 11 new maps on this topic. Also at the County's request, MBI conducted an analysis with table and mapping to overlay tax delinquent properties and the SFHA.

Following hazard identification and profiling, a vulnerability assessment was performed to identify the impact of natural or human-caused hazard events on people, buildings, infrastructure, and the community. The criteria used for the Risk Factor Approach in Section 4.4.1 were updated in 2019 to match the Commonwealth of Pennsylvania 2018 State Hazard Mitigation Plan (Michael Baker International, 2018). Each natural and human-caused hazard is discussed in terms of its potential impact on individual communities in Mifflin County, including the types of parcels and critical facilities that may be at risk. The assessment allows the County and its municipalities to focus mitigation efforts on areas most likely to be damaged or most likely to require early response to a hazard event. A vulnerability analysis was performed to identify land, facilities, or people that may be impacted by hazard events and describe what those events can do to physical, social, and economic assets. A Hazards U.S. Multi-Hazard (HAZUS-MH) analysis was conducted in May 2019 using the latest available data.

Section 4.2.1 provides a summary of previous disaster declarations and emergency proclamations affecting Mifflin County as well as a review of hazards identified as having the greatest potential to impact the County as of the 2019 Update. Only the most current and credible sources were used to complete the hazard profiles included in Section 4.3; see citations and the Bibliography for source details.

4.2. HAZARD IDENTIFICATION

4.2.1 Table of Presidential Disaster Declarations

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. Table 4.2.1-1 identifies 15 Presidential Disaster and Emergency Declarations issued between 1955 through 2019 that have affected Mifflin County.

Table 4.2.1-1: Presidential Disaster and Emergency Declarations Affecting Mifflin County (FEMA, 2019)		
Declaration Number	**Date**	**Event**
3356	October 2012	Hurricane Sandy
3340	September 2011	Remnants of Tropical Storm Lee
1649	June 2006	Flooding
3235	September 2005	Hurricane Katrina
1557	September 2004	Tropical Depression Ivan
3180	February 2003	Severe Winter Storm
1294	September 1999	Hurricane Floyd
1138	September 1996	Hurricane Fran
1093	January 1996	Flooding
1085	January 1996	Blizzard
1015	March 1994	Severe Winter Storm
3105	March 1993	Blizzard
523	October 1976	Severe Storms, Flooding
485	September 1975	Flood, Tropical Storm Eloise
340	June 1972	Flood, Tropical Storm Agnes

In addition to these federally declared events, 28 events warranted Gubernatorial Proclamations of Emergency.

Table 4.2.1-2: Mifflin County Gubernatorial Proclamations of Emergency (PEMA, 2019; Michael Baker International, 2018)	
Date	**Type**
January 2019	Severe Winter Storm
August 2018	Severe Storms
January 2018	Opioid Crisis
March 2017	Severe Winter Storm
January 2016	Severe Winter Storm
August 2015	Severe Storms
January 2015	Severe Winter Storm
February 2014	Severe Winter Storm

Table 4.2.1-2: Mifflin County Gubernatorial Proclamations of Emergency (PEMA, 2019; Michael Baker International, 2018)	
Date	**Type**
January 2014	Extreme Weather, Utility Interruption
June 2013	High Winds, Thunderstorms, Heavy Rain, Tornado, Flooding
October 2012	Hurricane Sandy
August 2011, amended September 2011	Hurricane Lee/Irene
January 2011	Severe Winter Storm
February 2010	Severe Winter Storm
April 2007	Severe Winter Storm
February 2007	Severe Winter Storm
February 2007	Regulations
September 2006	Tropical Depression Ernesto
June 2006	Proclamation of Emergency- Flooding
September 2005	Hurricane Katrina
July 1999	Drought
November 1980	Drought Emergency
February 1978	Blizzard
January 1978	Heavy Snow
February 1974	Truckers' Strike
February 1972	Heavy Snow
January 1966	Heavy Snow
March 1963	Ice Jam (Susquehanna & Juniata Rivers)

Since 1955, declarations have been issued for a variety of hazard events, including hurricanes, tornadoes, severe winter storms, and flooding. A unique Presidential Emergency Declaration was issued in September 2005, through Emergency Declaration 3235, President George W. Bush declared that a state of emergency existed in the Commonwealth of Pennsylvania and ordered federal aid to supplement Commonwealth and local response efforts to help people who were evacuated from their homes due to Hurricane Katrina.

A new Gubernatorial Disaster Declaration was made in January 2018 and subsequently extended in response to the statewide opioid crisis. The disaster declaration called attention to the epidemic-level occurrences of opioid use disorder and opioid overdose deaths.

4.2.2 Summary of Hazards

The Steering Committee reviewed the previous list of hazards from the existing MJHMP and was provided the Pennsylvania Standard List of Hazards to be considered for evaluation in the 2019 MJHMP Update. The Steering Committee decided that the 2019 Plan should identify, profile, and analyze 21 hazards. Table 4.2.2-1 contains a complete list of the 21 hazards deemed by 2019 MJHMP Update participants to have the greatest potential to impact Mifflin County, and Table 4.2.2-2 describes each hazard. Hazard profiles are included in Section 4.3 for each of these hazards.

Table 4.2.2-1: Mifflin County MJHMP Hazards Profiled: 2013 – 2019	
2013 Hazards Profiled	**2019 Hazards Profiled**
Drought	Drought
Extreme Temperature	Extreme Temperature
Flood, Flash Flood, Ice Jam	Flood, Flash Flood, Ice Jam
---	Hurricane, Tropical Storm, Nor'easter*
Invasive Species*	Invasive Species
Landslide	Landslide
Lightning Strike*	Lightning Strike
Pandemic and Infectious Disease	Pandemic and Infectious Disease
Radon Exposure*	Radon Exposure
Subsidence, Sinkhole	Subsidence, Sinkhole
Tornado, Windstorm	Tornado, Windstorm
Wildfire	Wildfire
Winter Storm	Winter Storm
---	Building and Structure Collapse*
Civil Disturbance	Civil Disturbance
Dam Failure	Dam Failure
Drowning*	Drowning
Environmental Hazard – Hazardous Materials Release	Environmental Hazard – Hazardous Materials Release
Transportation Accidents	Transportation Accidents
Urban Fire and Explosion	Urban Fire and Explosion
Utility Interruption	Utility Interruption
* Indicates new hazards in each MJHMP update	

Table 4.2.2-2: Hazards Profiled in the 2019 Mifflin County MJHMP Update with Associated Descriptions (PA 2013 SOG Drowning and 2018 PA State Hazard Mitigation Plan for all other hazards)	
Hazard Name	**Hazard Description**
Natural Hazards	
Drought 	Drought is defined as a deficiency of precipitation experienced over an extended period of time, usually a season or more. Droughts increase the risk of other hazards, like wildfires, flash floods, and landslides or debris flows. This hazard is of particular concern in Pennsylvania due to the prevalence of farms and other water-dependent industries, water-dependent recreation uses, and residents who depend on wells for drinking water. (National Drought Mitigation Center, 2018; Ready.gov 2018).
Extreme Temperature 	Extreme heat often results in the highest number of annual deaths of all weather-related hazards. In most of the United States, extreme heat is defined as a long period (2 to 3 days) of high heat and humidity with temperatures above 90 degrees. (Ready.gov, 2018). Extremely cold air comes every winter in at least part of the country and affects millions of people across the United States. The arctic air, together with brisk winds, can lead to dangerously cold wind chill values. People exposed to extreme cold are susceptible to frostbite and hypothermia in a matter of minutes. (NWS, 2018).
Flood, Flash Flood, Ice Jam 	Flooding is the temporary condition of partial or complete inundation of normally dry land and it is the most frequent and costly of all natural hazards in Pennsylvania (PEMA, 2018). Flash flooding is usually a result of heavy localized precipitation falling in a short time period over a given location, often along mountain streams and in urban areas where much of the ground is covered by impervious surfaces. (FEMA, 2018). Winter flooding can include ice jams which occur when warm temperatures and heavy rain cause snow to melt rapidly. Snow melt combined with heavy rains can cause frozen rivers to swell, which breaks the ice layer on top of a river. The ice layer often breaks into large chunks, which float downstream, piling up in narrow passages and near other obstructions such as bridges and dams. (NESEC, 2018).
Hurricane, Tropical Storm, Nor'easter 	Hurricanes, tropical storms, and nor'easters are classified as cyclones and are any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise (in the Northern Hemisphere) and whose diameter averages 10-30 miles across. Potential threats from hurricanes include powerful winds, heavy rainfall, storm surges, coastal and inland flooding, rip currents, tornadoes, and landslides. The Atlantic hurricane season runs from June 1 to November 30. (NOAA, 2018; Ready.gov, 2018).

Table 4.2.2-2: Hazards Profiled in the 2019 Mifflin County MJHMP Update with Associated Descriptions (PA 2013 SOG Drowning and 2018 PA State Hazard Mitigation Plan for all other hazards)	
Hazard Name	**Hazard Description**
Invasive Species 	An invasive species is a species that is not indigenous to the ecosystem under consideration and whose introduction causes or is likely to cause economic, environmental, or human harm. These species can be any type of organism: plant, fish, invertebrate, mammal, bird, disease, or pathogen. (NOAA, 2018; USDA, 2016).
Landslide 	In a landslide, masses of rock, earth or debris move down a slope. Landslides can be caused by a variety of factors, including earthquakes, storms, fire, and human modification of land. Areas that are prone to landslide hazards include previous landslide areas, areas on or at the base of slopes, areas in or at the base of drainage hollows, developed hillsides with leach field septic systems, and areas recently burned by forest or brush fires. (PA DCNR, 2018 and USGS, 2018).
Lightning Strike 	Lightning is a giant spark of electricity resulting from the build-up of positive and negative charges within a thunderstorm. The flash or "bolt" of light can occur within the thunderstorm cloud or between the cloud and the ground. Lightning is a leading cause of injury and death from weather-related hazards. Although most lightning victims survive, people struck by lightning often report a variety of long-term, debilitating symptoms. (NOAA NWS, 2018 and Ready.gov. 2018).
Pandemic and Infectious Disease 	A pandemic is a global outbreak of disease that occurs when a new virus emerges in the human population, spreading easily in a sustained manner, and causing serious illness. An epidemic describes a smaller-scale infectious outbreak, within a region or population, that emerges at a disproportional rate. Infectious disease outbreaks may be widely dispersed geographically, impact large numbers of the population, and could arrive in waves lasting several months at a time. (FEMA, 2018).
Radon Exposure 	Radon is a radioactive gas produced by the breakdown of uranium in soil and rock that can lead to lung cancer in people exposed over a long period of time. Most exposure comes from breathing in radon gas that enters homes and buildings through foundation cracks and other openings. According to the DEP, approximately 40% of Pennsylvania homes have elevated radon levels. (DEP, 2018 and American Cancer Society, 2018).

Table 4.2.2-2: Hazards Profiled in the 2019 Mifflin County MJHMP Update with Associated Descriptions (PA 2013 SOG Drowning and 2018 PA State Hazard Mitigation Plan for all other hazards)	
Hazard Name	**Hazard Description**
Subsidence, Sinkhole 	Land subsidence is a gradual settling or sudden sinking of the ground surface due to the movement of subsurface materials. A sinkhole is a subsidence feature resulting from the sinking of surficial material into a pre-existing subsurface void. Subsidence and sinkholes are geologic hazards that can impact roadways and buildings and disrupt utility services. Subsidence and sinkholes are most common in areas underlain by limestone, and can be exacerbated by human activities such as water, natural gas, and oil extraction. (USGS, 2018 and PA DCNR, 2018).
Tornado, Wind Storm 	A tornado is a narrow, violently rotating column of air that extends from the base of a thunderstorm to the ground. About 1,250 tornadoes hit the U.S. each year, with about 16 hitting Pennsylvania. Damaging winds exceeding 50-60 miles per hour can occur during tornadoes, severe thunderstorms, winter storms, or coastal storms. These winds can have severe impacts on buildings, pulling off the roof covering, roof deck, or wall siding and pushing or pulling off the windows. (FEMA, 2014 and NOAA, 2018).
Wildfire 	A wildfire is an unplanned fire that burns in a natural area. Wildfires can cause injuries or death and can ruin homes in their path. Wildfires can be caused by humans or lightning, and can happen anytime, though the risk increases in period of little rain. In Pennsylvania, 98% of wildfires are caused by people (Ready.gov, 2018 and PA DCNR, 2018).
Winter Storm 	A winter storm is a storm in which the main types of precipitation are snow, sleet, or freezing rain. A winter storm can range from a moderate snowfall or ice event over a period of a few hours to blizzard conditions with wind-driven snow that lasts for several days. Most deaths from winter storms are not directly related to the storm itself, but result from traffic accidents on icy roads, medical emergencies while shoveling snow, or hypothermia from prolonged exposure to cold. (NOAA, 2018).

Table 4.2.2-2: Hazards Profiled in the 2019 Mifflin County MJHMP Update with Associated Descriptions (PA 2013 SOG Drowning and 2018 PA State Hazard Mitigation Plan for all other hazards)	
Hazard Name	**Hazard Description**
Human-Caused Hazards	
Building and Structure Collapse 	Buildings and other engineered structures, including bridges, may collapse if their structural integrity is compromised, especially due to effects from other natural or human-made hazards. Older buildings or structures, structures that are not built to standard codes, or structures that have been weakened are more susceptible to be affected by these hazards.
Civil Disturbance 	A civil disturbance is defined by FEMA as a civil unrest activity (such as a demonstration, riot, or strike) that disrupts a community and requires intervention to maintain public safety. (FEMA, 2018)
Dam Failure 	Dam failure is the uncontrolled release of water (and any associated wastes) from a dam. This hazard often results from a combination of natural and human causes, and can follow other hazards such as hurricanes, earthquakes, and landslides. The consequences of dam failures can include property and environmental damage and loss of life. (ASDSO, 2018).
Drowning 	Drowning is death from suffocation, typically associated with swimming, fishing, boating or bridge accidents, or suicide. It can be a significant hazard in communities with numerous residential pools or water bodies (e.g. ponds, lakes, rivers, etc…) and extensive outdoor recreational activity. Drowning rates are particularly high for children ages 1-14. The Centers for Disease Control and Prevention estimates that drowning is the second leading cause of injury death (after motor vehicle crashes) among children ages 1-14. (CDC, 2008).

Table 4.2.2-2: Hazards Profiled in the 2019 Mifflin County MJHMP Update with Associated Descriptions (PA 2013 SOG Drowning and 2018 PA State Hazard Mitigation Plan for all other hazards)	
Hazard Name	**Hazard Description**
Environmental Hazards – Hazardous Materials Releases 	Hazardous material releases can contaminate air, water, and soils and have the potential to cause injury or death. Dispersion can take place rapidly when transported by water and wind. While often accidental, releases can occur as a result of human carelessness, intentional acts, or natural hazards. When caused by natural hazards, these incidents are known as secondary events.
Transportation Accident 	Transportation accidents are technological hazards involving the nation's system of land, sea, and air transportation infrastructure. A flaw or breakdown in any component of this system can and often does result in a major disaster involving loss of life, injuries, property and environmental damage, and economic consequences. (FEMA, 2018)
Urban Fire and Explosion 	Urban fire and explosion hazards include vehicle and building/structure fires as well as overpressure rupture, overheat, or other explosions that do not ignite. This hazard occurs in denser, more urbanized areas statewide and most often occurs in residential structures. Nationally, fires cause over 3,000 deaths and approximately 16,000 injuries each year (U.S. Fire Administration, 2018).
Utility Interruption 	Utility interruption hazards are hazards that impair the functioning of important utilities in the energy, telecommunications, public works, and information network sectors. Utility interruption hazards include the following: • Geomagnetic Storms • Fuel or Resource Shortage • Electromagnetic Pulse • Information Technology Failure • Ancillary Support Equipment • Public Works Failure • Telecommunications System Failure • Transmission Facility or Linear Utility Accident • Major Energy, Power, Utility Failure (Bonner, 2017)

4.3. HAZARD PROFILES AND VULNERABILITY ANALYSIS

NATURAL HAZARDS

4.3.1 Drought

4.3.1.1 Location and Extent

Droughts are defined as the consequence of a natural reduction in the amount of precipitation expected over an extended period of time, usually a season or more in length. Drought is a normal aspect of virtually all climates and is sometimes characterized by a water shortage, a dry spell, and general dryness in a location. High temperatures, prolonged winds, and low relative humidity can exacerbate the severity of drought. Droughts are regional climatic events, so they typically impact all communities in a relatively uniform fashion with only minor localized variations in rainfall events. Droughts often occur across county boundaries, affecting large areas of Pennsylvania at the same time. The spatial extent for areas of impact can range from localized areas in Pennsylvania to the entire Mid-Atlantic region. Areas with extensive agriculture uses are particularly vulnerable to drought. In Mifflin County alone, 80,970 acres are dedicated to farmland (USDA, 2017).

4.3.1.2 Range of Magnitude

Hydrologic drought events result in a reduction of stream flows, reduction of lake/reservoir storage, and a lowering of groundwater levels. These events have adverse impacts on public water supplies for human consumption and rural water supplies for livestock consumption and agricultural operations. Additionally, water quality may suffer and the availability of natural soil water or irrigation water for agriculture will diminish. Drought also effects soil moisture content and these extreme conditions are highly conducive to wildfire events.

The Commonwealth of Pennsylvania uses five indicators to assess drought conditions (Michael Baker International, 2018):

- **Precipitation Deficits –** Measured as the departure from normal, 30-year average precipitation. A deficit is the earliest indicator that a drought is possible in the area.
- **Stream Flows –** There are 61 USGS stream gages that the PA DEP uses to monitor droughts across the state. Two USGS stream gages are located in Mifflin County located at Kishacoquillas Creek in Reedsville and the Juniata River in Lewistown (USGS, 2019).
- **Groundwater Levels –** The 30-day average levels of groundwater are compared to historical average levels to determine potential drought. The USGS also maintains groundwater monitoring wells.
- **Soil Moisture –** An algorithm calibrated for relatively homogenous regions which measures dryness based on temperature and precipitation in the area, which is provided by NOAA. The Palmer Drought Severity Index (PDSI) is calculated using this information (See Table 4.3.1-1 for PDSI Classifications).

Table 4.3.1-1: PDSI Classifications (NDMC, 2019)	
Severity Category	**PDSI Value**
Extremely wet	4.0 or more
Very wet	3.0 to 3.99
Moderately wet	2.0 to 2.99
Slightly wet	1.0 to 1.99
Incipient wet spell	0.5 to 0.99
Near normal	0.49 to -0.49
Incipient dry spell	-0.5 to -0.99
Mild drought	-1.0 to -1.99
Moderate drought	-2.0 to -2.99
Severe drought	-3.0 to -3.99
Extreme drought	-4.0 or less

- **Reservoir Storage Levels –** Water level storage in several large public water supply reservoirs is used to identify drought stages. The total quantity of storage and the length of the refill period for various reservoirs are used to calculate varying percentages of storage draw down.

The following phases of drought preparedness in Pennsylvania are listed in order of increasing severity based on the PA DEP's *Drought Management in Pennsylvania* Fact Sheet (2018):

- **Drought Watch:** A period to alert government agencies, public water suppliers, water users, and the public regarding the potential for future drought-related problems. The focus is on increased monitoring, awareness, and preparation for response if conditions worsen. A request for voluntary water conservation is made. The objective of voluntary water conservation measures during a drought watch is to reduce water uses by 5 percent in the affected areas. Due to varying conditions, individual water suppliers or municipalities may be asking for more stringent conservation actions (Michael Baker International, 2018).
- **Drought Warning:** This phase involves a coordinated response to imminent drought conditions and potential water supply shortages through concerted voluntary conservation measures to avoid or reduce shortages, relieve stressed sources, develop new sources, and if possible, forestall the need to impose mandatory water use restrictions. The objective of voluntary water conservation measures during a drought warning is to reduce overall water uses by 10 to 15 percent in the affected areas. Due to varying conditions, individual water suppliers or municipalities may be asking for more stringent conservation actions (Michael Baker International, 2018).
- **Drought Emergency:** This stage is a phase of concerted management operations to marshal all available resources to respond to actual emergency conditions, to avoid depletion of water sources, to ensure at least minimum water supplies to protect public health and safety, to support essential and high-priority water uses, and to avoid unnecessary economic dislocations. It is possible during this phase to impose mandatory restrictions on non-essential water uses that are provided in the Pennsylvania Code (Chapter 119), if deemed necessary and if ordered

by the governor of Pennsylvania. The objective of water use restrictions (mandatory or voluntary) and other conservation measures during this phase is to reduce consumptive water use in the affected area by 15 percent, and to reduce total use to the extent necessary to preserve public water system supplies, to avoid or mitigate local or area shortages, and to ensure equitable sharing of limited supplies (Michael Baker International, 2018).

- **Local Water Rationing:** Although not a drought phase, 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 in designated water supply service areas. These individual water rationing plans, authorized through provisions of the Pennsylvania Code (Chapter 120), will 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, procedures are provided for granting of variances to consider individual hardships and economic dislocations (Michael Baker International, 2018).

The effects of a drought can be far-reaching in both the economic and environmental realms. Economic impacts include the reduced productivity of aquatic resources, mandatory water use restrictions, well failures, cutbacks in industrial production, agricultural losses, and limited recreational opportunities. Environmental impacts of drought include the following:

- **Hydrologic Effects –** lower water levels in reservoirs, lakes, and ponds; reduced stream flow; 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 Landscape Quality**

4.3.1.3 Past Occurrences

Based on Mifflin County's disaster history and other drought occurrence data, the county has experienced several droughts, the worst being in the summer of 1999. The drought of July 1999 caused Governor Ridge to declare a drought emergency in 55 of the 67 counties of Pennsylvania, following extended dry weather through most of the summer. Water usage was restricted. Precipitation deficits for many counties for the months of May through July averaged between five and seven inches. Precipitation departures for the 365-day period ending in mid-July were over one foot below normal in many places. This is about one-third of total annual normal precipitation in most areas. Streams were

empty, wells dried up, and the Susquehanna River hit record low flows. Hot, sunny days combined with the dry weather began to take a large toll on crops. Preliminary estimates by the U.S. Department of Agriculture indicated possible crop losses more than $500 million for Pennsylvania. Some counties experienced 70-100 percent crop loss. The $500 million figure did include a 20 percent decrease in milk production that would also result in several million dollars in losses. In August 1999, the drought emergency remained in effect for all 55 affected counties. Despite severe flash flooding in a few locations and normal or above normal precipitation in many others, water tables remained low and water usage was restricted.

The drought of 1995 began in August with a one-month period of drought conditions for several Commonwealth counties, including Mifflin. In September 1995, the drought continued unabated throughout eastern Pennsylvania. Rainfall was closer to normal during the second half of the month; however, most counties had approximately 75 percent of their normal rainfall.

The drought of October 1997 occurred as the growing season ended. Forty-six counties, including Mifflin, were declared agricultural disaster areas by the U.S. Department of Agriculture. Farmers in all Pennsylvania counties became eligible for disaster relief. Precipitation deficits for the growing season from April through October ranged from -1.6 inches in Cumberland County to a disastrous -8.5 inches in York County.

The drought of December 1998 was the result of abnormally dry conditions through the months, which developed into a drought across all central Pennsylvania by mid-December. Former Governor Tom Ridge declared drought emergency conditions in nine central Pennsylvania counties and drought warnings in others, calling for restrictions on water use and reduced water consumption of 10 to 15 percent. Precipitation departures from normal for the four months leading up to the declaration totaled more than eight inches in several locations, with nearly all areas in deficit by more than four inches. Bans were placed on outdoor burning, as numerous woodland and brush fires occurred across the region.

Mifflin County also experienced a significant drought in 1982. This event was widespread across the Commonwealth and caused over $196 million worth of losses. Droughts affected dairy farmers in the county who experienced significant losses due to the drought. The event required subsidies to be issued to farmers to offset losses.

As seen, previous drought event losses in farming agricultural can be substantial. Mifflin County has experienced several droughts in the last 23 years. The PA DEP maintains the most comprehensive data on drought occurrences across the Commonwealth. The PA DEP determines whether a County enters drought status by monitoring certain key indicators, including stream flows, groundwater levels, monthly precipitation levels, soil moisture levels, and water supply reservoir storage levels. PA DEP and PEMA begin monitoring drought conditions when three or more indicators signify levels below optimum. The number of declared droughts in Mifflin County from 1980 to 2013 is shown in Table 4.3.1-2. Mifflin's County's record of droughts prior to 1980 is limited.

Figure 4.3.1-1: Great Trough Creek in neighboring Huntingdon County during a 2016 drought (Photograph courtesy of Susquehanna River Basin Commission, 2016).

Table 4.3.1-2: Declared Drought Status in Mifflin County: 1980 – 2017 (PA DEP, 2018; Michael Baker International, 2018)

Total Drought Watches	Total Drought Warnings	Total Drought Emergencies
28	14	7

Table 4.3.1-3: Drought Events in Mifflin County: 1980 – 2017 (PA DEP, 2018)	
Time Period	**Drought Status**
November 18, 1980- April 20, 1982	Emergency
April 26, 1985- December 19,1985	Watch
July 7, 1988- August 24, 1988	Watch
August 24, 1988- December 12, 1988	Warning
March 3, 1989- May 15, 1989	Watch
June 28, 1991- July 24, 1991	Warning
July 24, 1991- April 20, 1992	Emergency
April 20, 1992- September 11, 1992	Warning
September 11, 1992–January 15, 1993	Warning
September 1, 1995- November 8, 1995	Warning
November 8, 1995- December 18, 1995	Watch
July 17, 1997- November 13, 1997	Watch
December 3, 1998- December 14, 1998	Watch
December 14, 1998- March 15, 1999	Warning
March 15, 1999- June 10, 1999	Watch
June 10, 1999- July 20, 1999	Warning
July 20,1999- September 30, 1999	Emergency
September 30, 1999- May 5, 2000	Watch
August 8, 2001- December 5, 2001	Watch
December 5, 2001- June 14, 2002	Warning
September 5, 2002- November 7, 2002	Watch
April 11, 2006- June, 30, 2006	Watch
August 6, 2007- September, 5 2007	Watch
September 16, 2010- November 10, 2010	Watch
August 5, 2011- September 2, 2011	Watch
June 17, 2015 – July 10, 2015	Watch
August 2, 2016 – December 16, 2016	Watch
December 16, 2016 – April 6, 2017	Warning
April 6, 2017 – May 16, 2017	Watch

Following the effects of the 1999 drought, Mifflin County completed a Water Supply Plan in 2000 (Mifflin County Commission, 2000). The previous review and evaluation of Mifflin County's long-term water needs was conducted in 1979. The purpose of this plan was to provide guidance for the Mifflin County Commissioners, county and local planners, water suppliers, and other interested groups to follow and implement as they address water supply needs throughout Mifflin County.

4.3.1.4 Future Occurrences

It is difficult to forecast the exact severity of future drought events. The impact of shortages on municipal water suppliers is expected to remain minor to moderate, but the impact is expected to become more severe for those living in rural areas. Based on national data from 1895 to 1995, Mifflin County, like the rest of the Middle Susquehanna Region, was in severe or extreme drought approximately 10 percent to 14.9 percent of the time. This is equivalent to a PDSI value of less than or equal to -2. Therefore, the future occurrence of a drought can be considered moderately possible as defined by the Risk Factor Methodology probability criteria (see Table 4.4.2-2).

4.3.1.5 Vulnerability Assessment

As indicated in Section 2.4, the sizeable agricultural economy and community in Mifflin County is most vulnerable to droughts and other water supply deficiencies. Daniel Taptich, Township Engineer for Decatur Township, noted on a 2019 *New Mitigation Action* form that a large majority of the population in this agricultural area relies exclusively on private water supplies, so he suggested a mitigation action to develop a drought emergency plan. Historical losses of drought are usually crop damage and losses and reduced livestock productivity rather than injuries or deaths of individuals. As of the 2017 USDA Agricultural Census, Mifflin County produced a net income of $41,236,000 based on crop sales. Nearly 90 percent of this total is the production of livestock, poultry, and their products; the remaining 10 percent is made up of crop production.

Water supplies are also vulnerable to the effects of drought, particularly in locations where citizens rely on wells for their fresh drinking water. Future droughts will affect those systems relying on surface supplies while those relying on wells should be able to handle short-term droughts without major difficulty. However, longer-term droughts that inhibit recharging of groundwater aquifers will extend the problems of well owners for an undetermined length of time. As a result, Mifflin County residents who use private, domestic wells are more vulnerable to droughts. Table 4.3.1-4 shows the number of domestic wells in each municipality. It is important to note that the well data was obtained from the Pennsylvania Groundwater Information System (PaGWIS) and that PaGWIS 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. This is the most complete dataset of domestic wells available.

Table 4.3.1-4: Domestic Wells by Municipality in Mifflin County in 2019 (PA DCNR, 2019)	
Municipality	**Number of Domestic Wells**
Armagh Township	159
Bratton Township	78
Brown Township	123
Burnham Borough	8
Decatur Township	321
Derry Township	185
Granville Township	219
Juniata Terrace Borough	0
Kistler Borough	0
Lewistown Borough	18
McVeytown Borough	2
Menno Township	101
Newton Hamilton Borough	2
Oliver Township	150
Union Township	94
Wayne Township	133
Total	**1,593**

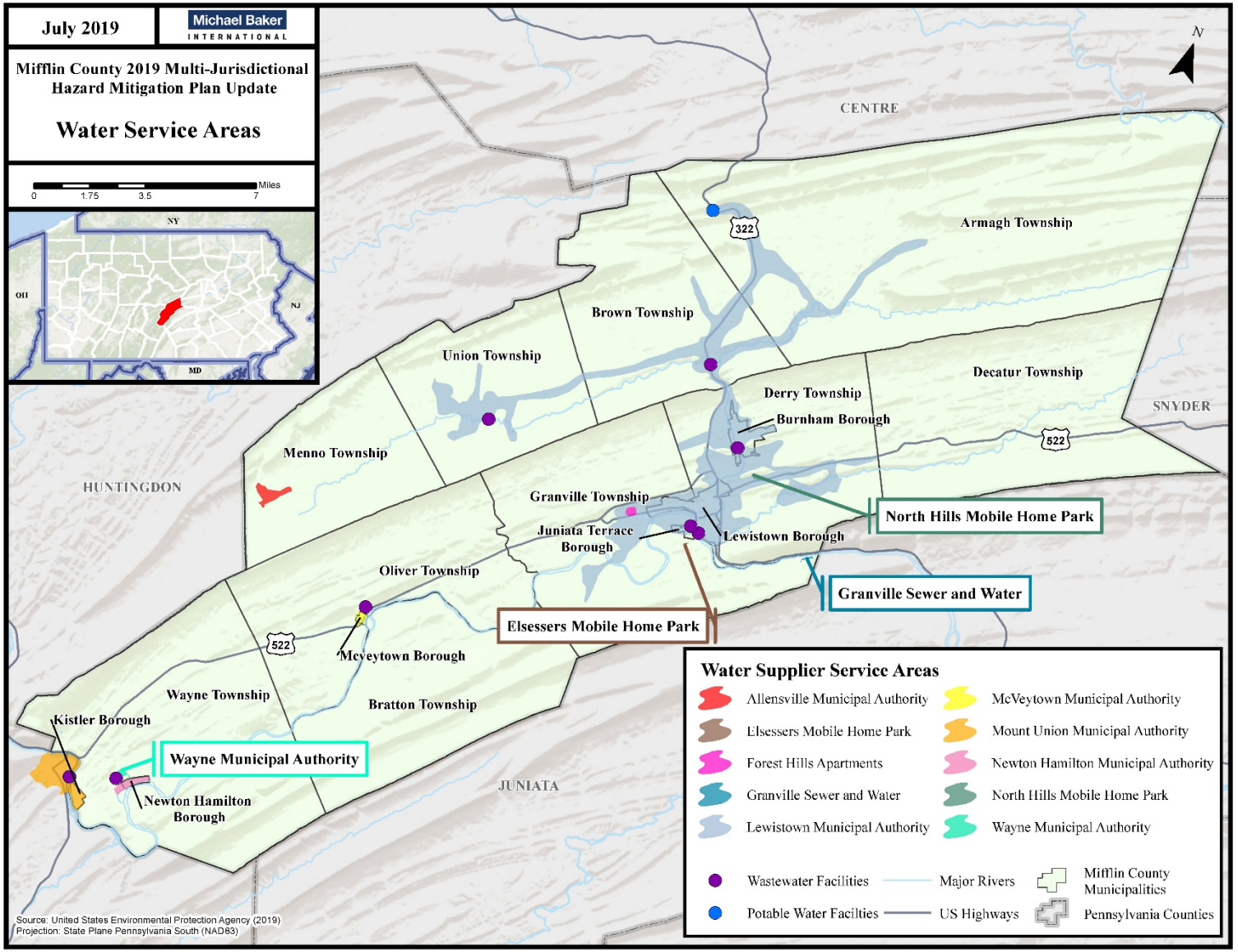
Table 4.3.1-5 shows the public water suppliers located in Mifflin County, the area(s) served, and the number of customers in each water system. Based on this data, approximately 64% of the population of Mifflin County is served by a public water system while approximately 36% rely on private wells.

Table 4.3.1-5: Water Systems, Municipalities Served and Population Served in Mifflin County (Mifflin County Planning Commission, 2014; *Personal communication, Allensville Water Authority Representative, July 15, 2019; M. E. Herto, July 15, 2019; C.A. Bubb, July 11, 2019; L. Johnson, July 12, 2019; and C. Hobbs, July 12, 2019)

Water Systems	Municipalities Served	Population Served
Public Water Systems		
The Municipal Authority of the Borough of Lewistown	Lewistown, Juniata Terrace, and Burnham Boroughs, urbanized portions of Derry, Granville, Armagh, Brown, and Union Townships	26,765*
Allensville Municipal Authority	Allensville, Menno Township	400*
Wayne Township Municipal Water Authority*	Wayne Township	247*
Cedar Crest – West Wayne Township**	Wayne Township	85*
McVeytown Borough Authority	McVeytown and adjacent areas of Oliver Township	460
Mount Union Municipal Authority	Kistler and Newton Hamilton Boroughs and urbanized portions of Wayne Township	473*
Newton Hamilton Borough Authority***	Newton Hamilton Borough	109*
Granville Township Sewer and Water Hawstone	Shawnee area of Granville Township	58*
Small Community Water Systems		
Elsessers Mobile Home Park	Granville Township	75
Forest Hills Apartments	Granville Township	170
Meadowview Manor	Wayne Township	47
North Hills Mobile Home Park	Derry Township	170
Total		**29,749**

**Additional systems identified through EPA July 2019; ***Additional system identified via personal communication, C. Hobbs, July 12, 2019

Figure 4.3.1-2: Water Service Areas in Mifflin County



The most severe secondary effect resulting from a drought is the likelihood of forest fires due to the extreme shortage of moisture in the ground. Forest fires can threaten agricultural and natural resources as well as commercial and residential properties throughout Mifflin County. Prolonged drought conditions may have a lasting impact on the economy, population settlement, and could cause major ecological changes such as increased shrub growth, increased flash flooding, and increased wind erosion of the soil. Long-term water shortages during severe drought conditions could have a high impact on agribusiness, public utilities, and other industries reliant upon water for production services. This may require water rationing and distribution, which will place a strain on the availability of consumable water to the community and has the potential to cause a public health emergency.

Loss of water pressure, reduction in hydroelectric power generation, and/or the suspension of services in affected areas would have limited effect on local government operations, the delivery of key services, and to property and infrastructure. The reduction of groundwater supply may exacerbate environmental factors by setting the conditions for the creation of sinkholes and other natural hazards. Reduced groundwater supply for non-domesticated animals and other organisms may add strain to the ecosystem.

4.3.2 Extreme Temperature

4.3.2.1 Location and Extent

Extreme temperatures constitute extended periods of excessive cold or hot weather with serious impact to human and/or animal populations. Extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the applicable region and last for several weeks. Humid or muggy conditions, which add to the discomfort of high temperatures, occur when a dome of high atmospheric pressure traps hazy, damp air near the ground. Excessively dry and hot conditions can provoke dust storms and low visibility, as well as droughts. Excessive heat can result in death by pushing the human body beyond its limits of thermal regulation. In extreme heat and humidity, evaporation is slowed, and the body must work harder to maintain normal body temperatures. Most heat disorders occur because of overexposure to heat or overexertion, which is determined based on the victim's age and physical condition.

Conditions that can induce heat-related illness include stagnant atmospheric conditions and poor air quality. Consequently, people living in urban areas may be at greater risk from the effects of prolonged heat wave conditions than those living in rural areas. Also, asphalt and concrete store heat longer and gradually release heat at night, which does not allow for nighttime temperatures decreases. This phenomenon is known as the heat island effect. To reduce the likelihood of the heat island effect, the county planted trees in downtown Lewistown. This project was part of a larger streetscape project that is a portion of a $3 million effort to revitalize downtown Lewistown.

Extreme cold is defined as temperatures at or below freezing for an extended period. Extreme cold events are usually part of winter storm events but can occur during any time of the year and have devastating effects on agricultural production. Due to the rising cost of heating for residential dwellings, people tend to keep their dwellings at a lower temperature than recommended, which may result in unhealthy conditions. Extreme cold presents health problems to those that may be more vulnerable to

it, such as those without shelter or who are stranded, or who live in a home that is poorly insulated or without heat. Prolonged exposure to extreme cold can lead to sickness or death.

Mifflin County is at risk to both extreme cold in the winter and extreme heat in the summer. The county in its entirety is affected by this hazard. Created by the National Weather Service, Figure 4.3.2-1 displays the Heat Index (HI), a chart that accurately measures apparent temperature of the air as it increases with the relative humidity. The HI can be used to determine what effects the temperature and humidity can have on a population. Figure 4.3.2-2 describes the adverse effects that prolonged heat exposure can have on individuals. To determine the HI, temperature and relative humidity are required. Once both values are calculated, the HI is determined by looking at the corresponding number with both values. The HI displays the "real feel" temperature. It is important to note that the HI values are devised for shady, light wind conditions. Exposure to full sunshine can increase HI values by up to 15 degrees. Also, strong winds, particularly very hot, dry air, can be extremely hazardous to individuals.

Figure 4.3.2-1: Heat Index (NOAA NWS, 2018).

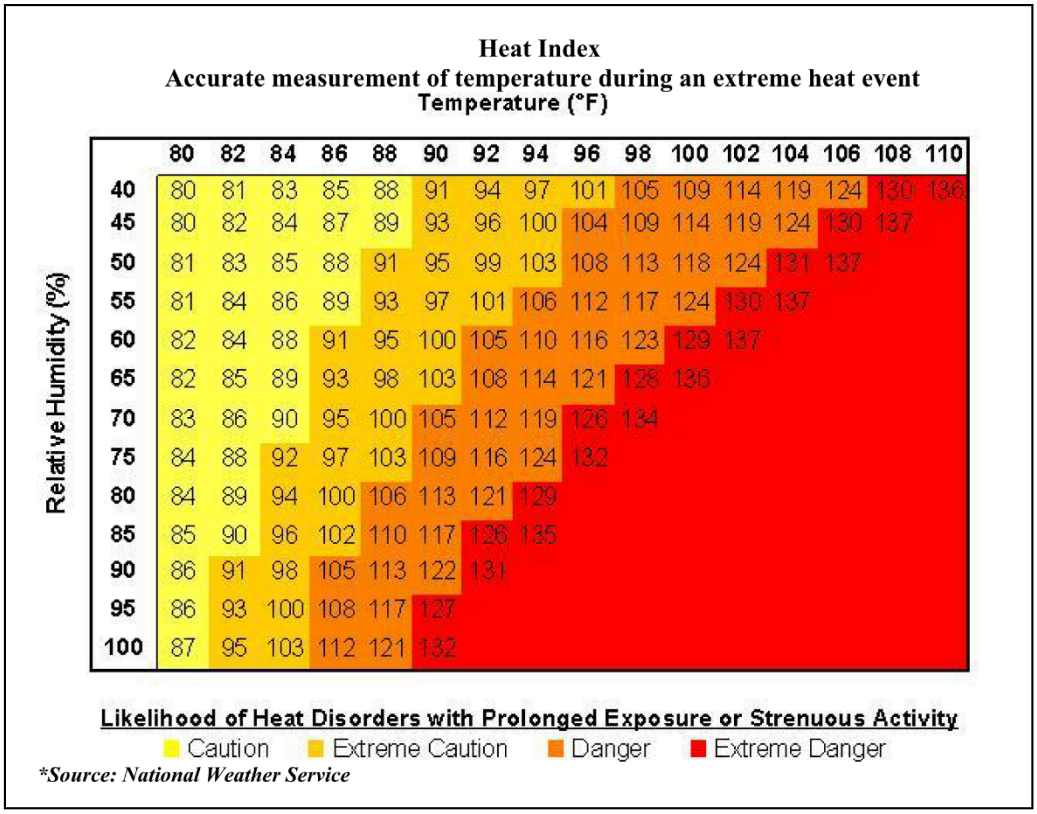


Figure 4.3.2-2: Adverse Effects of Prolonged Heat Exposure (NOAA NWS, 2018).

Adverse Effects of Prolonged Heat Exposure

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 exhaustion possible with prolonged exposure and /or physical activity.
Caution	80°F - 90°F	Fatigue possible with prolonged exposure and/or physical activity.

Exposure to excessive heat can present several health risks. In a 40-year period from 1936 to 1975, nearly 20,000 people were killed in the United States by the effects of heat and solar radiation. In the disastrous heat wave of 1980, more than 1,250 people died because of extreme heat exposure. To date, Mifflin County has seen no fatalities due to extreme temperatures.

4.3.2.2 Range of Magnitude

Table 4.3.2-1 details the annual high and low temperature normal in Mifflin County.

Table 4.3.2-1: Annual Temperature Normals for Mifflin County: 1981 – 2010 (NCEI, 2010)

Annual Observations in Mifflin County	
Maximum Temperature (°F)	61.7
Minimum Temperature (°F)	41.0
Average Temperature (°F)	51.4
**Data based on Lewistown, PA NOAA Station.*	

4.3.2.3 Past Occurrences

Excessive Heat Watches are issued when conditions are favorable for an excessive heat event in the next 24 to 72 hours. A watch is used when the risk of a heat wave has increased but its occurrence and timing is still uncertain. A watch provides enough lead time so that those who need to prepare can do so, such as cities officials who have excessive heat event mitigation plans. Excessive Heat Warning and Advisories are issued when an excessive heat event is expected in the next 36 hours. These products are issued when an excessive heat event is occurring, is imminent, or has a very high probability of occurring. The warning is used for conditions posing a threat to life or property. An advisory is for less serious conditions that cause significant discomfort or inconvenience and, if caution is not taken, could lead to a threat to life and/or property. On July 15, 1995, extreme heat and humidity resulted in the death of 20,000 chickens in Mifflin County. There have been several extreme temperature events documented in Mifflin County, listed in Table 4.3.2-2.

Table 4.3.2-2: Extreme Temperature Events in Mifflin County: 1950 – 2018 (NCEI, 2019)

Date	Extreme Temperature Event
02/05/2007	Extreme Cold/Wind Chill
02/10/2008	Extreme Cold/Wind Chill
07/21/2011	Excessive Heat
01/06/2014	Extreme Cold/Wind Chill
02/15/2015	Extreme Cold/Wind Chill

Figure 4.3.2-3: Average Minimum Temperatures in Mifflin County from 1960 - 2001

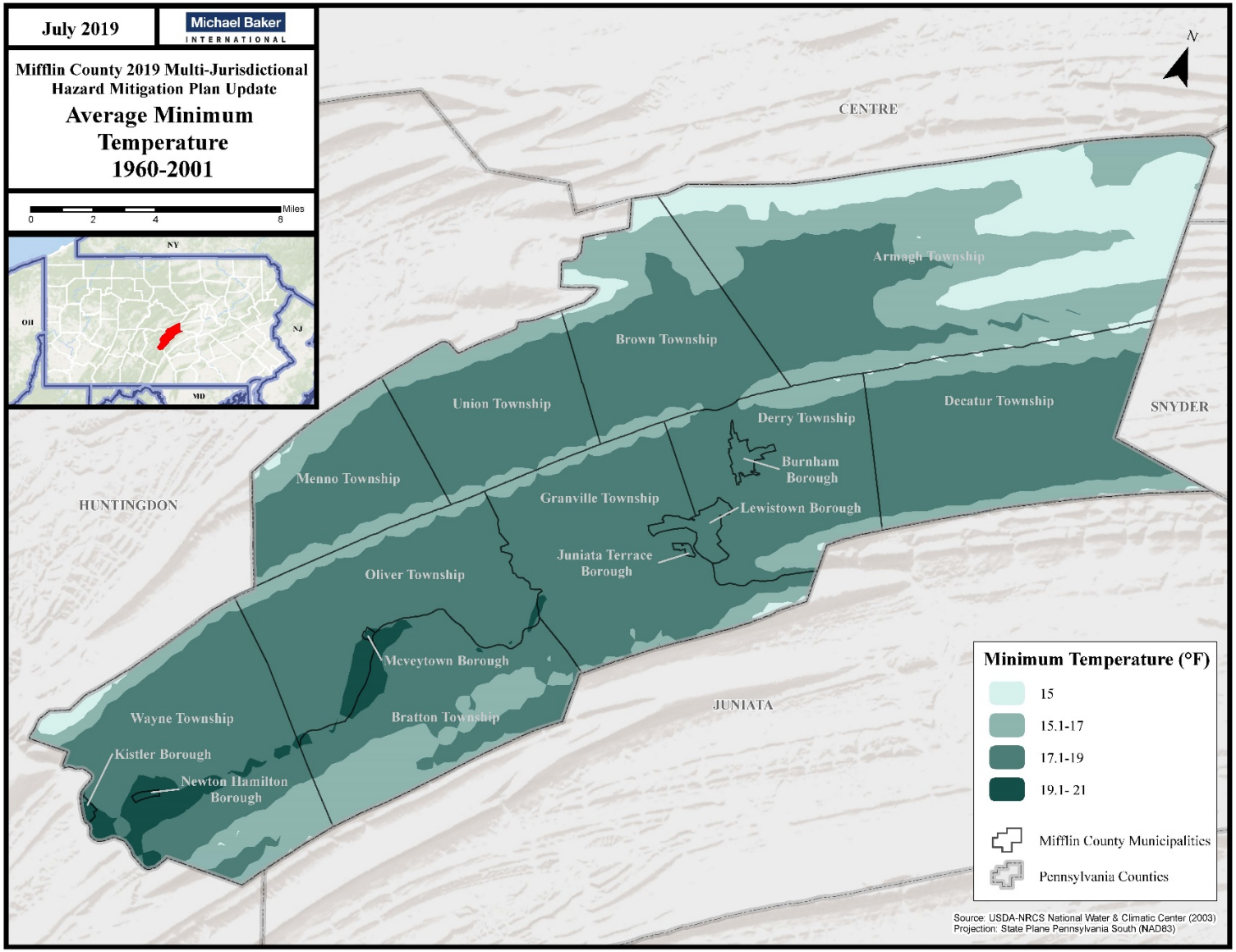
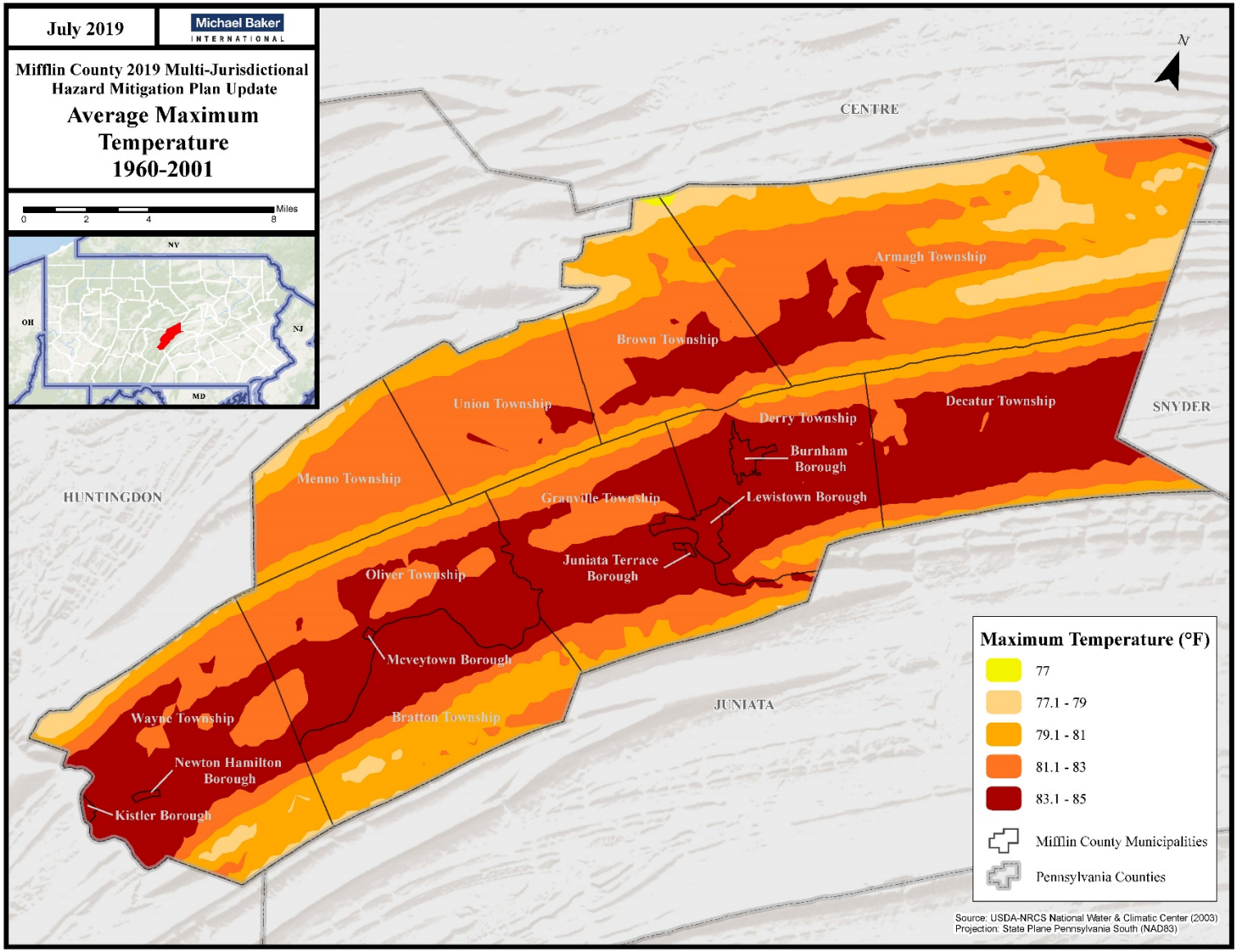


Figure 4.3.2-4: Average Maximum Temperatures in Mifflin County from 1960 - 2001



4.3.2.4 Future Occurrences

Extreme temperatures can affect a localized region or a widespread geographic area. Weather patterns and air movements within a particular area and time will affect the occurrences of extreme temperatures and the length of these occurrences. It is possible for prolonged periods (greater than one week in duration) of extreme hot or cold temperatures to occur within Mifflin County. Extreme temperatures were identified by the county as a moderately low hazard. Even though this hazard was rated as moderately low, serious planning efforts should be initiated when extreme temperatures are forecast.

4.3.2.5 Vulnerability Assessment

The following groups are classified as vulnerable to temperature extremes:

- Homeless
- Infants and small children under five years of age
- Pregnant women
- People over 65 years of age
- Obese people
- Bedridden people
- People with mental illness or disabilities
- People with cognitive disorders
- People with medical conditions or requiring medication for life-threatening illnesses
- People who are dependent on certain medical devices
- People who battle alcohol or drug addictions
- Blind/visually impaired and deaf/hearing impaired
- Socially isolated individuals

The NOAA National Weather Service (2001) preparedness guide titled "Winter Storms: The Deceptive Killers," determined that 50 percent of injuries related to cold temperatures occur in people over 60 years old, more than 75 percent happen to males, and about 20 percent occur in the home. Hazardous temperatures may result in moderate structural damage to public facilities, little to no damage to private property, and potential serious injury or death to humans. Additional threats associated with extreme temperatures include civil unrest, explosion, fire, transportation accidents, and utility failure.

4.3.3 Flood, Flash Flood, Ice Jam

4.3.3.1 Location and Extent

Flooding is the temporary condition of partial or complete inundation on normally dry land and it is the most frequent and costly of all hazards in Pennsylvania. Flooding events are generally the result of excessive precipitation. General flooding is typically experienced when precipitation occurs over a given river basin for an extended period. Flash flooding is usually a result of heavy localized precipitation falling in a short time period over a given location, often along mountain streams and in urban areas where much of the ground is covered by impervious surfaces. The severity of a flood event is dependent upon a combination of stream and river basin topography and physiography, hydrology, precipitation

and weather patterns, present soil moisture conditions, the degree of vegetative clearing as well as the presence of impervious surfaces in and around flood-prone areas. Winter flooding can include ice jams that occur when warm temperatures and heavy rain cause snow to melt rapidly. Snow melt combined with heavy rains can cause frozen rivers to swell, which breaks the ice layer on top of a river. The ice layer often breaks into large chunks, which float downstream, piling up in narrow passages and near other obstructions such as bridges and dams. Excess water from snowmelt or rainfall also accumulates and overflows onto stream banks and adjacent floodplains. Floodplains are lowlands adjacent to rivers, streams, and creeks that are subject to recurring floods. The size of the floodplain is described by the recurrence interval of a given flood. Flood recurrence intervals are explained in more detail in the Past Occurrence section.

Historically, Mifflin County is vulnerable to flooding and flooding remains the most significant hazard in the county. In the past, most of Mifflin County's flooding resulted from seasonal change. With winter thaws and spring rain, the county experiences most of its flooding in the late winter and early spring months (February to April). During winter thaws, pieces of ice can often back up and jam waterways, which can also lead to flooding. Flooding poses the biggest threat to those who reside or conduct business in the floodplain. Most flood damage to property and structures located in the floodplain is caused by water exposure to the interior of structures, high-velocity water, and debris flow. The most significant hazard exists for businesses in the floodplain that process, use, or store hazardous materials. A flood could potentially allow for hazardous materials releases into the floodplain. Agricultural areas within the floodplain are also at risk, as Mifflin County is mostly rural, and flooding could result in significant agricultural losses.

Mifflin County is prone to two types of floods:

- **Riverine Flood** – Occurs in the floodplain of a river or stream when the amount of water and the rate at which it is moving increase.
- **Flash Flood** – A type of riverine flood, this flood will occur after a heavy storm when the ground cannot absorb the high amount of precipitation. This occurs when heavy precipitation falls on frozen or already saturated soil.

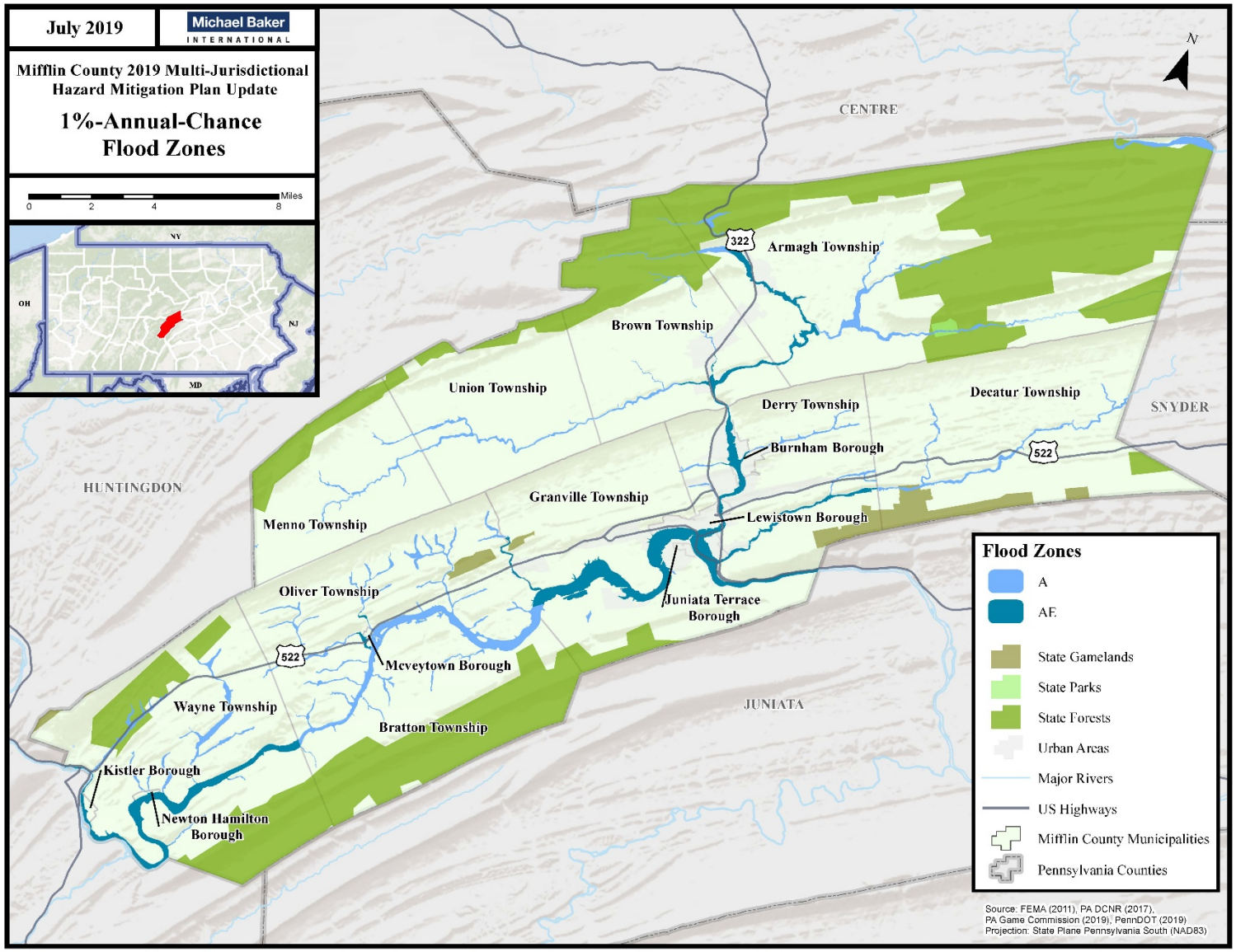
Most communities in Mifflin County are located along stream and creek valleys throughout the county. Table 4.3.3-1 lists the location of valuable water sources within the county (See Figure 4.3.3-3).

Table 4.3.3-1: Water Sources in Mifflin County (USGS, 2004)	
Municipality	**Major Water Source**
Armagh Township	Swift Run
	Rock Run
	Penns Creek
	Greens Valley Stream
	Honey Creek
	Treaster Run
	Havice Creek
	Panther Run
	Little Weikert Run
	Weikert Run
	Laurel Creek
Bratton Township	Carlisle Run
	East Licking Creek
	Juniata River
	Minehart Run
	Shanks Run
	West Licking Creek
Brown Township	Lingle Creek
	Kishacoquillas Creek
	Coffee Run
	Honey Creek
	Tea Creek

Table 4.3.3-1: Water Sources in Mifflin County (USGS, 2004)	
Municipality	**Major Water Source**
Burnham Borough	Hungry Run
	Kishacoquillas Creek
Decatur Township	Belltown Run
	Jacks Creek
	Meadow Creek
	Mowry Run
	Shindle Run
	Wagner Run
	Wolf Run
Derry Township	Buck Run
	Hungry Run
	Jacks Creek
	Juniata River
	Kishacoquillas Creek
Granville Township	East Minehart Run
	Minehart Run
	Juniata River
	Buck Run
	Strodes Run
	Granville Run
Lewistown Borough	Kishacoquillas Creek
Menno Township	Kishacoquillas Creek
	Little Kishacoquillas Creek
	Saddler Creek

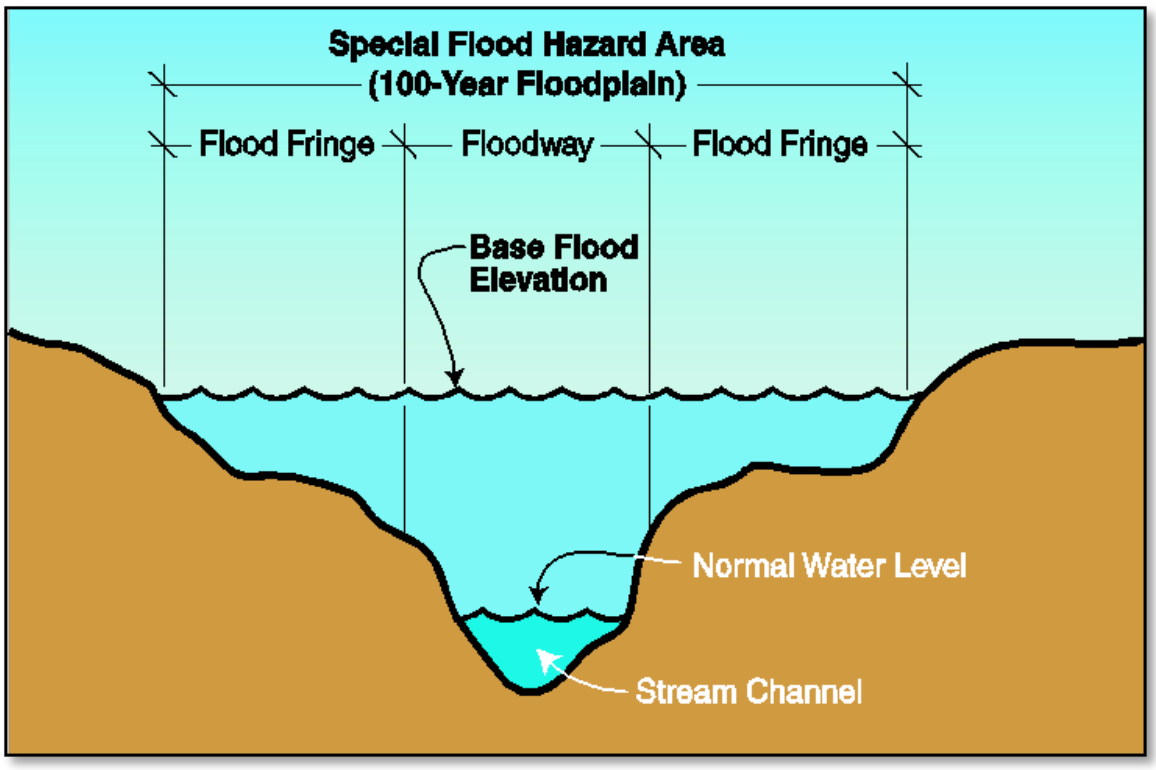
Table 4.3.3-1: Water Sources in Mifflin County (USGS, 2004)	
Municipality	**Major Water Source**
Oliver Township	Wakefield Run
	Musser Run
	Juniata River
	Spring Run
	Strodes Run
	Town Run
Union Township	Kishacoquillas Creek
	Little Kishacoquillas Creek
	Soft Run
Wayne Township	Beaverdam Run
	West Licking Creek
	Juniata River
	Furnace Run
	Long Hollow Run
	Musser Run
	Shanks Run
	Wharton Run

Figure 4.3.3-1: Special Flood Hazard Areas 1%-Annual-Chance Flood Zones in Mifflin County



The major cause of flooding in Mifflin County is slow moving rain storms. An abundance of moisture that has been transported from the Gulf of Mexico and resupplied with Atlantic Ocean moisture by strong, stationary Bermuda highs meets with a blocking high pressure area to the northeast of Pennsylvania which contributes to these conditions. Intense local flash floods are most likely to occur in squall lines just to the east of a slow moving north-south oriented cold front. These are usually warm weather phenomena, where afternoon heating adds to the instability of the already unstable, moist air mass. Storms of tropical origin affect the Susquehanna River Valley an average of once in three years. Their usual path is from the south to the northeast, but a few have traveled from the southeast to the northwest. Tropical storm season runs from June to November.

Figure 4.3.3-2: 1 Percent Annual Change (100-Year) Floodplain, Floodway, and Flood Fringe (Michael Baker International, 2018).



4.3.3.2 Range of Magnitude

Floods are considered hazards when people and property are affected. Most injuries and deaths from flooding happen when people are swept away by flood currents and exposed to bacteria and disease present in stagnant floodwaters (Michael Baker International, 2018). Most property damage results from inundation by sediment-filled water. A large amount of rainfall over a short time span can result in flash flood conditions. Small amounts of rain can result in floods in locations where the soil is frozen or saturated from a previous wet period or if the rain is concentrated in an area of impermeable surfaces such as large parking lots, paved roadways, or other impervious, developed areas. Flooding can occur in

individual municipalities within Mifflin County or it can have a countywide effect, involving multiple sites and streams. In this portion of the Susquehanna River Basin, flooding occurs most frequently in spring and early summer.

Several factors determine the severity of floods, including rainfall intensity and duration, topography, ground cover, and rate of snowmelt. Water runoff is greater in areas with steep slopes and little to no vegetative ground cover. Also, urbanization typically results in the replacement of vegetative ground cover with asphalt and concrete, increasing the volume of surface runoff and stormwater, particularly in areas with poorly planned stormwater drainage systems. In the winter and early spring (February to April), major flooding has occurred due to heavy rainfall on dense snowpack throughout contributing watersheds. Summer floods have occurred due to intense rainfall on previously saturated soils. Summer thunderstorms deposit large quantities of rainfall over a short period of time that can result in flash flood events, when the velocity of floodwaters has the potential to amplify the impacts of a flood event. Winter floods also have resulted from runoff of intense rainfall on frozen ground, and on rare occasions, local flooding has been exacerbated by ice jams in rivers. Ice jam floods occur on rivers that are totally or partially frozen. A rise in stream stage will break up a completely frozen river and create ice flows that can pile up on channel obstructions such as shallow riffles, log jams, or bridge piers. The jammed ice creates a dam across the channel over which the water and ice mixture continues to flow, allowing for more jamming to occur.

Although floods can cause damage to property and loss of life, floods are naturally occurring events that benefit riparian systems that have not been disrupted by human actions. Such benefits include groundwater recharge and the introduction of nutrient-rich sediment that improves soil fertility. However, the destruction of riparian buffers, changes to land use and land cover throughout a watershed, and the introduction of chemical or biological contaminants that often accompany human presence cause environmental harm when floods occur. Other negative environmental impacts of flooding include waterborne diseases, heavy siltation, damage or loss of crops, and drowning of both humans and animals.

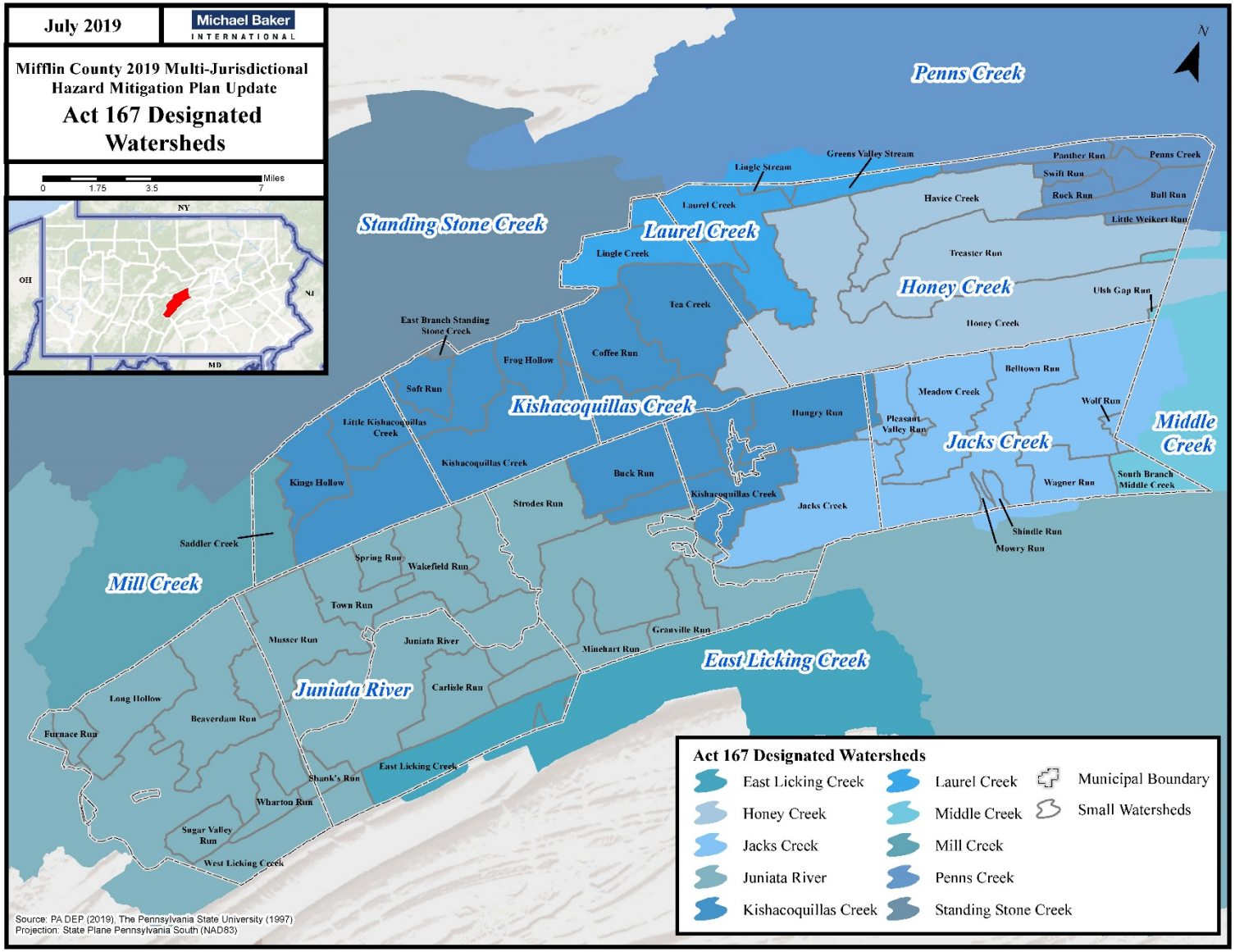
The Pennsylvania Emergency Management Agency (PEMA) maintains historical records of declared disasters since 1966. According to PEMA, thirteen flooding events since 1966 have resulted in a state declared disaster. Hurricane Sandy in 2012, Remnants of Tropical Storm Lee in 2011, Hurricane Katrina in 2006, and Depression Ivan in 2004 required a President's Declaration of Major Disaster and resulted in individual and public assistance to Mifflin County. Furthermore, Hurricane Irene in 2011, Ernesto in 2006, extensive winter flooding in January 1996, Hurricane Agnes in June 1972, Hurricane Eloise in September 1975, and Hurricane Floyd in September 1999, all resulted in a Governor's Proclamation and President's Declaration of Major Disaster.

- **Hurricane Sandy:** October 27, 2011, Hurricane Sandy impacted multiple counties throughout Pennsylvania causing significant flooding and wind damage. On January 10, 2013, eighteen counties in Pennsylvania were designated in the Major Disaster Declaration signed by President Obama. The eighteen counties include: Bedford, Bucks, Cameron, Dauphin, Forest, Franklin, Fulton, Huntingdon, Juniata, Monroe, Montgomery (added on Jan. 17, 2013), Northampton,

Philadelphia (added on Feb. 13, 2013), Pike, Potter, Somerset, Sullivan and Wyoming. The aftermath of the storm left numerous residents without power for extended periods of time and debris removal from roadways was a substantial problem throughout the Commonwealth. As of April 16, 2013, Pennsylvania has received over $3.8 million dollars in federal disaster aid. Hurricane Sandy impacted Mifflin County through multiple incidents of trees and electrical wires being brought down. The subsequent loss of electricity affected greater than 2,000 residents, with a higher percentage of power losses in the western portions of the county.

- **Hurricane Irene:** August 27, 2011, Hurricane Irene impacted Pennsylvania causing flooding and many secondary hazards. A total of 1.3 million Pennsylvania electricity customers were affected during the 12 days it took to restore service. At the peak of the power outages, more than 750,000 customers had no electricity. According to PEMA, three deaths of Pennsylvanians were caused by falling trees as a result of Irene. Among the others, one person drowned when she was swept away by raging waters, another fell off a deck and fractured his neck, and a third person's death was described as related to the power outage. Damage from the hurricane and tropical storm accounted for about $425 million in losses covered by government relief agencies and private insurers in Pennsylvania. Fortunately, Hurricane Irene did not significantly impact Mifflin County. There were only some isolated cases of flooding and wind damage. The county did deploy two ambulances at the request of the Pennsylvania Department of Health to assist other more heavily impacted counties in the region.

Figure 4.3.3-3: Act 167 Designated Watersheds in Mifflin County



Phil Lucas (personal communication, July 18, 2019), Director of the Mifflin County Office of Public Safety, reported via email correspondence, that Mifflin County experiences flooding along the path of the Juniata River on a semi-annual basis. He stated that it rarely reaches the designated Flood State at Lewistown and most often floods areas adjacent to the Juniata River, closing local roads and impacting private camping areas. According to Phil Lucas (personal communication, July 18, 2019), more frequent damage and interruptions occur due to storm water runoff and small tributaries, most often in Armagh and Decatur Townships, and to a lesser extent Derry Township.

Major flooding along the Juniata River has occurred in 1889, 1902, 1936, 1937, 1950, 1972, and 1996. Kishacoquillas Creek experienced severe flooding in 1972 and 1996.

4.3.3.3 Past Occurrence

Table 4.3.3-2 lists major flooding events that have affected Mifflin County since 1970. The National Center for Environmental Information (NCEI) from National Oceanic and Atmosphere Administration (NOAA) did not capture the most recent Gubernatorial and Presidentially declared floods in the county. The past occurrence flood table (Table 4.3.3-2) for Mifflin County cross references four data sources to present the most complete list of flooding events.

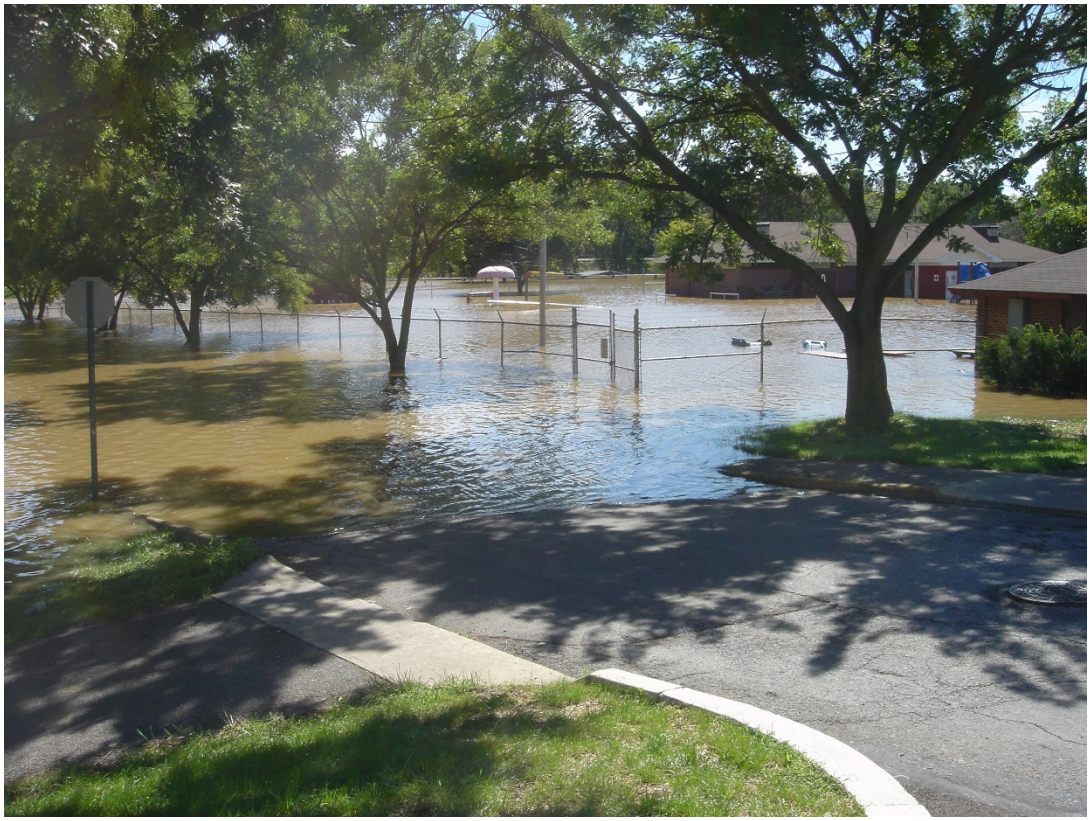
Table 4.3.3-2: Flood and Flash Flood Events in Mifflin County: 1970 – 2018 (NCEI, 2018; SHELDUS, 2013; FEMA, 2019; PEMA, 2019)

Date	Location and Description
April 2, 1970	Flooding - Severe Storm/Thunder Storm (SHELDUS, 2013)
June 21, 1972	Flooding - Severe Storm/Thunder Storm (SHELDUS, 2013)
October 1976	Severe Storms, Flooding from Disaster Declaration 523 (FEMA, 2019)
June 17, 1984	Flooding - Severe Storm/Thunder Storm (SHELDUS, 2013)
March 14, 1986	Flooding (SHELDUS, 2013)
June 14, 1986	Flooding (SHELDUS, 2013)
July 20, 1989	Flooding (SHELDUS, 2013)
July 21, 1989	Flooding (SHELDUS, 2013)
April 1, 1993	Small stream flooding was observed in Armagh and Brown Townships (NCEI, 2018)
November 28, 1993	The Kishacoquillas Creek went out of its banks. The recreation park in Lewistown was covered by several feet of water. Flooding was observed in Armagh, Brown, Decatur, and Derry Townships. (NCEI, 2018)
January 19, 1996	Flash Flood, County wide (NCEI, 2018)
September 6, 1996	Roads and streams flooded (NCEI, 2018)
September 13, 1996	Heavy rains dropped between 4 and 4.5 inches of rain causing small stream and road flooding across Mifflin, Juniata and Perry counties. (NCEI, 2018)
December 1, 1996	Flash Flood, County wide (NCEI, 2018)
January 8, 1998	Flash Flood, County wide (NCEI, 2018)
January 23, 1999	Flooding (NCEI, 2018)
September 17, 2004	Flooding (NCEI, 2018)
September 18, 2004	Flooding occurred due to heavy rains in Lewistown from Tropical Depression Ivan. The Juniata River flooded when water levels increased beyond 23 feet (NCEI, 2018).
June 2006	Flooding from Disaster Declaration 1649 (FEMA, 2019)
September 7, 2011	Multi-day heavy rainfall from Tropical Storm Lee produced widespread flooding, flash flooding and river flooding in Mifflin County and the surrounding Susquehanna Valley. Local climate sites in Harrisburg (KMDT) and Williamsport (KIPT) reported 13.44 and 9.03 inches, respectively. Damages were estimated at $100,000, mostly due to destruction of roads and bridges. (NCEI, 2018)
May 3, 2011	A broken line of severe thunderstorms formed ahead of a cold front during the late afternoon and produced localized wind damage and heavy rainfall across portions of east-central Pennsylvania. The heavy rain combined with above normal soil moisture and high stream-flows contributed to flash flooding. Flash flooding closed Back Maitland Road (SR 2004) in Derry Township northeast of Lewistown. (NCEI, 2018)
October 29, 2012	Superstorm Sandy gained momentum as it traveled just off the East Coast of the United States and eventually through New Jersey and Pennsylvania. Storm impacts to Mifflin County included small stream flooding and local road closures. (NCEI, 2018)
June 2013	High winds, thunderstorms, heavy rain, tornado, flooding from Gubernatorial Proclamations of Emergency (PEMA, 2019)

Table 4.3.3-2: Flood and Flash Flood Events in Mifflin County: 1970 – 2018 (NCEI, 2018; SHELDUS, 2013; FEMA, 2019; PEMA, 2019)

Date	Location and Description
May 16, 2014	Due to heavy rainfall, widespread flooding occurred throughout the county. Twelve county residents were evacuated from their homes and five water rescues had to be completed. (NCEI, 2018)
August 2015	Severe storms from Gubernatorial Proclamations of Emergency (PEMA, 2019)
August 2018	Severe storms from Gubernatorial Proclamations of Emergency– though the event was declared for flooding starting in August of 2018, wet weather and flooding continued into the Fall and Winter of 2018 (PEMA, 2019)

Figure 4.3.3-4: Flooding of a local playground following Hurricane Ivan (Photograph courtesy of Phil Lucas, September 19, 2004)



In addition to the previously mentioned past flood events, the NFIP identifies properties that frequently experience flooding. Repetitive loss properties are structures insured under the NFIP that have had at least two paid flood losses of more than $1,000 over any 10-year period since 1978. A property is considered a severe repetitive loss property either when there are at least four losses (each exceeding $5,000) or when there are two or more losses where the building payments exceed the property value.

As of 2018, there were 46 repetitive loss and one severe repetitive loss properties in Mifflin County (PEMA, 2018). These repetitive loss properties are in 10 of the 16 municipalities of Mifflin County. Most

of the repetitive loss properties are located within Lewistown Borough, Brown Township, and Derry Township. Of the repetitive loss properties, nine of the structures have been mitigated. Table 4.3.3-3 and 4.3.3-4 show the number and type of repetitive loss and severe repetitive loss properties, respectively by municipality, as well as the total amount paid due to flood damage. This data was obtained from PEMA in January 2018 and joined with data on mitigated properties from the Commonwealth of PA 2013 State Standards All-Hazard Mitigation Plan and PEMA mitigated properties tracking from July 2017.

Table 4.3.3-3: Total and Mitigated Repetitive Loss Properties in Mifflin County: 1978 – 2018 (PEMA, January 2018; Commonwealth of PA 2013 State Standards All-Hazard Mitigation Plan; PEMA mitigated properties tracking, July 2017)

Municipality	Single Fmly		2-4 Family		Assmd Condo		Other Resid		Non Residnt		Total		Total Amount Paid ($)
	Total	Mit	Total	Mit	Total	Mit	Total	Mit	Total	Mit	Total	Mit	
Armagh	5	1	0	0	0	0	0	0	1	0	6	1	69,977.54
Bratton	2	1	0	0	0	0	0	0	0	0	2	1	66,194.64
Brown	6	1	0	0	0	0	0	0	2	0	8	1	181,026.83
Derry	5	2	0	0	0	0	0	0	7	0	12	2	907,839.62
Granville	1	0	0	0	0	0	0	0	0	0	1	0	7,686.07
Lewistown	5	0	0	0	0	0	1	0	1	0	7	0	308,036.88
McVeytown	1	0	0	0	0	0	0	0	0	0	1	0	48,096.43
Newton Hamilton	2	1	0	0	0	0	0	0	0	0	2	1	118,397.75
Oliver	2	0	0	0	0	0	0	0	1	1	3	1	108,695.77
Wayne	4	2	0	0	0	0	0	0	0	0	4	2	91,638.85
Total	**33**	**8**	**0**	**0**	**0**	**0**	**1**	**0**	**12**	**1**	**46**	**9**	**1,907,590.38**

Table 4.3.3-4: Total and Mitigated Severe Repetitive Loss Properties in Mifflin County: 1978 – 2018 (PEMA, January 2018; Commonwealth of PA 2013 State Standards All-Hazard Mitigation Plan; PEMA mitigated properties tracking, July 2017)

Municipality	Single Fmly		2-4 Family		Assmd Condo		Other Resid		Non Residnt		Total		Total Amount Paid ($)
	Total	Mit	Total	Mit	Total	Mit	Total	Mit	Total	Mit	Total	Mit	
Armagh	0	0	0	0	0	0	0	0	0	0	0	0	-
Bratton	0	0	0	0	0	0	0	0	0	0	0	0	-
Brown	0	0	0	0	0	0	0	0	0	0	0	0	-
Derry	0	0	0	0	0	0	0	0	0	0	0	0	-
Granville	0	0	0	0	0	0	0	0	0	0	0	0	-
Lewistown	0	0	0	0	0	0	0	0	0	0	0	0	-
McVeytown	0	0	0	0	0	0	0	0	0	0	0	0	-
Newton Hamilton	0	0	0	0	0	0	0	0	0	0	0	0	-
Oliver	0	0	0	0	0	0	0	0	0	0	0	0	-
Wayne	1	1	0	0	0	0	0	0	0	0	1	1	32,727.61
Total	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**32,727.61**

Floods are the most common and costly natural hazard in the United States. In terms of economic disruption, property damage, and loss of life, floods are "nature's number-one disaster." For that reason, flood insurance is almost never available under industry-standard homeowner's and renter's policies. The best way for citizens to protect their property against flood losses is to purchase flood insurance through the NFIP. Congress established the NFIP in 1968 to help control the growing cost of federal disaster relief. The NFIP is administered by FEMA, part of the U.S. Department of Homeland Security. The NFIP offers federally backed flood insurance in communities that adopt and enforce effective floodplain management ordinances to reduce future flood losses.

Since 1983, the chief means of providing flood insurance coverage has been a cooperative venture of FEMA and the private insurance industry known as the Write Your Own (WYO) Program. This partnership allows qualified property and casualty insurance companies to "write" (i.e., issue) and service the NFIP's Standard Flood Insurance Policy (SFIP) under their own names. Today, nearly 90 WYO insurance companies issue and service the SFIP under their own names. More than 4.4 million federal flood insurance policies are in force. These policies represent $650 billion in flood insurance coverage for homeowners, renters, and business owners throughout the United States and its territories. The NFIP provides flood insurance to individuals in communities that are members of the program. Membership in the program is contingent on the community adopting and enforcing floodplain management and development regulations. The NFIP is also based on the voluntary participation of communities of all sizes. In the context of this program, a "community" is a political entity – whether an incorporated city, town, township, borough, village, or an unincorporated area of a county or parish – that has legal authority to adopt and enforce floodplain management ordinances for the area under its jurisdiction. National Flood Insurance is available only in communities that apply for participation in the NFIP and agree to implement prescribed flood mitigation measures. Newly participating communities are admitted to the NFIP's Emergency Program. Most of these communities quickly earn "promotion" to the Regular Program.

The Emergency Program is the initial phase of a community's participation in the NFIP. In return for the local government's agreeing to adopt basic floodplain management standards, the NFIP allows local property owners to buy modest amounts of flood insurance coverage. In return for agreeing to adopt more comprehensive floodplain management measures, an Emergency Program community can be "promoted" to the Regular Program. Local policyholders immediately become eligible to buy greater amounts of flood insurance coverage. All municipalities in Mifflin County are in the Regular Program.

The minimum floodplain management requirements include the following:

- Review and permit all development in the Special Flood Hazard Area (SFHA)
- Elevate new and substantially improved residential structures above the Base Flood Elevation
- Elevate or dry flood proof new and substantially improved nonresidential structures
- Limit development in floodways
- Locate or construct all public utilities and facilities to minimize or eliminate flood damage
- Anchor foundation or structure to resist floatation, collapse, or lateral movement

In addition, Regular Program communities are eligible to participate in the NFIP's Community Rating System (CRS). Under the CRS, policyholders can receive premium discounts of 5 to 45 percent as their cities and towns adopt more comprehensive flood mitigation measures. Currently, three communities in Mifflin County participate in CRS. CRS rewards those communities that establish floodplain management programs that go beyond NFIP minimum requirements by providing discounts on flood insurance premiums. Under the CRS, communities receive credit for activities falling into four categories: public information, mapping and regulations, flood damage reduction, and flood preparedness. The CRS was implemented in 1990 to recognize and encourage community floodplain management activities that exceed the minimum NFIP standards. Section 541 of the 1994 Act amends Section 1315 of the 1968 Act to codify the CRS in the NFIP. Section 541 also expands the CRS goals to specifically include incentives to reduce the risk of flood-related erosion and to encourage measures that protect natural and beneficial floodplain functions. These goals have been incorporated into the CRS, and communities now receive credit toward premium reductions for activities that contribute to them. There are 10 CRS classes that provide varied reductions in insurance premiums. Class 1 requires the most credit points and gives the largest premium reduction, and Class 10 receives no premium reduction. CRS premium discounts on flood insurance range from 5 percent for Class 9 communities and up to 45 percent for Class 1 communities. Table 4.3.3-5 lists the Mifflin County CRS communities.

Table 4.3.3-5: Mifflin County CRS Participation (FEMA, 2016)

Community	CRS Class	Discount Amount	CRS Entry Date	Current Effective Date
Granville Township	9	5%	10/1/1993	10/1/1993
Lewistown Borough	8	10%	10/1/1993	5/1/2010
Union Township	10	0%	10/1/1993	10/1/1998

Table 4.3.3-6 lists the Mifflin County municipalities participating in the NFIP along with the date of the initial FIRM and the current effective map date. Fifteen of sixteen jurisdictions in the county participate in the NFIP. Juniata Terrace Borough has chosen not to participate because it is not located in a floodplain.

Table 4.3.3-6: Mifflin County NFIP Participation (FEMA, 2006)

Community	Participation Status	CID	Initial Firm Date	Current Effective Map Date
Armagh Township	Participating	421879	8/19/91	8/16/06
Bratton Township	Participating	421008	12/15/78	08/16/06
Brown Township	Participating	420683	08/19/91	08/16/06
Burnham Borough	Participating	42068	02/15/78	08/16/06
Decatur Township	Participating	421880	06/01/87	08/16/06
Derry Township	Participating	421168	09/01/78	08/16/06
Granville Township	Participating	421134	08/15/78	08/16/06
Juniata Terrace Borough	Not Participating	NA	NA	NA
Kistler Borough	Participating	420686	09/15/77	08/16/06
Lewistown Borough	Participating	420687	08/15/78	08/16/06
McVeytown Borough	Participating	420688	06/01/87	08/16/06
Menno Township	Participating	421881	06/01/87	08/16/06
Newton Hamilton Borough	Participating	420689	02/15/78	08/16/06
Oliver Township	Participating	421882	09/17/80	08/16/06
Union Township	Participating	421883	06/01/87	08/16/06
Wayne Township	Participating	421240	03/02/81	08/16/06

The NFIP has been significantly modified due to the Biggert-Waters Flood Insurance Reform Act of 2012. The goal of this Act was to raise subsidized insurance rates to actuarial rates in the NFIP to make the program more financially stable. This Act increased rates for owners that held subsidized policies on non-primary/secondary residences, owners that held subsidized policies on properties with severe or repeated flooding, and business/non-residential properties that are located within a Special Flood Hazard Area (SFHA). Grandfathered rates would be phased out at a rate of 20% increase per year for five years when a community adopts a new, updated Pre-Flood Insurance Rate Map (FIRM). Following the implementation of the Biggert-Waters Flood Insurance Reform Act, the Homeowner Flood Insurance Affordability Act of 2014 (HFIAA) was created to aid in making a more gradual change to increased insurance rates. HFIAA limited annual rate increases and introduced an annual surcharge to all policyholders. This reform was enacted to aid with the fiscal stability of the program (Michael Baker International, 2018).

Figure 4.3.3-5: Standing water on Ort Valley Road, Derry Township (left) and elevated water levels at the River Road boat launch in Bratton Township (right) in December 2018. (Photograph courtesy of William A. Gomes, December 2018 and Dan Dunmire, December 2018).

4.3.3.4 Future Occurrence

In Mifflin County, flooding can occur during any season of the year. Therefore, the future occurrence of floods in Mifflin County can be considered highly likely as defined by the Risk Factor Methodology probability criteria (see Table 4.4.2-2). 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 floods.

The NFIP recognizes the 1 percent annual chance flood, also known as the base flood, as the standard for identifying properties subject to federal flood insurance purchase requirements. A 1 percent annual chance flood, also known as a 100-year flood, is a flood that has a 1 percent chance of occurring over a given year. A 0.2 percent annual chance flood, also known as a 500-year flood, has a 0.2 percent chance of occurring over a given year. The Digital Flood Insurance Rate Maps (DFIRMs) are created by FEMA and are used to identify areas that are subject to 1 and 0.2 percent annual chance flooding. Water surface elevations associated with 1 and 0.2 percent annual chance flooding events are included in the flood source profile within the Flood Insurance Study Report. Table 4.3.3-7 shows a range of flood recurrence intervals and associated probabilities of occurrence.

Table 4.3.3-7: Flood Recurrence Intervals and Associated Probabilities of Occurrence (USGS, 2019)	
Recurrence Interval	**Chance of Occurrence in Any Given Year (%)**
500	0.2
200	0.5
100	1
50	2
25	4
10	10
5	20
2	50

4.3.3.5 Vulnerability Assessment

A flood, flash flood, ice jam occurrence is highly likely as defined by the Risk Factor Methodology (Section 4.4-1) and is a frequent event that affects every municipality annually in Mifflin County. There is a high probability that the county will experience low- to high-impact flooding late in the winter and much of the spring seasons. There is also potential for periodic flooding instances along lakes, streams, rivers, and tributaries throughout the remainder of the calendar year. The potential impacts that exist range from very low to catastrophic depending on the type and location of the flooding. Special flood hazard areas (SFHA) are identified by FEMA on the Flood Insurance Rate Map (FIRM) as areas that can be inundated by a flood event and have a 1 percent chance of being equaled or exceeded in any given year. SFHAs are divided into different zones to distinguish flooding probability. The county's biggest flood risk are the floodplains of the Juniata River. The flooding impact in these areas would have tremendous impact on the county's social and economic vitality. Consequently, these dense population centers and surrounding residential communities would also experience the greatest impact. The potential for loss of life and injuries to occur in these areas is high. Additionally, the long-term impact that severe flooding would have on the health and safety of citizens is high. Depending on the scope and magnitude of the flooding, the likelihood of long-term economic disruption is possible. Flooding may have a moderate impact on property, facilities, and infrastructure with varying levels of damage to structures, particularly mobile homes, in the affected area. Basic life support systems may experience moderate disruptions for short periods of time. Government operations are expected to continue without disruption, and the environmental impact should be minimal unless hazardous materials are released during a flooding event.

Table 4.3.3-8: Structures and Population in SFHA by Municipality (Mifflin County GIS Department, 2017)

Municipality	Total Structures in Municipality	Structures in SFHA	Structures in SFHA (%)	Total Population	Population in SFHA	Population in SFHA (%)
Armagh Township	741	282	38	3,820	114	2.98
Bratton Township	336	45	13	1,150	50	4.37
Brown Township	479	107	22	4,073	104	2.56
Burnham Borough	194	95	49	1,981	589	29.71
Decatur Township	794	47	6	3,102	57	1.85
Derry Township	1,045	241	23	7,324	386	5.27
Granville Township	902	180	20	5,029	418	8.31
Juniata Terrace Borough	16	0	0	625	0	0
Kistler Borough	44	15	34	359	79	22.06
Lewistown Borough	1,471	240	16	8,264	2,356	28.51
McVeytown Borough	80	14	18	364	82	22.59
Menno Township	317	16	5	1,762	25	1.44
Newton Hamilton Borough	37	32	86	141	64	45.31
Oliver Township	516	166	32	2,065	186	9.01
Union Township	522	59	11	3,461	73	2.10
Wayne Township	856	264	31	2,532	186	7.34
Total	**8,350**	**1,803**	**22**	**46,052**	**4,769**	**10.36**

** Note that total structures by municipality were evaluated by using Mifflin County land use codes for those only applicable to structures within the 2017 Land Use dataset.*

Table 4.3.3-9: Mobile Homes in the SFHA by Municipality (Mifflin County GIS Department, 2017)	
Municipality	**Number of Mobile Home Parcels in the Floodplain**
Armagh Township	37
Bratton Township	6
Brown Township	3
Burnham Borough	6
Decatur Township	8
Derry Township	22
Granville Township	26
Juniata Terrace Borough	0
Kistler Borough	6
Lewistown Borough	7
McVeytown Borough	2
Menno Township	1
Newton Hamilton Borough	6
Oliver Township	28
Union Township	1
Wayne Township	60

A unique risk analysis approach to the Mifflin County Multi-Jurisdictional Hazard Mitigation Plan 2019 update was to evaluate the county's Repository List of Unsold Properties (i.e., properties unsold at a judicial sale conducted under The Real Estate Tax Sale Law) and determine if any of these properties are located within the SFHA. Such properties could then be strategically evaluated and positioned for acquisition and returned to productive reuse to mitigate or eliminate future flood risks.

The Repository List (dated 6/26/2019) obtained from the Tax Claim Bureau of Mifflin County through its website includes 23 listed properties, which can be found in Appendix D (See Table 4.3.3-10). Of these properties, two are located within the SFHA and are illustrated in Figures 4.3.3-6 and 4.3.3-7, respectively (See Appendix D).

A key tool for enabling the acquisition, management and repurposing of Repository List properties (or any vacant or blighted property) are land banks authorized through the Pennsylvania Land Bank Law (Act 153-2012). Since the law's enactment in 2012, approximately 21 land bank programs have been organized to facilitate the strategic acquisition, reclamation and repurposing of abandoned, tax-delinquent, unmarketable or other distressed properties, and temporarily hold and manage certain types of properties designated for reuse. Organizing a land bank program for Mifflin County may also be a useful tool to in part help the County and its municipalities mitigate flood risks to blighted and vacant properties located within the SFHA.

The most likely secondary effect resulting from flooding is power failure. Power failures combined with a shortage of critical services and supplies could cause a public health emergency. Disruption in traffic patterns could place a strain on the county's transportation networks, increase the frequency of traffic accidents, and lead to a deterioration in emergency service coverage for both affected and unaffected areas. Flooding also has the potential to cause landslides along steep gradient areas and introduce hazardous materials into the environment as industrial, commercial, and public infrastructure facilities are inundated with floodwater. The most dangerous secondary effect would be the failure of dams in the county. See the Dam Failure profile in Section 4.3.16 for more information.

Severe flooding may have long-term secondary effects that affect the population, economy, and infrastructure of the county. Escalating costs of damages to private structures and the frequency of flooding may cause permanent population displacement. Small businesses that contribute to the local economy may close if unable to recover from damages. Disruptions to commerce and/or transportation nodes may have an adverse effect on municipal economies in affected areas and critical infrastructure, such as sewage and water treatment facilities, may be irreparably damaged.

HAZUS critical facilities included in this 2019 MJHMP were as follows: Medical Care Facilities, Emergency Operations Facilities, Fire Stations, Police Stations, and Schools. Table 4.3.3-11 presents the number of these critical facilities in each municipality and the number and percentage that are within the SFHA. A detailed table citing the specific name and address information, as well as whether or not each individual facility is within the SFHA, is included in Appendix D, which is not for public distribution due to security concerns. Appendix D includes a county-wide map of these critical facilities, as well as individual municipal maps portraying the flood vulnerability of these critical facilities. Appendix D also includes a county-wide map with additional critical facilities not included in the 2019 HAZUS analysis, telecommunication towers and places of worship, which were added based on the needs of local municipalities.

Table 4.3.3-11: Critical Facilities in the 1% Annual Chance Floodplain by Municipality (Mifflin County GIS Department, 2017)			
Municipality	**Total Critical Facilities**	**Total Critical Facilities in SFHA**	**% Critical Facilities in SFHA**
Armagh Township	7	1	14.29
Bratton Township	0	0	0
Brown Township	12	1	0.83
Burnham Borough	2	0	0
Decatur Township	3	0	0
Derry Township	23	0	0
Granville Township	6	2	0.33
Juniata Terrace Borough	0	0	0
Kistler Borough	1	0	0
Lewistown Borough	13	1	0.08
McVeytown Borough	1	0	0
Menno Township	10	0	0
Newton Hamilton Borough	1	0	0
Oliver Township	2	0	0
Union Township	12	0	0
Wayne Township	1	1	100
Total	**94**	**6**	**6.38**

4.3.4 Hurricane, Tropical Storm, Nor'easter

4.3.4.1 Location and Extent

Tropical storm systems that impact Mifflin County develop in tropical or sub-tropical waters of the Atlantic Ocean, Gulf of Mexico, and the Caribbean Sea. Storms that produce maximum sustained winds below 39 miles per hour are categorized as tropical depressions, whereas a storm that produces maximum sustained winds greater than 74 miles per hour is considered a hurricane. Mifflin County is located approximately 250 miles from the Atlantic Coast, however, tropical storms and hurricanes may track inland, leading to intense winds and heavy rainfall.

Nor'easters are extra-tropical storms which typically develop from low-pressure centers off the Atlantic Coast north of North Carolina during winter months. Extra-tropical is a term used to describe a hurricane or tropical storm that's cyclone has lost its 'tropical' characteristics. While an extra-tropical storm denotes a change in weather pattern and how the storm is gathering energy, it may still have winds that are tropical storm or hurricane force (Michael Baker International, 2018). Additionally, a nor'easter can cause heavy snow and hurricane force winds.

Coastal storms are known as regional events, where they may impact hundreds or thousands of miles throughout their duration. Therefore, hurricane, tropical storms, and nor'easters have the potential to impact all areas of Mifflin County. Those areas particularly vulnerable to flooding, winds, and winter storms are at an increased risk.

4.3.4.2 Range of Magnitude

Impacts most associated with hurricanes and tropical storms primarily include wind damage and flooding. There is also possibility of tornado development during a tropical cyclone hazard event. Historically in Pennsylvania, these events have brought intense rainfall and northeast winds which have led to extensive flood damage and downed trees and utility poles (Michael Baker International, 2018). The impact of a tropical cyclone event is measured by wind speed, using the Saffir-Simpson Scale (Table 4.3.4-1). This scale categorizes hurricanes intensity linearly based on maximum sustained winds, barometric pressure, and potential for storm surge. Major hurricanes comprise 20% of tropical cyclones that reach landfall, but account for over 70% of damage in the United States. Storm intensity may also be impacted by orientation, location of landfall, and speed. The likelihood that these damages would occur in Mifflin County is assessed in Section 4.3.4.4, Future Occurrence (Michael Baker International, 2018).

Table 4.3.4-1: Saffir-Simpson Scale Categories with Associated Wind Speeds and Damages (NHC, 2009)

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

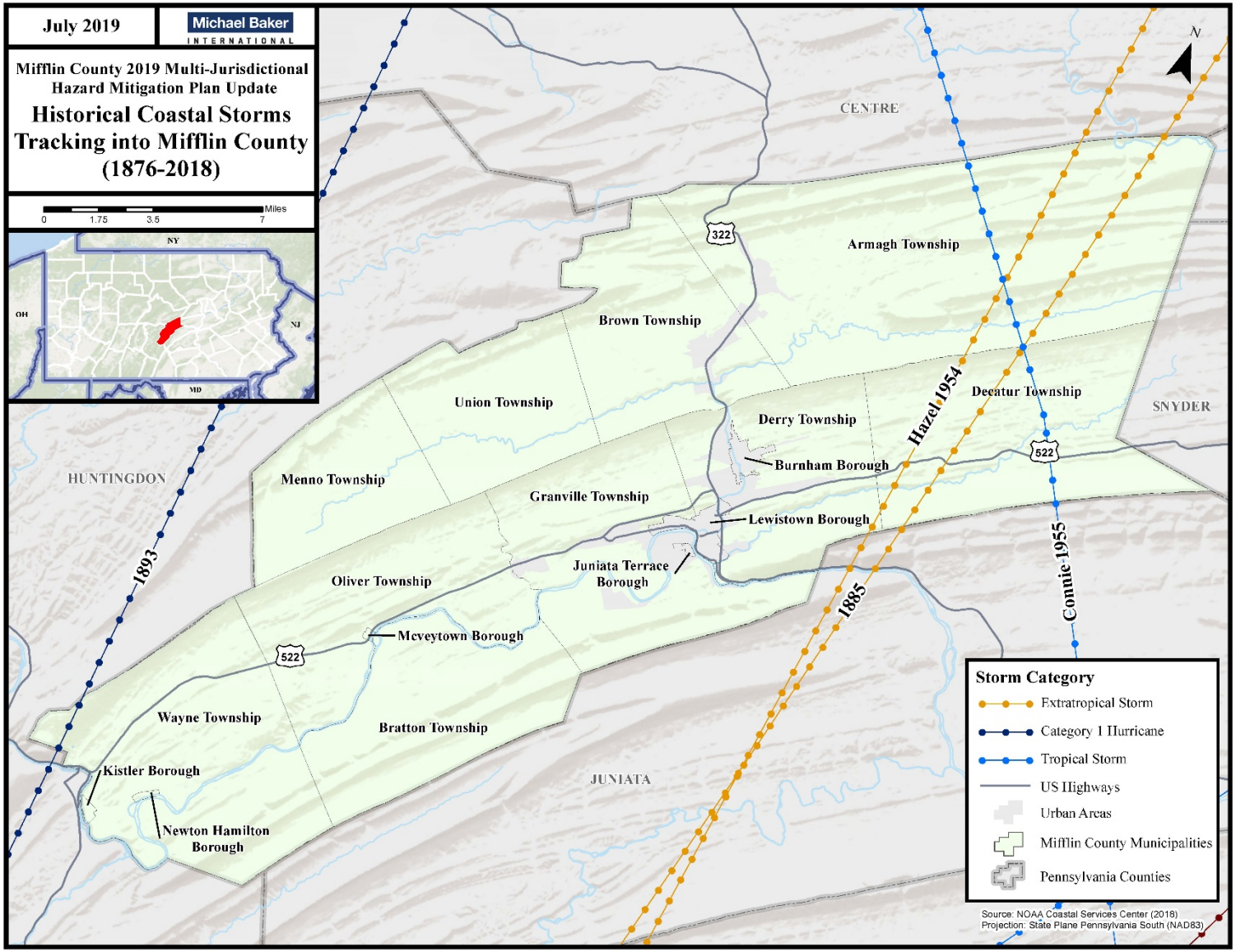
4.3.4.3 Past Occurrence

Tropical cyclone events are recorded by the National Oceanic and Atmospheric Administration's Coastal Service Center, which tracks storms that have impacted the United States since the 1850s. Table 4.3.4-2 lists all tropical cyclone events that have impacted Mifflin County since the 1850s. This was determined by recording only centers of circulation that were within 30 nautical miles of Mifflin County. It is important to note that some storms recorded have impacted the county without tracking in or near it. Due to its inland location, Mifflin County may not experience high wind speeds that tropical cyclone events bring as coastal communities would. Of the storms listed in Table, Hurricane Sandy (2012) resulted in a Presidential Disaster Declaration.

Table 4.3.4-2: Previous Tropical Cyclone Events with Centers of Circulation within 30 Nautical Miles of Mifflin County (NOAA, 2019)

Year	Event	Strength in/Near Mifflin County
2012	Sandy	Hurricane
2006	Ernesto	Hurricane
2003	Isabel	Hurricane
1999	Dennis	Tropical Storm
1955	Connie	Tropical Storm
1954	Hazel	Hurricane
1943	Unnamed	Tropical Storm
1933	Unnamed	Tropical Storm
1928	Unnamed	Hurricane
1893	Unnamed	Tropical Storm
1888	Unnamed	Tropical Storm
1885	Unnamed	Hurricane
1876	Unnamed	Tropical Storm
1864	Unnamed	Hurricane
1861	Unnamed	Tropical Storm

Figure 4.3.4-1: Historical Coastal Storms Tracking through Mifflin County



4.3.4.4 Future Occurrence

Current methods exist to determine future tropical cyclone events and potential hazard risk. One approach recommended by FEMA is to examine the frequency and spatial distribution of past tropical cyclone events. FEMA used this approach in developing its National Risk Index (NRI). It is important to note that there are currently no identified methods for predicting future nor'easter occurrences. Since the 1970s, there has been increased hurricane activity in the North Atlantic (Kossin et al., 2017). Ocean circulation, volcanic eruptions, Saharan dust, and effects of climate change due to increased levels of greenhouse gases and sulfate aerosols have led to increased tropical cyclone activity in the Atlantic (Michael Baker International, 2018).

Furthermore, tropical cyclone intensities are expected to increase with global warming. Although intensities are expected to increase, models show that the frequency of tropical cyclones will likely stay the same or even decrease with time. Although it is difficult to determine regional projections due to differences in circulation patterns and sea surface temperature increases, scientists predict that the Atlantic is *likely* to experience increased frequency of intense tropical storms (Kossin et al., 2017; Michael Baker International, 2018).

Climate change can cause increased intensity of hurricanes by creating heavier rainfalls and higher storm surges. Researchers found a correlation between the general slowdown of atmospheric circulation and the warming of Artic air, which has led to storms lingering longer in places, promoting higher destruction potential. Having an increased presence of Category 4 and 5 storms in the Atlantic may increase hurricane damage by 30% by 2100 (Geophysical Fluid Dynamics Laboratory, 2019).

4.3.4.5 Vulnerability Assessment

Mifflin County is vulnerable to the impact of flooding and severe wind caused by hurricanes, tropical storms, and nor'easters. Flood vulnerability is addressed in Section 4.3.3.5, whereas wind damage is addressed in 4.3.11.5. Mifflin County is also vulnerable to the severe weather impacts of nor'easters, which have been evaluated in Section 4.3.13.5.

4.3.5 Invasive Species

4.3.5.1 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 is host to several 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, 2016). Invasive species threats are generally divided into two main subsets (Michael Baker International, 2018):

- ***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 Governor's Invasive Species Council of Pennsylvania (PISC), the lead organization for invasive species threats, identified species threats that have the potential to become significant in Pennsylvania, or have already become quite significant. These threats are not prioritized or ranked. These species are listed in Table 4.3.5-1.

Table 4.3.5-1: Invasive Species of Concern in Pennsylvania (PISC, 2016)

Aquatic Invasive Species		
Amphibians and Reptiles		
Red-Eared Slider	Yellow-bellied Slider	
Fishes, Diseases, Invertebrates		
Northern Snakehead	Round Goby	
European Rudd	Sea Lamprey	Zebra Mussel
Tubenose Goby	West Nile Virus	Asian Clam
Asian Carp	Viral Hemorrhagic Septicemia	Rusty Crayfish
Eurasian Ruffe	Spring Viremia of Carp	Spiny Waterflea
Flathead Catfish	Quagga Mussel	Fishhook Waterflea
Mammals and Birds		
Nutria	Mute Swans	Canada Goose
Submerged Aquatic Plants		
Wild Taro	Water Chestnut	Limnophila sessiliflora
Hydrilla	Eurasian Watermilfoil	Carolina fanwort
Curly Leaf Pondweed	Giant Salvinia	Parrot feather
Alligator Weed	East Indian Hygrophila	Brazilian waterweed
Water Spinach	Didymo	
Terrestrial Aquatic Plants		
Narrow Leaved Cattail	Japanese Knotweed	Giant Knotweed
Japanese Hops	Common Reed	Hybrid Cattail
Giant Hogweed	Purple Loosestrife	
Terrestrial Invasive Species		
Human and Animal Pathogens		
Avian Influenza	Plague	Q Fever
Smallpox	Salmonellosis	Chronic Wasting Disease

Table 4.3.5-1: Invasive Species of Concern in Pennsylvania (PISC, 2016)		
West Nile Virus	Brucellosis	Bovine Spongiform Encephalopathy
Foot and Mouth Disease	Anthrax	Glanders
Botulism		
Plant Pathogens		
Chrysanthemum White Rust	Potato Wart	Plum Pox Virus
Dutch Elm Disease	White Pine Blister	Ralstonia Blight
Sudden Oak Death	European Stone Fruit	Yellows Ring Rot
Birds		
European Starling	House Sparrows	Monk Parakeet
Pigeons		
Insects and Other Invertebrates		
Japanese Beetle	Gypsy Moth	Tracheal Mite
Pine Shoot Beetle	Brown Marmorated Stink Bug	Non-Native Earthworms
Emerald Ash Borer	Hemlock Wooly Adelgid	Potato Cyst Nematode
Exotic Bark Beetle	Elongate Hemlock	Scale Golden Nematode
Asian Longhorned Beetle	Beech Bark Scale	Soybean Cyst Nematode
Siren Wood Wasp	Varroa Mite	Giant African Snail
Higher Mammals		
Norway Rat	13-Lined Ground Squirrel	Feral Swine
House Mouse		
Vascular Plants		
Tropical Soda Apple	Goatsrue	Asiatic Bittersweet
Beach Vitex	Multiflora Rose	Japanese Knotweed
Benghal Dayflower	Johnsongrass	Tree of Heaven
Rosary Pea	Garlic Mustard	Purple Loosestrife
Cagon Grass	Mile-A-Minute	Japanese Hops
Kudzu	Canada Thistle	Common Reed
**Species listed above have been cited in documents of the Governor's Council on Invasive Species and do not represent a comprehensive list of invasive species threats.*		

The location and extent of these invasive threats depends on the preferred habitat of the species as well as the species ease of movement and establishment. For example, kudzu vine is an aggressive vascular plant due to its wide ecological parameters and its ease of spread. The vine is a more widespread invasive species threat. Other species have limited extent due to the diligence of state agencies. For example, the emerald ash borer's extent has been limited to six counties (Allegheny, Beaver, Butler, Lawrence, Mercer, and Mifflin) because of an aggressive quarantine and testing program.

4.3.5.2 Range of Magnitude

The magnitude of invasive species threats ranges from nuisance to widespread killer. Some invasive species like the Brown Marmorated Stink Bugs are not considered an agricultural pest and do not harm

humans. Other invasive species can cause significant changes in the composition of Pennsylvania ecosystems. For example, the Emerald Ash Borer has a 99% mortality rate for any ash tree it infects. Didymo, an aggressive form of algae, can clog waterways and smother native aquatic plants and animals. Still more invasive species can cause widespread illness or death in humans. A species of concern with this magnitude is anthrax, considered by the Centers for Disease Control and Prevention (CDC) to be a Category A agent that may pose a significant, widespread threat to public health. The magnitude of an invasive species threat 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. An example of a worsening scenario for invasive species is if the Emerald Ash Borer breaks through the quarantine in Pennsylvania and invades the Commonwealth's 323 million ash trees. With the high mortality rate associated with the ash borer, Pennsylvania's hardwood forests are devastated, causing the Commonwealth's 263 logging establishments to shut down, resulting in loss of jobs and valuable income to the state.

4.3.5.3 Past Occurrence

Table 4.3.5-2 lists the invasive species that have previously or continue to pose a threat to Mifflin County or its surrounding counties. Following the table, the location and impact of each species will be discussed.

Table 4.3.5-2: Invasive Species Potentially Found in Mifflin County (PA Natural Heritage Program, 2007)

Aquatic Invasive Species	
Amphibians and Reptiles	
Red-Eared Slider	
Fishes, Diseases, Invertebrates	
Asian Clam	Grass Carp
Rusty Crayfish	Common Carp
Snakehead	
Mammals and Birds	
Mute Swan	House Sparrow
European Starling	European Pigeon
Terrestrial Aquatic Plants	
Japanese Knotweed	
Terrestrial Invasive Species	
Human and Animal Pathogens	
Botulism	Salmonellosis
Brucellosis	West Nile Virus
Q Fever	
Plant Pathogens	
Beech Bark Disease	Dutch Elm Disease
Butternut Canker	Plum Pox Virus

Table 4.3.5-2: Invasive Species Potentially Found in Mifflin County (PA Natural Heritage Program, 2007)	
Dogwood Anthracnose	
Insects and Other Invertebrates	
Brown Marmorated Stink Bug	Japanese Beetle
Emerald Ash Borer	Non -Native Earthworm
Gypsy Moth	Pine Shoot Beetle
Hemlock Woolly Adelgid	Sirex Woodwasp
Spotted Lantern Fly	Asian Ladybird Beetle
Higher Mammals	
House Mouse	Norway Rat
House Cat (domestic and feral)	
Vascular Plants	
Tropical Soda Apple	Purple Loosestrife
Multiflora Rosa	Tree of Heaven
Brush Honeysuckles	Goat's Rue
Garlic Mustard	Canada Thistle
Mile-A-Minute	Common Reed
Asiatic Bittersweet	Kudzu
Norway Maple	Japanese Stilt Grass
Spotted Knapweed	Autumn Olive
Japanese Barberry	Winged Burning Bush
Jetbead	Privet

The extent and impact of select invasive species listed in Table 4.3.5-2 are described in detail below:

Red-Eared Slider

Location: Lower Juniata River

Impact: Red-eared Sliders in the southern U.S. states compete with the indigenous, closely related Yellow-bellied Slider. Additionally, interbreeding between the two races has occurred in various southern states, which compromises the genetic integrity of indigenous Yellow-bellied Sliders (Somma et al., 2018).

Asian Clam

Location: Juniata River

Impact: The most prominent effect of the introduction of the Asian clam into the United States has been biofouling, especially of complex power plant and industrial water systems. It has also been documented to cause problems in irrigation canals, pipes, and drinking water supplies. It also competes with native species for limited resources (Foster et al., 2018).

Rusty Crayfish

Location: Juniata River

Impact: The rusty crayfish has been known to displace native crayfish by reducing the availability of resources within the ecosystem and may cause aggressive behavior in the native crayfish. They also have been found to destruct plant bed abundance and diversity and have outcompeted native snail species (Durland et al., 2019).

Japanese Knotweed

Location: Pennsylvania, extensively planted at strip mine reclamation sites, surveyed in Mifflin County

Impact: Dense stands of Japanese Knotweed exclude other plant species, such as native seeds trying to germinate. This leads to very limited biological diversity in infested sites and the degradation of native habitats. Japanese Knotweed is also very tolerant to many different growing conditions and has underground stems, or rhizomes, that may remain in the soil after the plant is removed, which will lead to the growth of a new plant (Pennsylvania Sea Grant, 2013).

Brucellosis

Location: 100 to 200 cases occur each year in the United States, on average in Pennsylvania there are 5 confirmed cases of brucellosis each year.

Impact: Brucellosis is an infectious disease caused by a bacterium that infects cattle and bison. The bacterium becomes of great concern when in infects humans. Humans become infected by coming into contact with animals or animal products that are contaminated with brucellosis. In humans, brucellosis can cause a range of symptoms similar to the flu called undulant fever. Although harmful to humans, brucellosis poses more of a risk in domestic and wild mammal species (PA Game Commission, 2019).

Q Fever

Location: In 2014, 160 cases of Q fever were reported in the United States. Of those cases, 137 were acute and 39 were chronic (CDC, 2019).

Impact: Q fever is a result of infection with the obligate, intracellular bacterium, *Coxiella burnetii*. Cattle, sheep, and goats are commonly infected and may transmit infection to humans when the animal gives birth. *C. burnetii* can survive for long periods of time in the environment and may be spread by wind and dust. The disease is global in distribution, with cases reported sporadically or occasionally as outbreaks (CDC, 2019).

West Nile Virus

Location: In Mifflin County, there have been no confirmed human cases, however, 25 positive veterinary and mosquito samples were confirmed in 2018. Currently, Mifflin County does not have a county program for West Nile Virus (PA DEP, 2018; Mifflin County Conservation District, personal communication, August 14, 2019).

Impact: West Nile Virus Control Program began in Pennsylvania in 2000 when West Nile Virus was introduced into the U.S. By 2003, the virus was rampant and there were more than 200 confirmed human cases in Pennsylvania. West Nile Virus is a mosquito-borne illness that cycles in several bird species. Most people who become infected will not have illness, however, 1 in 5 people who do become infected will develop West Nile fever. While anyone can get the virus, the elderly has the highest risk of severity (PA DEP, 2019).

Beech Bark Disease

Location: Throughout Pennsylvania and the North East United States

Impact: The disease is caused by the beech scale insect feeding through the bark of the beech tree. After the insect feeds, the ability of fungus spores to colonize produces a waxy crust on the bark of the tree. The effects of Beech Bark Disease have resulted in high mortality levels of beech trees. However, some beech trees have become resistant to the scale insect and can disperse resistant seeds (PA DCNR, 2019).

Butternut Canker

Location: Butternut Canker has been found to be present in 23 of 67 Pennsylvania counties (PA DCNR, 2010).

Impact: This fungus initially infects trees through buds, leaf scars, and openings in the bark, rapidly killing small branches. Cankers develop throughout the tree, on the main stem, at the base of the tree, and on exposed roots. Spores produced on branches are carried down the stem by rain, resulting in multiple perennial stem cankers that will slowly kill infected trees (PA DCNR, 2010).

Dogwood Anthracnose

Location: Mifflin County, Pennsylvania

Impact: An anthracnose fungus is the causal agent of this disease. Consecutive years of heavy infection have resulted in extensive mortality in both woodland and ornamental dogwoods (The Pennsylvania State University, 2000).

Dutch Elm Disease

Location: Mifflin County, Eastern portion of the United States

Impact: The Dutch elm disease fungus, *Ophiostoma ulmi*, grows and reproduces in the water-moving system of elm trees. The fungus blocks water movement to tree leaves, which causes the leaves to wilt and turn brown. Elm bark beetles use weakened and diseased trees as a method to reproduce. Beetle offspring emerge from diseased elms and fly to healthy elms to feed, where spores of fungus attach to them. When these fungus-infested beetles feed on healthy tree branches, they make small wounds in the wood allowing the fungus to enter the branch. Once the fungus has been introduced into the elm tree, it can move through the root system of a diseased tree into the root system of an adjacent healthy elm tree (The Pennsylvania State University, 2000).

Plum Pox

Location: Pennsylvania and New York

Impact: Plum Pox is a virus disease of stone fruit species that first appeared in Pennsylvania in 1999. The plum pox virus is transmitted from one plant to another by the feeding of several species of aphid, which causes yield losses to growers and reduces the marketability of fruit. In 2000, the United States Secretary of Agriculture declared an extraordinary emergency to prevent the spread of the virus from Pennsylvania to the rest of the United States. This emergency declaration allowed the United States Department of Agriculture to provide the funding necessary for eradication and to pay compensation to affected growers. Through the removal of infected trees, plum pox was eradicated from Pennsylvania (USDA Animal and Plant Health Inspection Service, 2019).

Brown Marmorated Stink Bug

Location: The United States

Impact: The brown marmorated stink bug is an invasive insect introduced to the U.S. from Asia. It poses a significant risk to specialty crop growers, an estimated $20 billion in value (USDA, 2017).

Emerald Ash Borer

Location: First detected in Pennsylvania in 2007 and is now present in Mifflin County.

Impact: The emerald ash borer can be spread by transporting infested firewood and logs. In 2010, the emerald ash borer was detected in 18 Pennsylvania counties. The state issued a quarantine for 43 counties in order to prevent the spread of the emerald ash borer (PA DCNR, 2011). Derry Township Supervisor Ron Napikoski submitted a *New Mitigation Action* form related to the emerald ash borer. He stated that more than 200 ash trees had been removed from Kish Park and provided a new action for the 2019 MJHMP Update to address the current inventory and health of trees in the park (see Appendix C). Similarly, during the 2019 Risk Assessment-Mitigation Solutions Workshop, John Allison, who works in Rothrock State Forest, cited his biggest concern for Menno Township as wildfire, because the Emerald Ash Borer and other pests result in a lot of dead trees in the forest.

Figure 4.3.5-1: Emerald Ash Borer larva (top left), Emerald Ash Borer adult (top right), "D" shaped exit hole of the adult (bottom left), and "S" shaped characteristic of an infested ash tree (bottom right) (Photographs courtesy of PA DCNR, 2011).

Gypsy Moths

Location: Present in Mifflin County, Pennsylvania

Impact: In 2007, Gypsy Moths were responsible for the defoliation of more than 680,000 acres. In a 2010 survey, 25 counties in Pennsylvania were found to contain positive gypsy moth sampling sites (PA DCNR, 2010).

Hemlock Woolly Adelgid

Location: The hemlock woolly adelgid was found in southeastern Pennsylvania in the late 1960s. In 2012, the insect was present in 49 of the Commonwealth's 67 counties, including Mifflin County.

Impact: In the eastern U.S., hemlock woolly adelgid is killing Eastern and Carolina hemlocks in large numbers from Connecticut to the southern Appalachian Mountains. It has been determined that hemlock health is influenced by the presence of the hemlock woolly adelgid and decline of hemlock trees has occurred in areas with high adelgid populations. It was also found that the severity of the hemlock woolly adelgid infestation is high in Mifflin County. The Commonwealth uses chemical treatment to help suppress infestations (PA DCNR, 2010).

Japanese Beetle

Location: Found in Mifflin County, Pennsylvania (USDA – U.S. Forest Service, 2019)

Impact: The Japanese beetle damages ornamental trees, shrubs, and flowers found in the eastern United States and can feed on 300 different host plants. There have been strategies proposed to manage the larval and adult stages in the United States, however those strategies are estimated to cost $460 million a year (The Pennsylvania State University, 2019).

Non-Native Earth Worm

Location: Throughout Pennsylvania and the United States.

Impact: Earthworms can pose a threat in forests because they mix nutrients in the soil making it more suitable for the growth of invasive plants. As a result, it becomes difficult for native trees and animals adapted to forest floor conditions to survive following earthworm invasion (Smithsonian Environmental Research Center, 2019).

Pine Shoot Beetle

Location: Present in Pennsylvania and all Pennsylvania counties have been quarantined.

Impact: These beetles attack new shoots of pine trees, which consequently will stunt tree growth. Pine shoot beetles have caused severe decline in pine trees, especially when large populations are present. Since it was detected in 1992, the pine shoot beetle has been found present in 20 states in the United States (USDA Animal and Plant Health Inspection Service, 2015).

Sirex Woodwasp

Location: Northern Pennsylvania

Impact: Sirex woodwasp causes mortality in living pine trees. At low populations, Sirex woodwasp selects injured or stressed trees to lay its eggs. A key biological control that has helped manage the spread of the sirex woodwasp has been a nematode that infects the female wasp and causes sterilization (USDA – U.S Forest Service, 2005).

Spotted Lanternfly

Location: First discovered in Berks County, PA in 2014 and is now present in southeastern Pennsylvania.

Impact: The spotted lanternfly is native to Asia and poses a significant threat to Pennsylvania's agricultural sector due to its effect on grapes, hardwood, and tree fruits. These industries alone contribute largely to Pennsylvania's economy, approximately $18 billion every year. The spotted lanternfly is extremely damaging to plants due to its ability to excrete honeydew, which in turn attracts other pest and promotes the growth of mold. Consequently, the state of Pennsylvania has enforced a quarantine for counties where spotted lanternfly is present in an effort to mitigate its spread (The Pennsylvania State University, 2018). In June 2019, it was reported that spotted lanternflies were found on *Ailanthus altissima* trees, commonly known as the tree of heaven. Researchers believe that symbiotic fungi living in both the soil and *A. altissima* may be responsible for killing mass quantities of the spotted

lanternfly. Although not extensively studied, researchers plan on continuing to observe this potential mitigation measure (Barr, 2019).

Figure 4.3.5-2: Life cycle of the spotted lanternfly (top) and a spotted lanternfly infested branch (bottom) (Photographs courtesy of The Pennsylvania State University, 2018).

Asiatic/Oriental Bittersweet

Location: Spread throughout New England to the Midwest.

Impact: This plant is a woody vine that can kill trees or damage them severely due to its ability to climb and grow around the tree, preventing sun from reaching it. Oriental bittersweet and American bittersweet can also hybridize which has resulted in a decrease of genetic diversity (PA DCNR, 2019).

Canada Thistle

Location: Present in Mifflin County, Pennsylvania. Located in much of the northern United States.

Impact: Canada thistle prevents the growth of native plants by shading them from sunlight, using valuable soil resources, and even has the potential to release chemical toxins that are poisonous to other plants (PA DCNR, 2019).

Garlic Mustard

Location: Throughout Pennsylvania and United States

Impact: Garlic mustard is very tolerant to poor shaded areas and consequently has invaded forest ecosystems. It also possesses allelopathic properties, where it can chemically inhibit another plant. Garlic mustard interferes with the symbiotic relationship between forest trees and mycorrhizal fungi (PA DCNR, 2019).

Kudzu

Location: Throughout Pennsylvania and the United States

Impact: Kudzu smothers native plants under a blanket of leaves, wraps around woody stems and tree trunks, and can break branches or entire trees and shrubs due its weight, as some kudzu tap roots can weigh up to 400 pounds. Kudzu vine also grows very rapidly, up to one foot each day (PA DCNR, 2019).

Mile-A-Minute

Location: Mid-Atlantic region of the United States and is present in the southern portion of Pennsylvania.

Impact: Mile-a-minute weed can grow up to 6 inches in one day and climb up native trees. This vine then blocks native plants from valuable light and reduces their ability to photosynthesize. Consequently, the vine is a threat to forest regeneration (PA DCNR, 2019).

Tree of Heaven

Location: Commonly present in the Midwest and the Northeast United States.

Impact: Tree of Heaven grows rapidly and once established, forms dense stands and impenetrable thickets that can outcompete native vegetation. It also produces toxins that prevent the establishment of other plant species. Tree of Heaven has also been found to cause damage to buildings and sewer lines (PA DCNR, 2019). John Allison of Menno Township noted on the 2019 *Evaluation of Identified Hazards and Risk* form that he has been seeing more Tree of Heaven but has limited ability to spray because of organic farming practices.

Tropical Soda Apple

Location: Currently present in Pennsylvania and several southern states.

Impact: Tropical soda apple reduces biodiversity within the ecosystem and prohibits wildlife from grazing due to its large prickles. It is also poisonous to humans due to the presence of solasodine in the plant. Tropical soda apple can also readily spread viruses to economically viable vegetable crops because viruses use it as a host (USDA – U.S. Forest Service, 2005).

4.3.5.4 Future Occurrence

According to the PISC, the probability of future invasive species threats has increased due to 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 and established in new countries or regions. Furthermore, climate change is contributing to the introduction of new invasive species. As maximum and minimum seasonal

temperatures change, pests can establish themselves in previously inhospitable climates. This also allows newly introduced species to increase the magnitude of their growth.

In an effort to combat an increase in future occurrences, the PISC, which is a collaboration of state agencies, public organizations, and federal agencies, released the Invasive Species Management Plan in April 2010. This plan outlines the Commonwealth's goals for the management of the spread of nonnative invasive species and creates a framework for responding to threats through research, action, and public outreach and communication.

4.3.5.5 Vulnerability Assessment

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, particularly in the case of invasive species that invade forest ecosystems. 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, potatoes, and stone fruits. As a state with a strong agricultural population, invasive species remain a hazard for the economic livelihood of the state.

Areas with a high concentration of crops and trees are most vulnerable to these invasive species due to the overwhelming affect they can have on the ecosystem. Steps must be taken to protect food sources for the county as well as valuable forest land. The Juniata River and other local river systems are also vulnerable to invasive species, and preventative measures should be taken for the county's aquatic systems as well.

4.3.6 Landslide

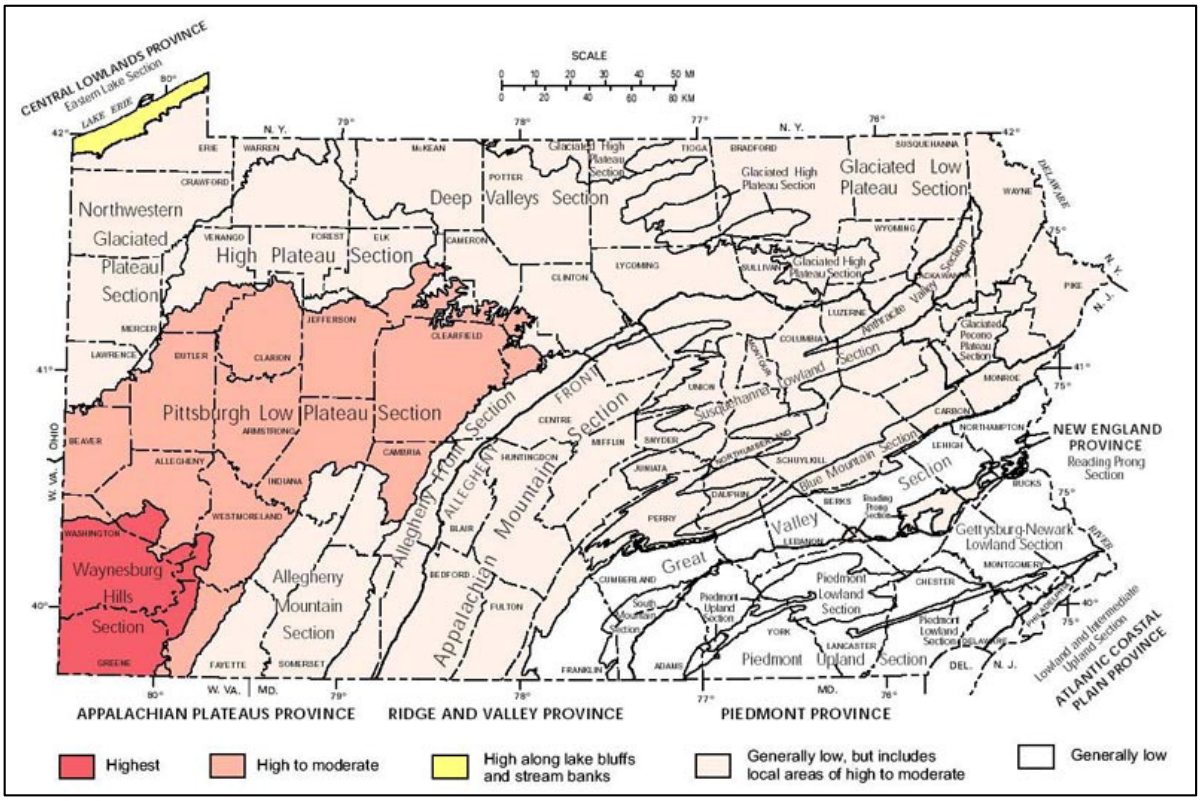
4.3.6.1 Location and Extent

A landslide is the downward and outward movement of slope-forming soil, rock, and vegetation reacting to the force of gravity. Landslides may be triggered by both natural and human-caused changes in the environment, including heavy rain, rapid snow melt, steepening of slopes due to construction or erosion, earthquakes, and changes in groundwater levels. Mudflows, mudslides, rock falls, rockslides, and rock topple are all forms of a landslide. Areas that are generally prone to landslide hazards include previous landslide areas, the bases of steep slopes, the bases of drainage channels, developed hillsides, and areas recently burned by forest and brush fires.

Mifflin County's vulnerability to landslides is generally low, however, there are areas with a moderate to high possibility of occurrence. The most vulnerable places to landslides are along transportation routes and pipeline pathways. Roadways are often blocked with soil and rocks from recent landslides. An injury or death from a landslide would most likely be reported when it happens on a roadway. Furthermore, pipelines are dangerous places for landslides because of the materials in the pipeline. Pipeline breaks

from landslides, often carrying hazardous materials through rural areas, can contaminate soils, waterways, and other natural habitats. Some of the secondary effects of a landslide include utility failure, dam failure, hazardous material spills, and transportation accidents/roadway damage. Much like earthquakes, landslides will occur several times a year and may go unnoticed. Figure 4.3.6-1 demonstrates landslide zones throughout Pennsylvania.

Figure 4.3.6-1: Landslide Zones in Pennsylvania (Delano and Wilshusen, 2001).



4.3.6.2 Range of Magnitude

Southwestern Pennsylvania is more susceptible to landslides than the rest of the state. Landslides occur primarily in colluvial, or loose soil and old landslide debris on steep slopes. Steep mountain slopes across the state have experienced debris avalanches associated with extreme rainfall or rain-on-snow events. Glacial and glacial-lake sediments underlie stream banks, lake bluff slumps, and other failure areas across much of the northern part of the state. Outside of the southwest, high susceptibility areas are smaller and have more geology and topography variation. Landslides cause damage to transportation routes, utilities, and buildings and create travel delays and other side effects. Fortunately, deaths and injuries due to landslides are rare in Pennsylvania and no deaths have been reported in Mifflin County. Almost all known deaths in Pennsylvania due to landslides have occurred due to rock falls or other slides along highways involving vehicles. Storm-induced debris flows are the only other type of landslide likely to cause death and injury. As residential and recreational development increases on and near steep

mountain slopes, the potential hazard from these rapid events will also increase. Ultimately, most Pennsylvania landslides are moderate to slow moving and damage property.

A study completed by Delano and Wilshusen (2001) concluded that the Pennsylvania Department of Transportation (PennDOT) and large municipalities incur substantial costs from landslide damage and the construction of new roads in known landslide-prone areas. A 1991 estimate revealed that an average of $10 million per year was spent on landslide repair contracts across the Commonwealth, and a similar amount is spent on mitigation costs for grading projects (Michael Baker International, 2018). Urban and rural land development is increasing both the number of landslides and the economic effects of natural slides. Major highway construction with large excavations and fills located in mountainous areas also creates potential for many landslides.

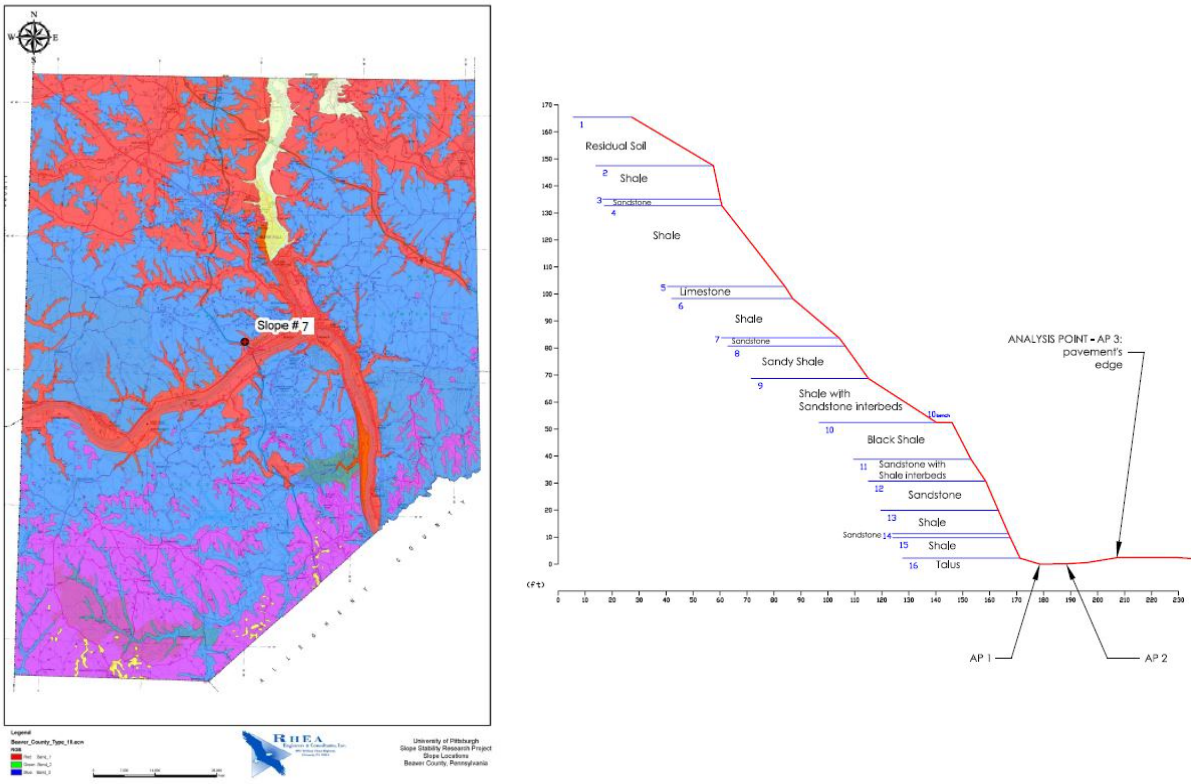
4.3.6.3 Past Occurrences

There is no comprehensive list of landslide incidents for Mifflin County available currently, as there is no formal reporting system in place in the county or the Commonwealth. Based on anecdotal information from the county and municipal officials, minor landslides occur each year, typically during periods of heavy rains.

4.3.6.4 Future Occurrences

Based on historical events, landslide events resulting in loss of life and property damage are unlikely in Mifflin County. However, with mixed susceptibility to landslides, the probability of landslides occurring in the county is possible. A study completed by the University of Pittsburgh in conjunction with PennDOT (2008) used the Colorado Rockfall Simulation Program (CRSP) to determine the geological condition of highway slopes and assess the vulnerability of transportation routes to rockfall and landslide activity in Western Pennsylvania. The use of CRSP to map slopes into an input profile and produce a detailed risk analysis is a reliable process that could be used to detect future landslide occurrences in Mifflin County. Specifically, vulnerability could be assessed using major transportation routes in the county to determine landslide risk along those routes (Figure 4.3.6-2). Due to this program initially being developed in Colorado, new input parameters would need to be developed that are suitable to the geology of the area. Currently, landslides are considered a low risk in Mifflin County, as defined by the Risk Factor Methodology (Section 4.4.2-2). However, mismanaged, intense development in steeply sloped areas could increase the frequency of occurrence.

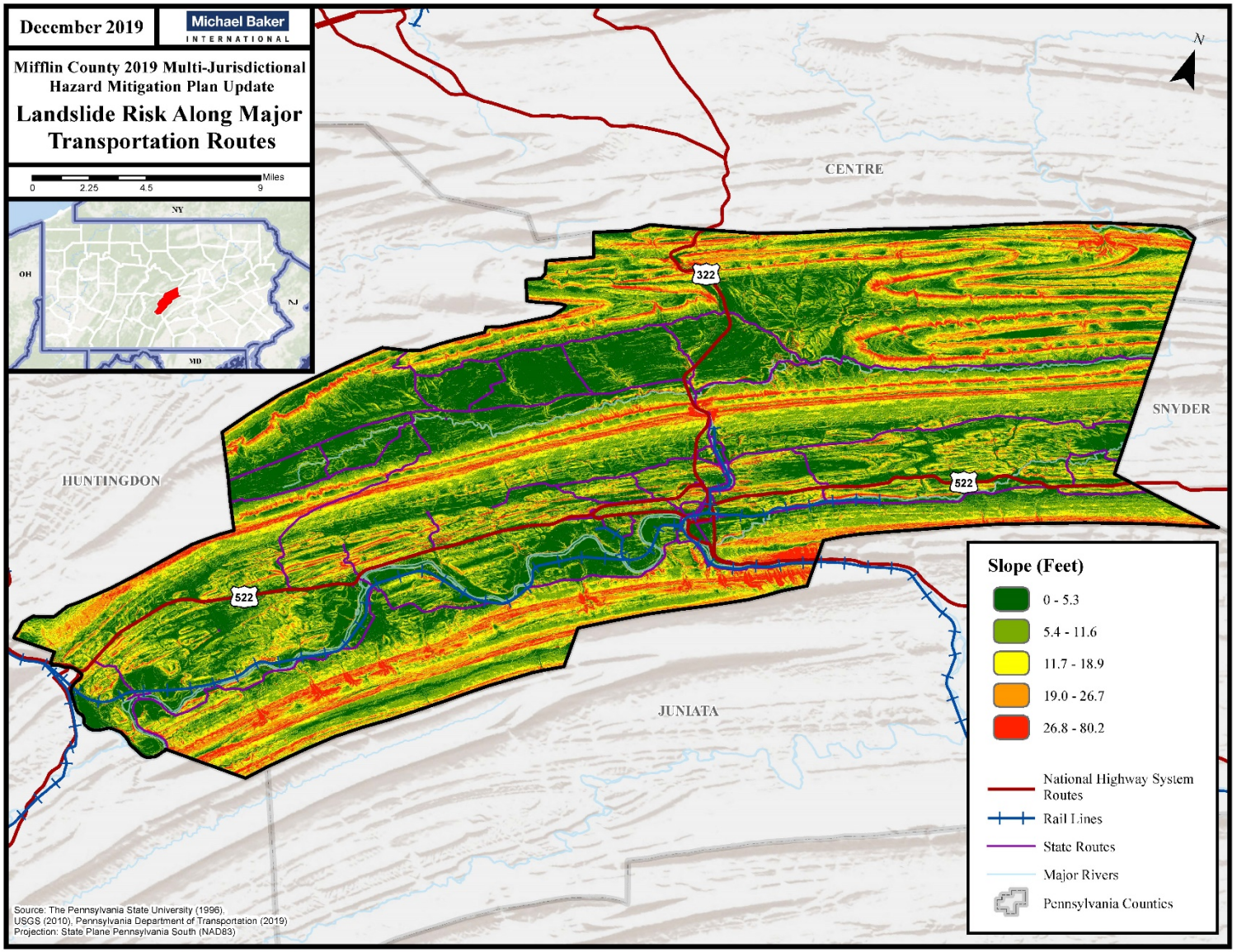
Figure 4.3.6-2: Selected slope of interest in Beaver County, PA (left) and a summary of the CRSP results (right) (University of Pittsburgh, 2008).



4.3.6.5 Vulnerability Assessment

Mifflin County is not particularly vulnerable to landslides. However, transportation routes throughout the county located at the base or crest of cliffs should be considered vulnerable to this hazard (See Figure 4.3.6-3).

Figure 4.3.6-3: Vulnerability of Major Transportation Routes in Mifflin County to Landslides



4.3.7 Lightning Strike

4.3.7.1 Location and Extent

Lightning events have occurred throughout the Commonwealth, with varying event frequencies. In all cases, lightning strikes have occurred primarily during the summer months. While the impact of flash events is highly localized, strong storms can result in numerous widespread events over a broad area. In addition, the impacts of an event can be serious or widespread, depending whether the lightning strikes a significant location such as a power station or large public venue. In general, Lewistown Borough and Juniata Terrace Borough are at a greater lightning risk than the rest of the county due to having a higher population density.

4.3.7.2 Range of Magnitude

Each year in the United States alone, lightning is responsible for the deaths of approximately one hundred people, injuries to several hundred more, and millions of dollars in property damage. In many cases, heart damage, inflated lungs, or brain damage have resulted from lightning strikes, which may lead to death. Loss of consciousness, amnesia, paralysis and burns are reported by many who have survived. Deaths and injuries to livestock and other animals, thousands of forest and brush fires, as well as millions of dollars in damage to buildings, communications systems, power lines, and electrical systems have also resulted from lightning strikes. Records from the National Centers for Environmental Information (NCEI) demonstrates that Pennsylvania, from 1950 to 2018, had 657 lightning events across its 67 counties. Also, within this time frame, Pennsylvania had 30 deaths and 2,257 injuries due to lighting strikes (NOAA NSSL, 2019).

A severe lightning event would occur if a strike hit a large crowd or gathering of people such as in a large sporting event or outdoor concert. This could result in mass death or injury. The highest reported loss in property damage in Pennsylvania occurred in Braddock Borough, Allegheny County in 1995 when lightning caused $5 million dollars in damage after a deodorizer manufacturing plant was struck. The subsequent fire completely destroyed the facility (Michael Baker International, 2018).

4.3.7.3 Past Occurrence

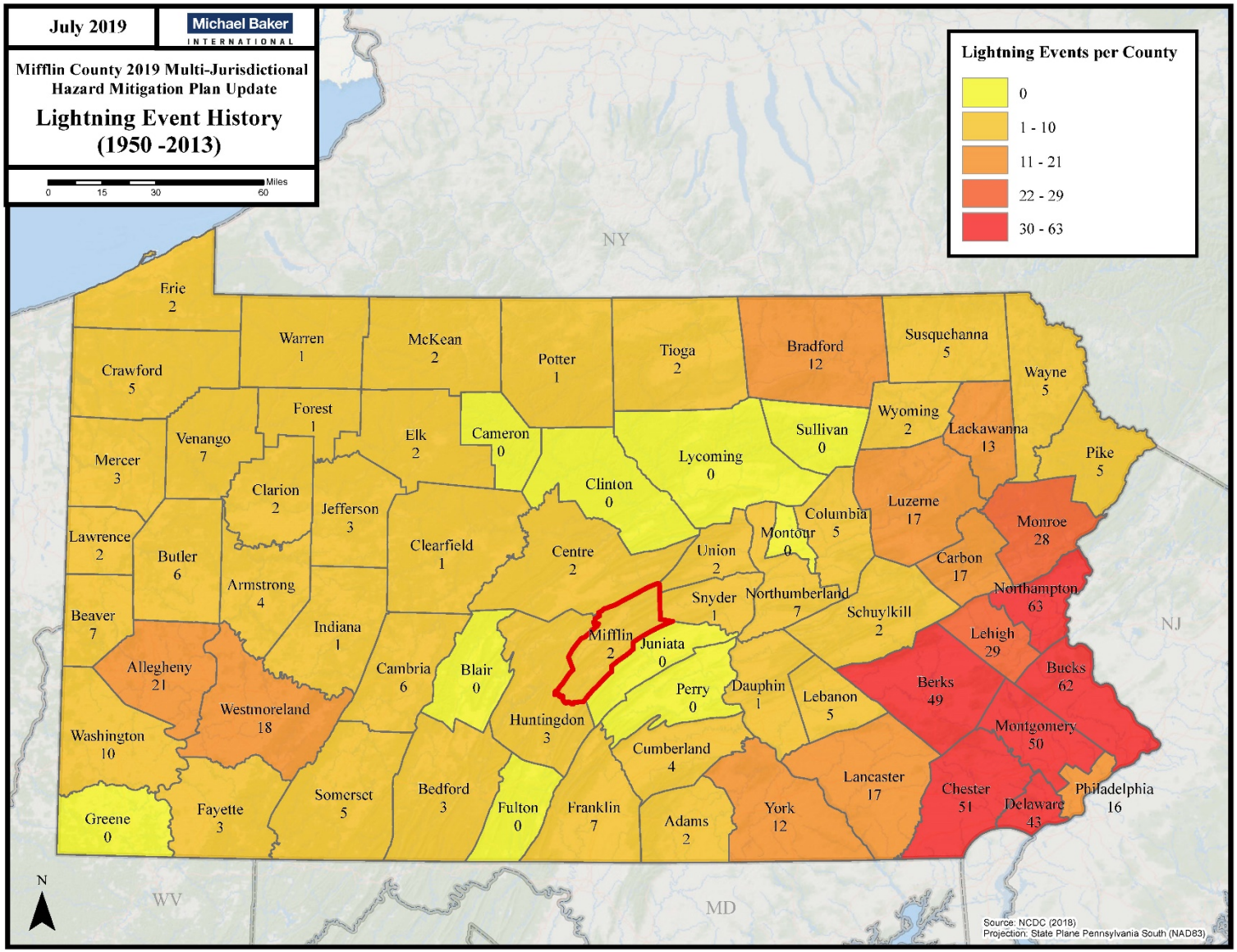
Records from the NCEI from 1950 to 2018 were observed to determine lightning events in Mifflin County. Table 4.3.7-1 gives a description of these incidents.

Table 4.3.7-1: Lightning Events in Mifflin County: 1950-2018 (NCEI, 2018)

Date	Location	Description	Property Damage ($)
June 6, 1994	Lewistown Borough	Lightning struck a house causing a fire.	-
July 24, 1994	Lewistown Borough	Lightning strike caused trees to fall and a resident was injured.	0

Figure 4.3.7-1: Lightning strike event in Reedsville on May 24th, 2019 (left) and on September 3rd, 2018 (right) (Photographs courtesy of Mifflin County Alerts 2 Facebook Page, May 24, 2019 and September 3, 2018).

Figure 4.3.7-2: Historic Lightning Strike Events in Mifflin County in Relation to Pennsylvania



4.3.7.4 Future Occurrence

As seen in Figure 4.3.7-2, Mifflin County has experienced two lightning strike events from 1950 to 2018. Therefore, it can be predicted that future lightning strike occurrences do not pose a large threat in Mifflin County. It is also important to note that counties with denser populations and increased property and structure density are at a higher risk of lightning hazards (Michael Baker International, 2018). Boroughs within Mifflin County with denser populations should consider taking preventive measures to mitigate lightning strike impacts. In addition, the Pennsylvania Climate Impacts Assessment Update predicts a future increase in thunderstorm frequency, and subsequent lightning events (Shortle et al., 2015). The NOAA National Severe Storms Laboratory (NSSL) forecasts intense lightning events, however, it is not possible to forecast individual lightning strike events, as they are widespread and randomized. Cloud electrification in general is still not completely understood among scientists (NOAA NSSL, 2019).

4.3.7.5 Vulnerability Assessment

The environmental impacts often associated with lightning strikes include damage or death to trees and ignition of wildfires (Michael Baker International, 2018). Losses due to lightning strikes can be prevented by installing surge protection on critical electronic lighting or information technology systems. Lightning protection devices and methods such as lightning rods and grounding can be installed on a community's communications infrastructure and other critical facilities to reduce potential losses.

4.3.8 Pandemic and Infectious Disease

4.3.8.1 Location and Extent

Pandemic and infectious disease events cover a wide geographical area and can affect large populations, such as the entire population of the Commonwealth. The exact size and extent of an infected population is dependent upon how easily the illness is spread, the mode of transmission and the amount of contact between infected and uninfected individuals. The transmission rates of pandemic illnesses are often higher in denser areas where there are large concentrations of people. The transmission rate of an infectious disease will depend on the mode of transmission of a given illness.

Mifflin County is primarily concerned with two diseases with pandemic potential: West Nile Virus and influenza. West Nile Virus is a vector-borne disease that can cause headache, high fever, neck stiffness, disorientation, tremors, convulsions, muscle weakness, paralysis, and in its most serious form, death. The virus spreads via mosquito bite and is aided by warm temperatures and wet climates conducive to mosquito breeding. West Nile Virus has been detected in all 67 counties in Pennsylvania, and at least once in the past 10 years. The virus is highly temporal with most cases occurring between April and October (PA DEP, 2019).

Pandemic influenza planning began in response to the H5N1 (avian) flu outbreak in Asia, Africa, Europe, the Pacific, and the Near East in the late 1990s and early 2000s. H5N1 did not reach pandemic proportions in the United States, but the Commonwealth actively began planning initiatives for an influenza pandemic. Influenza, also known as the flu, is a contagious disease that is caused by the influenza virus and most commonly attacks the respiratory tract in humans. As stated in the

Pennsylvania Department of Health (DOH) Influenza Pandemic Response Plan, "an influenza pandemic is inevitable and will probably give little warning" (PA DOH, 2019). The estimated morbidity and mortality during an influenza pandemic within 12-16 weeks nationwide are shown Table 4.3.8-1.

Table 4.3.8-1: Estimated Morbidity and Mortality During an Influenza Pandemic: 12-16 Week Period (Michael Baker International, 2018)

	United States	Pennsylvania
Require Outpatient Care	50 Million	1.6 Million
Hospitalization	2 Million	37,800
Deaths	500,000	9,100

The 2009 H1N1 virus, colloquially known as swine flu, was particularly of concern. This virus was first detected in the United States in April of 2009. On June 11, 2009, the World Health Organization signaled that a pandemic of H1N1 flu was underway. H1N1 flu now only exists as a regular human flu virus and it circulates through the population every season (CDC, 2010).

4.3.8.2 Range of Magnitude

The magnitude of a pandemic or infectious disease threat in the Commonwealth will range significantly depending on the aggressiveness of the virus in question and the ease of transmission. In the case of West Nile Virus, slightly less than 80% of cases are clinically asymptomatic. Approximately 20% of cases result in mild infection, called West Nile Fever, lasting two to seven days. However, one in 150 cases result in severe neurological disease or death. Since the appearance of West Nile Virus in Pennsylvania in 2000, the worst infection year was 2003 when 237 Pennsylvanians were infected, and 9 people died. The virus is typically more serious in older adults.

Pandemic influenza is more easily transmitted from person-to-person than West Nile Virus, but advances in medical technologies have greatly reduced the number of deaths caused by influenza over time. In terms of lives lost, the impact various pandemic influenza outbreaks have had globally over the last century has declined (see Table 4.3.8-2). The severity of illness from the 2009 H1N1 influenza flu virus has varied, with the gravest cases occurring mainly among those considered at high risk. High risk populations include children, the elderly, pregnant women, and chronic disease patients with reduced immune system capacity. Most people infected with H1N1 in 2009 recovered without needing medical treatment. However, the virus resulted in many deaths, including 78 in Pennsylvania as of February 2010. According to the CDC, about 70% of those who were hospitalized with the 2009 H1N1 flu virus in the United States belonged to a high-risk group (CDC, 2010).

The magnitude of a pandemic may be exacerbated by the fact that an influenza pandemic will cause outbreaks across the United States, limiting the ability to transfer assistance from one jurisdiction to another. Additionally, effective preventative and therapeutic measures, including vaccines and other medications, will likely be in short supply or will not be available. The 1918 Spanish flu pandemic remains the worst pandemic event on record both in Pennsylvania and worldwide. While mortality figures were probably under-reported, in the first month of the pandemic alone, 8,000 Pennsylvanians

died from the flu or related complications. As the densest city in the Commonwealth, Philadelphia experienced high losses during this pandemic.

4.3.8.3 Past Occurrence

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 4.3.8-2.

Table 4.3.8-2: Worldwide Influenza Pandemics Over the Past Century (Michael Baker International, 2019; CDC, 2018)

Date	Pandemic Name/Subtype	Worldwide Deaths (Estimated)
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 / A / H1N1	150,000 – 575,000

The aftermath of pandemic influenza outbreaks in the United States resulted in many fatalities. The Spanish Flu claimed 500,000 lives in the United States, with a total of 350,000 cases in Pennsylvania. A total of 150,000 cases were in Philadelphia alone. Most deaths resulting from the Asian Flu occurred between September of 1957 and March of 1958. There were approximately 70,000 deaths in the United States and approximately 15% of the population of Pennsylvania was affected. The first cases of the Hong Kong Flu in the U.S. were detected in September of 1968 with deaths peaking between December of 1968 and January of 1969 (Global Security, 2009). Most recently, 34,098 cases of the 2009 H1N1 virus were confirmed in Pennsylvania, which resulted in 79 deaths. Table 4.3.8-3 reports the number of influenza cases in Mifflin County within the last seven years, including the recent 2009 H1N1 pandemic. Additionally, the total number of cases reported, total number of hospitalizations, and total flu related deaths in Pennsylvania are listed.

Table 4.3.8-3: Pennsylvania Influenza Occurrences: 2005 – 2018 (PA DOH, 2019; PA Health Care Cost Containment Council, 2019)

Influenza Season	Cases Reported in Mifflin County	Total Cases in PA	Total Hospitalizations Reported in PA	Total Flu Related Deaths in PA
2017-2018	1,089	122,030	8,647	258
2016-2017	131	71,272	5,328	149
2015-2016	297	31,992	2,862	64
2014-2015	412	55,533	6,173	221
**2013-2014*				
2012-2013	333	43,227	3,277	190
2011-2012	15	3020	265	11
2010-2011	168	19,209	1,586	90
2009-2010	274	34,098	1,402	79
2008-2009	113	15,549	466	26
2007-2008	227	17,857	1,229	19
2006-2007	43	4,014	207	4
2005-2006	191	8,276	1,071	17

**Note seasonal data for 2013-2014 period not available.*

West Nile Virus arrived in the United States in 1999 and was first detected in Pennsylvania in 2000 when mosquito pools, dead birds, and horses in 19 counties tested positive for the virus. Since then, the number of positive Pennsylvania counties, human cases, and deaths have fluctuated in correlation with temperature and precipitation each year. Table 4.3.8-4 illustrates the virus's overall impact in Mifflin County since 2000.

Table 4.3.8-4: West Nile Virus Occurrences in Mifflin County: 2000 – 2018 (PA DEP, 2019)					
Year	Total Positive Cases	Positive Human Cases	Positive Avian Sample	Positive Mosquito Samples	Veterinary Positive
2018	25	0	0	5	20
2017	11	0	0	7	4
2016	2	0	0	1	1
2015	2	0	1	1	0
2014	3	0	1	2	0
2013	0	0	0	0	0
2012	17	0	2	11	4
2011	8	0	2	5	1
2010	0	0	0	0	0
2009	0	0	0	0	0
2008	0	0	0	0	0
2007	0	0	0	0	0
2006	0	0	0	0	0
2005	0	0	0	0	0
2004	0	0	0	0	0
2003	15	0	3	10	2
2002	16	0	6	4	6
2001	0	0	0	0	0
2000	0	0	0	0	0

4.3.8.4 Future Occurrence

West Nile Virus occurrences have generally decreased due to aggressive planning and eradication efforts, however, some scientists suggest that as global temperatures rise, and extreme weather conditions increase due to climate change, the virus may spread more rapidly in the United States. The 2018 data as seen in Table 4.3.8-4 may suggest an increase of West Nile Virus may be underway due to increased temperatures and changes in climate.

Similarly, the precise timing of pandemic influenza is uncertain, however occurrences are most likely when the Influenza Type A virus develops changes, or antigenic shift, that results in a new or "novel" virus to which the population has no immunity. The emergence of a novel virus is the first step towards the development of a pandemic.

4.3.8.5 Vulnerability Assessment

There are no true environmental impacts of pandemics and infectious disease threats, but significant economic and social costs beyond the possibility of disease-related deaths may occur. Widespread illness may increase the likelihood of personnel shortages to perform essential community services. In addition, high rates of illness and worker absenteeism occur within the business community, and these contribute to social and economic disruption. The largest employers in Mifflin County are Lewistown Hospital and Mifflin County School District. If not already in place, these employers should consider

adopting pandemic plans in the event they become short staffed. Major producers of essential goods may be unable to gain the resources needed to supply the county if a pandemic were to occur. Alternative methods to continue the flow of essential goods should be considered as part of their pandemic plan.

On a national scale, the Congressional Budget Office estimates that a severe pandemic could cost the U.S. economy more than $600 million, or 5% of the Gross Domestic Product. Social and economic disruptions could be temporary but may be amplified in today's closely interrelated and interdependent systems of trade and commerce. Social disruption may be greatest when rates of absenteeism impair essential services, such as power, transportation, and communications.

Those municipalities with high population densities are more susceptible to disease threats. Juniata Terrace Borough, Lewistown Borough and McVeytown Borough have the highest population densities in the county and should take extra precautions. During the Risk Assessment-Mitigation Solutions Workshop WebEx conference call in April 2019, Mayor John Wagner, Juniata Terrace Borough, explained that the Borough has many row homes, so an outbreak of flu or other contagious disease could spread very rapidly. In addition, high risk populations, such as children, the elderly, pregnant women, and chronic disease patients with reduced immune system capacity, are considered more vulnerable to pandemics. Overall, 20.5 percent of Mifflin County's population is over the age of 65, while 6.1 percent is under the age of 5.

4.3.9 Radon Exposure

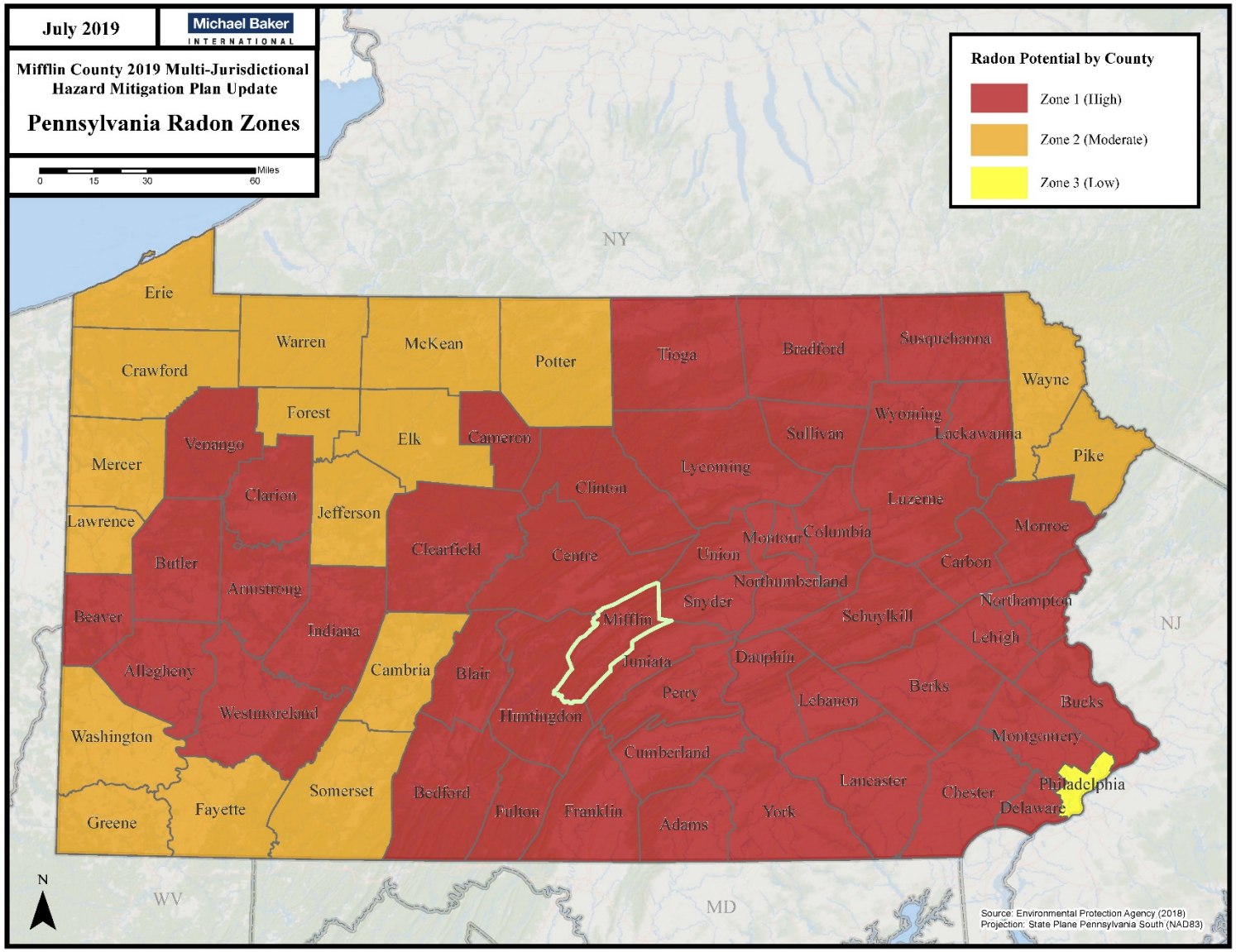
4.3.9.1 Location and Extent

Radioactivity caused by airborne radon has been recognized for many years as an important component in the natural background radioactivity exposure of humans, but it was not until the 1980s that the wide geographic distribution of elevated values in houses and the possibility of extremely high radon values in houses were recognized. In 1984, routine monitoring of employees leaving the Limerick nuclear power plant near Reading, Pennsylvania, while it was still under construction and non-operative, showed that readings conducted on a construction worker at the plant frequently exceeded expected radiation levels. However, only natural, non-fission-product radioactivity was detected on the worker. Subsequent testing of the employee's home in the Reading Prong section of Pennsylvania revealed extremely high radon levels around 2,500 pCi/L (pico Curies per Liter). The Environmental Protection Agency (EPA) guidelines state that action should be taken if radon levels exceed 4 pCi/L in a home, and uranium miners have a maximum exposure of 67 pCi/L. Due to this event, the Reading area became the focus of the first large-scale radon scare in the world.

Radon is a cancer-causing natural radioactive gas that is clear, odorless, and tasteless. It is a noble gas that originates from the natural radioactive decay of uranium and thorium. Like other noble gases, radon forms essentially no chemical compounds and tends to exist as a gas or as a dissolved atomic constituent in groundwater. It is a large component of the natural radiation that humans are exposed to and can pose a serious threat to public health when it accumulates in poorly ventilated residential and occupational settings. According to the EPA, radon is estimated to cause about 21,000 lung cancer deaths per year, just second to smoking as the leading cause of lung cancer. Two isotopes of radon are

significant in nature, 222Rn and 220Rn, formed in the radioactive decay series of 238U and 232Th, respectively. The isotope thoron, 220Rn, has a half-life, the time for decay of half of a given group of atoms, of 55 seconds. This is barely long enough for the gas to migrate from its source to the air inside a house and pose a health risk. However, 222Rn, which has a half-life of 3.8 days, is a widespread hazard. The distribution of radon is correlated with the distribution of radium, its immediate radioactive parent, and with uranium, its original ancestor. Due to the short half-life of radon, the distance that radon atoms can travel from their parent before decay is generally limited to distances of feet or tens of feet. Each county in Pennsylvania is classified as having a low, moderate, or high radon hazard potential. Mifflin County is classified as having a high hazard, meaning there is a predicted indoor radon level greater than 4 pCi/L (See Figure 4.3.9-1).

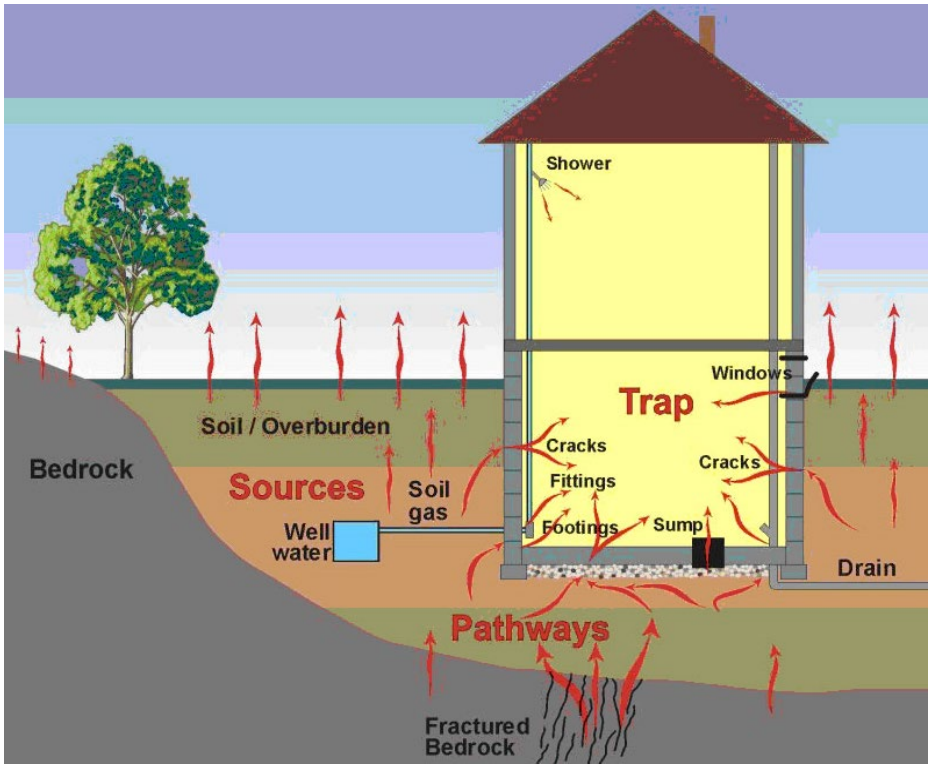
Figure 4.3.9-1: Radon Exposure Zone of Mifflin County



Three sources of radon in houses are now recognized (shown in Figure 4.3.9-2):

- 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.
- Radon emanating from uranium-rich building materials (e.g., concrete blocks or gypsum wallboard). This is not known to be a problem in Pennsylvania.

Figure 4.3.9-2: Radon Entry Points into a House (Michael Baker International, 2018)



High radon levels were initially thought to be exacerbated in houses that were tightly sealed, but it is now recognized that rates of air flow into and out of houses, plus the location of air inflow and the radon content of air in the surrounding soil, are key factors in radon concentrations. Outflows of air from a house, caused by a furnace, fan, thermal "chimney" effect, or wind effects, require that air be drawn into the house to compensate. If the upper part of the house is tight enough to impede influx of outdoor air (radon concentration generally <0.1 pCi/L), then 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 (see Figure 4.3.9-2). Soil gas typically contains 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 (Michael Baker International, 2018).

The radon concentration of soil gas depends upon several soil properties, the importance of which is 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 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 air flow, including cracks and channels, are important factors determining radon concentration in soil gas and its rate of flow into a house. Soil depth and moisture content, mineral host and form for radium, and other soil properties may also be important. For houses built on bedrock, fractured zones may supply air having radon concentrations like those in deep soil (Michael Baker International, 2018).

Areas where houses have high levels of radon can be divided into three groups in terms of uranium content in rock and soil (Michael Baker International, 2018):

- *Areas of very elevated uranium content (>50 ppm) around uranium deposits and prospects.* Although very high levels of radon can occur in such areas, the hazard normally is restricted to within a few hundred feet of the deposit. In Pennsylvania, such localities occupy an insignificant area.
- *Areas of common rocks having higher than average uranium content (5 to 50 ppm).* In Pennsylvania, such rock types include granitic and felsic alkali igneous rocks and black shales. In the Reading Prong, high uranium values in rock or soil and high radon levels in houses are associated with Precambrian granitic gneisses commonly containing 10 to 20 ppm uranium, but locally containing more than 500 ppm uranium. In Pennsylvania, elevated uranium occurs in black shales of the Devonian Marcellus Formation and possibly the Ordovician Martinsburg Formation. High radon values are locally present in areas underlain by these formations.
- *Areas of soil or bedrock that have normal uranium content but properties that promote high radon levels in houses.* This group is incompletely understood at present. Relatively high soil permeability can lead to high radon, 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 in which 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 the fact that radon contents in 93 percent of a sample of houses built on limestone-dolomite soils near State College, Centre County, exceeded 4 pCi/L, and 21 percent exceeded 20 pCi/L, even though the uranium values in the underlying bedrock are all in the normal range of 0.5 to 5 ppm uranium.

The majority of Mifflin County has high radon level test results. High radon levels in the county are mostly likely due to areas of common rocks having high uranium contents (See Figure 4.3.9-2).

4.3.9.2 Range of Magnitude

According to the EPA, the average radon concentration in the indoor air of homes nationwide is about 1.3 pCi/L. The EPA recommends homes be fixed if the radon level is 4 pCi/L or more. However, because there is no known safe level of exposure to radon, the EPA also recommends that Americans consider fixing their home for radon levels between 2 pCi/L and 4 pCi/L. Table 4.3.9-1 shows the relationship between various radon levels, probability of lung cancer, comparable risks from other hazards, and action thresholds. As is shown in Table 4.3.9-1, a smoker exposed to radon has a much higher risk of lung cancer (EPA, 2016).

A worst-case scenario for radon exposure would be a large area of tightly sealed homes that exposed residents to high levels of radon over a prolonged period without the residents being aware. This long-term exposure could lead to cancer attributed to radon in these homes.

Table 4.3.9-1: Radon Risk for Smokers and Nonsmokers (EPA, 2016; Michael Baker International, 2018)			
Radon Level (Pci/L)	**If 1,000 People Were Exposed to This Level Over a Lifetime…***	**Risk of Cancer from Radon Exposure Compares to…****	**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 2pCi/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 2pCi/L is difficult
0.4	-	(Average outdoor radon level)	

NOTE: Risk may be lower for former smokers.

** Lifetime risk of lung cancer deaths from EPA Assessment of Risks from Radon in Homes (EPA 402-R-03-003).*

*** Comparison data calculated using the Centers for Disease Control and Prevention's 1999-2001 National Center for Injury Prevention and Control Reports.*

4.3.9.3 Past Occurrence

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. The PA DEP has estimated that the average indoor concentration in Pennsylvania basements is about 7.1 pCi/L, and 3.6 pCi/L on the first floor.

The PA DEP Bureau of Radiation Protection provides information for homeowners on how to test for radon in their houses. If a test is reported to the Bureau with over 4 pCi/L, then the Bureau works to help the homeowners make repairs to their houses to prevent high radon levels. Current data on the abundance and distribution of radon and its effect on Mifflin County specifically, is considered incomplete, due to the PA DEP Bureau of Radiation Protection's reporting system. The total number of tests reported to the Bureau since 1990 and their results are provided by zip code on the Bureau's website. However, this information is only provided if over 30 tests total were reported to best approximate the average for any given area. In Mifflin County, nine zip codes had radon tests reported to the Bureau, which are shown in Table 4.3.9-2. Those zip codes that contained insufficient data were not included in Table 4.3.9-2. The Bureau does not track the number of homes that have received remediation assistance.

Table 4.3.9-2: Radon Level Tests in Mifflin County by Zip Code: 1990 – 2019 (PA DEP, 2019)					
Zip Code	**Area of Mifflin County**	**Location**	**Number of Tests**	**Maximum Result (Pci/L)**	**Average Result (Pci/L)**
17004	Belleville, Union Township	Basement	182	291.6	21.9
17004	Belleville, Union Township	First Floor	38	43.3	8.1
17009	Burnham Borough	Basement	57	333.2	11.9
17009	Burnham Borough	First Floor	Insufficient Data	Insufficient Data	Insufficient Data
17044	Lewistown Borough, Derry Township	Basement	1054	709.3	11.2
17044	Lewistown Borough, Derry Township	First Floor	123	71.9	5.2
17051	McVeytown Borough	Basement	131	101.7	12.5
17051	McVeytown Borough	First Floor	Insufficient Data	Insufficient Data	Insufficient Data
17063	Milroy, Armagh Township	Basement	74	61.2	12.0
17063	Milroy, Armagh Township	First Floor	Insufficient Data	Insufficient Data	Insufficient Data
17066	Kistler Borough	Basement	59	174.7	8.7
17066	Kistler Borough	First Floor	Insufficient Data	Insufficient Data	Insufficient Data
17084	Reedsville, Brown Township	Basement	528	289.6	20.4
17084	Reedsville, Brown Township	First Floor	49	92.7	16.7
17099	Yeagertown, Derry Township	Basement	31	34.3	7.8
17099	Yeagertown, Derry Township	First Floor	Insufficient Data	Insufficient Data	Insufficient Data
17841	Decatur Township	Basement	108	326.2	16.4
17841	Decatur Township	First Floor	Insufficient Data	Insufficient Data	Insufficient Data

4.3.9.4 Future Occurrence

Radon exposure is inevitable, given the present soil, geologic, and geomorphic factors in Mifflin County. Future occurrence of high radon level hazards can be considered *highly likely* as defined by the Risk Factor Methodology probability criteria (see Table 4.4.2-2) (Michael Baker International, 2018).

Development in areas where previous radon levels have been 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 with proper testing for both past and future development and appropriate mitigation measures.

4.3.9.5 Vulnerability Assessment

As Table 4.3.9-2 shows, houses in Union and Brown Township, which had the highest average levels of radon, and houses in Lewistown Borough, which had the highest maximum level, could be susceptible to high levels of radon. A new mitigation action was formulated to conduct outreach and provide education about radon in these municipalities. Smokers can be up to 10 times more vulnerable to lung cancer from exposure to high levels of radon (see Table 4.3.9-1). Older houses that have crawl spaces or unfinished basements are more vulnerable due to increased exposure to soils that could be releasing higher levels of radon gas. Additionally, houses that rely on wells as their water source may face additional risk, although this type of exposure is rare in Pennsylvania.

Proper testing for radon levels should be completed across Mifflin County, especially in areas of higher incidence levels and for those individuals and households that face the contributing risks described above. This testing will determine the level of vulnerability that residents face in their homes, as well as in their businesses and schools. The PA DEP Bureau of Radiation Protection provides short- and long-term tests to determine radon levels as well as information on how to mitigate high levels of radon in a building. According to the EPA, repairs to houses to protect against radon can cost on average the same as regular house repairs. In summer 2018, the PA DEP provided free radon test kits to Derry Township residents. Based on these test results, some residents then installed radon mitigation systems (see Figure 4.3.9-3). Mifflin County has also been conducting radon tests through the Countywide Housing Rehabilitation Program's Community Development Block Grant (CDBG) (Mifflin County Planning and Development Department, 2018).

Figure 4.3.9-3: Radon mitigation system installed in a Derry Township residence (Photograph courtesy of William A. Gomes, 2019).

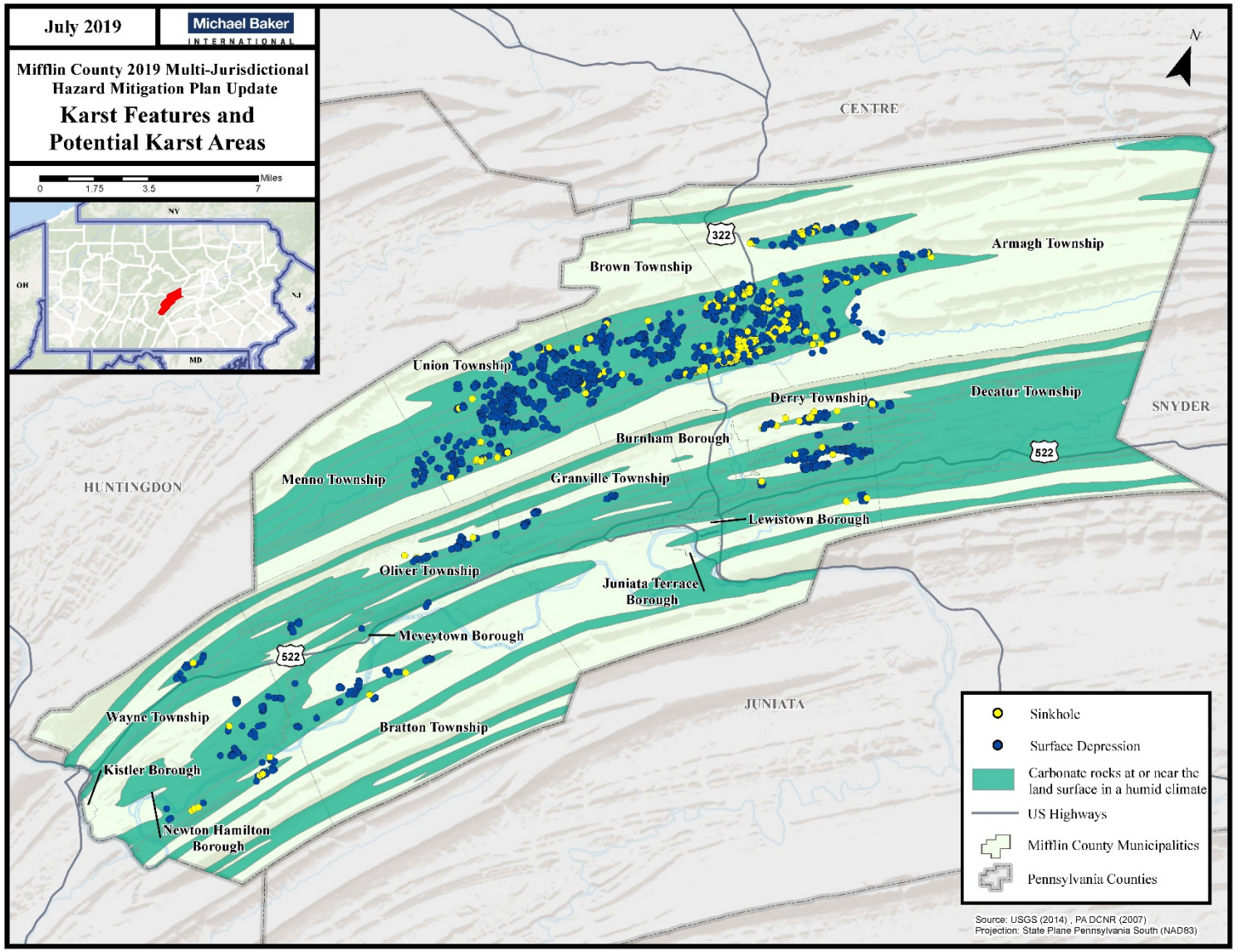
4.3.10 Subsidence, Sinkhole

4.3.10.1 Location and Extent

Subsidence is a natural geologic process that commonly occurs in areas with underlying limestone bedrock and other rock types that are soluble in water. Water passing through naturally occurring fractures dissolves these materials leaving underground voids. Eventually, overburden on top of the voids causes a collapse which can damage structures with low strain tolerances. This collapse can take place slowly over time or quickly in a single event. Karst topography describes a landscape that contains characteristic structures such as sinkholes, linear depressions, and caves. In addition to natural processes, human activity such as water, natural gas, and oil extraction can cause subsidence and sinkhole formations (Michael Baker International, 2018).

There are two common causes of subsidence in Mifflin County: (1) dissolution of carbonate rock such as limestone or dolomite and (2) mining activity. Often in the first case, subsurface solution of limestone will not result in the immediate formation of karst features. Collapse sometimes occurs only after a large amount of activity, or when a heavy burden is placed on the overlying material. Figure 4.3.10-1 depicts the distribution of general karst areas in Mifflin County.

Figure 4.3.10-1: Karst Features and Subsidence Zones in Mifflin County



Karst features are defined as pockets of limestone or dolomite bedrock located within more stable geological formations that could cause subsidence or sinkholes. The density of karst features ranges from 0 to 600 features per square mile, with wide variations in size. Fewer karst features have been mapped in existing urban areas as this is likely a result of development activities that disguise, cover, or fill existing features.

Human activity can also result in subsidence or sinkhole events. Leaking water pipes or structures that convey storm water runoff may result in subsidence as the water dissolves substantial amounts of rock over time. In some cases, construction, land grading, or earthmoving activities that cause changes in stormwater flow can trigger sinkhole events. Subsidence or sinkhole events may occur in the presence of mining activity, even in areas where bedrock is not necessarily conducive to their formation. Subsurface (i.e., underground) extraction of materials such as oil, gas, coal, metal ores (i.e., copper, iron, and zinc), clay, shale, limestone, or water may result in slow-moving or abrupt shifts in the ground surface (Michael Baker International, 2018).

Sinkholes generally develop where the cover above a mine is thin. Piggott and Eynon (1978) indicated that sinkhole development normally occurs where the interval to the ground surface is less than three to five times the thickness of the extracted seam, and the maximum interval is up to 10 times the thickness of the extracted seam (Michael Baker International, 2018).

4.3.10.2 Range of Magnitude

No two subsidence areas or sinkholes are exactly alike. Variations in size and shape, time period (i.e., gradually or abruptly), and their proximity to development ultimately determine the magnitude of damage incurred. Events could result in minor elevation changes or deep, gaping holes in the ground surface. Subsidence and sinkhole events can cause severe damage in urban environments, although gradual events can be addressed before significant damage occurs. Primarily, problems related to subsidence include the disruption of utility services and damages to private and public property, including buildings, roads, and underground infrastructure. If long-term subsidence or sinkhole formation is not recognized and mitigation measures are not implemented, fractures or the complete collapse of building foundations and roadways may result. If mitigation measures are not taken, the cost to fill in and stabilize sinkholes can be significant, even if sinkholes are limited in extent. The 1994 event in Allentown is one of the worst known subsidence events in Pennsylvania. Damage to the Corporate Plaza Building was significant, however the dollar amount is unknown (Michael Baker International, 2018).

4.3.10.3 Past Occurrence

There is a significant presence of sinkholes throughout Mifflin County, with the greatest concentration located in southern Armagh Township and northern Brown Township. A sinkhole in Armagh Township has posed issues as it is blocked with debris, which in turn causes flooding (see the *New Mitigation Action* form in Appendix C). Teresa L. King of Brown Township noted on the *Evaluation of Identified Hazards and Risk* form that two sinkholes opened in 2018. Previous subsidence and sinkhole events, as well as karst features in Mifflin County have been displayed in Table 4.3.10-1 by municipality.

Table 4.3.10-1: Karst Features in Mifflin County (PA DCNR, 2019)				
Municipality	Karst Feature Occurrences			
	Sinkhole	Surface Mine	Surface Depression	Cave
Armagh	61	6	380	23
Bratton	2	1	14	0
Brown	67	1	555	3
Decatur	2	1	12	1
Derry	17	2	181	0
Granville	0	0	27	1
Menno	0	0	25	0
Oliver	3	1	82	0
Union	16	6	556	2
Wayne	8	1	86	0
**Note that municipalities with no occurrence data were not included in this table.*				

4.3.10.4 Future Occurrence

It is highly probable for a sinkhole event to occur in Mifflin County. Historically, sinkholes have occurred mostly in Armagh or Brown Townships, however, they remain prevalent in most Mifflin County municipalities. A new mitigation action was formulated for Armagh and Brown Townships to utilize subsidence and sinkhole hazard maps to determine if additional requirements should be added to obtain building permits in sinkhole and subsidence prone areas of community. There is no accurate means for predicting sinkhole activity, therefore county response and recovery agencies must be vigilant in their ability to manage these types of incidents.

4.3.10.5 Vulnerability Assessment

Mifflin County is at a high risk for sinkhole occurrences given the number of previous collapses and the geologic makeup of the county. There have been no deaths, serious injuries or extensive property damage due to sinkholes, which presents a low risk for economic loss within the county. Table 4.3.10-2 further supports this statement, in that 27.66% of critical facilities within Mifflin County are located within one mile of a sinkhole or a surface depression, and 38.30% are located within carbonate rock geological areas.

Table 4.3.10-2: Critical Facilities Located in Karst Areas by Municipality (Mifflin County GIS Department, 2017; PA DCNR, 2019)

Municipality	Total Critical Facilities	Critical Facilities within 1 Mile of a Sinkhole/Surface Depression	% Critical Facilities Located within 1 mile of a Sinkhole/Surface Depression	Critical Facilities Located in Carbonate Rock Areas	% Critical Facilities Located in Carbonate Rock Areas
Armagh Township	7	5	71.43	3	42.86
Bratton Township	0	0	0	0	0
Brown Township	12	10	83.33	10	83.33
Burnham Borough	2	0	0	0	0
Decatur Township	3	0	0	2	66.67
Derry Township	23	1	4.35	4	17.39
Granville Township	6	0	0	1	16.67
Juniata Terrace Borough	0	0	0	0	0
Kistler Borough	1	0	0	0	0
Lewistown Borough	13	0	0	1	7.69
McVeytown Borough	1	0	0	0	0
Menno Township	10	1	1.00	7	70.00
Newton Hamilton Borough	1	0	0	0	0
Oliver Township	2	1	50.00	0	0
Union Township	12	8	66.67	8	66.67
Wayne Township	1	0	0	0	0
Total	**94**	**26**	**27.66**	**36**	**38.30**

During the Risk Assessment-Mitigation Solutions Workshop WebEx conference call in April 2019, Mayor John Wagner, Juniata Terrace Borough, suggested a mitigation action to update stormwater management systems, thereby mitigating against sinkholes, and he did subsequently provide a *New Mitigation Action* form on this topic.

4.3.11 Tornado, Windstorm

4.3.11.1 Location and Extent

A wind storm can occur during severe thunderstorms, winter storms, coastal storms, or tornadoes. Straight-line winds such as a downburst have the potential to cause wind gusts that exceed 100 miles per hour. Based on 40 years of tornado history and over 100 years of hurricane history, FEMA identifies western and central Pennsylvania as being more susceptible to higher winds than eastern Pennsylvania. A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by thunderstorm activity but can result from hurricanes or tropical storms. Cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to

rise rapidly. The damage caused by a tornado is a result of high wind velocities and wind-blown debris. According to the National Weather Service, tornado wind speeds can range between 30 to more than 300 miles per hour.

Severe thunderstorms may result in conditions favorable to the formation of numerous or long-lived tornadoes. 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 they 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. Tornadoes and windstorms can occur throughout Mifflin County, though events are usually localized.

4.3.11.2 Range of Magnitude

Although most tornadoes are a few dozen yards wide and touch down briefly, even small, short-lived tornadoes can inflict tremendous damage. Destruction ranges from minor to catastrophic depending on the intensity, size, and duration of the storm. Each year, tornadoes account for $1.1 billion in damages and cause over 80 deaths nationally. While the extent of tornado damage is usually localized, the vortex of extreme wind associated with a tornado can result in some of the most destructive forces on Earth. Rotational wind speeds can range from 100 mph to more than 250 mph. In addition, the speed of forward motion can range from 0 to 50 mph. Therefore, some estimates place the maximum velocity (combination of ground speed, wind speed, and upper winds) of tornadoes at about 300 mph. The damage caused by a tornado is a result of the high wind velocity and windblown debris, also accompanied by lightning or large hail. The most violent tornadoes have rotating winds of 250 miles per hour or more and are capable of extreme destruction and turning normally harmless objects into deadly missiles (Michael Baker International, 2018).

Damages and deaths can be especially significant when tornadoes move through populated and developed areas. The destruction caused by tornadoes ranges from minor to extreme, depending on the intensity, size, and duration of the storm. Typically, tornadoes cause the greatest damages to structures of light construction such as mobile homes. The Enhanced Fujita Scale, also known as the EF-Scale, measures tornado strength and associated damages. The EF-Scale is an update to the earlier Fujita Scale, also known as the F-Scale that was published in 1971. It classifies U.S. tornadoes into six intensity categories, as shown in Table 4.3.11-1, based upon the estimated maximum winds occurring within the wind vortex.

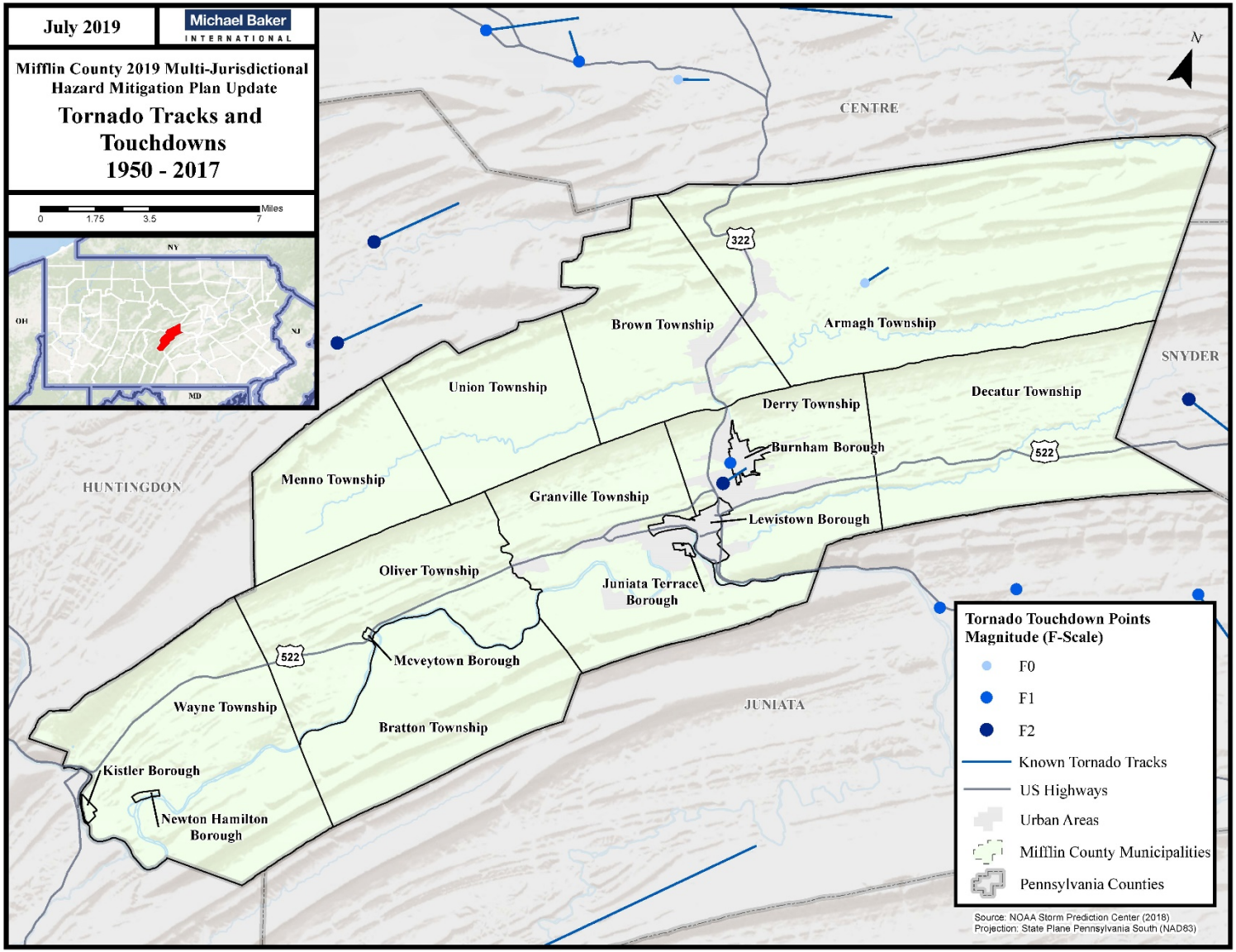
Since its implementation by the National Weather Service in 2007, the EF-Scale has become the definitive metric for estimating wind speeds within tornadoes based upon damage to buildings and structures. F-Scale categories with corresponding EF-Scale wind speeds are provided in Table 4.3.11-1, since the magnitude of previous tornado occurrences is based on the F-Scale.

Table 4.3.11-1: Enhanced Fujita Scale (EF-Scale) Categories with Associated Wind Speeds (FEMA, 2012; Michael Baker International, 2018)

EF-Scale Number	Wind Speed (Mph)	F-Scale Number	Type of Damage Possible
EF0	65–85	F0-F1	**Light damage**: Chimneys are damaged, tree branches are broken, shallow-rooted trees are toppled.
EF1	86-110	F1	**Moderate damage**: Roof surfaces severely stripped, mobile homes overturned or badly damaged, loss of exterior doors, windows and other glass broken.
EF2	111–135	F1-F2	**Considerable damage**: Roofs torn off well-constructed houses, foundations of frame homes shifted, mobile homes completely destroyed, large trees snapped or uprooted, debris becomes airborne.
EF3	136–165	F2-F3	**Severe damage**: Entire stories of well-constructed houses destroyed, severe damage to large buildings such as shopping malls, trains overturned, trees debark, heavy cars lifted off the ground and thrown, structures with weak foundations blown away some distance.
EF4	166–200	F3	**Devastating damage**: Well-constructed houses and whole frame houses completely leveled, cars thrown and blown some distance, large debris becomes airborne.
EF5	>200	F3-F6	**Extreme damage**: Strong frame houses leveled off foundations and swept away, automobile-sized missiles fly more than 100 m (300 ft), steel reinforced concrete structures badly damaged, high-rise buildings have significant structural deformation, trees completely debarked.

Figure 4.3.11-1 portrays tornado tracks and touchdowns in Mifflin County from 1950 to 2017.

Figure 4.3.11-1: Tornado Tracks and Touchdowns in Mifflin County from 1950 - 2017



The most significant windstorm event to hit Mifflin County occurred in 1952, when a Category 2 storm resulted in $25,000 in property damages and four injuries. 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 located in Mifflin County should meet design requirements in order to withstand winds up to 200 mph to prevent against the release of hazardous materials into the environment (Michael Baker International, 2018).

4.3.11.3 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. One of the deadliest tornadoes in the Commonwealth occurred during a May 1985 storm that killed six people, injured 60, and destroyed campers, mobile homes, and businesses across Lycoming, Union, and Northumberland Counties. During this storm, multiple injuries and heavy damages were reported. A list of tornado events that have occurred in Mifflin County between 1950 to 2018 are shown in Table 4.3.11-2 with an associated Fujita Tornado Scale magnitude.

Figure 4.3.11-2: Tornado event in Granville Township on April 19th, 2019 (left) and damage near Minehart Reservoir in Granville Township following a tornado touchdown (right) (Photographs courtesy of Joe Murgo, April 19, 2019 and Lisa Harris, incident date not specified).

Table 4.3.11-2: Tornado Events in Mifflin County: 1950 – 2019 (NCEI, 2019)				
Location	**Date**	**Magnitude**	**Estimated Property Damage ($)**	**Injury**
Lewistown	4/19/2019	F2	500,000	0
Burnham	11/8/1996	F1	40,000	0
One mile west of Granville	7/21/1983	F1	250,000	0
Mifflin County	3/15/1954	F0	4,000	0
Mifflin County	7/23/1952	F2	25,000	4

No deaths have resulted due to a tornado in Mifflin County. In the last sixteen years, only six deaths have occurred due to tornadoes state wide. A list of high-wind events that have occurred since 1950 is shown in Table 4.3.11-3. High wind events may be the result of thunderstorms, hurricanes, tropical storms, winter storms, or nor'easters.

Table 4.3.11-3: High Wind Events in Mifflin County: 1950 – 2018 (NCEI, 2018)			
Date	**Estimated Wind Speed (Knots)**	**Injuries**	**Estimated Property Damage ($)**
4/4/2018	52	0	0
4/3/2016	52	2	25,000
10/29/2012	50	0	0
2/12/2009	50	0	10,000
12/1/2006	45	0	0
12/1/2004	60	0	0
11/13/2003	60	0	0
2/23/2003	60	0	0
3/9/2002	50	0	0
2/10/2001	-	0	5,550
12/12/2000	-	0	13,900
4/9/2000	-	0	15,000
1/10/2000	50	0	0
9/29/1999	60	0	0

4.3.11.4 Future Occurrence

According to the National Weather Service, the Commonwealth of Pennsylvania has an annual average of ten tornadoes with two related deaths. While the chance of being hit by a tornado is small, the damage that results when the tornado arrives is devastating. An EF4 tornado, with a 0.019 percent annual probability of occurring, 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. Based on historical events between 1950 and 1998, there are three zones in Pennsylvania that experience less than one, one to five, and six to fifteen EF3, EF4, and EF5 tornadoes per 3,700 square miles. Mifflin County is expected to have less than one tornado annually. Using the Risk Factor Methodology in Table 4.4.2-2, participants in this Plan's development have indicated that they feel a tornado event is *minimal.*

4.3.11.5 Vulnerability Assessment

While the frequency of windstorms and minor tornadoes is expected to remain relatively constant, vulnerability increases in more densely developed areas. Since high-wind events may affect the entire county, it is important to identify specific critical facilities and assets that are most vulnerable to the hazard. Due to their lightweight and often unanchored design, mobile homes and commercial trailers are extremely vulnerable to high winds and will generally sustain the most damage. While the county does not assign a structure type to its addressable structure data, the county's parcel data indicates the number and location of mobile home parcels. While there may be multiple mobile homes on a parcel described as "Mobile Home," this gives a general indication of the number and location of mobile homes. Table 4.3.11-4 lists the number of mobile home parcels per municipality for all jurisdictions with mobile home parcels. The parcel data indicates that all municipalities expect Juniata Terrace Borough have mobile home parcels.

Tornados typically have limited secondary effects. The most common is power failure, as severe wind conditions dismantle power sources. Significant structural damage to property, facilities, or infrastructure could cause small parts of the population to be temporarily displaced. Hazardous material spills can occur if a tornado damages a holding tank or causes a vehicular accident. Limited disruptions of critical emergency services may be experienced by non-affected portions of the county. Economic and financial impact can range from nominal to major, based on the severity of damage.

Table 4.3.11-4: Mobile Home Parcels per Jurisdiction (Mifflin County GIS Department, 2017)	
Municipality	**Number of Mobile Home Parcels**
Armagh Township	126
Bratton Township	68
Brown Township	32
Burnham Borough	21
Decatur Township	168
Derry Township	148
Granville Township	166
Juniata Terrace Borough	0
Kistler Borough	20
Lewistown Borough	24
McVeytown Borough	4
Menno Township	9
Newton Hamilton Borough	7
Oliver Township	83
Union Township	21
Wayne Township	171
Total	**1,068**

4.3.12 Wildfire

4.3.12.1 Location and Extent

A wildfire is a raging, uncontrolled fire that spreads rapidly 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. Wildfires can occur at any time of the year, but mostly occur during long, dry hot spells. Any small fire in a wooded area, 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 fields, grass, brush, and forests. Ninety-eight percent of wildfires in Pennsylvania are a direct result of people, often caused by debris burns (PA DCNR – BOF, 2019). Wildfires take place in less developed or completely undeveloped areas, spreading rapidly through vegetative fuels.

Woodlands cover more than 65 percent of Mifflin County, approximately 173,970 acres of forest land, which make it highly vulnerable to wildfires. Forest land is most heavily concentrated along the county's mountain ranges and includes Reeds Gap State Park; three state forests, Tuscarora State Forest, Bald Eagle State Forest, Rothrock State Forest; State Game Lands, and non-public lands. The county's public lands alone comprise of 68,648 acres or 39.5 percent of the county's total forest land (Mifflin County Planning Commission, 2014).

4.3.12.2 Range of Magnitude

Wildfire events can range from small fires that can be managed by local firefighters to large fires impacting several 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. It often destroys property, valuable timber, forage, and recreational and scenic values (Michael Baker International, 2018). In addition to the risk wildfires pose to the 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. 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 (Michael Baker International, 2018).

The impact of a severe wildfire can be devastating. The most significant environmental impact is the potential for severe erosion, silting of stream beds and reservoirs, and flooding due to ground cover loss following a fire event. Wildfires can also have a positive environmental impact, in that they burn dead trees, leaves, and grass to allow more open spaces for new vegetation to grow and receive sunlight. Another positive effect is that a wildfire stimulates the growth of new shoots on trees and shrubs and can open pine cones and other seed pods that need high heat exposure to germinate (Michael Baker International, 2018).

4.3.12.3 Past Occurrence

Table 4.3.12-1 lists wildfire events reported in Mifflin County between 2002 and 2015.

Table 4.3.12-1: Wildfire Events Reported in Mifflin County: 2002 – 2015 (U.S. Forest Service, 2017)		
Year of Wildfire	**Number of Fires**	**Fire Size (Acres)**
2015	7	8.75
2014	7	1.2
2013	6	3.55
2012	2	45
2011	1	0.1
2010	7	12.34
2009	2	1.1
2008	-	-
2007	4	4.35
2006	8	8.3
2005	4	4.2
2004	1	2.5
2003	4	41.6
2002	1	7.5

Figure 4.3.12-1: Wildfire in Granville Township on April 23rd, 2018 (Photograph courtesy of Granville Fire Company Facebook Page, April 23, 2018).

4.3.12.4 Future Occurrence

Previous events indicate that wildfires will continue to occur annually. Weather conditions like drought can increase the likelihood of wildfires occurring. Any fire, without the quick response or attention of firefighters, forestry personnel, or visitors to the forest, has the potential to become a wildfire. Mifflin County is *at high risk* in any given year as defined by the Risk Factor Methodology (Section 4.4.2-2). However, the likelihood of one of those fires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response.

4.3.12.5 Vulnerability Assessment

Two municipal officials raised concerns about wildfire risk during the Risk Assessment-Mitigation Solutions Workshop WebEx conference calls in March-April 2019. John Allison, who works in Rothrock State Forest, cited his biggest concern for Menno Township as wildfire, as the Emerald Ash Borer and other pests result in a lot of dead trees in the forest. Mayor John Wagner, Juniata Terrace Borough also indicated concerns about wildfire, as there are many downed trees in the Borough. In each instance, conversation ensued about how these concerns could be translated into *New Mitigation Action* forms, but forms on these topics were not submitted. A new mitigation action was formulated by the consultant to clear brush and downed trees as appropriate for wildfire mitigation in Menno Township and Juniata Terrace Borough. Additionally, Daniel Taptich, Engineer for Decatur Township, submitted a

New Mitigation Action form to map, assess, and plan responses to address wildfires and to educate residents on fire safety construction and techniques (see Appendix C).

Figure 4.3.12-2 portrays wildfire hazard in Mifflin County in relation to Pennsylvania. Figure 4.3.12-3 portrays wildfire occurrences in Mifflin County from 1992 to 2015.

Figure 4.3.12-2: Wildfire Hazard in Mifflin County in Relation to Pennsylvania

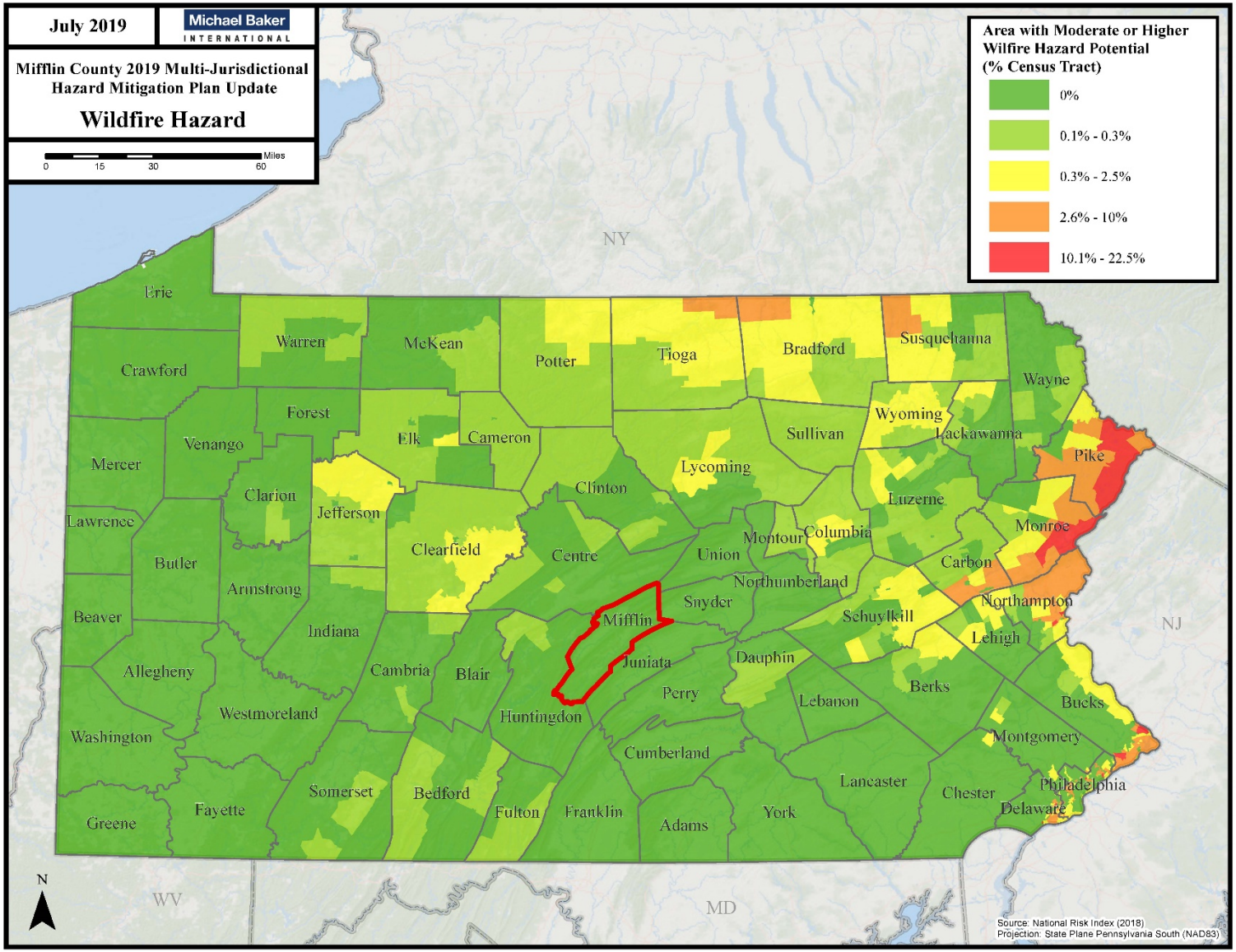
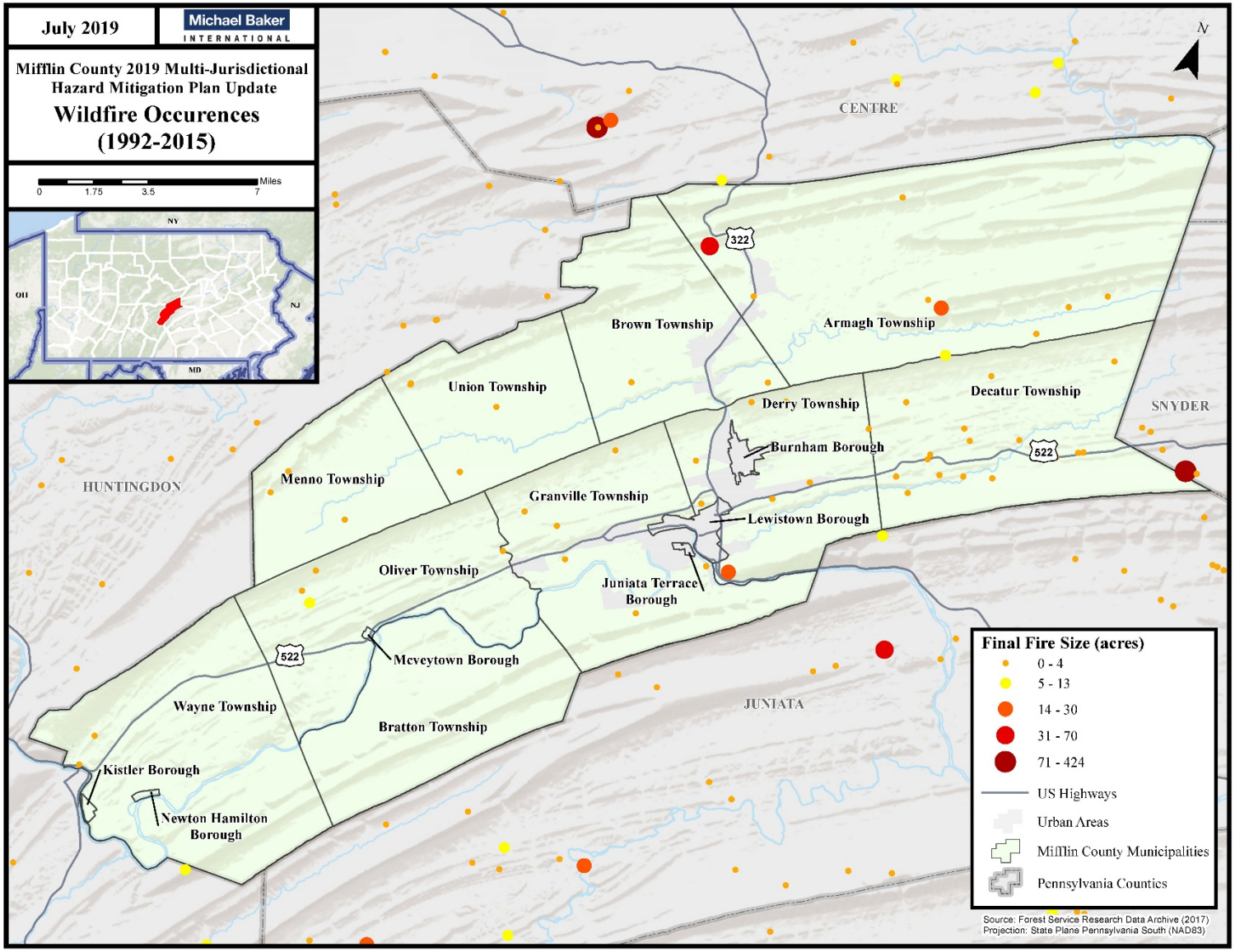


Figure 4.3.12-3: Wildfire Occurrences in Mifflin County from 1992-2015



4.3.13 Winter Storm

4.3.13.1 Location and Extent

Winter storms are regional events. Every county in the Commonwealth is subject to severe winter storms. Mifflin County generally receives the same amount of snowfall throughout each municipality. On average, the county receives 20.1 inches of snow annually, which is tracked by the county's snowfall tracking station located in Lewistown Borough.

4.3.13.2 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 either following the jet stream or developing as extra-tropical cyclonic weather systems over the Atlantic Ocean called nor'easters. Due to their regular occurrence, these storms are considered hazards only when they result in damage to specific structures or cause disruption to traffic, communications, electric power, or other utilities (Michael Baker International, 2018).

A winter storm can adversely affect roadways, utilities, and business activities, and can cause frostbite or potential 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 12-hour period.
- **Sleet Storm:** Significant accumulations of solid pellets that form from the freezing of raindrops or partially melted snowflakes, causing slippery surfaces that pose 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 lasting 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 lasting over an extended period.

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 oil heating supplies. Environmental impacts often include damage to shrubbery and trees due to heavy snow loading, ice buildup, and/or high winds that can break limbs or even bring down large trees. Gradual melting of snow and ice provide excellent sources for groundwater recharge. However, high temperatures following a heavy snowfall can cause rapid surface water runoff and severe flooding.

Three Presidential Disaster and Emergency Declarations and nine Gubernatorial Proclamations of Emergency have occurred in Mifflin County in response to winter storm hazards (See Table 4.2.1-1 and Table 4.2.1-2).

The worst winter storm on record occurred on March 12-13, 1993. This blizzard, often called the *Storm of the Century*, stretched from Canada to the Gulf of Mexico, but hit the hardest in the Eastern United States, including all of Pennsylvania. This storm caused widespread blackout conditions, with snowfall totals ranging from twelve inches in Philadelphia, to 20 inches in Harrisburg and Scranton, and 24 inches in the Pittsburgh area. This event garnered a Presidential Emergency Declaration, and the overall damage estimate for all states was $5.5 billion (Michael Baker International, 2018).

4.3.13.3 Past Occurrence

Table 4.3.13-1 lists significant snowstorms in Mifflin County in the last 18 years. The worst day of snowfall on record for Mifflin County occurred on March 29th, 1942, where a total of 31 inches fell (NCEI, 2018).

Table 4.3.13-1: Winter Storm Occurrences in Mifflin County: 2000 – 2018 (NCEI, 2018)

Date	Type	Inches of Snowfall/Ice
11/15/2018	Heavy Snow	7-10
3/20/2018	Heavy Snow	8-10
3/13/2017	Ice/Heavy Snow	12-15
2/08/2017	Heavy Snow/Blizzard/Avalanche	6-8
1/22/2016	Heavy Snow	12-20
2/04/2014	Ice/Winter Storm	2-4
12/14/2013	Winter Storm	4-8
02/01/2011	Winter Storm/Sleet/Ice	0.5-1
02/09/2010	Heavy Snow	6-10
02/05/2010	Heavy Snow	10-15
12/19/2008	Winter Storm/Sleet/Ice	1
02/01/2008	Ice Storm	0.25
02/13/2007	Heavy Snow	9
12/16/2005	Heavy Snow	-
01/05/2005	Ice Storm	-
12/13/2000	Winter Storm	-
02/18/2000	Winter Storm	-

Figure 4.3.13-1: Winter storm caused vehicular accident on March 21st, 2018 in Granville Township (Photograph courtesy of Granville Fire Company Facebook Page, March 21, 2018).

In the winter of 1993-1994, the Commonwealth was hit by a series of protracted winter storms. The severity and nature of these storms, combined with accompanying record-breaking frigid temperatures, posed a major threat to the lives, safety, and well-being of Commonwealth residents and caused major disruptions to the activities of schools, businesses, hospitals, and nursing homes. One of these devastating winter storms occurred in early January 1994, with record snowfall depths in many areas of the Commonwealth, strong winds, sleet, and freezing rains. Numerous storm-related power outages were reported and as many as 600,000 residents were without electricity, in some cases for several days at a time. A ravaging ice storm following the snow closed major arterial roads and downed trees and power lines. Utility crews from a five-state area were called to assist in power restoration repairs. Officials from PPL Corporation stated that this was the worst winter storm in the history of the company, with related damage-repair costs exceeding $5,000,000.

Serious power supply shortages continued through mid-January because of record cold temperatures in many places, causing sporadic power generation outages across the Commonwealth. The entire Pennsylvania-New Jersey-Maryland grid and its partners in the District of Columbia, New York, and Virginia experienced 15- to 30-minute rolling blackouts, threatening the lives of people and the safety of buildings. Power and fuel shortages affecting Pennsylvania and the East Coast power grid system required the

governor to recommend power conservation measures be taken by all commercial, residential, and industrial power consumers.

4.3.13.4 Future Occurrence

Given the winter storm history in Mifflin County, it is expected that winter storm events will continue to occur in the future at varying levels of impact. This puts people and property within the county at risk to this hazard. Furthermore, the probability of future winter storm occurrences is highly likely according to the Risk Factor Methodology (See Table 4.4.2-2).

4.3.13.5 Vulnerability Assessment

Based on previous occurrence data, all communities in Mifflin County are equally vulnerable to the direct impacts of winter storms. Residents living in rural areas of the county may be more susceptible to isolation caused by winter storms, especially when emergency medical assistance is required. These areas have heavily wooded, private developments that make emergency response extremely difficult when roadways are blocked by downed trees and wires. Due to the frequency of winter storms, strategies have been developed to respond to these events. Snow removal and utility repair equipment is available to respond to typical winter events; however, the County does not have snow removal parking restrictions. This can make it more difficult to efficiently remove snow from roadways.

The use of auxiliary heat and power supplies such as wood-burning stoves, kerosene heaters, and gasoline-powered generators reduces the vulnerability of humans to extreme cold temperatures commonly associated with winter storms. People residing in structures lacking adequate equipment to protect against cold temperatures or significant snow and ice are more vulnerable to winter storm events. Even for communities that are prepared to respond to winter storms, severe events involving snow accumulations that exceed six or more inches in a 12-hour period can cause numerous traffic accidents, cause motorists to be stranded due to snow drifts, interrupt power supply and communications, and cause failure of inadequately designed and/or maintained roof systems.

Mifflin County has many structurally old buildings. The 2010 Census reported that about 53 percent of the housing units in Mifflin County were built before 1960. Only 12.4 percent of the housing units in Mifflin County were completed after 1990. Municipalities with concentrations of units completed before 1950 include Juniata Terrace Borough (93.5%), McVeytown Borough (72.4%), Newton Hamilton (68.1%), Lewistown Borough (67.8%), Burnham Borough (57.4%), and Bratton Township (50.2%). Municipalities with older building structures may be more vulnerable to snowstorms because older roofs may not be able to handle a significant snow load. A new mitigation action was formulated for Juniata Terrace Borough to determine if historic public buildings would benefit from mitigation to handle snow loads and apply for grants as needed.

HUMAN-MADE HAZARDS

4.3.14 Building or Structure Collapse

4.3.14.1 Location and Extent

Building and structure collapse occurs when the structural integrity of the structure has been compromised, heavily impacted by both human and natural hazards. Other causes of building and other engineered structure collapse may be due to how old the building is, if the building was built to standard codes, or structures that have already been weakened, making them even more susceptible to other hazards. Building codes are developed by the International Code Council (ICC) alongside FEMA and other federal, state, local, and private authorities. These building codes specify legal designs and construction requirements for buildings so that they have structural integrity, fire protection, and adequate construction materials. Building codes also provide a consistent standard for all buildings and have several benefits. These include saving lives during potential natural and human made hazards, protecting investments, helping residents save on insurance, and increasing disaster resilience (FEMA, 2014).

Compliance with new building codes can significantly lower a building's vulnerability to structure collapse. In Mifflin County, 48 to 57 percent of buildings were built before 1960, and 30 buildings are categorized as historical buildings, as shown in Table 4.3.14-1 (Michael Baker International, 2018). Historical buildings in Mifflin County listed in the National Register of Historic Places are seen in Table 4.3.14-2. Other common historical structures include bridges, which serve to connect roadways to communities in the county. Many of these bridges are structurally old and need repairs. PennDOT (2019) determined that Pennsylvania has more than 25,000 state-owned bridges, the third largest number in the nation, that are an average of 50 years old.

Table 4.3.14-1: Historic Buildings, Structures, and Districts in Mifflin County: 2018 (PHMC, June 14, 2018)

	Eligible	Listed	National Historic Landmark
	Count		
Building	23	7	0
Structure	2	2	0
District/Site	6	0	0

Table 4.3.14-2: Historical Buildings Listed in National Register of Historic Places in Mifflin County (PHMC, June 14, 2018)

Property Name	Address
Pennsylvania Main Line Canal, Juniata Division, Canal Section	1.5 mile section of canal between PA RR Main Line and Juniata River, Granville Township
Embassy Theatre	6 S Main St, Lewistown
Lewistown Armory	1101 Walnut St, Lewistown
McCoy House	17 N. Main St, Lewistown
Mifflin County Courthouse	1 W Market Street, Lewistown
Montgomery Ward Building	3-7 W Market St, Lewistown

Table 4.3.14-2: Historical Buildings Listed in National Register of Historic Places in Mifflin County (PHMC, June 14, 2018)	
Property Name	**Address**
Old Hoopes School	NE of Lewistown, Derry Township
Old Stone Arch Bridge	Over Jack's Creek, Derry Township
Wollner Building	16 W Market St, Lewistown

4.3.14.2 Range of Magnitude

Building and structure collapse has different effects based on the cause of the collapse and the type of structure. A likely result of a building collapsing on itself will be a debris field with a small but dense footprint, whereas a building collapsing outward, will have widely scattered debris (Michael Baker International, 2018). Building and structure collapse can cause injury and potential loss of life if the structure was occupied, damage of property, and large of amounts of debris that can affect nearby communities. Mifflin County has a total of 184 bridges on its state route system, with 11 deemed to be in poor condition (See Table 4.3.14-3). Mifflin County has a total of 50 bridges on its local route system. Of those bridges, one was closed by PennDOT in April of 2019 and 12 have been deemed to be in poor condition (See Table 4.3.14-4) (PennDOT, 2019). The condition of bridges has worsened since the 2014 transportation analysis in the Mifflin County Comprehensive Plan, where it was determined that although the deficiency rate in state bridges was higher than the state average, no bridge closures were necessary. There were also no closed locally owned bridges (Mifflin County Planning Commission, 2014). With one closure already in effect, bridge collapse risk could be increasingly more prominent within the county.

Table 4.3.14-3: State Bridges in Poor Condition in Mifflin County (PennDOT, 2019)				
Location/Structure Name	**Feature Carried**	**Feature Intersected**	**Municipality**	**Posting Status**
3 Miles NW of Newton Hamilton Borough	State Route 22 – U.S. Route 22	Tributary of Long Hollow Run	Wayne Township	Open with no restrictions
4 Miles NW of Newton Hamilton Borough	State Route 22 – U.S. Route 22	Tributary of Long Hollow Run	Wayne Township	Open with no restrictions
2 Miles SW of Atkinson Mills	State Route 22 – U.S. Route 22	Tributary of Long Hollow Run	Wayne Township	Open with no restrictions
Lewistown Borough	State Route 3006	State Route 8005	Lewistown Borough	Open with no restrictions
Lewistown Borough	State Route 103 – PA 103	State Route 8005	Lewistown Borough	Open with no restrictions
2 Miles South of Lewistown	State Route 103 – PA 103	Tributary of Juniata River	Granville Township	Open with no restrictions
Milroy	On TSR 187	Laurel Run	Armagh Township	Open with no restrictions
Lewistown	State Route 2004	State Route 22 – PA 22	Derry Township	Posted for load

Table 4.3.14-3: State Bridges in Poor Condition in Mifflin County (PennDOT, 2019)

Location/Structure Name	Feature Carried	Feature Intersected	Municipality	Posting Status
2 Miles NE of Lewistown	State Route 2004	Jacks Creek	Derry Township	Open with no restrictions
2 Miles North East of Wagner	State Route 2008	Tributary of Jacks Creek	Decatur Township	Open with no restrictions
Lewistown Borough	State Route 3001	Kishacoquillas Creek	Lewistown Borough	Open with no restrictions

Table 4.3.14-4: Local Bridges in Poor Condition in Mifflin County (PennDOT, 2019)				
Location/Structure Name	**Feature Carried**	**Feature Intersected**	**Municipality**	**Posting Status**
Intersection of T – 464 and State Route 1012	T-464	Laurel Creek	Armagh Township	Posted for load
1,300 Feet W of intersection of T439 – LR29	T-439	Kishacoquillas Creek	Brown Township	Open with no restrictions
4,500 Feet South of the intersection T457 – LR192	T-458 Taylor Mill	Kishacoquillas Creek	Brown Township	Open with no restrictions
350 Feet East of T707	T-383 Snook Road	Belltown Run	Decatur Township	Open with no restrictions
100 Feet West of T-450	T-391 Ertley Road	Belltown Run	Decatur Township	Posted for load
900 Feet North of T385	T-454 Hoffman Road	Jacks Creek	Decatur Township	Posted for load
500 Feet East of the intersection of LR29 – T-420	T-420	Kishacoquillas Creek	Derry Township	Bridge closed to all traffic
900 Feet South of State Route 4013	T-783	Buck Run	Derry Township	Posted for load
0.4 Miles North of State Route 0022	T-710	Strodes Run	Granville Township	Open with no restrictions
West end of McVeytown	T-803	Musser Run	Oliver Township	Open with no restrictions
2,800 Feet North of T-437	T-350	Kishacoquillas Creek	Union Township	Posted for load
0.8 Miles South of State Route 0655	T-368 Spring Run	Kishacoquillas Creek	Union Township	Open with no restrictions

4.3.14.3 Past Occurrence

Currently, no comprehensive list of building and structure collapse events is available for Pennsylvania. However, various news sources report structure collapse events throughout Mifflin County. In 2014, the garage roof at the Reedsville Volunteer Fire Company collapsed. It was determined that the collapse was due to a support wall failing when a compartment door was opened accidentally (Poindexter, 2016) (See Figure 4.3.14-1). As of 2019, local bridge intersecting LR29 and T-420 over Kishacoquillas Creek in Mifflin County is closed to all traffic due to serious superstructure condition and poor substructure condition (See Table 4.3.14-4) (PennDOT, 2019). Phil Lucas (personal communication, July 18, 2019), Director of the Mifflin County Office of Public Safety, reported that there have been several instances of significant roof and small building damage (incident specifics not provided). He also reported that a mobile home rolled over due to an undetermined cause.

Figure 4.3.14-1: Roof collapse at the Reedsville Volunteer Fire Company on March 17th, 2014 (Photographs courtesy of Chris Gardner (top) and Eric Moist (bottom), March 18, 2014).

4.3.14.4 Future Occurrence

Structure and building collapse may occur due to deterioration and wear of structural integrity, however, external factors may also impact structure collapse events. As mentioned, Pennsylvania is the third-highest ranked state in terms of total bridge structures, with 234 of those structures located in Mifflin County, and several with compromised structural integrity (Michael Baker International, 2018). As a result, Mifflin County will experience increased prevention and mitigation efforts for structure collapse in the coming years. Note that this new hazard profile was not ranked in Table 4.4.2-2 for the 2019 update.

Although there is no comprehensive data collection of structural collapses in Mifflin County, it can be determined that the frequency of building collapses in the county could grow without appropriate maintenance and enforcement of building codes. The 2017 United States Census determined that Mifflin County has 52 housing units for rent that are not occupied, 120 housing units sold but not occupied, and 878 other buildings that are vacant from a five-year period of 2013 to 2017 (U.S. Census Bureau, 2017). These vacant structures may have an increased vulnerability to building collapse due to not receiving routine inspections and maintenance. Natural hazards can also increase structure collapse hazards in Mifflin County. These include fires, winter storms, and tropical storms. These hazards create conditions suitable for structure collapse (Michael Baker International, 2018). Information on the future occurrences of such natural events can be found in their respective hazard profiles.

4.3.14.5 Vulnerability Assessment

The vulnerability of buildings and structures to collapse in Mifflin County is dependent upon age, condition, and vulnerability to other natural hazards. Keith Mernin, Chairman of the Union Township Board of Supervisors, submitted a *New Mitigation Action* form in 2019 citing concern that aging smoke stacks and tanks at the former Fairmont facility could collapse (See Appendix C). With many buildings in Mifflin County built before 1960, and many structurally deficient bridges, the county is at an increased risk to building and structure collapses. Historic buildings and structures that are within the floodplain are of special concern and are at an increased vulnerability to flooding. GIS data for historic structures in Mifflin County was obtained from the Pennsylvania Historical and Museum Commission (PHMC) on June 14th, 2018. All listed, eligible, and National Historical Landmark (NHL) structures were considered to determine which structures were within the floodplain. It is important to note that there are no NHL properties in Mifflin County as of June 14th, 2018. There is a total of 11 historical structures within the floodplain in Mifflin County, with 9 eligible structures and 2 listed structures (Table 4.3.14-5). The figures below demonstrate detailed mapping of all structures within the floodplain.

Table 4.3.14-5: Historical Structures within the SFHA (PHMC, June 14, 2018)

Structure Type	Historical Property Type	Eligible, Listed, or NHL
Structure	Pennsylvania Main Line Canal, Juniata Division Canal Section	Listed
Structure	Old Stone Arch Bridge	Listed
District	Belleville Historic District	Eligible
Structure	Pennsylvania Railroad: Station (Lewistown Junction)	Eligible
Building	Pleasant View Dairy	Eligible
District	Newton Hamilton Historic District	Eligible
Building	Wharton, G. & H., Farmstead	Eligible
Structure	Honey Brook Bridge	Eligible
Building	American Viscose	Eligible
Structure	Pennsylvania Railroad: Main Line (Harrisburg to Pittsburgh)	Eligible
Building	Alexander, S., Property	Eligible

Figure 4.3.14-2: Alexander Property Eligible Historical Structure and Belleville District Eligible Historical Structure in SFHA

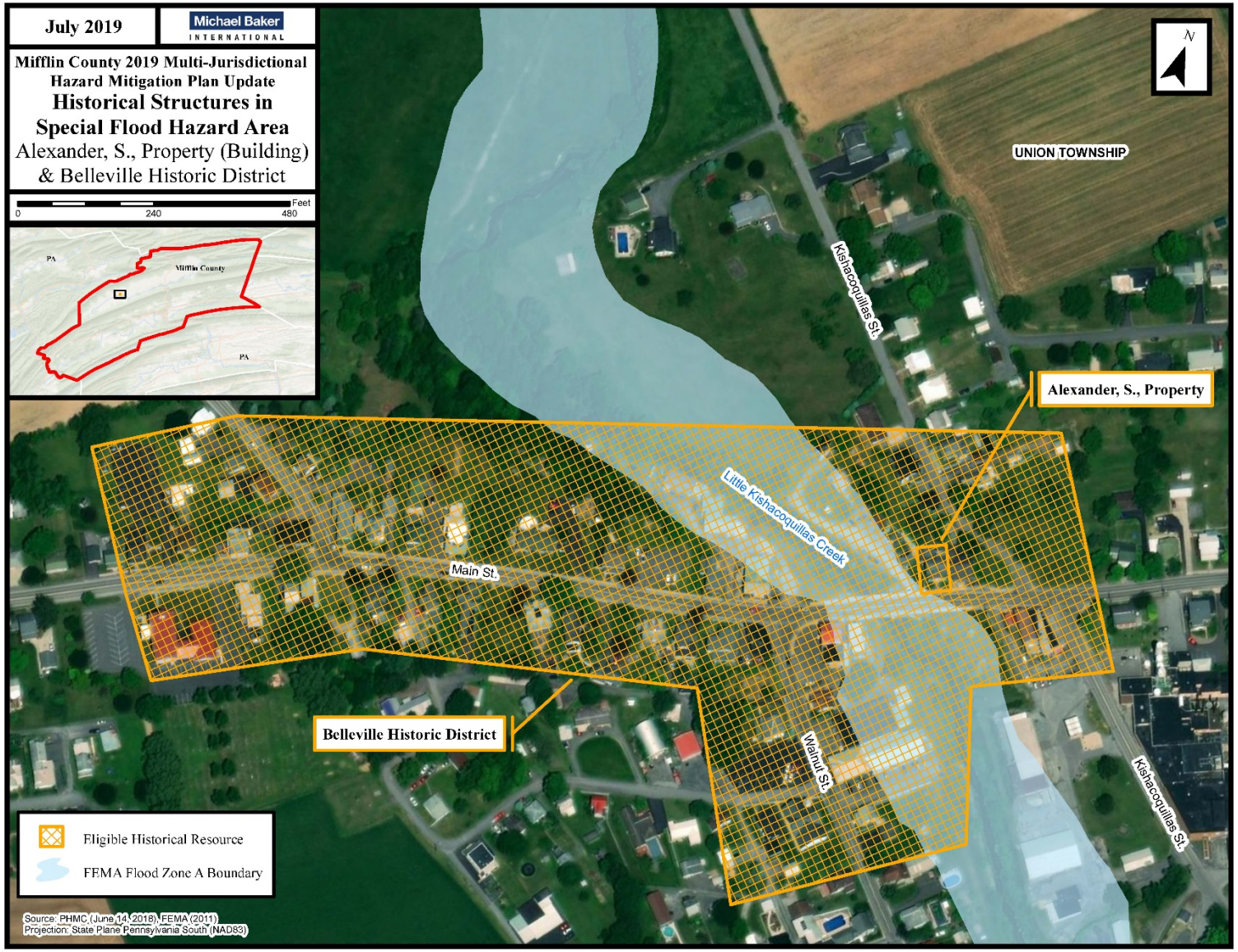


Figure 4.3.14-3: American Viscose Eligible Historical Structure in SFHA

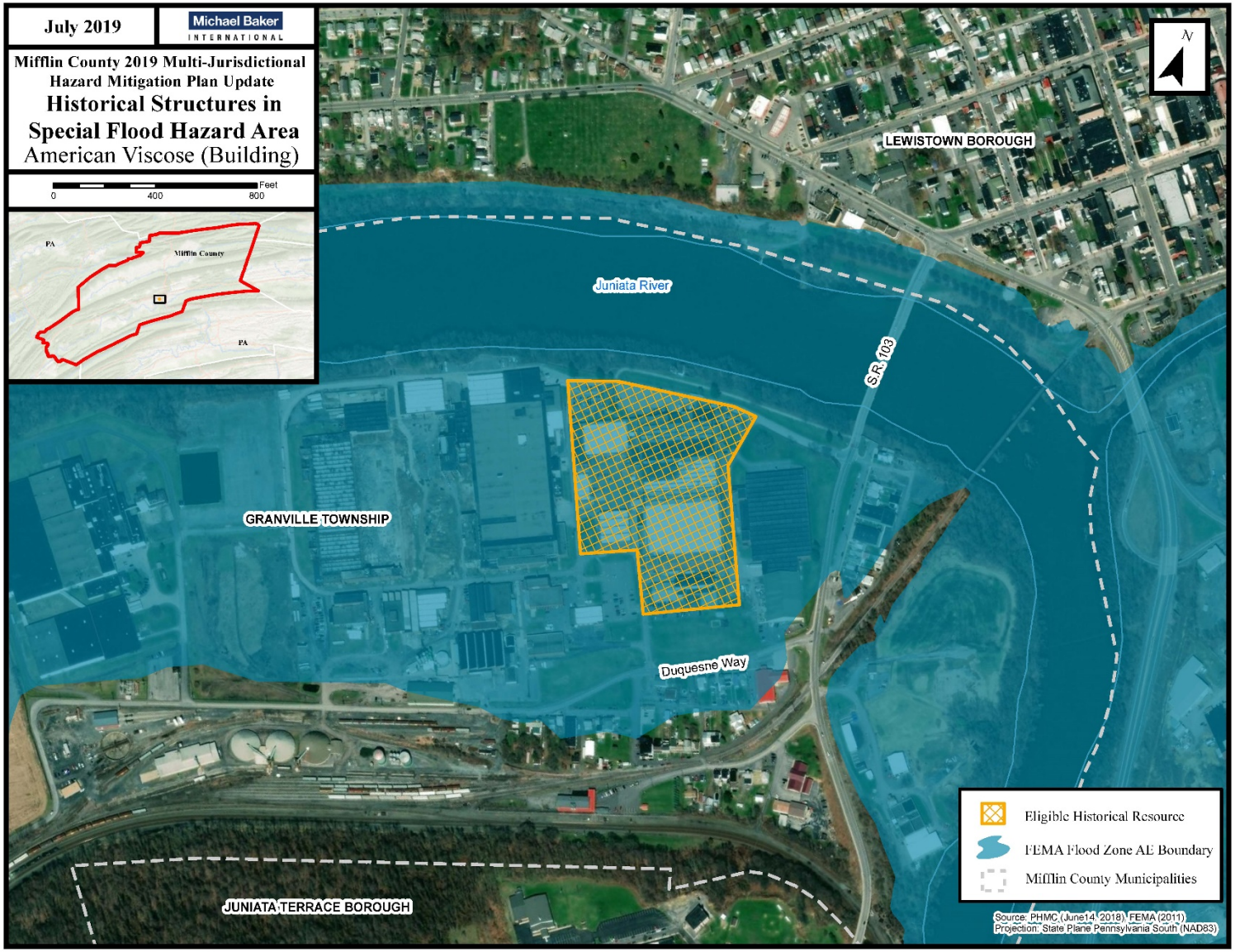


Figure 4.3.14-4: Honey Brook Eligible Historical Structure in SFHA

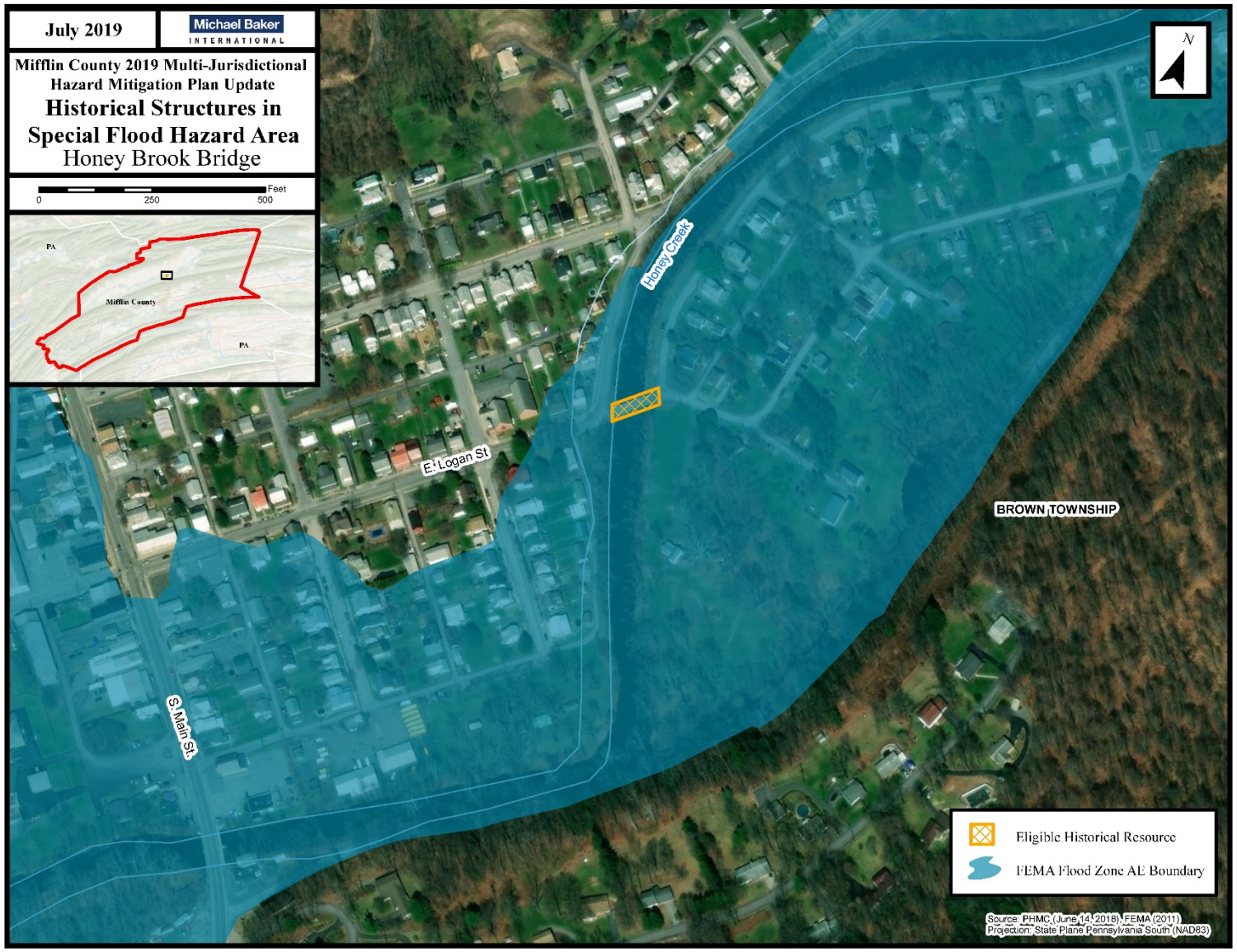


Figure 4.3.14-5: Newton Hamilton District Eligible Historical Property and Wharton Farmstead Eligible Historical Structure in SFHA

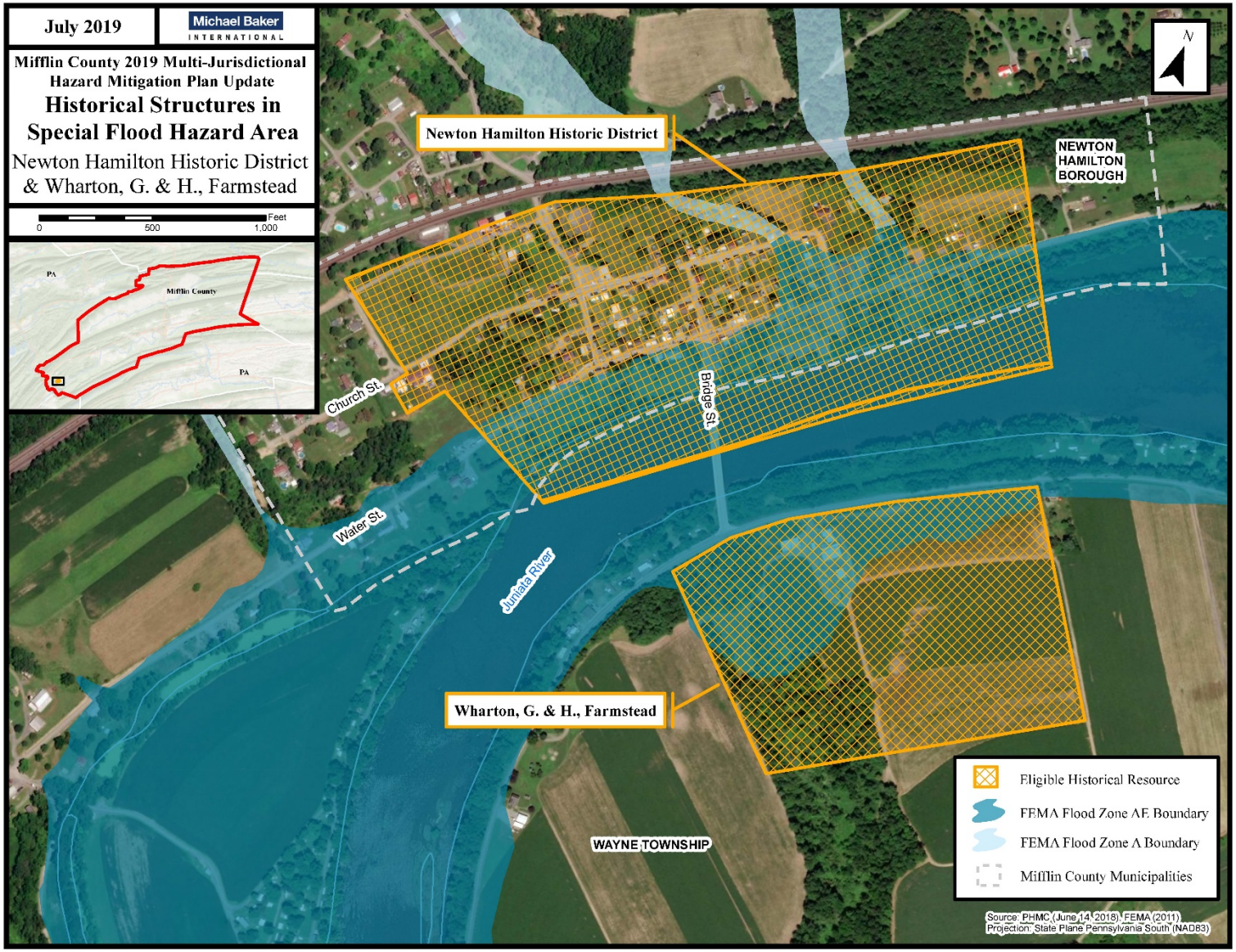


Figure 4.3.14-6: Pennsylvania Railroad Station, Lewistown Junction Eligible Historical Structure in SFHA

Figure 4.3.14-7: Pennsylvania Railroad Main Line from Harrisburg to Pittsburgh Eligible Historical Structure in SFHA

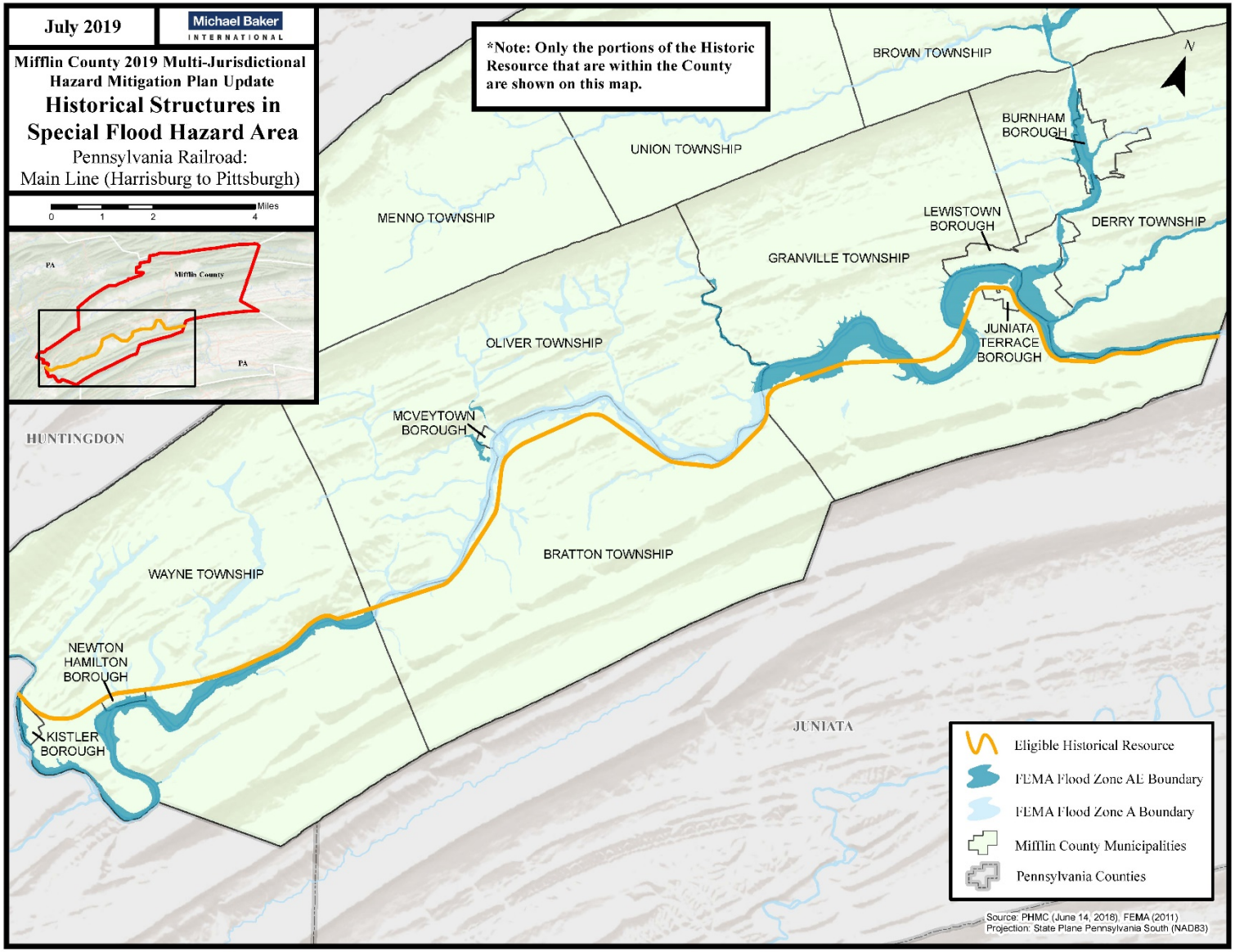


Figure 4.3.14-8: Pleasant View Dairy Eligible Historical Structure in SFHA

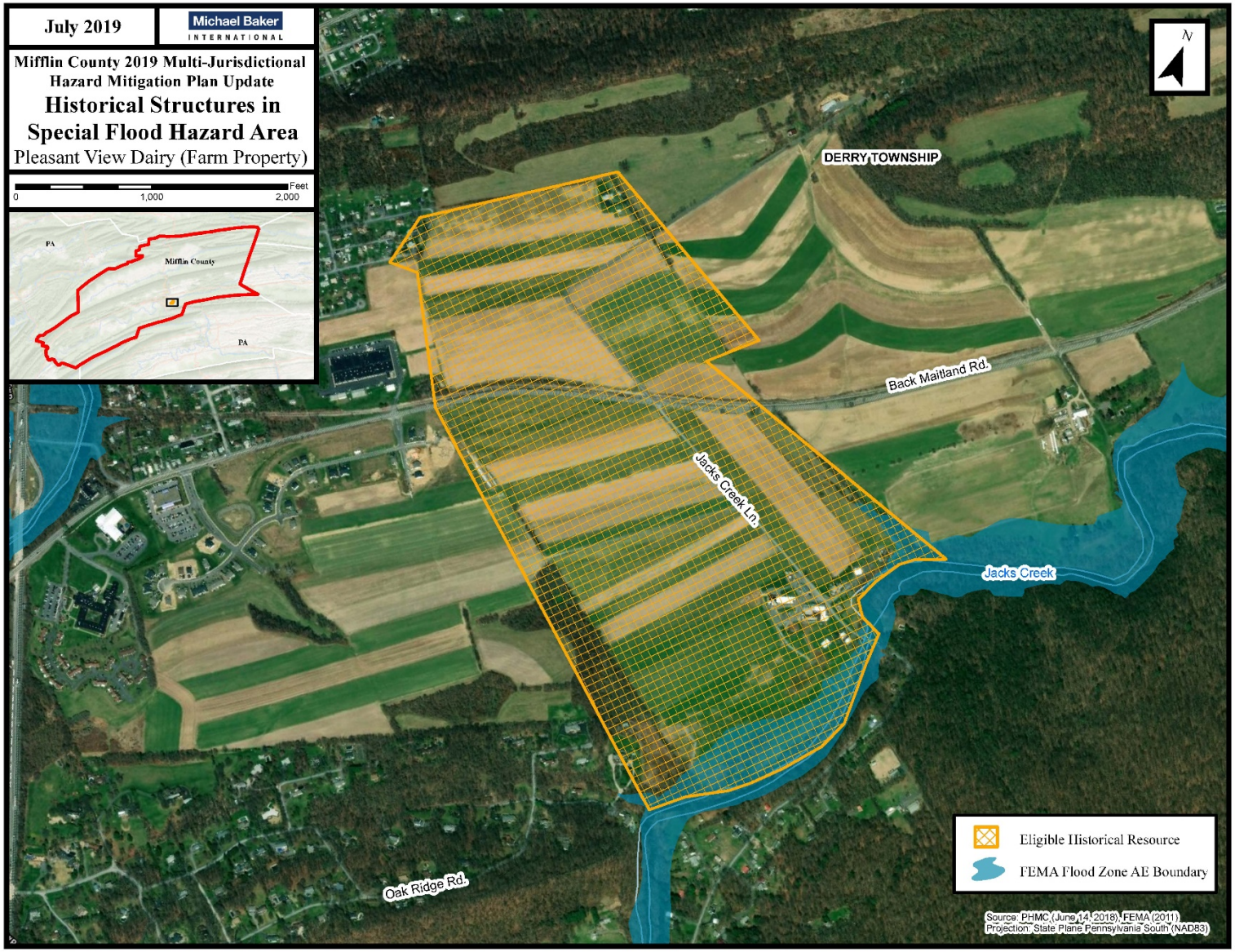


Figure 4.3.14-9: Old Stone Arch Bridge Listed Historical Structure in SFHA

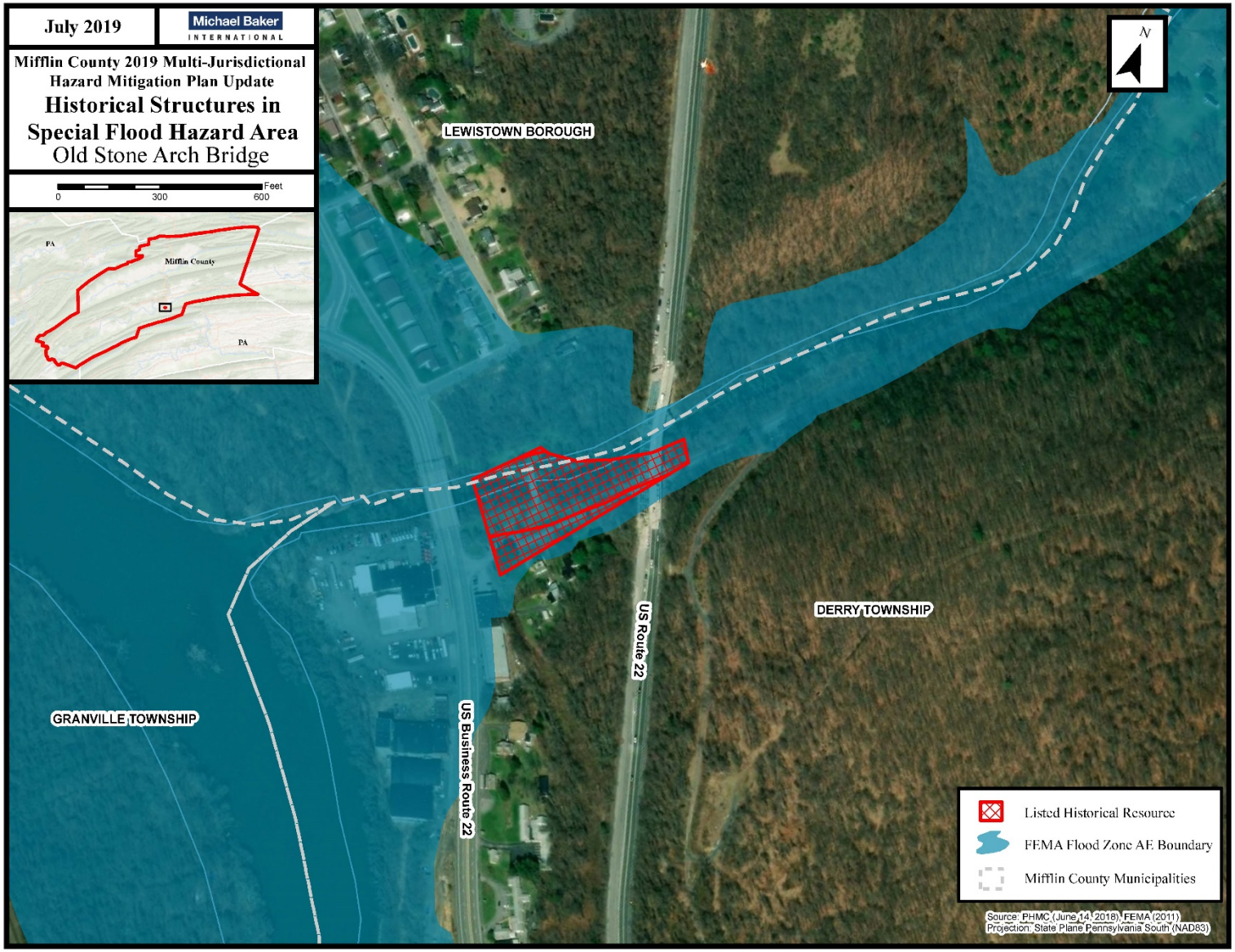
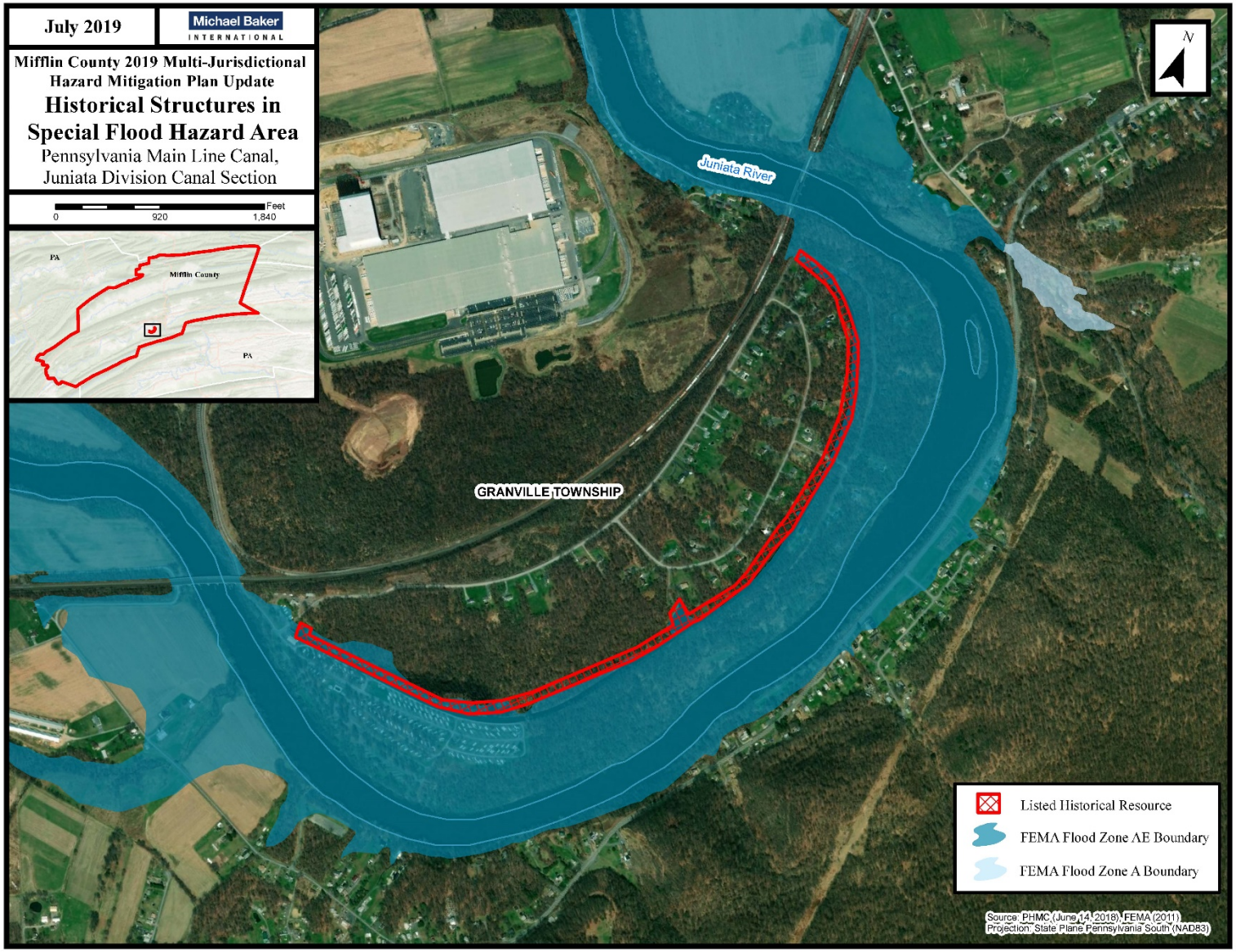


Figure 4.3.14-10: Pennsylvania Main Line Canal Listed Historical Structure in SFHA



4.3.15 Civil Disturbance

4.3.15.1 Location and Extent

Civil disturbances are activities such as a demonstration, riot, or strike that disrupts a community and requires intervention to maintain public safety. Examples include demonstrations, riots, strikes, public nuisances, and criminal activities.[4] Civil disturbances can take place throughout the county but are more likely to occur in the higher populated municipalities such as Lewistown Borough where Mifflin County government buildings are located. Table 4.3.15-1 lists the location of principal Mifflin County government facilities owned or leased by the County. This does not include other municipal government owned buildings located throughout the County.

Table 4.3.15-1: Government Buildings in Mifflin County (Mifflin County, 2015)

Building	Location
Mifflin County Courthouse	20 North Wayne Street Lewistown, PA 17044
Mifflin County Children and Youth	144 East Market Street Lewistown, PA 17044
Mifflin County Domestic Relations Office	152 East Market Street Lewistown, PA 17044
Mifflin County Public Defender's Office	15 North Dorcas Street Lewistown, PA 17044
Mifflin County Correctional Facility	103 West Market Street Lewistown, PA 17044

4.3.15.2 Range of Magnitude

Civil disturbances can affect entire communities and can range from small and peaceful to a large riot. A peaceful demonstration may quickly turn into chaos and disturb public order. Therefore, it is difficult to predict how wide spread an incident will be, when an event will occur, or how disruptive it may be. There are two types of gatherings that may occur during a civil disturbance, a crowd or a mob. A crowd is a collection of people without a strong cohesive relationship. There are four types of crowds: casual, cohesive, expressive, and aggressive (Michael Baker International, 2018).

- ***Casual Crowd:*** A group of people who happen to be in the same place at the same time. Violent conduct does not occur.
- ***Cohesive Crowd:*** This type of crowd consists of members who are involved in a unified behavior or common activity such as worshipping, dancing, or watching a sporting event. A cohesive crowd requires substantial provocation to arouse to action.

[4] Although active shooters are not included in FEMA's definition of civil disturbance, William Gomes, Mifflin County Department of Planning and Development, asked that the 2019 MJHMP Update note the prevalence and risk of active shooter situations.

- ***Expressive Crowd:*** A crowd held together by a common commitment or purpose. This crowd assembles as an expression of common sentiment or frustration. An example of an expressive crowd is a group that has assembled to protest.
- ***Aggressive Crowd:*** A crowd comprised of individuals for a specific purpose and has leaders who attempt to arouse members or motivate them to action. This type of crowd is noisy and threatening and may taunt authorities.

The other type of gathering, a mob is a large disorderly crowd or throng. Mobs are usually emotional, loud, violent, and lawless. They have different levels of commitment and can be classified into four types: Aggressive, escape, acquisitive, and expressive (Michael Baker International, 2018; Alvarez and Bachman, 2008).

- ***Aggressive Mob:*** A type of mob that attacks, riots, and terrorizes property or people. An aggressive mob is distinguished from an aggressive crowd by lawless activity.
- ***Escape Mob:*** An escape mob is attempting to flee from fire, a bomb, a flood, or some type of catastrophe. Members of these mobs are difficult to control and can be characterized by unreasonable terror.
- ***Acquisitive Mob:*** A mob motivated by desire to acquire something and may participate in looting sprees. This mob exploits a lack of control by authorities in safeguarding property.
- ***Expressive Mob:*** A mob that expresses fervor or revelry following an event, celebration, or religious activity. Members of an expressive mob release pent up emotions in highly charged situations.

4.3.15.3 Past Occurrence

There have been several notable civil disturbances in Pennsylvania, the most recent being the 2018 riot when the Philadelphia Eagles won the Super Bowl (Michael Baker International, 2018). Civil disturbance events are documented through the PEMA Knowledge Center (PEMA – KC). Table 4.3.15-2 contains recorded civil disturbance events in Mifflin County.

Table 4.3.15-2: Recorded Civil Disturbance Events in Mifflin County (PEMA-KC, 2018)

Event	Jurisdiction	Occurrence Date(s)
Healthcare Workers Strike	Lewistown	5/1/14 – 5/9/14

4.3.15.4 Future Occurrence

Civil disturbances can occur for several reasons but are hard to predict. To prevent future occurrences within the county, it is best to keep track of national events that could have an impact on the community. Perceived social and economic injustices remain prevalent in the United States. As long as discrimination prevails, the potential for civil disturbances will always remain a risk (Michael Baker International, 2018). It is difficult to determine where a civil disturbance may occur, however, past events have demonstrated a pattern of riots taking place in cities, universities, and sporting events. Local Mifflin County authorities should continue to prepare for small civil disturbances in the event a future occurrence takes place. The Department of Homeland Security gives a list of warning signs, listed below, that can be used as indicators

for persons in distress that may be used to determine possible threats for civil disturbance. By actively taking notice and getting help to these individuals, such acts can be prevented.

- Increased use of alcohol and/or illegal drugs
- Unexplained increase in absenteeism, and/or vague physical complaints
- Depression/Withdrawal
- Increased severe mood swings, and noticeably unstable or emotional responses
- Increasingly talks of problems at home
- Increase in unsolicited comments about violence, firearms, and other dangerous weapons and violent crimes

4.3.15.5 Vulnerability Assessment

Civil disturbance incidents can occur anywhere within the county but are more likely to occur in the more populated townships and boroughs of Mifflin County. Those that contain a higher amount of official government buildings and schools may also be more vulnerable to civil unrest. A representative of Shelter Service, Inc., noted that the emergency and homeless shelter in Lewistown is at heightened risk of being impacted by a civil disturbance. Concern was noted due to surrounding socioeconomic conditions, patronage by people who are undergoing a lot of stress factors, and patronage by those reentering society from a correctional facility (J. Neff, personal communication, March 5, 2019).

4.3.16 Dam Failure

The dam failure profile is included as Appendix E, which is not for public distribution due to security concerns.

4.3.17 Drowning

4.3.17.1 Location and Extent

Drowning is the process of experiencing respiratory impairment from submersion/immersion in liquid. Drowning outcomes are classified as death, morbidity and no morbidity (World Health Organization, 2018). Nonfatal drowning can result in brain damage that may result in long-term disabilities including memory problems, learning disabilities, and permanent loss of basic functioning. Drowning incidents can occur in any source of water, such as residential pools or bathtubs, and in rivers or other natural sources of water throughout Mifflin County. See Table 4.3.3-1 for a list of major water sources in the county.

4.3.17.2 Range of Magnitude

From 2005 to 2009, there were an average of 3,533 fatal unintentional drowning (non-boating related) annually in the United States — about ten deaths per day. An additional 347 people died each year from drowning in boating-related incidents. Drowning is the second leading cause of accidental injury-related death among children ages 1 to 14 and the leading cause of injury-related death among children 1 to 4. More than half of drowning incidents among infants under the age of 1 occur in bathtubs, buckets, or toilets (CDC, 2016). Mifflin County is part of the Juniata River Valley region, which comprises both Mifflin and Juniata Counties. The impact of tourism in this region for both Juniata and Mifflin Counties, is more

than $102 million. In addition, 618 of the 844 estimated tourism jobs in the Juniata River Valley region are employed in Mifflin County (Juniata River Valley Tourism, 2017). Therefore, with many tourists visiting the county's water network and many residents working in the tourism field, drowning becomes a high risk.

4.3.17.3 Past Occurrences

Phil Lucas (personal communication, July 18, 2019), Director of the Mifflin County Office of Public Safety, reported that there have been seven drowning incidents in the past eight years in Mifflin County, including two drowning incidents in the Juniata River at the Mifflin-Huntingdon County border in Mt. Union. While this number may seem low in comparison to other hazards, it is possibly one of the simplest hazards to mitigate. Considering the amount of open water, recreational water activities and public and private pools within the county, drowning is a growing concern and should continue to be profiled.

4.3.17.4 Future Occurrences

Drowning incidents can occur in any source of water if precautions are not taken. To assist in preventing future occurrences the CDC (2016) recommends the following safety guidelines when in and around water:

- Supervise when in or around water. Designate a responsible adult to watch young children while in the bath and all children swimming or playing in or around water. Supervisors of preschool children should provide "touch supervision," and should be close enough to reach the child at all times. Because drowning occurs quickly and quietly, adults should not be involved in any other distracting activity (such as reading, playing cards, talking on the phone, or mowing the lawn) while supervising children, even if lifeguards are present.
- Use the Buddy System. Always swim with a buddy. Select swimming sites that have lifeguards when possible.
- Learn to swim. Formal swimming lessons can protect young children from drowning. However, even when children have had formal swimming lessons, constant, careful supervision when children are in the water, and barriers, such as pool fencing to prevent unsupervised access, are still important.
- Learn Cardiopulmonary Resuscitation (CPR). In the time it takes for paramedics to arrive, your CPR skills could save someone's life.
- Air-filled or foam toys are not safety devices. Don't use air-filled or foam toys, such as "water wings", "noodles", or inner-tubes, instead of life jackets. These toys are not life jackets and are not designed to keep swimmers safe.
- Avoid alcohol. Avoid drinking alcohol before or during swimming, boating, or water skiing. Do not drink alcohol while supervising children.
- Don't let swimmers hyperventilate before swimming underwater or try to hold their breath for long periods of time. This can cause them to pass out (sometimes called "shallow water blackout") and drown.
- Know how to prevent recreational water illnesses. Contrary to popular belief, chlorine does not kill all germs instantly. There are germs today that are very tolerant to chlorine and were not known to

cause human disease until recently. Once these germs get in the pool, it can take anywhere from minutes to days for chlorine to kill them. Swallowing just a little water that contains these germs can make you sick. Keeping chlorine at recommended levels is essential to maintaining a healthy pool. However, a 2010 study found that 1 in 8 public pool inspections resulted in pools being closed immediately due to serious code violations such as improper chlorine levels.

- Know the local weather conditions and forecast before swimming or boating. Strong winds and thunderstorms with lightning strikes are dangerous.

4.3.17.5 Vulnerability Assessment

Males are especially at risk of drowning, with twice the overall mortality rate of females. They are more likely to be hospitalized than females for non-fatal drowning. Studies suggest that the higher drowning rates among males are due to increased exposure to water and riskier behavior such as swimming alone or drinking alcohol before swimming alone and boating. The World Health Organization (2018) identified several factors that are associated with an increased risk of drowning. Note that drowning in public pools is not included, as there is an insufficient amount of research to support this, and it is perceived as a rare occurrence (Schwebel et al., 2007).

- In many countries, lower socioeconomic status, being a member of an ethnic minority, lack of higher education, and rural populations may be associated with increased risk.
- Infants left unsupervised or alone with another child in a bathtub.
- Unsafe or overcrowded transportation vessels lacking flotation devices.
- Alcohol use, near or in the water.
- Medical conditions, such as epilepsy.
- Tourists unfamiliar with local water risks and features.
- Floods and other cataclysmic events like tsunamis.

4.3.18 Environmental Hazard – Hazardous Materials Release

4.3.18.1 Location and Extent

One of the greatest threats to those who reside in the Commonwealth is the constant production, storage, use, and transportation of hazardous materials. The release of these materials from a facility may be less dangerous than the release of these materials while being transported. Hazardous materials include flammable liquids, solids, and gases, combustible liquids, explosives, blasting agents, radioactive materials, oxidizing materials, corrosive materials, poisons, refrigerated liquids, hazardous waste/substances, and other regulated material. The City of Philadelphia and the Delaware Valley Region, which is about 150 miles southeast of Mifflin County, make up one of the leading industrial trade complexes in the nation. With the numerous forms of transportation available in Mifflin County, hazardous materials such as chemicals, fuels, and other hazardous materials are frequently transported through the county. The carriers of hazardous materials must have response plans in place in the event of an accident.

Any facility in Pennsylvania that uses, manufactures, or stores hazardous materials must comply with Title III of the Superfund Amendments and Reauthorization Act (SARA). This is also known as the Emergency Planning and Community Right-to-Know Act (EPCRA). These facilities must also comply with the reporting requirements, as amended, in Pennsylvania's Hazardous Materials Emergency Planning and Response Act (1990-165). Information about the chemicals that are being manufactured or processed in facilities can be found in the U.S. Environmental Protection Agency's (EPA) Toxic Release Inventory (TRI) database. The EPA defines a hazardous waste facility required to report to the TRI Program as a facility that meets the following criteria: facility is listed in the TRI-covered North American Industry Classification System (NAICS), has ten or more full time employees, and manufactures or processes an EPCRA Section 313 chemical in quantities beyond the established threshold in one calendar year (EPA, 2018).

A listing of hazardous materials facilities in Mifflin County were provided by Phil Lucas, Director of the Mifflin County Office of Public Safety (Table 4.3.18-1). A map is provided of these facilities in Figure 4.3.18-1.

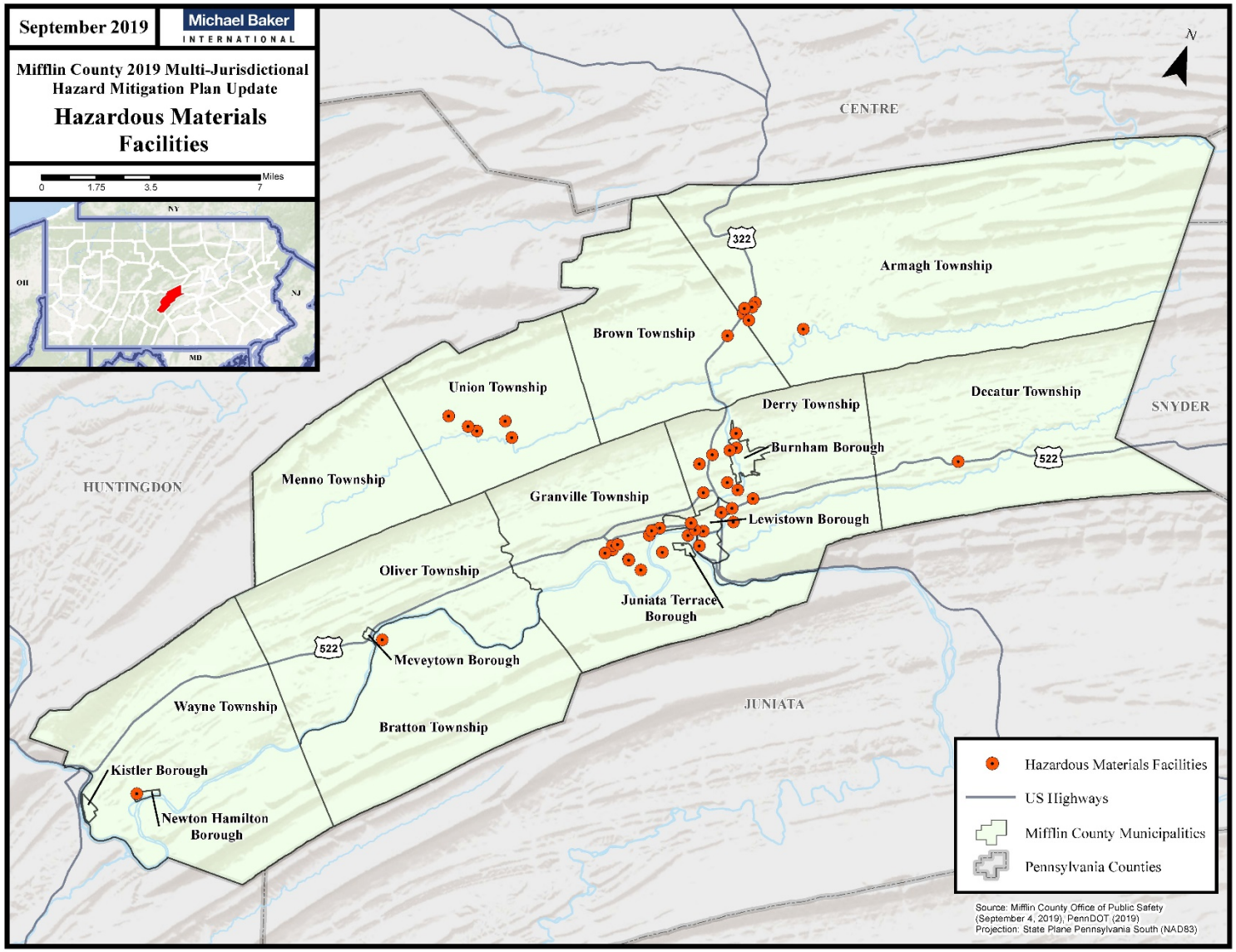
Table 4.3.18-1: Hazardous Materials Facilities in Mifflin County: 2018 (Phil Lucas, personal communication, September 4, 2019)

Facility	Address
Bell & Evans-Farmer's Pride Hatchery	217 Mechanic Street, Belleville
KV Oil Company, Inc. (Bulk Plant)	4529 East Main Street, Belleville
Peachey Foods	85 South Penn Street, Belleville
Premier Select Sire, Inc.	State Route 655 Belle Acres Complex, Belleville
Union Mill Division Chemgro Inc.	316 Apple House Road, Belleville
Standard Steel LLC	500 Walnut Street, Burnham
TMS International @ Standard Steel LLC	250 High Dump Road, Burnham
Valero Station Burnham	13037 Ferguson Valley Road, Burnham
AmeriGas, LLC (Penn Fuel)	299 West Fleming Avenue, Lewistown
Clayton Lewistown (CMH Manufacturing)	30 Industrial Park, Lewistown
Comcast Cable – Lewistown Headend & Warehouse	625 Pitt Street, Lewistown
First Quality Baby Products LLC	97 Locust Road, Lewistown
GE Inspection Technologies	50 Industrial Park Road, Lewistown
Greenbrier Rail Services	16 Expansion Drive, Lewistown
J.J. Powell, Inc.	P.O. Box 1, 518 South Main Street, Lewistown
Juniata Concrete Co. Plant 1	2 Silver Sand Avenue, Lewistown
Lewistown Armory	28 Armory Lane, P.O. Box 589, Lewistown

Table 4.3.18-1: Hazardous Materials Facilities in Mifflin County: 2018 (Phil Lucas, personal communication, September 4, 2019)

Facility	Address
Lewistown Sentinel	352 Sixth Street, Lewistown
Lowe's	10472 US Highway 522 South, Lewistown
Nittany Oil Company #13612	401 East Walnut Street, Lewistown
Overhead Door	23 Industrial Park Road, Lewistown
Penelec (First Energy)	12785 Ferguson Valley Road, Lewistown
Penelec/Lewistown Substation	306 Round House Road, Lewistown
PennDOT	1200 West Fourth Street, Lewistown
Ryder Transportation Services	18 Industrial Park Road, Lewistown
Schwan's Home Service	2180 Middle Road, Lewistown
Snedeker Oil Co. Service & Bulk Station	711 East Walnut Street, Lewistown
Snedeker Oil Co. US Highway 22 Bulk	912 US Highway 22, Lewistown
Snedeker Oil Co., Kish Pike Bulk	Kish Pike Bulk Plant Rr. Electric Avenue, Lewistown
United Chemical Technology	6395 State Route 103N, Building 54-10, Lewistown
Valero Station	51 South Juniata Street, Lewistown
Verizon Lewistown Dial Office (PA31091)	200 North Grand Street, Lewistown
AMES Companies, Inc.	4935 US Highway 522 North, McClure
Windstream Paetec McVeytown Switch	36 Mattawana Boulevard, McVeytown
Glenn O. Hawbaker, Inc.-Plant No. 5 & No. 6	155 Hostetler Quarry Road, Milroy
Newton Hamilton Regen Quest dba Centry Link	127 Kinsloe Avenue, Newton Hamilton
Auto Accessories of America, Inc. Manufacturing	100 Calssic Car Drive, Reedsville
Auto Accessories of America, Inc. Manufacturing	5165 Old US Highway 322, Reedsville
CenturyLink	4478 US 322, Reedsville
Jarden Plastic Solutions	20 Setar Way, Reedsville
Philips Ultrasound	1 Echo Drive, Reedsville
United Parcel Service	145 Royal Street, Reedsville
Suburban Energy Services	331 South Main Street, Yeagertown

Figure 4.3.18-1: Hazardous Materials Facilities Located in Mifflin County



4.3.18.2 Range of Magnitude

Hazardous material releases can contaminate air, water, and soils, possibly resulting in death or severe injury. Dispersion can take place rapidly when transported by water and wind. While often accidental, releases can occur because of human carelessness, intentional acts, or natural hazards. When caused by natural hazards, these incidents are known as secondary events. Hazardous materials include toxic chemicals, radioactive materials, infectious substances, and hazardous wastes. Such releases can affect nearby populations and contaminate critical or sensitive environmental areas. With a hazardous material release, whether accidental or intentional, there are several potentially exacerbating or mitigating circumstances that will affect its severity or impact. Mitigating conditions are precautionary measures taken in advance to reduce the impact of a release on the surrounding environment. Primary and secondary containment or shielding by sheltering-in-place protects people and property from the harmful effects of a hazardous material release. Exacerbating conditions, or characteristics that can enhance or magnify the effects of a hazardous material release, include the following:

- **Weather conditions:** Affect how the hazard occurs and develops.
- **Micro-meteorological effects of buildings and terrain:** Alters dispersion of hazardous materials.
- **Noncompliance with applicable codes (e.g., building or fire codes) and maintenance failures (e.g., fire protection and containment features):** Can substantially increase the damage to the facility itself and to surrounding buildings.

Whether or not a hazardous materials site is contained in the floodplain is also a concern, as there could be large-scale water contamination during a flood event, should the flood compromise the production or storage of hazardous chemicals. Such a situation could swiftly move toxic chemicals throughout a water supply and across great distances.

The severity of a given incident is dependent on the type of material released and the distance and related response time for emergency response teams. The areas within closest proximity to the releases are generally at greatest risk, yet depending on the agent, a release can travel great distances or remain present in the environment for a long period of time (e.g., centuries to millennia for radioactive materials), resulting in extensive impacts on people and the environment.

4.3.18.3 Past Occurrence

The Commonwealth in its entirety had a total of 1,000 hazardous materials spills in 2003, most of which occurred on highways. According to the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration, Office of Hazardous Material Safety (US DOT PHMSA OHMS), in 2012, of the 13,522 spills in the United States, 11,567, or 85.7%, happened on highways. These spills cost approximately $47 million in cleanup efforts. Table 4.3.18-2 describes hazardous material spill events by environmental medium and the extent of their damage within Mifflin County.

Table 4.3.18-2: Total On-Site Releases by Environmental Medium in Mifflin County: 2004 – 2018 (U.S. DOT PHMSA, 2019)					
Mode of Transportation	**Incidents**	**Hospitalized**	**Non-Hospitalized**	**Fatalities**	**Damages**
Air	1	0	0	0	$0
Highway	8	0	0	0	$184,000
Railway	1	0	0	0	$5,500
Water	0	0	0	0	$0
Total	**10**	**0**	**0**	**0**	**$189,500**

Table 4.3.18-3 lists hazardous material spills reported to PEMA -KC from 2013 to 2018, and Table 4.3.18-4 lists hazardous material spills reported to the U.S. DOT PHMSA OHMS in Mifflin County from 1971 to 2019, respectively. Most spills occurred along US Route 322 and State Route 103, the major transportation routes in the county.

Table 4.3.18-3: Hazardous Materials Incidents Reported by PEMA in Mifflin County: 2013 – 2018 (PEMA – KC, 2018)		
Incident Municipality	**Date of Incident**	**Event Description**
Lewistown Borough	5/11/2013	Chemical odor
Lewistown Borough	4/13/2014	N/A
Oliver Township	3/18/2015	Oil spill
Wayne Township	12/26/2016	N/A
Lewistown Borough	2/14/2017	Red petroleum substance in creek
Granville Township	6/12/2017	Oil spill
Armagh Township	6/19/2017	Kerosene spill
Granville Township	6/20/2017	Diesel fuel spill
McVeytown Borough	7/7/2017	Oil spill
Lewistown Borough	10/25/2017	N/A
Brown Township	11/9/2017	N/A
Armagh Township	12/14/2017	Fuel spill
Total	**12**	

Table 4.3.18-4: Hazardous Material Spills in Mifflin County: 1971 – February 2019 (U.S DOT PHMSA, 2019)

Incident Route	Incident City	Date of Incident	Total Hazmat Fatalities	Total Amount of Damages ($)	Mode of Transportation	Failure Cause	Event Description
N/A	Lewistown	10/4/1973	0	0	Highway	Vehicular crash or accident damage	N/A
N/A	Milroy	9/22/1975	0	0	Highway	Vehicular crash or accident damage	N/A
N/A	Lewistown	3/14/1977	0	0	Highway	N/A	N/A
N/A	Lewistown	3/31/1977	0	0	Highway	Vehicular crash or accident damage; Fire temperature or heat	N/A
N/A	Lewistown	6/2/1987	0	0	Highway	Vehicular crash or accident damage	N/A
N/A	Lewistown	5/7/1989	0	0	Highway	Loose closure component or device	N/A
Route 22	McVeytown	2/19/1996	0	0	Rail	Derailment	A conrail train traveling on the conrail Pittsburgh line derailed in McVeytown, PA. Derailment caused damage to covered hopper containing environmentally hazardous solid adipic acid and released approximately 300 pounds of product.
Elizabeth	Lewistown	7/31/1996	0	0	Rail	Defective component or device	Carbon dioxide refrigerated liquid was

Table 4.3.18-4: Hazardous Material Spills in Mifflin County: 1971 – February 2019 (U.S DOT PHMSA, 2019)

Incident Route	Incident City	Date of Incident	Total Hazmat Fatalities	Total Amount of Damages ($)	Mode of Transportation	Failure Cause	Event Description
							reported to be leaking. Car inspection manager responded and conducted an investigation that revealed the pressure regulator was frozen and iced over. Tank car was secured.
US Route 322 & 522	Lewistown	11/13/1996	0	55	Highway	Vehicular crash or accident damage	Driver was stopped at railroad crossing on route 322, when a truck approached from the rear and struck driver in the rear. A small quantity of product that was in the unloading line leaked and was captured by the fire department.
36 Maple Ave.	Belleville	11/19/1999	0	285	Highway	Impact with sharp or protruding object	Drum had a protruding nail that caused half of the drum's contents to spill.
Route 322	Armagh	8/22/2000	0	150,019	Highway	Rollover accident; Vehicular crash or accident damage; Impact with sharp or protruding object	Tanker of truck was punctured by guide rail causing less than fifty gallons of the reclaimed oil it was hauling to spill onto roadway.

Table 4.3.18-4: Hazardous Material Spills in Mifflin County: 1971 – February 2019 (U.S DOT PHMSA, 2019)

Incident Route	Incident City	Date of Incident	Total Hazmat Fatalities	Total Amount of Damages ($)	Mode of Transportation	Failure Cause	Event Description
113 Runnymede Ave.	Wayne	3/29/2004	0	0	Highway	Overfilled	While making a home heating oil delivery, driver overfilled the tanks.
State RT 103	McVeytown	8/8/2004	0	5,500	Rail	Derailment; Rollover accident	Car was involved in a train derailment, where drip leak occurred. All spilled material was recovered.
Route 322 West	Milroy	11/28/2005	0	145,000	Highway	Rollover accident	Tractor & trailer involved in a rollover accident. The Penn Color drum that was impacted ruptured at the lid closure. The Dupont drum that was impacted was crushed at the scene and lost its contents.
145 Royal St.	Reedsville	8/12/2009	0	0	Highway	Improper preparation for transportation	Preloader was unloading trailer and noticed package was damp.
145 Royal St.	Reedsville	9/14/2009	0	0	Air	N/A	Package contained aerosol cans and was not properly marked.
145 Royal St.	Reedsville	8/26/2010	0	0	Highway	Improper preparation for transportation	Unloader found package marked with a corrosive label but no hazmat paperwork in the package car. Upon opening, the package was leaking internally slightly.

Table 4.3.18-4: Hazardous Material Spills in Mifflin County: 1971 – February 2019 (U.S DOT PHMSA, 2019)

Incident Route	Incident City	Date of Incident	Total Hazmat Fatalities	Total Amount of Damages ($)	Mode of Transportation	Failure Cause	Event Description
145 Royal St.	Reedsville	8/10/2011	0	0	Highway	Inadequate preparation for transportation	Package came down the belt loaded where glass was broken and product evaporated.
145 Royal St.	Reedsville	7/23/2012	0	8,000	Highway	Inadequate preparation for transportation	Package placed on belt where it was noticed that the bottom of the package was starting to smoke and had a noxious odor. Designated responder donned PPE and relocated the spill from belt to outside.
US 322, Walnut St. Exit	Lewistown	5/12/2015	0	0	Highway	Rollover accident	Tractor trailer was involved in a single vehicle accident rollover that resulted in damage to the freight being carried. 18-20 pallets of UN2794 batteries filled with acid were transloaded onto a relief trailer. Approximately 10-20 gallons of battery acid was estimated to be released.
145 Royal St.	Reedsville	8/9/2018	0	0	Highway	Human error	Package containing fumes were visible and outside responder was called.

Table 4.3.18-4: Hazardous Material Spills in Mifflin County: 1971 – February 2019 (U.S DOT PHMSA, 2019)

Incident Route	Incident City	Date of Incident	Total Hazmat Fatalities	Total Amount of Damages ($)	Mode of Transportation	Failure Cause	Event Description
Route 522/22	Wayne	2/20/2019	0	27,534	Highway	N/A	Heavy snow caused East Penn NFG Co. Box truck to lose control and veer into a ditch. The secured load of 5 pallets shifted and came undone inside the truck. Pallets contained lead acid batteries that leaked.

Figure 4.3.18-2 depicts a methamphetamine laboratory bust that occurred in Mifflin County, which poses several hazardous materials concerns. Figure 4.3.18-3 depicts other hazardous materials releases in Mifflin County.

Figure 4.3.18-2: Methamphetamine laboratory bust in a basement in Lewistown, PA on January 30th, 2017 (Photograph courtesy of The Sentinel's Buffie Boyer, January 31, 2017).

Figure 4.3.18-3: Truck carrying batteries crashed near a local reservoir (left) and a train hauling cement mix derailed into the Juniata River (right) (Photographs courtesy of Phil Lucas, incident dates not specified).

4.3.18.4 Future Occurrence

While many hazardous material release incidents have occurred in Pennsylvania in the past, they are generally considered difficult to predict. An occurrence is largely dependent upon the accidental or intentional actions of a person or group. One concern specific to Mifflin County is abandoned oil tanks buried beneath sidewalks that are unknown to property owners. In 2013, one such oil tank in downtown Lewistown, PA, was pierced and began leaking, but was shortly remediated (William Gomes, personal communication, September 23, 2019).

Risk associated with a hazardous material release is expected to remain moderate. Hazardous material release incidents occur annually in Pennsylvania, so a 100 percent annual probability is anticipated (Michael Baker International, 2018). In most circumstances, it is difficult to predict when and where environmental hazards will arise, as they are often related to equipment failure and human error. Adequate monitoring through the PA DEP will reduce the likelihood of potential impacts to the community and the environment.

4.3.18.5 Vulnerability Assessment

A hazardous material spill can be the result of human carelessness, an intentional act, or a natural hazard. Human carelessness occurs predominantly during the manufacturing, transporting, or storing of the material. An intentional act would include a terrorist act, criminal act, or act of vandalism. A

hazardous materials spill can be a secondary effect of a natural hazard such as flooding, an earthquake, or severe weather.

Matthew Stringer of McVeytown Borough submitted a 2019 *New Mitigation Action* form related to prevention of contamination of the municipal sewer system from home heating oil (see Appendix C). During the Risk Assessment-Mitigation Solutions Workshop WebEx conference call in April 2019, Mayor John Wagner, Juniata Terrace Borough, explained that the Borough is surrounded by Norfolk Southern. He believes that with the prevailing winds from the west, the Borough could be susceptible to air-borne contaminants in the event of a train accident involving hazardous materials. Similarly, Ron Napikoski of Derry Township noted concern on the 2019 *Evaluation of Identified Hazards and Risk* form of hazardous materials release during rail accidents (see Appendix C).

U.S. Route 22/322 and U.S. Route 522 have the most traffic volume in Mifflin County. The Average Annual Daily Traffic (AADT) in 1999 was 6,766 in Armagh Township on U.S. Route 322. As of March 2010, the AADT has increased to 7,086, which is a 4.7 percent increase in daily traffic. An increase in traffic is also seen when Pennsylvania State University, University Park, PA holds a large event, which increases the risk of fatalities if an incident should occur. Over the last decade, the state Department of Transportation has invested $288 million into eliminating the bottlenecks on the U.S. Route 22/322 corridor between Harrisburg and Pennsylvania State University, but there are still major delays, increasing the risk of a transportation accident occurrence, and hazardous material releases. In fact, on the *Evaluation of Identified Hazards and Risk* worksheet, Craig Bubb, Municipal Authority of the Borough of Lewistown, noted concern of drinking water contamination. He stated that on U.S. Route 22/322 east/west in Armagh Township, located near Laurel Run Dam, there is no stormwater management/spill containment along the highway adjacent to the dam. Several dangerous spills have occurred there over the last two years, and a majority of the County's drinking water comes from this source.

In accordance with SARA, facilities that store hazardous chemicals must disclose to public officials and citizens the types of chemicals stored, the amount of chemicals stored, and the exact locations of the chemicals stored in their facilities. Mifflin County has 14 SARA EHS planning facilities, each having a plan filed with the county's emergency management office. Table 4.3.18-5 lists all of the TRI facilities in Mifflin County.

Table 4.3.18-5: TRI Facilities Located in Mifflin County: 2019 (EPA, 2019)		
TRI Facility ID	**Facility Name**	**Address**
17044MSLND12IND	Ames True Temper, Inc.	12 Industrial Park Rd, Lewistown
17044VTXFB1000E	Avtex Fibers Lewistown Inc.	1000 Elizabeth St, Lewistown
17063BLLNMUSROU	Ball Corp Unimark Plastics Div	U.S. Rte. 322 & Plastic Ave, Milroy
17044MRLTT30IND	Clayton Lewistown	30 Industrial Park, Lewistown
17004FRDNW36MAP	CNH America LLC	36 Maple St, Belleville
17004BLLVLRD1FR	Donsco Inc Building 8	4381 Front Mountain Rd, Belleville
17004FRMNT15KIS	Fairmont Dairy LLC	15 Kishacoquillas St, Belleville
17044FLCNRONEBE	Falconer-Lewistown Inc	1 Belle Ave Bldg 35, Lewistown
17044GFNDT50IND	GE Inspection Technologies	50 Industrial Park Rd, Lewistown
17044GRDNN6395S	Guardian Industries Corp	6395 Sr 103 N Bldg 35, Lewistown
17063JWDWCROUTE	J Wood WCI Cabinet Group	Rte 322, Milroy
17044HDCRP23IND	Overhead Door Corp - Pennsylvania Div	23 Industrial Park Rd, Lewistown
17084PHLPS1ECHO	Philips Ultrasound Inc	1 Echo Dr, Reedsville
17009STNDR500WA	Standard Steel LLC	500 N Walnut St, Burnham
1709WTMSNT25HIG	TMS International LLC	250 High Dump Road, Yeagertown

If a hazardous materials spill were to occur, its impact can be measured using environmental, economic, and societal factors. If the materials spilled are flammable, both urban and rural fires can occur. The greatest secondary effect of hazard material releases is associated with transportation accidents that follow from spills on major transportation routes.

4.3.19 Transportation Accidents

4.3.19.1 Location and Extent

Transportation accidents can result from any form of air, rail, water, or road travel. It is unlikely that small accidents would significantly impact communities on a large scale. However, certain accidents could have secondary regional impacts such as a hazardous material release or a disruption in critical

supply/access routes, especially if vital transportation corridors or junctions are present. Traffic congestion in certain circumstances can also be hazardous. Traffic congestion is a condition that occurs when traffic demand approaches or exceeds the available capacity of the road network. This hazard should be carefully evaluated during emergency planning, since it is a key factor in timely disaster or hazard response, especially in areas with a high population density.

There is one public airport listed in Mifflin County by the PennDOT Bureau of Aviation, the Mifflin County Airport, located in Brown Township. The Mifflin County Airport is listed as a General Aviation Airport by the National Plan of Integrated Airport Systems (NPIAS), and it is most commonly used for recreational flying (Mifflin County Comprehensive Plan, 2014).

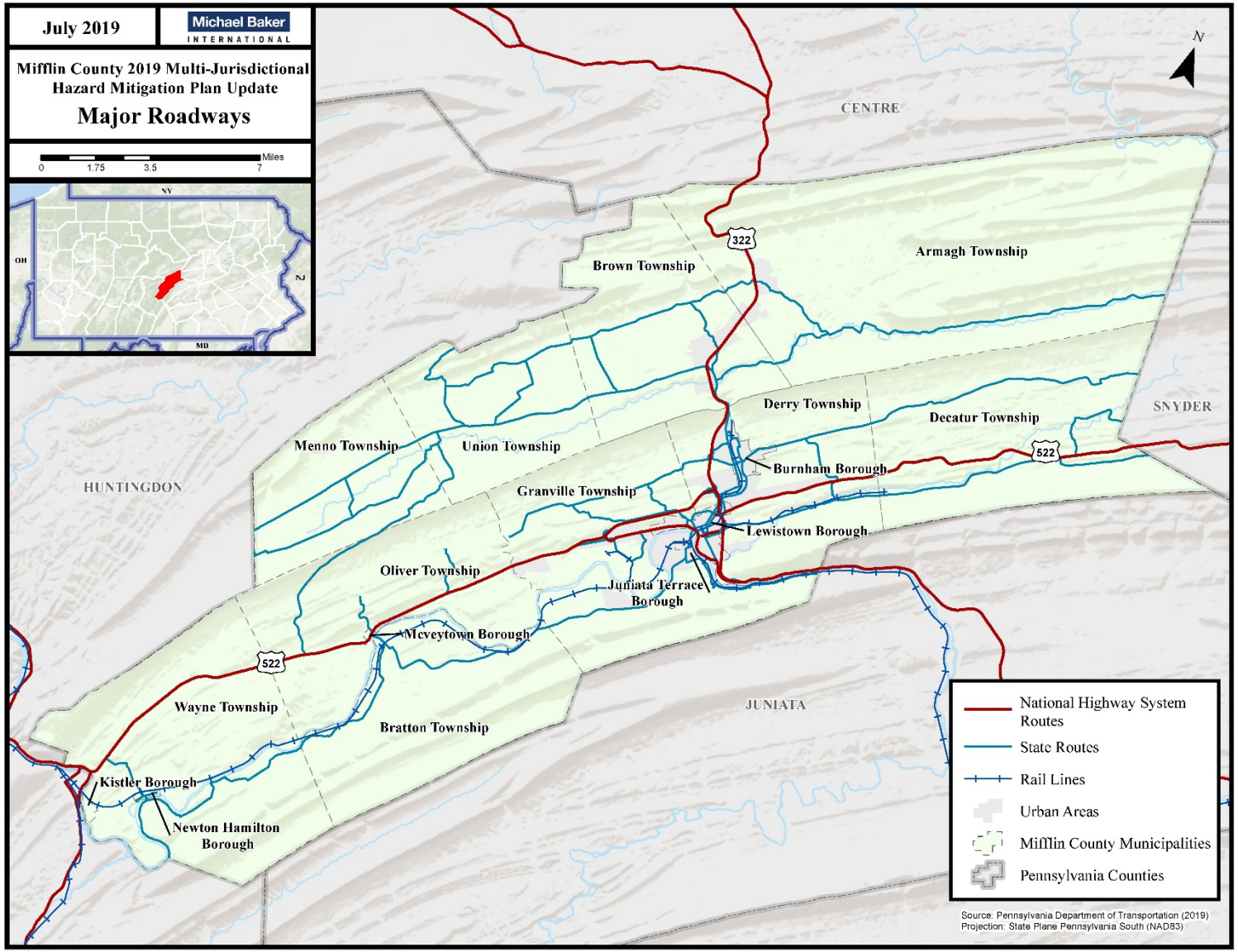
Mifflin County is serviced by several major highways:

- U.S. Route 22/322, which runs east to west through the central portion of Lewistown, PA.
- U.S. Route 22/522, which runs north to south through Lewistown, PA.
- PA Route 655, which runs north to south, with the northern terminus in Reedsville, PA.

Other major connector routes within the county include State Routes 103 and 305. Figure 4.3.19-1 shows major roadways running throughout Mifflin County.

Mifflin County is served by two railroads, Norfolk Southern and the Juniata Valley Railroad. The Juniata Valley Railroad is a switching carrier and the Norfolk Southern is a line carrier. Furthermore, Amtrak provides service from Harrisburg to Pittsburgh, with once a day service to Lewistown (Mifflin County Comprehensive Plan, 2014). The Mifflin-Juniata Area Agency on Aging provides public transportation in Mifflin County through Call A Ride Services (CARS). CARS provide shared-ride transportation services to clients who register for them. In addition, Fullington Trailways provides intercity bus service for both passengers and package shipments. The bus service has an intermediate stop in Lewistown and has three inbound and outbound routes during the weekdays (Mifflin County Commissioners, 2014). Furthermore, Greyhound bus services provides two round trips per day from Lewistown for its service from Harrisburg to State College to Pittsburgh (Mifflin County Commissioners, 2014).

Figure 4.3.19-1: Major Roadways in Mifflin County



4.3.19.2 Range of Magnitude

Significant transportation accidents can result in serious injury, extensive property loss or damage, and even death. The majority of motor vehicle crashes are non-fatal in Pennsylvania, but PennDOT estimates that every hour nine people are injured in a car crash, and every seven hours someone dies as a result of a car crash (Michael Baker International, 2018; PennDOT, 2016). Furthermore, road and railway accidents are of concern for hazardous material releases.

4.3.19.3 Past Occurrence

Mifflin County has had eight aviation accidents, leading to a total of two deaths since 1950. Table 4.3.19-1 lists all aviation crashes that have occurred in Mifflin County since 1950. The average rate of aviation accidents nationwide is 8.47 accidents per 100,000 flight hours, or 0.0086%. Therefore, the likelihood of an aviation incident occurring within the county is considered low.

Table 4.3.19-1: Aviation Crashes in Mifflin County: 1950 – 2018 (NTSB, 2018)

Location	Date	Event	Injuries	Deaths
Milroy	5/31/1993	Mountain obscuration and fog reduced visibility, causing airplane to enter clouds and impacted terrain.	1	1
Reedsville	4/01/1984	Pilot lost control during takeoff and went through a snowbank adjacent to the runway.	0	0
Granville	1/05/1983	Airplane made an emergency landing after running out of fuel and landed in a field, colliding with several trees.	1	0
Reedsville	5/26/1993	Pilot lost control of airplane during landing and entered a ditch.	0	0
Mount Union	12/31/2002	The airplane did not accelerate properly, and the pilot decided to abort takeoff, but lost control and impacted a ditch.	0	0
Burnham	10/20/2003	Student pilot lost control of airplane during takeoff.	0	0
McVeytown	9/01/2012	Helicopter had low fuel levels in a low altitude area, leading to loss of engine power.	0	1
Reedsville	5/10/2017	Pilot did not maintain control of airplane during takeoff and impacted a field.	2	0

Figure 4.3.19-2: Aircraft accident at the Mifflin County Airport (Photograph courtesy of Phil Lucas, incident date not specified).

The most recently updated Pennsylvania Crash Facts and Statistics states that 453 vehicular crashes occurred in Mifflin County in 2017 (PennDOT, 2017). Of these crashes, 6 were fatal, 172 resulted in injury only, and 275 resulted in property damage only. Table 4.3.19-2 lists a five-year trend of vehicular crashes within Mifflin County.

Table 4.3.19-2: Five-Year Trend of Vehicular Crashes in Mifflin County: 2013 – 2017 (PennDOT, 2017)

Year	# of Crashes	# of Fatalities	# of Pedestrian Fatalities
2013	418	9	4
2014	366	5	1
2015	459	4	0
2016	451	3	2
2017	453	7	1

Figure 4.3.19-3: Vehicular accident in Granville Township on December 21st, 2018 (left) and on July 7th, 2019 (Photographs courtesy of Granville Fire Company Facebook Page, December 21, 2018 and July 7, 2019).

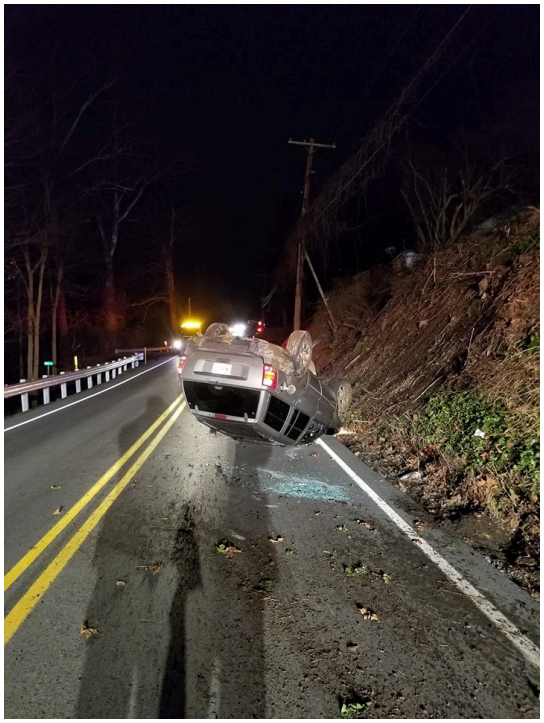


Table 4.3.19-3 provides an account of rail accidents within the past ten years and associated damage costs (FRA OSA, 2018).

Table 4.3.19-3: Rail Incidents in Mifflin County: 2008 – 2018 (FRA OSA, 2018)

Incident Date	Incident Type	Injuries	Deaths	Total Damage ($)
12/02/2009	Freight Train Derailment	0	0	272,500
3/11/2010	Head Car Derailed	0	0	15,000
7/09/2010	Freight Train Derailment	0	0	-
4/14/2017	Freight Train Derailment	2	0	390,694

Figure 4.3.19-4: Train derailment in Bratton Township, west of Mattawana, on April 14th, 2017 (Photograph courtesy of Bradley Kreitzer, April 14, 2017).

4.3.19.4 Future Occurrence

The number of transportation-related accidents is expected to increase with increased vehicular usage. The trucking industry is expected to continue growing, which will increase the number of long-haul trucks operating daily within the county. Transportation incidents may increase slightly over the next five years without proper mitigation strategies in place. Therefore, based on past occurrence data and projected transportation increases, the probability of transportation accident occurrences is characterized as moderate.

Another rising transportation hazard has been the resiliency of central Pennsylvania transportation systems. The SEDA-Council of Governments (COG) has expressed concern in transportation systems across the eleven Pennsylvania counties that it oversees, in dealing with extreme weather events in their 2015 Strategic Plan. The issue revolves around the impacts extreme weather events may have on transportation infrastructure and operations, the frequency of these events, and reliability of the regional economy on transportation systems (SEDA COQ, 2015). The Fixing America's Surface Transportation Act, also known as the FAST Act, enacted in 2015 provides long-term funding for surface transportation such as new highways and transit lines (U.S. DOT, 2016). The FAST Act will improve the reliability and the resilience of transportation systems. Furthermore, the identification of weather

trends and subsequent impacts would mitigate transportation system impacts for future occurrences (SEDA COQ, 2015).

4.3.19.5 Vulnerability Assessment

Mifflin County has one airport, the Mifflin County Airport in Reedsville, PA. There are 36 aircrafts based at the airport: 33 single engine airplanes, 1 multi-engine airplane, and 2 glider airplanes. On average there are 39 aircraft operations per day in a one-year period. Eighty eight percent of the operations is local general aviation, 11 percent is transient general aviation, and 1 percent is air taxi (AirNav, 2018). As the amount of aviation traffic increases, so does the possibility of an incident.

The vulnerability to a highway accident is directly related to the traffic density of a given area. U.S. Route 22/322, which connects Harrisburg to State College, cuts through the center of Mifflin County and receives the highest traffic volume during the year. Severe vehicular crashes on Route 22/322 have previously led to several hours of delay and have raised questions about the need for emergency direction and alternative routing. Segments of State Route 655 and U.S. Route 22/522 also receive high volumes of traffic.

A representative of Shelter Service, Inc., noted that their emergency and homeless shelter in Lewistown is at risk of being impacted by a rail accident (J. Neff, personal communication, March 5, 2019). The facility is less than one hundred feet from a rail line with at-grade crossing. Possible secondary effects of transportation accidents include chemical/hazardous material spills, fires (both urban and rural), and utility failures.

4.3.20 Urban Fire and Explosion

4.3.20.1 Location and Extent

Urban fire and explosion hazards include vehicle and building/structure fires as well as overpressure rupture, overheat, or other explosions that do not ignite (Michael Baker International, 2018). Although urban fires can start from numerous causes, major fires are often the result of other hazards such as storms, droughts, transportation accidents, hazardous material spills, criminal activity (arson), or terrorism. Small structural fires occur more frequently and do not cause significant impacts on a community but significantly increase insurance rates (Michael Baker International, 2018).

Urban fires and explosion hazards often occur in more heavily populated and developed areas. Most fires affect only a few structures before being contained. However, the greatest risk is the potential of an urban fire to spread from one structure to another before it can be contained by local fire departments. The Boroughs of Mifflin County including, Burnham, Juniata Terrace, Kistler, Lewistown, McVeytown, and Newton Hamilton, are highly susceptible to urban fire and explosions due to high structural density and the age of their housing stock. Throughout the six Mifflin County Boroughs, most of the housing stock was constructed prior to 1940, before the present fire code and uniform construction code.

4.3.20.2 Range of Magnitude

Significant urban fires and explosions can result in the loss of life and property if they are not contained quickly. Municipalities with a higher population density face an increased risk of a large magnitude fire. Furthermore, urban fires can have devastating results in apartment buildings, were multiple families/residents may live. Not only is there an increased risk of lives lost, but multiple residents may be displaced for months at a time. Urban fires can also occur due to arson, which may target critical buildings and structures.

4.3.20.3 Past Occurrence

Pennsylvania experienced 13 major fires in suburban and urban settings between 1910 and 1990. Ten of thirteen fires occurred between the years 1980-1990. Current fire deaths in Pennsylvania average at approximately 13.2 deaths annually. The death rates are calculated based on all deaths in which exposure to fire, fire products, or explosion was the underlying cause of death or was a contributing factor in the chain of events leading to death.

Table 4.3.20-1: Urban Fire and Explosion Events in Mifflin County: 2013 – 2018 (PEMA – KC, 2018)

	2013	2014	2015	2016	2017	2018
Structure Fires	2	5	7	4	7	1
Vehicle Fires	0	1	0	0	0	0
Explosions	0	0	0	0	0	0

A significant fire event occurred in Juniata Terrace Borough on March 27, 2014 that required fire emergency assistance from five different counties. A six-alarm fire destroyed six row homes and affected a total of 25 homes (The Sentinel, March 29, 2014).

Figure 4.3.20-1: House fire caused by a lightning strike in Alfarata, Decatur Township, on July 2nd, 2017 (left) and the Juniata Terrace row home fire that damaged 25 homes on March 27th, 2019 (right) (Photographs courtesy of Mifflin County Alerts Facebook Page, July 2, 2017 and Jennifer Shreffler Ruble, March 27, 2014).

4.3.20.4 Future Occurrence

The probability of an urban fire or explosion occurring in Mifflin County is relatively low. The impacts of an urban fire or explosion depend greatly on location, magnitude, and sprinkler/detector use. Most urban fires are quickly contained and cause only localized damage, due to the proximity and rapid response time of emergency services personnel. However, it is predicted that the probability of urban fire occurrences will increase with population growth. Risk of urban fires also increases as the use of wood burning and kerosene space heaters increases.

4.3.20.5 Vulnerability Assessment

The vulnerability for an urban fire or explosion greatly depends on the vulnerability to other hazards. As mentioned above, most fires result from the secondary effect of another hazard. People that are 65 and older tend to be more vulnerable to fires than any other age group. They also experience the highest number of deaths per fire. The second most vulnerable age group is those who are aged 14 and younger. These groups are generally affected while they are at home, as they may often be home alone. Additionally, many homes destroyed by urban fires are often older homes in the community. Fire can spread faster in areas with high density housing, as opposed to rural areas. Potential secondary effects of an urban fire include utility failure and hazardous material spills.

With all fires, the response time of emergency personnel can greatly determine the impact of the fire. This is particularly critical in urban fires, due to the increased potential for loss of life and property. The U.S. Fire Administration defines "response time" as the beginning of ignition and continuing until the fire is extinguished. If an urban fire is not contained, certain secondary hazards could occur, such as power outages and temporary population displacements. The economic impact of widespread fires could be very devastating. Environmental hazards could also result from a wildfire or urban fire. Wildfires can damage lands and resources, and urban fires can damage infrastructure and property. Wildfires reduce vegetation and can cause soil erosion, which leads to soil runoff. This can impact the health of the county's watersheds by contaminating ground water sources and potential drinking water sources. Reduced vegetation and soil erosion can result in mudslides when precipitation returns, damaging transportation infrastructure. Existing forage for livestock and wildlife can be destroyed, further straining the ecosystem. Urban fires and explosions can also cause potential brief periods of airborne ash, smoke, or soot that may cause long-term health problems and raise health concerns among the county's residents. Lastly, hazardous materials releases in a fire could generate a public health emergency.

Chriss Schultz of the American Red Cross submitted a *New Mitigation Action* form to provide smoke detectors and basic fire safety training to residents (see Appendix C).

4.3.21 Utility Interruption

4.3.21.1 Location and Extent

Utility interruption hazards are hazards that impair the functioning of important utilities in the energy, telecommunications, public works, and information network sectors. Utility interruption hazards may include the following events:

- **Geomagnetic Storm -** Temporary disturbances of the Earth's magnetic field resulting in disruptions of communication, navigation, and satellite systems
- **Fuel or Resource Shortage** - Resulting from supply chain breaks or secondary to other hazard events
- **Electromagnetic Pulse** - Originating from an explosion or fluctuating magnetic field and causing damaging current surges in electrical and electronic systems
- **Information Technology Failure** - Due to software bugs, viruses, or improper use
- **Ancillary Support Equipment** - electrical generating, transmission, system control, and distribution system equipment for the energy industry
- **Public Works Failure** - Damage to or failure of highways, flood control systems, deep-water ports and harbors, public buildings, bridges, dams
- **Telecommunications System Failure** - Damage to data transfer, communications, and processing equipment
- **Transmission Facility or Linear Utility Accident** - Liquefied natural gas leakages, explosions, facility problems
- **Major Energy, Power, Utility Failure** - Interruptions of generation and distribution, power outages

Utility interruptions in Mifflin County include disruptions in fuel, water, electric, and telecommunications capabilities, but the primary focus is on electric power failures. Utility interruptions are often a secondary effect of another hazard event, such as extreme weather events. For example, windstorms and severe winter storms may bring down power lines and cause widespread disruptions in the delivery of electricity. Flooding at utility facilities can also disrupt supplies of potable water, electricity, and fuel. Utility interruptions occur countywide, and their geographic extent typically depends on the source of the utility interruption. Severe thunderstorms, tornadoes, and winter storms can also lead to more regional utility interruptions, while localized outages can be caused by traffic accidents or wind damage. Heat waves may also result in rolling blackouts where power may not be available for an extended period. With many Mifflin County residents depending on utilities, disruptions could lead to many households without heat or cooling. Below are the utility companies and providers in Mifflin County:

- **Electric** – Electric services are provided to Mifflin County by Penelec/GPU and the Valley Electric Cooperative (VREC).
- **Water and Wastewater** – Water and wastewater services in Mifflin County are provided by several municipal authorities listed below. The Laurel Creek Reservoir is the largest water source within the county.
    - **Water and Sewer** - Granville Township Municipal Authority
    - **Water -** McVeytown Borough Authority, Allensville Municipal Authority, Lewistown Borough Municipal Authority, and water is provided to Wayne Township, Kistler Borough, and Newton Hamilton Borough through Mount Union Borough, Huntingdon County
    - **Sewer -** Mt. Union Municipal Authority (only services Kistler Borough, Wayne Township, and Newton Hamilton Borough), Armagh Twp. Municipal Authority, Brown Twp. Municipal Authority, Burnham Borough Municipal Authority, Derry Twp. Municipal Authority, Borough of Lewistown, Union Twp. Municipal Authority, West Wayne Sewer Authority (joint authority with Newton Hamilton Borough)
- **Gas –** Natural gas services are provided to Mifflin County Penn Fuel Gas, Inc., Interboro Gas Company, UGI, and Lewistown Gas Company.

Communications – Verizon and AT&T/Sprint provide communications access to Mifflin County. There are also other lesser known communications providers.

Table 4.3.21-1 demonstrates the different types of fuels used in housing units, and the percent of each type in each municipality.

Table 4.3.21-1: Household Fuels by Municipality (U.S. Census Bureau, 2017)										
Municipality	Occupied housing units (Total Number)	Utility Gas	Bottled, Tank or LP gas	Electricity	Fuel oil, kerosene	Coal or coke	Wood	Solar Energy	Other Fuel	No fuel used
		Percent of Population								
Armagh Township	1,534	2.1	0.7	19.9	50.8	3.2	21.4	0.7	1.0	0.0
Bratton Township	584	5.0	1.0	24.1	41.8	4.1	20.7	0.0	2.2	1.0
Brown Township	1584	8.1	3.9	35.7	33.8	3.0	13.0	0.0	2.0	0.6
Burnham Borough	848	13.6	1.5	18.5	53.1	0.6	8.7	0.0	4.0	0.0
Decatur Township	1,143	1.4	7.5	12.7	38.4	3.7	33.6	0.0	2.1	0.6
Derry Township	3,193	14.9	2.9	20.5	48.0	0.8	9.8	0.0	3.1	0.0
Granville Township	2,163	4.1	4.0	28.9	44.4	2.5	13.6	0.0	1.4	1.0
Juniata Terrace Borough	244	64.3	1.6	13.1	18.0	0.0	0.8	1.2	0.8	0.0
Kistler Borough	146	0.0	5.5	23.3	63.0	1.4	6.2	0.0	0.7	0.0
Lewistown Borough	3,593	38.6	2.6	20.1	34.3	0.0	2.7	0.2	0.7	0.8
McVeytown Borough	172	2.9	3.5	26.7	59.9	0.0	5.2	0.0	1.7	0.0
Menno Township	527	0.4	0.0	13.5	22.8	1.3	60.7	0.0	1.3	0.0
Newton Hamilton Borough	61	0.0	0.0	27.9	65.6	1.6	3.3	0.0	0.0	1.6
Oliver Township	843	1.3	6.3	22.4	42.2	2.7	23.1	0.6	1.3	0.0
Union Township	1,279	8.3	3.8	24.9	41.9	0.0	17.5	0.0	1.9	1.6
Wayne Township	1,025	0.3	3.0	12.9	58.1	3.0	21.9	0.0	0.8	0.0

4.3.21.2 Range of Magnitude

Most severe utility interruptions and power failures are regional events. Loss of utilities can have numerous impacts, including but not limited to food spoilage, loss of water supply due to damaged pipeline or well pump failure, loss of heating or air conditioning, basement flooding, lack of indoor lighting, and lack of telephone and internet service. These issues range from a minor nuisance to a full hazard event, but the degree of damage or harm depends on the population affected and the severity of the outage. For example, loss of heating and cooling capability is more dangerous in the winter and summer months, when heat-sensitive populations like the elderly rely on utilities to maintain a safe temperature. At a minimum, utility interruptions can cause short-term disruption in the orderly functioning of business, government, and private citizen functioning and activities like traffic signals, elevators, and retail sales.

4.3.21.3 Past Occurrence

It is commonly known that utility failures occur annually, at a minimum. The PEMA Knowledge Center (PEMA – KC) tracks utility interruption events (See Table 4.3.21-2).

Table 4.3.21-2: Utility Interruption Events in Mifflin County: 2013 – 2018 (PEMA – KC, 2018)

Date(s)	Utility Interruption Event
11/28/13	Power Outage with 911 Tower Affected
1/7/14	Power Outage
5/20/14 – 5/22/14	Boil Water Advisory
7/2/14 – 7/3/14	Phone Outage
8/5/14 – 8/6/14	Utility Emergency
2/6/15	911 Outage
5/20/15	Gas Line Ruptured
6/8/15	Power Outage
7/20/15 – 8/13/15	Boil Water Advisory
12/14/15 – 12/15/17	Phone Outage
1/6/17 – 1/18/17	Phone Service Issue
9/4/17	Telecomm Outage
9/20/17 – 9/26/17	Water Main Break
10/2/17	Power Outage
3/6/18 – 3/8/18	Boil Water Advisory
3/26/18 – 4/5/18	Boil Water Advisory

Figure 4.3.21-1: Utility line interruption on April 19th, 2019 (right) and on December 25th, 2017 (left) (Photographs courtesy of Granville Fire Company Facebook Page, April 19, 2019 and December 25, 2017).

4.3.21.4 Future Occurrence

Minor, short-term utility interruptions may occur several times a year for any given area in the county, while major, long-term events taking place once every few years. Although utility interruptions may be difficult to predict, because they are frequent by-products of severe weather events, citizens should prepare for them during severe storms. Mifflin County has a back-up power system for all nursing homes and hospitals within the County. Some of these back-up power systems are for emergency or critical only. Mifflin County also has both cooling and warming facilities along with shelters, created in partnership with the American Red Cross for formal and short-term sheltering (Phil Lucas, personal communication, September 24, 2019). The future occurrence of utility interruptions should be considered moderately possible as defined by the Risk Factor Methodology probability criteria.

Utility interruptions become most significant when they involve the release of hazardous materials (Michael Baker International, 2018). Hazardous materials may be released in a pipeline accident or when a material is in transit. Utility pipelines carrying flammable materials have the possibility of exploding or starting a fire (Michael Baker International, 2018).

4.3.21.5 Vulnerability Assessment

Although the risk for future occurrence of utility interruptions is likely across Mifflin County due to the frequency of contributing factors such as transportation accidents and severe weather events, these

interruptions are typically short-lived. Hospitals and emergency medical facilities as well as retirement homes and senior centers are particularly vulnerable to power outages. While backup power generators are often used at these facilities, loss of electricity may result in hot or cold temperatures to which elderly populations are particularly vulnerable. Cynthia Hobbs of Kistler Borough submitted a 2019 *New Mitigation Action* form to flood proof the wastewater treatment facility and lift stations located in flood hazard areas to prevent backup of sewage into lines and homes during extended power outages (see Appendix C).

Figure 4.3.21-2: A storm in Mifflin County caused downed trees and power lines, with subsequent power outages (Photographs courtesy of Bradley Kreitzer, August 20, 2019).

Sentinel photos by BRADLEY KREITZER

ABOVE: A crew works to clear fallen branches from a building along the alley way between Shaw Avenue and Pannebaker Avenue Monday morning in Lewistown.

RIGHT: A crew works to clear fallen branches from a back yard of a home on Pannebaker Avenue Monday morning in Lewistown. The area was still without power since a storm ripped through Mifflin County Sunday evening, downing trees and power lines.

4.4. HAZARD VULNERABILITY SUMMARY

4.4.1 Methodology

Ranking hazards helps communities set goals and priorities for mitigation based on their vulnerabilities. A Risk Factor (RF) is a tool used to measure the degree of risk for identified hazards in a particular planning area. The RF can also be used to assist local community officials in ranking and prioritizing those hazards that pose the most significant threat to their area based on a variety of factors deemed important by the Steering Committee and other stakeholders involved in the hazard mitigation planning process. The RF system relies mainly on historical data, local knowledge, general consensus opinions from the Steering Committee, and information collected through development of the hazard profiles included in Section 4.3. 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 were obtained by assigning varying degrees of risk to five categories for each of the 21 hazards profiled in the 2019 MJHMP Update. Those categories include: *probability*, *impact*, *spatial extent*, *warning time,* and *duration*. Each degree of risk was assigned a value ranging from 1 to 4. The weighting factor is shown in Table 4.4.1-1. To calculate the RF value for a given hazard, the assigned risk value for each category was multiplied by the weighting factor. The sum of all five categories equals the final RF value, as demonstrated in the example equation:

Risk Factor Value = [(Probability x .30) + (Impact x .30) +
(Spatial Extent x .20) + (Warning Time x .10) + (Duration x .10)]

Table 4.4.1-1 summarizes each of the five categories used for calculating an RF for each hazard. According to the weighting scheme applied, the highest possible RF value is 4.0.

Table 4.4.1-1: Summary of Risk Factor Approach Used to Rank Hazard Risk (Michael Baker International, 2018)

Risk Assessment Category	Degree of Risk			Weight Value
	Level	Criteria	Index	
PROBABILITY *What is the likelihood of a hazard event occurring in a given year?*	**UNLIKELY**	LESS THAN 1% ANNUAL PROBABILITY	1	30%
	POSSIBLE	BETWEEN 1% AND 49.9% ANNUAL PROBABILITY	2	
	LIKELY	BETWEEN 50% AND 90% ANNUAL PROBABILITY	3	
	HIGHLY LIKELY	GREATER THAN 90% ANNUAL PROBABILITY	4	
IMPACT *In terms of injuries, damage, death, and economic impact, 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 AND MINIMAL DISRUPTION ON QUALITY OF LIFE. TEMPORARY SHUTDOWN OF CRITICAL FACILITIES.	1	30%
	LIMITED	MINOR INJURIES ONLY. MORE THAN 10% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE DAY.	2	
	CRITICAL	MULTIPLE DEATHS/INJURIES POSSIBLE. MORE THAN 25% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE WEEK.	3	
	CATASTROPHIC	HIGH NUMBER OF DEATHS/INJURIES POSSIBLE. MORE THAN 50% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR 30 DAYS OR MORE.	4	
SPATIAL EXTENT *How large of an area could be impacted by a hazard event? Are impacts localized or regional?*	**NEGLIGIBLE**	LESS THAN 1% OF AREA AFFECTED	1	20%
	SMALL	BETWEEN 1 & 10% OF AREA AFFECTED	2	
	MODERATE	BETWEEN 10 & 50% OF AREA AFFECTED	3	
	LARGE	BETWEEN 50 & 100% OF AREA AFFECTED	4	
WARNING TIME *Is there usually some lead time associated with the hazard event? Have warning measures been implemented?*	**MORE THAN 24 HRS**	SELF-DEFINED	1	10%
	12 TO 24 HRS	SELF-DEFINED	2	
	6 TO 12 HRS	SELF-DEFINED	3	
	LESS THAN 6 HRS	SELF-DEFINED	4	
DURATION *How long does the hazard event usually last?*	**LESS THAN 6 HRS**	SELF-DEFINED	1	10%
	LESS THAN 24 HRS	SELF-DEFINED	2	
	LESS THAN 1 WEEK	SELF-DEFINED	3	
	MORE THAN 1 WEEK	SELF-DEFINED	4	

(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)

(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)

4.4.2 Ranking Results

Using the methodology described in Section 4.4.1, Table 4.4.2-1 lists the RF calculated for each of the 21 potential hazards identified in the 2019 MJHMP Update. Hazards identified as *high* risk have risk factors greater than or equal to 2.5. RFs ranging from 2.0 to 2.4 were deemed *moderate* risk hazards. Hazards with RFs of 1.9 and less are considered *low* risk.

Table 4.4.2-1: Ranking of Hazard Types by the County Based on Risk Factor Methodology

Hazard	Risk Assessment Category					Calculated Risk Factor
	Probability (1-4)	Impact (1-4)	Spatial Extent (1-4)	Warning Time (1-4)	Duration (1-4)	
Flood, Flash Flood, Ice Jam	4	3	2	4	3	3.2
Hurricane, Tropical Storm, Nor'easter	4	3	3	2	2	3.1
Winter Storm	4	2	4	2	2	3.0
Wildfire	3	2	3	4	2	2.7
Radon Exposure	4	2	2	1	4	2.7
Utility Interruption	3	2	2	3	2	2.4
Tornado, Windstorm	2	3	2	4	1	2.4
Pandemic	2	2	3	1	4	2.3
Dam Failure	2	2	2	4	3	2.3
Drought	2	1	4	1	4	2.2
Environmental Hazards	2	2	2	4	2	2.2
Transportation Accidents	4	1	1	4	1	2.2
Urban Fire and Explosion	3	2	1	4	1	2.2
Subsidence, Sink Holes	3	2	1	4	1	2.2
Extreme Temperatures	2	1	4	1	1	1.9
Civil Disturbances	1	3	1	3	1	1.8
Invasive Species	2	1	2	1	4	1.8
Landslide	1	2	1	4	1	1.6
Lightning Strike	2	1	1	3	1	1.5
Building or Structure Collapse	1	2	1	2	1	1.4
Drowning	1	1	1	4	1	1.3

*Confirmed and expanded to reflect new hazards in 2019 MJHMP Update

Based on these results, there are 5 high risk hazards, 9 moderate risk hazards, and 7 low risk hazards in Mifflin County. Mitigation actions were developed for all high, moderate, and low risk hazards (see Section 6.4).

A risk assessment result for the entire County does not mean that each municipality is at the same amount of risk to each hazard. Table 4.4.2-2 shows the different municipalities in Mifflin County and whether their risk is greater than (>), less than (<), or equal to (=) the RF assigned to the County as a whole.

Table 4.4.2-2: Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk (*Jurisdictional Risk Evaluation* forms completed by 2019 MJHMP Update participants (see Appendix C))

Jurisdiction	Flood	Hurricane	Winter Storm	Wildfire	Radon Exposure	Utility Interruption	Tornado	Pandemic	Dam Failure	Drought	Environmental Hazards	Transportation Accidents	Urban Fire, Explosion	Subsidence, Sink Holes	Extreme Temperatures	Civil Disturbances	Invasive Species	Landslide	Lightning Strike	Building Collapse	Drowning
	3.2	3.1	3.0	2.7	2.7	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	1.9	1.8	1.8	1.6	1.5	1.4	1.3
Armagh Township	<	=	=	<	<	<	<	<	>	=	=	>	=	=	>	>	<	<	=	=	<
Bratton Township	>	=	=	<	<	>	<	<	<	>	>	>	<	<	<	<	=	>	<	>	>
Brown Township	=	=	=	=	>	>	<	<	<	>	>	>	<	>	>	<	<	<	>	=	>
Burnham Borough	<	=	=	<	<	>	<	<	<	>	>	<	<	<	>	<	>	<	>	>	>
Decatur Township	>	=	=	=	<	=	=	<	<	=	=	=	=	>	=	=	=	=	=	=	=
Derry Township	<	=	=	<	<	>	<	=	=	=	>	>	=	=	=	=	>	=	=	=	=
Granville Township	>	=	=	>	<	=	=	<	=	=	=	=	=	>	=	=	=	=	=	=	=
Juniata Terrace Borough	<	=	=	<	<	=	=	>	<	=	=	=	>	<	=	=	=	=	=	>	<
Kistler Borough	>	=	=	<	>	=	=	>	<	=	=	=	>	<	=	=	=	=	=	=	=
Lewistown Borough	<	=	=	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	<	>	<

Table 4.4.2-2: Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk (*Jurisdictional Risk Evaluation* forms completed by 2019 MJHMP Update participants (see Appendix C))

Jurisdiction	Flood	Hurricane	Winter Storm	Wildfire	Radon Exposure	Utility Interruption	Tornado	Pandemic	Dam Failure	Drought	Environmental Hazards	Transportation Accidents	Urban Fire, Explosion	Subsidence, Sink Holes	Extreme Temperatures	Civil Disturbances	Invasive Species	Landslide	Lightning Strike	Building Collapse	Drowning
	3.2	3.1	3.0	2.7	2.7	2.4	2.4	2.3	2.3	2.2	2.2	2.2	2.2	2.2	1.9	1.8	1.8	1.6	1.5	1.4	1.3
McVeytown Borough	=	=	=	<	<	>	=	=	=	=	=	=	=	=	>	=	=	=	=	>	>
Menno Township	<	=	=	>	=	=	=	=	<	=	=	=	=	=	=	=	>	=	=	=	=
Newton Hamilton Borough	>	=	=	<	<	=	=	>	<	=	=	=	>	<	=	=	=	=	=	>	=
Oliver Township	=	=	=	<	<	>	=	=	=	=	=	=	=	=	>	=	=	=	=	=	>
Union Township	>	=	=	>	>	=	=	<	=	=	=	=	=	>	=	=	=	=	=	>	=
Wayne Township	=	=	>	>	=	>	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=

4.4.3 Potential Loss Estimates

HAZUS-MH, version 4.0 was used to estimate flood losses at the countywide level. HAZUS is a standardized geospatial loss estimation software from FEMA. Inputs included:

- 2010 Census demographic and structural estimates
- Flood Depth Grid of FEMA's 1-Percent-Annual-Chance Floodplain (National Flood Hazard Layer, September 13, 2011)
- Critical Facilities provided by Mifflin County (April 2019)

The full suite of potential flood losses was calculated. The outputs included total economic loss, building damage, content damage, and other economic impacts that can be used in local response and mitigation planning activity.

HAZUS estimated 21,202 buildings in the County with a total building replacement value (excluding contents) of $4,371 million (2014 dollars). Approximately 92.11% of the buildings (and 72.51% of the building value) are associated with residential housing.

Building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were $147.11 million. 1% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 43.87% of the total loss. Table 4.4.3-1 below provides a summary of the losses associated with the building damage.

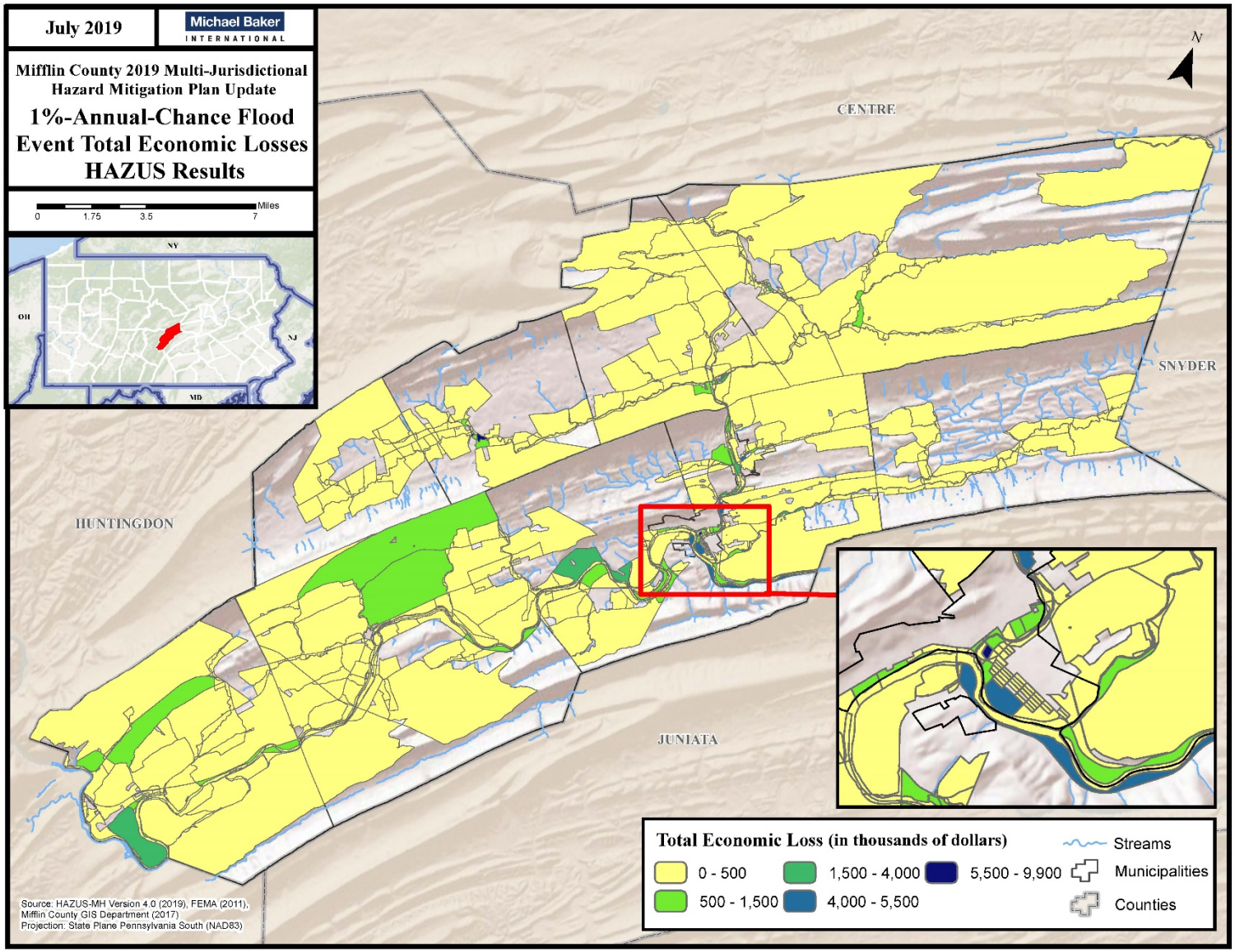
Table 4.4.3-1: HAZUS Estimated Flood Losses in Millions of Dollars

		Residential	Commercial	Industrial	Others	Total
Direct Building Loss	Building	44.25	12.36	4.40	3.04	64.04
	Content	20.89	35.82	10.61	12.30	79.61
	Inventory	0.00	1.31	1.85	0.30	3.46
	Subtotal	*65.14*	*49.48*	*16.85*	*15.63*	*147.11*
Business Interruption Loss		**Residential**	**Commercial**	**Industrial**	**Others**	**Total**
	Income	0.00	0.11	0.00	0.01	0.12
	Relocation	0.04	0.03	0.00	0.01	0.08
	Rental Income	0.01	0.02	0.00	0.00	0.02
	Wage	0.00	0.14	0.00	1.14	1.29
	Subtotal	*0.05*	*0.30*	*0.00*	*1.16*	*1.51*
Total		**65.20**	**49.78**	**16.85**	**16.79**	**148.62**

The following critical facilities were also analyzed for flood losses: Fire Stations (18), Medical Facilities (20), Police Stations (4), Emergency Operation Centers (1), and Schools (51). Out of these facilities, one Fire Station, one Medical Facility, and one School are estimated to be moderately damaged. No critical facilities are estimated to be substantially damaged. Figure 4.4.3-1 illustrates the distribution by Census Block of potential economic loss from a 1% annual-chance-flood, defined as the sum of direct building-related losses and business interruption losses. Total building-related economic loss is estimated to be

$147.11 million and total economic losses are estimated at $148.62 million. Losses are highest along the Juniata River in Brown Township, Burnham Borough, Granville Township, and Lewistown Borough, as well as the Kishacoquillas Creek in Union Township.

Figure 4.4.3-1: 1%-Annual-Chance Flood Event Total Economic Losses: HAZUS Results



4.4.4 Future Development and Vulnerability

Risk and vulnerability to natural and human-caused hazard events are not static. Risk will increase or decrease as counties and municipalities see changes in land use and development as well as changes in population. Mifflin County is expected to experience a variety of factors that will, in some areas, increase vulnerability to hazards, while in other areas, vulnerability may stay static or even be reduced.

Population change and the age of the housing stock are main indicators of vulnerability change in Mifflin County. As discussed in Section 2.3, according to the 2013-2017 American Community Survey population estimates, the population of Mifflin County decreased very slightly (-0.07%) between 2000 and 2017. The population change in the County can be seen in Table 2.3-3. This overall change reflects areas of growth in ten municipalities along with loss in population in the remaining 6. Of the ten municipalities that grew in this time period, three experienced growth of over five percent: Bratton Township (23.11%), Brown Township (5.74%) and Juniata Terrace Borough (24.50%). Of the six municipalities which experienced population loss between 2000 and 2017, four experienced loss over five percent: Burnham Borough (-7.60%), Lewistown Borough (-8.16%), McVeytown Borough (-10.12%), and Newton Hamilton Borough (-48.16%).

It is projected that the Mifflin County population will grow by 3.86% between the 2000 census and the 2030 census, for a gain of nearly 60 people, on average, annually from 2000 to 2030. The populations of Armagh Township, Bratton Township, Derry Township, and Granville Township are projected to experience modest growth of 1-8% during this time frame. Union Township is projected to grow 12%; Decatur Township, Menno Township, Oliver Township, and Wayne Township are projected to grow 20-23%; and Brown Township is projected to grow 34% between the years 2000 and 2030. Projected population losses range from nearly 15% (Kistler Borough); 20-25% for Burnham Borough, Juniata Terrace Borough, and Lewistown Borough; and roughly 30% for McVeytown Borough and Newton Hamilton Borough. In the municipalities losing population, some structures may become vacant and infrastructure will age, since there will be little new development that would spur updates. It is important that the County properly maintains its existing infrastructure and has plans to manage or redevelop vacant properties.

Areas of higher density face increased vulnerability and loss estimates from many hazard events, for example flooding, extreme temperature, hurricane, pandemic, tornado, building or structure collapse, civil disturbance, dam failure, transportation accidents, and urban fire. Rural areas with lower population density and more agricultural or forested land may be more vulnerable to drought, invasive species, and wildfire. In addition, remote and sparsely populated municipalities may also face higher vulnerability to hazards because they do not have easy access to care facilities or response personnel. For example, these residents face increased vulnerability to winter storms due to isolation, access issues, and longer emergency response times. As shown in Table 2.3-2, the boroughs have the highest population densities in Mifflin County, with the densest concentrations in Lewistown Borough, McVeytown Borough, and Juniata Terrace Borough, respectively. The lowest population densities are in Armagh Township and Bratton Township, respectively.

The aging housing stock in Mifflin County is another source of current and future vulnerability in many hazard events. The 2010 Census reported that about 53 percent of the housing units in Mifflin County were built before 1960. Only 12.4 percent of the housing units in Mifflin County were completed after 1990. Municipalities with the highest concentrations of units completed before 1950 include Juniata Terrace Borough (93.5%), McVeytown Borough (72.4%), Newton Hamilton Borough (68.1%), Lewistown Borough (67.8%), Burnham Borough (57.4%), and Bratton Township (50.2%). Throughout the six Mifflin County boroughs, most of the housing stock was constructed prior to 1940, before the present fire code and uniform construction code. Municipalities with older building structures may be more vulnerable to snowstorms because older roofs may not be able to handle a significant snow load. These municipalities with older buildings may 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, Mifflin County can experience gusts of wind up to 150 miles per hour during windstorms or tornadoes. The structure of these older houses may be more at risk of destruction under strong wind conditions.

The Housing Plan included as Chapter 10 of the Mifflin County Comprehensive Plan (Mifflin County Planning Commission, 2014) speaks to Mifflin County's long-term goal of improving housing availability and the quality of housing for all residents in the County. The majority of houses (75%) in the County were built prior to 1980. These houses often require one or more significant financial investments to bring them to compliance with current codes and standards as they are now over 39 years old. The lack of modernization puts these structures at greater risk to damage during a hazard event, as they are not necessarily as structurally sound as newer buildings. The County's plan to improve the quality of housing will help reduce risk to both human-caused and natural hazards. An additional area of interest is ensuring sufficient and appropriate housing for the County's more vulnerable populations, i.e., the elderly and those with functional needs.

Other common historical structures include bridges, which serve to connect roadways to communities in the county. Many of these bridges are old and need repairs. PennDOT determined that Pennsylvania has more than 25,000 state-owned bridges, the third largest number in the nation, that are an average of 50 years old (PennDOT, 2019). These aging bridges can potentially pose a hazard to the traveling public if structural deficiencies are not repaired or replaced in a timely manner. Furthermore, when these bridges were designed 50 to 100 years ago, they often were not designed to accommodate the level of stormwater flows now experienced due to increased development and impervious surfaces. Replacement of aging bridges may therefore have benefits in terms of both structural integrity and reduced flooding. However, during replacement, if traffic is detoured, the detour could potentially delay an evacuation.

5. CAPABILITY ASSESSMENT

Performing the Capability Assessment is important to formulate a viable mitigation strategy later in the planning process. A Capability Assessment has two components: an inventory of a jurisdiction's existing tools and an analysis of its capacity to use them effectively. The assessment process helps identify existing gaps, conflicts, and/or weaknesses that may need to be addressed through future mitigation planning goals, objectives, and actions. It also highlights the measures in place or already undertaken that merit continued support and enhancement through future mitigation efforts. The Capability Assessment also helps to ensure that proposed mitigation actions are practical, considering the local ability to implement them.

The Capability Assessment is an evaluation of Mifflin County's governmental structure, political framework, legal jurisdiction, fiscal status, policies and programs, regulations and ordinances, and resource availability. Each category is evaluated for its strengths and weaknesses in responding to, preparing for, and mitigating the effects of the identified hazards. The Capability Assessment has two components: (1) an inventory of the County's and municipalities' missions, programs, and policies and (2) an analysis of their capacity to execute them. A Capability Assessment is an integral part of the hazard mitigation planning process. Here, the County and municipalities identify, review, and analyze what they are currently doing to reduce losses and to identify the framework necessary to implement new mitigation actions. This information will help the County and municipalities evaluate alternative mitigation actions and address shortfalls in the mitigation Plan.

The evaluation of the categories listed above – governmental structure, political framework, legal jurisdiction, fiscal status, policies and programs, regulations and ordinances, and resource availability – allows the mitigation Steering Committee to determine the viability of certain mitigation actions. The Capability Assessment analyzes what Mifflin County and its municipalities have the capacity to do and provides an understanding of what must be changed to mitigate loss.

Throughout the planning process, the mitigation Steering Committee considered the County's 16 individual municipalities. Pennsylvania municipalities have their own governing bodies, pass and enforce their own ordinances and regulations, purchase equipment, and manage their own resources, including critical infrastructure. Therefore, this Capability Assessment must consider the various characteristics and capabilities of each municipality under study.

The *Standard Operating Guide* (Michael Baker Jr., Inc., 2013) for Pennsylvania's All-Hazard Mitigation Planning presents a standardized format for performing a capability assessment via municipal survey. This is presented in Section 5.2. Supplemental information on the existing resources within Mifflin County was also provided in the 2014 MJHMP via other data sources. Since this information does not fit within the standardized format but is still considered valuable, it was moved to this section and verified/updated where possible.

Human Resources

Human resources include local fire, police, ambulance, and emergency management and response personnel. There is a total of four law enforcement agencies;

- Lewistown Borough Police Department
- Granville Township Police Department, serving Granville Township and Juniata Terrace Borough
- Mifflin County Regional Police Department, serving Armagh Township, Brown Township, Derry Township, Union Township, and Burnham Borough
- Pennsylvania State Police (PSP) – Troop G, serving the balance of Mifflin County from its Lewistown Station, and assisting local departments upon request

Fire protection services in Mifflin County are entirely dependent upon volunteer personnel. Declining volunteerism in firefighting has impacted the effectiveness of fire protection services, i.e. response times. Municipalities in Pennsylvania may levy a fire tax to financially support their local fire departments. Only four municipalities in Mifflin County currently levy a fire tax. These include: Lewistown Borough, Burnham Borough, Granville Township, and Derry Township. Other municipalities, such as Wayne Township and Union Township, choose to support their local fire departments with an annual contribution.

Mifflin County is serviced by seven emergency medical service agencies. Five provide basic life support (BLS) service, namely Big Valley EMS, Milroy Ambulance Co., McVeytown EMS, Mount Union EMS, and FAME EMS. Three provide quick response services (QRS), namely Newton-Wayne Fire Co., Decatur Fire Co., and Milroy Ambulance Co. One, FAME EMA, provides Advanced Life Support (ALS). Much like volunteer fire companies, emergency medical services are in constant need of volunteers.

These units are dispatched by the Mifflin County 9-1-1 communications center headquartered in Lewistown. There are also 71 Box Alarms through the county for residents to notify emergency officials of an incident.

Physical Resources

Physical resources include the equipment, vehicles, public lands, facilities, and buildings available to the community.

Lewistown Hospital, a non-profit organization, is a 123-bed acute care community hospital serving the 80,000 residents of Mifflin and Juniata counties and members of the contiguous counties of Centre, Perry, Snyder, and Huntingdon. The hospital provides inpatient, outpatient, wellness, and community services. It employs over 1,000 full-time and part-time employees, including a medical staff of physicians and allied health practitioners in specialties ranging from family medicine, internal medicine, and cardiology to infectious disease and general / cardiovascular surgery. The three nursing homes in the county offer a total of 377 beds. All three accept private payment, as well as Medicare and Medicaid.

Table 5.0-1 list all medical facilities and services in Mifflin County, as listed in the Comprehensive Plan (Mifflin County Planning Commission, 2014).

Table 5.0-1: Medical Facilities and Services (Mifflin County Planning Commission, 2014)

Facility	Type of Ownership	Capacity	Services
Hospitals			
Geisinger-Lewistown Hospital	Profit	123	-
DaVita Lewistown Dialysis Center	Profit	14	Dialysis
Meadowview Manor Rehab Services	Profit	n/a	Physical Therapy
Mifflin County Community Surgical Center	Profit	n/a	Surgery
Nursing Homes			
William Penn Healthcare & Rehabilitation Center	Profit	121	Short Term Care, Dementia & Alzheimer's Care, Long Term Care
Ohesson Manor, a Diakon Lutheran Senior Living Community	Non-Profit	134	104 beds skilled care 30 beds dementia unit 32 residential cottages
Valley View Haven Retirement Community	Non-Profit	122	95 beds personal care suites 122 beds skilled care 118 residential cottages
Drug & Alcohol Facilities			
Clear Concepts Counseling	Profit	220	Outpatient Drug-Free
Pyramid Healthcare/Belleville	Profit	26	18 Inpatient Non-Hospital Drug-Free 8 Partial Hospitalization Drug-Free
Home Care Agencies/Registries			
Care for People/Care for People Plus, Reedsville			Profit
Community Resources for Independence, Inc., Lewistown			Profit
PRN Medical Staffing of Lewistown, Inc., Lewistown			Profit
UCP Central Pa, Lewistown			Profit
VNA Private Duty, Inc., Lewistown			Profit

During the 2019 MJHMP Update process, Jane Neff of Shelter Service, Inc., indicated via email correspondence dated March 5, 2019, that the facility can house up to 42 people in the emergency shelter. Shelter Service, Inc., also uses their Thrift Store to help those facing tragedy by allowing free shopping for necessities. Ms. Neff noted that the facility installed a Wi-Fi fire alarm system in the emergency shelter in February 2019 and that she was creating a risk management plan for the shelter that the Mifflin County Department of Public Safety offered to review. At completion Ms. Neff will make the risk management plan available to the local Fire Chief and EMS to aid them in building awareness and critical phone contacts for the emergency homeless site, in the event a local crisis would occur. Additionally, Shelter Service, Inc. offers utility assistance, housing financial assistance, and rental assistance, according to Mifflin County's website (http://www.co.mifflin.pa.us/dept/HS/Pages/Services-Housing.aspx).

The County also has numerous publicly-owned or leased facilities and land that may be available in various times of need. These properties are described in Table 5.0-2.

Table 5.0-2: County-Owned and County-Leased Property (Mifflin County, 2015)					
Description	**Sub-description**	**Street**	**City**	**State**	**Zip Code**
Government Center	Mifflin County Courthouse & Annex	20 North Wayne St.	Lewistown	PA	17044
County Offices	Children & Youth Office	144 East Market St.	Lewistown	PA	17044
	District Attorney's Office	20 North Main St.	Lewistown	PA	17044
	Domestic Relations Office, Extension Director, and Director of Outreach	152 E Market St. (Regional Business Center)	Lewistown	PA	17044
	Public Defender	15 North Dorcas St.	Lewistown	PA	17044
	Various, including but not limited to, Auditors, Coroner's Office, and the County Commissioners' Offices	20 North Wayne St.	Lewistown	PA	17044
Area Agency on Aging	Black Hospital Building	1 Buena Vista Circle	Lewistown	PA	17044
Courthouse	Historic Courthouse	Monument Square	Lewistown	PA	17044
Library	Mifflin County Library	123 North Wayne St.	Lewistown	PA	17044
MH/MR	Tri-County MH/MR	399 Green Ave, Suite 100	Lewistown	PA	17044
Prison	Mifflin County Correctional Facility	103 West Market St.	Lewistown	PA	17044
Bridge	Stone Arch Bridge		Lewistown	PA	17044
Public Square	Monument Square	Market St. & Main St.	Lewistown	PA	17044
Boat Launch	Mifflin County Boat Launch maintained by Oliver and Bratton Townships, and McVeytown Borough	River Road	Lewistown	PA	17044

Technological Resources

Technological resources include early warning systems, stream-level monitoring gauges, computer systems, the Internet, and 9-1-1 communications systems. At the time of the MJHMP's development, a number of technological resources were available to aid in hazard mitigation:

- A 9-1-1 communication system located in Lewistown, PA
- Stream-level monitoring gauge, located in Mifflin County, PA
- GIS and other computer systems

5.1. UPDATE PROCESS SUMMARY

Section 5 was largely reorganized during the 2019 MJHMP Update, in order to align with the standardized outline provided in the *Standard Operating Guide* (Michael Baker Jr., Inc., 2013). Likewise, the *Standard Operating Guide* presents a standardized format for performing a capability assessment via municipal survey, which is presented in Section 5.2. Supplemental information on the existing resources within Mifflin County was also provided in the 2014 MJHMP via other data sources. Since this information does not fit within the standardized format but is still considered valuable, Section 5 was reorganized and verified/updated where possible. Likewise, the data in Section 5.2 was verified where possible by online data sources and local plans. The Capability Assessment Survey was not re-administered in 2019, as it was considered too much of a burden on the municipal officials of Mifflin County, based on coordination of the other worksheets and data requests in 2019. Instead, municipal officials will review Section 5.2 during the public comment period and will provide any necessary updates or corrections at that time.

In order to learn more about the municipalities' involvement in the NFIP, MBI queried the Community Information System (CIS) and conducted phone interviews in 2019 to complete the *National Flood Insurance Program (NFIP) Compliance and Capabilities Worksheet*. Table 5.2.1-1 added in Section 5.2.1.2, listing municipal participation in the NFIP in terms of number of policies and coverage amounts. The results of the survey are summarized in Table 5.2.1-2, with the completed worksheets in Appendix C. In Section 5.2.1.3, the Planning and Regulatory Capability table was updated using FEMA CRS and the 2018 Mifflin County Directory, which lists many ordinances and plans for each municipality; the table was reviewed for accuracy by the municipalities during the public comment period. In Section 5.2.2, the Administrative and Technical Capability table was updated using the Pennsylvania Department of Community and Economic Development (2019) website for Municipal Statistics and will be verified by the municipalities. Additional funding sources were added to Section 5.2.3 on Financial Capability, and additional websites were added to Section 5.2.4 on Education and Outreach. Two tables were added to Section 5.2.5 Plan Integration: Mifflin County Comprehensive Plan (2014) Goals and Objectives which are Relevant to Hazard Mitigation Planning, as well as 2019 MJHMP Mitigation Goals and Objectives and Integration Opportunities into the Mifflin County Comprehensive Plan. These tables were accompanied by several specific examples of integration opportunities between these two key community plans.

5.2. CAPABILITY ASSESSMENT FINDINGS

Below are descriptions of the items listed in the Capabilities Assessment Survey. The self-assessment provided the County and each municipality with an opportunity to approximate the jurisdiction's capability to implement hazard mitigation strategies. The assessment reflects this capability in each of the major capability areas. Responses to this section of the survey can be found in Table 5.2-1.

With the exception of emergency managers and engineers or professionals trained in construction practices related to buildings and/or infrastructure (including building inspectors), very few of the municipalities had staff or access to personnel with technical expertise.

A majority of respondents indicated that there was limited capability in their respective jurisdiction to effectively implement hazard mitigation strategies.

Self-assessments of the different areas of capability also varied by municipality, but the overall trend showed that the communities have low capability to implement hazard mitigation strategies, especially in terms of fiscal capability.

Table 5.2-1: Self-Assessment of Capability (Capability Assessment developed in 2014 and reviewed in 2019)

H – High M – Moderate L – Limited	Planning and Regulatory Capability	Administrative and Technical Capability	Fiscal Capability	Community Political Capability	Community Resiliency Capability
Armagh Township	M	H	M	M	M
Bratton Township	L	L	L	L	L
Brown Township	H	H	M	M	M
Burnham Borough	H	M	M	M	M
Decatur Township	-	-	-	-	-
Derry Township	-	-	-	-	-
Granville Township	M	M	M	M	M
Juniata Terrace Borough	M	M	L	M	M
Kistler Borough	-	-	-	-	-
Lewistown Borough	-	-	-	-	-
McVeytown Borough	M	M	L	L	M
Menno Township	-	-	-	-	-
Newton Hamilton Borough	-	-	-	-	-
Oliver Township	L	M	L	M	M
Union Township	-	-	-	-	-
Wayne Township	-	-	-	-	-

**To be confirmed by municipalities during review of 2019 MJHMP*
(-) = no response

5.2.1 Planning and Regulatory Capability

Pennsylvania municipalities have the authority to govern more restrictively than the state and county minimum requirements, assuming they are in compliance with all criteria established in the Pennsylvania Municipalities Planning Code (MPC) and their respective municipal codes. Municipalities

can develop their own policies and programs and implement their own rules and regulations to protect and serve their local residents. Local policies and programs are typically identified in a comprehensive plan, implemented via a local ordinance, and enforced through the governmental body or its appointee.

Municipalities regulate land use via the adoption and enforcement of zoning, subdivision and land development ordinances, building codes, building permit ordinances, floodplain, and/or stormwater management ordinances. When effectively prepared and administered, these regulations can lead to hazard mitigation. For example, the adoption of the NFIP and the Pennsylvania Flood Plain Management Act (Act 166 of 1978) established minimum floodplain management criteria. A municipality must adopt and enforce these minimum criteria to be eligible for participation in the NFIP. Municipalities have the option of adopting a single-purpose ordinance or incorporating these provisions into their zoning and/or subdivision and land development ordinances, or building codes, thereby mitigating the potential impacts of local flooding.

5.2.1.1 Local Plans and Ordinances

Hazard Mitigation Plan

HMPs describe in detail the hazards that may affect the community, the community's vulnerability to those hazards, and an action plan for how the community plans to minimize or eliminate that vulnerability. MJHMPs are governed by the DMA 2000, and having a FEMA-approved MJHMP makes the jurisdiction eligible for federal mitigation funding. The previous County MJHMP was adopted in 2014.

Comprehensive Plan

A Comprehensive Plan is a policy document that states objectives and guides the future growth and physical development of a municipality. The Comprehensive Plan is a blueprint for housing, transportation, community facilities, utilities, and land use. It examines how the past led to the present and charts the community's future path. The MPC Act 247 of 1968, as reauthorized and amended, requires counties to prepare and maintain a county Comprehensive Plan. In addition, the MPC requires counties to update the Comprehensive Plan every 10 years. The County Comprehensive Plan was updated in 2014.

With regard to hazard mitigation planning, Section 301a. (2) of the MPC requires Comprehensive Plans to include a plan for land use, which, among other provisions, suggests that the plan should give consideration to floodplains and other areas of special hazards and other similar uses. The MPC also requires Comprehensive Plans to include a plan for community facilities and services and recommends giving consideration to storm drainage and floodplain management.

Floodplain Management Plan

Floodplain Management Plans describe how the community will reduce the impact of flood events through preventive and corrective actions. These actions may include mandated open space and prohibition of development in floodplains, property buyout, and other measures.

Open Space Management Plan (or Parks/Rec or Greenways Plan)

Open Space Management Plans are designed to protect the natural environment of the community. They describe how the community will manage woodlands, grasslands, and trails without sacrificing the economic goals of the community. These areas are most widely used for recreational purposes, but also serve as the primary habitat for a number of species of plants and animals.

The Juniata/Mifflin County Greenways, Open Space, and Rural Recreation Plan (2010) states that recreation opportunities promote health and wellness and a sense of community among participants and are vital for residents' quality of life.

- The plan's public input process found:
    - Recreation in the great outdoors is a hallmark of the bi-county region. Citizens ranked public forests, natural areas, playgrounds, and picnic areas as the top four recreation facilities or opportunities in the Counties.
    - Close to home parks are limited and there is not enough parkland to meet the recreation needs of the existing and projected population. Taking care of existing facilities and maximizing their use is preferable to building new facilities
    - Health issues related to the lack of physical activity are a major issue in Juniata and Mifflin Counties and citizens of all ages with varied interests should have access to programs and services. Year-round recreation should be a priority. The plan envisions plentiful recreational opportunities among the counties' natural resources and scenic landscapes.
- It advocates that outdoor recreation can improve health and wellness among citizens, expand tourism spending (time and dollars), and diversify amenities that attract and retain business. It recommends more parkland, land and water trails, and bikeways, as well as broader recreation programming.

Stormwater Management Plans

The proper management of stormwater runoff can improve conditions and decrease the chance of flooding. These ordinances are developed in conjunction with the guidelines established in the Pennsylvania Stormwater Management Act (Act 167 of 1978).

The Pennsylvania Department of Environmental Protection's Stormwater Management Program provides grant money to counties to develop stormwater management plans for designated watersheds. This planning effort, as required by the Stormwater Management Act (Act 167 of 1978), results in sound engineering standards and criteria being incorporated into local codes and ordinances in order to manage stormwater runoff from new development in a coordinated, watershed-wide approach. Without such planning, stormwater is either not controlled by municipal ordinances, or is addressed on a site-to-site or municipal boundary basis. Municipalities within the same watershed may require different levels of control of stormwater. The result is often the total disregard of downstream impacts or the compounding of existing flooding problems.

Municipalities have an obligation to implement the criteria and standards developed in each watershed stormwater management plan by amending or adopting laws and regulations for land use and development. The implementation of stormwater management criteria and standards at the local level is necessary, since municipalities are responsible for local land use decisions and planning. The degree of detail in the ordinances depends on the extent of existing and projected development.

Municipalities within rapidly developing watersheds will benefit from the Watershed Stormwater Management Plan and will use the information for sound land use considerations. The Watershed Stormwater Management Plan is designed to aid the municipality in setting standards for the land uses it has proposed. The Watershed Plan and the attendant municipal regulations are intended to prevent future drainage problems and avoid the aggravation of existing problems. Mifflin County has four major watersheds that lie entirely within the Susquehanna River drainage basin. Two of these watersheds, the Juniata River and Penns Creek, drain directly into the Susquehanna River. The other two major watersheds in the County, the Kishacoquillas Creek and Jacks Creek, drain into the Juniata River (Mifflin County Commissioners, 2000).

- Juniata River Watershed: The Juniata River Watershed is located in the southwest section of the County between the slopes of Jacks Mountain and Blue Mountain. The municipalities located in this watershed are Newton Hamilton, Kistler, McVeytown and Juniata Terrace Boroughs, as well as Oliver, Bratton, Wayne and a portion of Granville Townships.
- Penns Creek Watershed: The Penns Creek Watershed is located at the northeastern tip of the County on state forest land. Only a small portion of Armagh Township is located in this watershed.
- Kishacoquillas Creek Watershed: The Kishacoquillas Creek Watershed is located in the northern half of the County and consists essentially of the land area north of Jacks Mountain. The municipalities located in this watershed are Burnham and a portion of Lewistown Boroughs as well as Menno, Union, Brown and portions of Granville, Armagh, Derry and Decatur townships. The Kishacoquillas Creek Watershed Final Report within the Act 167 Stormwater Management Plan was adopted by all municipalities within the watershed, except for Menno Township (Mifflin County Planning Commission, 2003; William Gomes, personal communication, August 19, 2019).
- Jacks Creek Watershed: The Jacks Creek Watershed is located in the southeastern portion of the County bounded by the steep slopes of Jacks and Shade Mountain. The municipalities located in this watershed are a portion of Lewistown Borough as well as all of Decatur and a portion of Derry Township.

The Mifflin County Stormwater Management Plan was adopted by the Mifflin County Commissioners on June 17, 2010 and was also adopted by five municipalities. The Act 167 Plan was subsequently approved by the Pennsylvania Department of Environmental Protection (PA DEP) in September 2010. Funding for the plan was provided primarily by PA DEP and local sources (HRG, Inc. Engineering & Related Services, June 2010).

The Countywide Act 167 Plan was developed in accordance with the Pennsylvania Stormwater management Act, P.L. 864 No. 167, 1978 in order to maintain or decrease current flood levels by managing accelerated runoff from future development, prevent damage to stream banks, improve water quality and increase groundwater infiltration. The Act 167 Plan provides a holistic stormwater management plan for all of Mifflin County as opposed to individual watershed plans. The Plan is a policy document to manage stormwater runoff. The goals of the plan were established during the early stages of the project with input from the Watershed Plan Advisory Committee to meet requirements of the Act 167 Program, as well as the needs of Mifflin County. The Plan was developed to include strategies with these objectives in mind to address each of the Plan's goals. The model ordinance was developed through this planning process.

Natural Resource Protection Plan

Natural Resource Protection Plans are designed to protect woodlands, steep slopes, waterways, floodplains, wetlands, and coastal buffers through prohibiting or severely limiting development in these areas. Emergency managers and community planners have been made more and more aware of the benefits of protecting these areas as mitigation measures over the last few decades. For example, in 2007, the Pennsylvania Natural Heritage Program of the Western Pennsylvania Conservancy compiled and wrote *A Natural Heritage Inventory of Mifflin County, Pennsylvania*. This document contains information on the locations of rare, threatened, and endangered species as well as high quality natural areas in Mifflin County so that the inventory can serve as a conservation tool in making land management decisions.

Flood Response Plan

These plans describe how a community will respond to flood events. They include warning the public, evacuation and sheltering, emergency response, recovery, and mitigation of future events. Most communities in Pennsylvania have moved away from planning for individual hazards and now include flood response as part of their all-hazard EOPs.

Capital Improvements Plan

The Capital Improvements Plan is a multiyear policy guide that identifies needed capital projects and is used to coordinate the financing and timing of public improvements. Capital improvements relate to streets, stormwater systems, water distribution, sewage treatment, and other major public facilities. A Capital Improvements Plan should be prepared by the respective county's planning commission and should include a capital budget. This budget identifies the highest-priority projects recommended for funding in the next annual budget. The Capital Improvements Plan is dynamic and can be tailored to specific circumstances.

Economic Development Plan

An Economic Development Plan serves as a road map for economic development decision making, based on the collection of statistical data, historical perspective, and human potential, and it does the following:

- Clearly defines realistic goals and objectives
- Establishes a defined time frame to implement goals and objectives
- Communicates those goals and objectives to the organization's constituents
- Ensures effective use of the organization's resources
- Provides a baseline from which progress can be measured
- Builds consensus around future goals and objectives

The Mifflin County Economic Development Strategy has served as a policy guide since it was drafted in 2003, but the document was never finalized nor adopted. However, the Economic Development Strategy is included in the 2014 County Comprehensive Plan and was developed as a plan to coordinate and guide the county's economic development activities. The strategy is designed to ensure that the county retains the desirable characteristics and quality of life for the residents of Mifflin County, while at the same time taking the steps necessary to improve economic vitality and ensure jobs and income growth for the citizens of the county. The strategy encompasses an analysis of the overall economic structure of the county, labor force, land, and institutional infrastructure, as well as growth potential by industry. The analysis also includes an organizational matrix that identifies the agencies that provide economic development services and highlights development areas that are not addressed by those agencies. The strategy concludes with a recommended action plan.

Historic Preservation Plan

These plans describe how the community will preserve the historic structures and areas within it. Since these structures' pre-date building codes and modern community planning requirements, many of them are especially vulnerable to a variety of hazards. The Historic Preservation Plan may include measures to retrofit or relocate historic treasures out of hazard impact areas.

Mifflin County has played an important role in the industrial history of Pennsylvania as the center of transportation networks including the Juniata River Canal, the Pennsylvania Railroad, and the Pennsylvania Turnpike. The Planning and Development Department plays an important role in identifying historic resources, researching funding opportunities for preservation projects, and managing restoration and preservation grant projects for Mifflin County. Mifflin County published a historic preservation plan entitled, "Historical Sites Survey – Mifflin County," in 1978. The County has identified the need to update the plan with more recent data.

Floodplain Regulations

Through administration of the floodplain ordinances, the municipalities can ensure that all new construction or substantial improvements to existing structures that are located in the 1 percent chance floodplain are built with first-floor elevations at or above the Base Flood Elevation (BFE).

Zoning Regulations

Article VI of the MPC authorizes municipalities to prepare, enact, and enforce zoning to regulate land use. Its regulations can apply to the following:

- Permitted use of land
- Height and bulk of structures
- Percentage of a lot that may be occupied by buildings and other impervious surfaces
- Yard setbacks
- Density of development
- Height and size of signs

Zoning ordinances contain both a map that delineates zoning districts and text documenting the regulations that apply in each zoning district. Eight of the 16 municipalities in the County have zoning regulations.

Subdivision Regulations

Article V of the MPC authorizes municipalities to prepare, enact, and enforce a subdivision and land development ordinance, including regulations to control the layout of streets, minimum lot sizes, and the provision of utilities. The objectives of a subdivision and land development ordinance are to do the following:

- Coordinate street patterns
- Ensure that adequate utilities and other improvements are provided in a manner that will not pollute streams, wells, and/or soils
- Reduce traffic congestion
- Provide sound design standards as a guide to developers, elected officials, planning commissions, and other municipal officials

The Mifflin County Planning Commission has the authority to approve, approve with conditions, or disapprove all subdivisions and land developments that occur in municipalities that do not have an ordinance.

In cases where municipalities have their own Subdivision and Land Development Ordinance, plans must be submitted to the County Planning Commission for review, and the Planning Commission provides comments to the municipality within 30 days. Currently, 10 municipalities have their own subdivision regulations and ordinance, and the County manages the other six municipalities' regulations.

Stormwater Ordinance

According to Section 11(b) of the Stormwater Management Act, each municipality within the area covered by the Mifflin County Stormwater Management Plan is required to adopt or amend and implement ordinances and other regulations (parts of zoning, building code, subdivision and land development, and erosion and sedimentation control ordinances, etc.) that regulate development within the municipality in a manner consistent with the County's Plan and the provisions of the Stormwater Management Act. Stormwater management and ordinances are not present in all the municipalities within Mifflin County (William Gomes, personal communication, August 19, 2019).

Unified Development Ordinance

Unified Development Ordinances combine all other development ordinances (e.g., subdivision management, zoning) into a single document reflecting the community's vision for its development. Combining these documents helps to "de-conflict" any discrepancies among them, which may be due to the individual documents being required by separate legislation.

Post-disaster Redevelopment/ Reconstruction Ordinance

These ordinances are passed by proactive communities that recognize the complexities of post-disaster recovery. They describe the organization of the redevelopment oversight body, damage assessment, and recovery policies related to making the community more sustainable and safer following a disaster.

Building Code

Building codes are important in mitigation, because codes are developed for regions of the country in consideration of the hazards present within that region. Consequently, structures that are built to applicable codes are inherently resistant to many hazards like strong winds, floods, and earthquakes, and can help mitigate regional hazards like wildfires. In 2003 the Commonwealth of Pennsylvania implemented the Uniform Construction Code (Act 45 of 1999), a comprehensive building code that establishes minimum regulations for most new construction, including additions and renovations to existing structures.

The code applies to almost all buildings, excluding manufactured and industrialized housing (which are covered by other laws), agricultural buildings, and certain utility and miscellaneous buildings. The Uniform Construction Code (UCC) has many advantages in requiring builders to use materials and methods that have been professionally evaluated for quality and safety, as well as requiring inspections of completed work to ensure compliance.

If a municipality has "opted in," all UCC enforcement is local, except where municipal (or third-party) code officials lack the certification necessary to approve plans and inspect commercial construction for compliance with UCC accessibility requirements. If a municipality has "opted out," the Department of Labor and Industry is responsible for all commercial code enforcement in that municipality. The Department of Labor and Industry also has sole jurisdiction for all state-owned buildings no matter where they are located. All the municipalities in Mifflin County have "opted in" to the UCC.

Fire Code

Fire codes relate to both the construction and use of structures in terms of preventing fires from starting and minimizing their spread, and minimizing the injuries and deaths caused by a fire within a building. They govern such things as the following:

- Building materials that may be used
- The presence and number/type of fire extinguishers
- Means of egress
- Hazardous materials storage and use

Firewise

Firewise is a national program that brings together the response community, community planners, and homeowners to minimize the risk of wildfires. The program focuses on development that is compatible with the natural environment. Participation in the program is begun and maintained by groups of homeowners.

5.2.1.2 Participation in the National Flood Insurance Program (NFIP)

The Pennsylvania Flood Plain Management Act (Act 166 of 1978) requires every municipality identified by the Federal Emergency Management Agency (FEMA) to participate in the NFIP and permits all municipalities to adopt floodplain management regulations. It is in the interest of all property owners in the floodplain to keep development and land usage within the scope of the floodplain regulations for their community. This helps keep insurance rates low and makes sure that the risk of flood damage is not increased by property development.

Of the County's 16 municipalities, 15 participate in the FEMA NFIP and are in good standing. Table 5.2.1-1 provides the number of policies and coverage amounts.

Table 5.2.1-1: Mifflin County Municipal Participation in the National Flood Insurance Program (FEMA, 2018)				
Community	**Participation Status**	**Community in Good Standing**	**Policies in Force**	**Total Premium and Coverage**
Armagh Township	Participating	Yes	54	$36,416 (premium), $3,680,900 (coverage)
Bratton Township	Participating	Yes	4	$4,827 (premium), $503,100 (coverage)
Brown Township	Participating	Yes	39	$39,432 (premium), $3,295,500 (coverage)
Burnham Borough	Participating	Yes	16	$155,865 (premium), $6,401,200 (coverage)
Decatur Township	Participating	Yes	7	$6,685 (premium), $943,500 (coverage)
Derry Township	Participating	Yes	64	$85,087 (premium), $5,891,900 (coverage)
Granville Township	Participating	Yes	46	$39,441 (premium), $5,620,500 (coverage)
Juniata Terrace Borough	Not Participating	N/A	0	N/A
Kistler Borough	Participating	Yes	9	$7,932 (premium), $828,600
Lewistown Borough	Participating	Yes	166	$160,497 (premium), $18,096,800 (coverage)
McVeytown Borough	Participating	Yes	2	$489 (premium), $203,000 (coverage)
Menno Township	Participating	Yes	0	N/A
Newton Hamilton Borough	Participating	Yes	5	$2,498 (premium), $155,000 (coverage)
Oliver Township	Participating	Yes	14	$9,897 (premium), $896,300 (coverage)
Union Township	Participating	Yes	6	$7,244 (premium), $613,100 (coverage)
Wayne Township	Participating	Yes	21	$16,559 (premium), $2,385,200

The NFIP program is managed by participating municipalities through ordinance adoption and floodplain regulation, while the County provides an oversight and coordination role. Similarly, permitting processes needed for building construction and development in the floodplain are implemented at the municipal level through various ordinances (e.g. zoning, subdivision/land development and floodplain ordinances).

FEMA Region III makes available to communities an ordinance review checklist that lists required provisions for floodplain management ordinances. This checklist helps communities develop an effective floodplain management ordinance that meets federal requirements for participation in the NFIP.

The Pennsylvania Department of Community and Economic Development (DCED) provides communities, based on their CFR, Title 44, Section 60.3 level of regulations, with a suggested ordinance document to assist them in meeting the minimum requirements of the NFIP along with the Pennsylvania Flood Plain Management Act (Act 166). These suggested or model ordinances contain provisions that are more restrictive than state and federal requirements. Suggested provisions include but are not limited to the following:

- Prohibiting manufactured homes in the floodway
- Prohibiting manufactured homes within the area measured 50 feet landward from the top of a bank of any watercourse within a special flood hazard area
- Special requirements for recreational vehicles within the special flood hazard area
- Special requirements for accessory structures
- Prohibiting new construction and development within the area measured 50 feet landward from the top of a bank of any watercourse within a special flood hazard area
- Providing the County Conservation District an opportunity to review and comment on all applications and plans for any proposed construction or development in any identified floodplain area

In order to learn more about the municipalities' involvement in the NFIP, MBI queried the Community Information System (CIS) and conducted phone interviews in 2019 to complete the *National Flood Insurance Program (NFIP) Compliance and Capabilities Worksheet*. The results of the survey are summarized in Table 5.2.1-2, with the completed worksheets in Appendix C. See Appendix C for responses to these questions:

- Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability).
- What are the barriers to running an effective NFIP program in the community?
- Provide an explanation of the permitting process.

Additional details about the participation of Mifflin County municipalities in the NFIP are provided in Section 4.3.3, with NFIP participation listed in Table 4.3.3-6.

The Mifflin County Planning and Development Department developed the Mifflin County Subdivision and Land Development Ordinance in 1995 and was last updated in 2006. The ordinance applies to the municipalities in the County that do not have Subdivision and Land Development ordinances. The municipalities that are covered under the county ordinance are Bratton Township, Juniata Terrace Borough, Kistler Borough, McVeytown Borough, Newton Hamilton Borough, and Wayne Township. The remaining municipalities; Armagh Township, Brown Township, Burnham Borough, Decatur Township, Derry Township, Granville Township, Lewistown Borough, Menno Township, Oliver Township, and Union Township have developed and adopted separate subdivision and/or land use development plans. The

County's Subdivision and Land Development Ordinance addresses and complies with requirements set forth by the NFIP but currently do not have requirements that exceed the national standard.

Table 5.2.1-2: NFIP Compliance and Capabilities Worksheet Results (*National Flood Insurance Program (NFIP) Compliance and Capabilities Worksheet,* completed via FEMA (2018) and phone interviews (2019))

Municipality	How many claims have been paid in the community?	What is the total amount of paid claims?	How many of the claims were for substantial damage?	How many structures are exposed to flood risk within the community?	Do any areas regularly flood but not have NFIP policies?	Is the Community Floodplain Administrator or NFIP Coordinator certified?	Standalone floodplain management ordinance or part of zoning/subdivision?	Are there any outstanding compliance issues (i.e., current violations)?	When was the most recent Community Assistance Visit or Contact?	Is a Community Assistance Visit or Contact scheduled or needed?	When did the community enter the NFIP?	Are the FIRMS digital or paper?	Do floodplain development regulations meet or exceed FEMA or State minimum requirements?	Does the community participate in CRS?
Armagh Township	51	$260,378	2	282	No	No	Part	No	4/3/90	No	8/19/91	D – 8/16/06	Meet	No
Bratton Township	26	$299,404	6	45	No	No	Standalone	No	3/14/90	No	12/15/78	D – 8/16/06	Meet	No
Brown Township	82	$328,017	0	107	No	No	Part	No	4/3/90	No	8/19/91	D – 8/16/06	Meet	No
Burnham Borough	19	$248,008	0	95	-	-	-	No	7/20/89	No	2/15/78	D – 8/16/06	-	No
Decatur Township	2	$4,315	0	47	-	-	-	No	3/14/90	No	6/1/87	D-8/16/06	-	No
Derry Township	89	$1,245,068	6	241	-	-	-	No	4/3/90	No	9/1/78	D-8/16/06	-	No
Granville Township	23	$200,335	4	180	-	-	-	No	4/3/90	Possibly for CRS	8/15/78	D-8/16/06	-	Yes – Class 9
Juniata Terrace Borough	N/A	N/A	N/A	0				N/A	N/A	N/A	N/A	D-8/16/06		No
Kistler Borough	3	$7,479	0	15	-	-	-	No	None	No	9/15/77	D-8/16/06	-	No
Lewistown Borough	110	$696,474	4	240	No	No	Standalone	No	1/13/11	No	8/15/78	D-8/16/06	Meet	Yes – Class 8
McVeytown Borough	5	$116,234	0	14	No	No	Part	No	None	No	6/1/87	D-8/16/06	Meet	No
Menno Township	N/A	N/A	N/A	16	-	-	-	No	4/3/90	No	6/1/87	D-8/16/06	-	No
Newton Hamilton Borough	17	$169,629	3	32	-	-	-	No	8/15/88	No	2/15/78	D-8/16/06	-	No
Oliver Township	15	$77,444	1	166	No	No	Standalone	No	4/3/90	No	9/17/80	D-8/16/06	Meet	No
Union Township	10	$49,213	0	59	-	-	-	No	4/3/90	No	6/1/87	D-8/16/06	-	Yes – Class 10
Wayne Township	51	$543,628	5	264	No	No	Standalone	No	5/29/92	No	3/2/81	D-8/16/06	Meet	No

(-) = No response

National Flood Insurance Program – CRS

The NFIP's Community Rating System (CRS) provides discounts on flood insurance premiums in those communities that establish floodplain management programs that go beyond NFIP minimum requirements. Under the CRS, communities receive credit for more restrictive regulations, acquisition, relocation, or flood-proofing of flood-prone buildings, preservation of open space, and other measures that reduce flood damage or protect the natural resources and functions of floodplains.

The CRS was implemented in 1990 to recognize and encourage community floodplain management activities that exceed the minimum NFIP standards. Section 541 of the 1994 Act amends Section 1315 of the 1968 Act to codify the CRS in the NFIP and expands the CRS goals to specifically include incentives to reduce the risk of flood-related erosion and to encourage measures that protect natural and beneficial floodplain functions. These goals have been incorporated into the CRS, and communities now receive credit toward premium reductions for activities that contribute to them.

Under the CRS, flood insurance premium rates are adjusted to reflect the reduced flood risk resulting from community activities that meet a minimum of three of the following CRS goals:

- Reduce flood losses
- Reduce damage to property
- Protect public health and safety
- Prevent increases in flood damage from new construction
- Reduce the risk of erosion damage
- Protect natural and beneficial floodplain functions
- Facilitate accurate insurance rating
- Promote the awareness of flood insurance

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.

The three Mifflin County jurisdictions that are participating in the CRS are depicted in Table 5.2.1-3.

Table 5.2.1-3: Mifflin County CRS Jurisdictions (FEMA, 2016)		
Community Number	**Jurisdiction**	**Class**
421134	Granville Township	9
420687	Lewistown Borough	8
420834	Union Township	10

The Biggert-Waters Flood Insurance Reform Act of 2012 significantly raised subsidized flood insurance rates to actuarial rates, so the Homeowner Flood Insurance Affordability Act of 2014 made insurance rate transitions more gradual. The NFIP Reauthorization is currently in consideration of the US Congress and additional changes may be made. The summary for communities and policy holders is that the cost of insurance is likely to rise and that the investment in mitigation is likely to see additional benefits in both safety and savings. In response to these changes, FEMA is encouraging communities to consider joining the CRS or to increase their CRS activities to lower premiums for residents and also to consider pursuing FEMA grants through the Commonwealth (Michael Baker International, 2018).

5.2.1.3 Emergency Management

Emergency management is a comprehensive, integrated program of mitigation, preparedness, response, and recovery for emergencies/disasters of any kind. No public or private entity is immune to disasters, and no single segment of society can meet the complex needs of a major emergency or disaster on its own. Responses to this section of the survey can be found in Table 5.2.1-4.

Emergency Operations Plan

The Pennsylvania Emergency Management Services Code, Title 35, requires all political jurisdictions in the Commonwealth to have an Emergency Operations Plan (EOP), an Emergency Management Coordinator (EMC), and an Emergency Operations Center (EOC).

Mifflin County's EOP is updated every two years, complies with the National Incident Management System (NIMS) and is the basis for a coordinated and effective response to any disaster that may affect lives and property in Mifflin County. The EOP, or portions thereof, would be implemented when emergency circumstances warrant it. According to the Mifflin County Emergency Management Agency (EMA), six municipalities within Mifflin County have updated local EOPs.

Continuity of Operations Plan

Continuity of Operations (COOP) is a critically important planning principle for emergency managers as well as for municipal officials. National Fire Protection Association (NFPA) 1600 provides those with the responsibility for disaster and emergency management and COOP planning programs with the criteria to assess current programs or to develop, implement, and maintain a program to mitigate, prepare for, respond to, and recover from disasters and emergencies.

Evacuation Plan

Evacuation is one of the most widely used methods of protecting the public from hazard impacts. The easiest way to minimize death and injury due to a hazard event is to remove as many people as possible from its path. Evacuation plans include descriptions of the area(s) being evacuated, the demographics and characteristics of people within those area(s), transportation routes to safe areas, and how the community will support those individuals who do not have access to their own transportation. The community should also consider evacuation needs for areas and communities which may be more isolated, such as campgrounds and Amish communities.

To support this effort, Mifflin County maintains a special needs database. Bob Henry, representing Juniata Valley Behavioral & Developmental Services, noted during the Risk Assessment-Mitigation Solutions Workshop on February 26, 2019, that he considers this database valuable. Therefore, one of the mitigation actions for the 2019 MJHMP Update is to update the database of special needs populations in Mifflin County, by location and need. The database could be used during extended disaster events, in the event that residents are asked to shelter in place or to evacuate. The County could send resource-specific support for the evacuation or to check on special needs residents' welfare during the crisis.

Disaster Recovery Plan

A Disaster Recovery Plan (DRP) is a comprehensive set of measures and procedures that ensure essential, mission-critical resources and infrastructure are maintained or backed up by alternatives during various stages of a disaster. The DRP is another step to ensure the preparedness and ability to respond quickly and effectively to restore the community's essential services. The DRP addresses the public sector's responsibilities, including temporary shelter, refuse disposal, overall damage assessment, restoration of utility services, reconstruction priorities, financial assistance, and dealing with demands.

StormReady

StormReady is a program administered by the NWS. To be certified as StormReady, a community must establish links to the NWS's warning systems and relationships with NWS staff, establish a 24-hour warning point, ensure sufficient capability to respond to severe weather events, and provide public outreach and education.

Table 5.2.1-4: Planning and Regulatory Capability (Capability Assessment developed in 2014 and reviewed in 2019; FEMA, 2016; Mifflin County Board of Commissioners, 2018; municipal review)

	Hazard Mitigation Plan	Emergency Operations Plan	Evacuation Plan	Continuity of Oper. Plan	NFIP	NFIP-CRS	Floodplain Mgt./Ord.	Zoning Regulations	Subdivision Regulations	Comprehensive Land Use Plan	Open Space Mgt. Plan	Stormwater Mgt. Plan/Ord.	Natl Resource Protection	Capital Improvement Plan	Economic Development	Historic Preservation Plan	Farmland Preservation Plan	Building Code	Fire Code	Firewise	Storm Ready	Other
Armagh Township	Y	Y	-	-	Y	N	Y	N	Y	Y	-	Y	-	-	-	-	-	Y	-	-	-	-
Bratton Township	Y	-	-	-	Y	N	Y	N	N	N	-	N	-	-	-	-	-	Y	-	-	-	-
Brown Township	Y	Y	Y	-	Y	N	Y	Y	Y	Y	-	Y	-	-	-	-	-	Y	-	-	-	
Burnham Borough	Y	Y	-	-	Y	N	Y	Y	Y	Y	-	Y	-	-	-	-	-	Y	Y	-	-	-
Decatur Township	Y	-	-	-	Y	N	Y	N	Y	N	-	Y	-	-	-	-	-	Y	-	-	-	-
Derry Township	Y	-	-	-	Y	N	Y	Y	Y	Y	-	Y	-	-	-	-	-	Y	-	-	-	-
Granville Township	Y	Y	-	-	Y	Y	Y	Y	Y	Y	-	Y	-	-	-	-	-	Y	-	-	-	-
Juniata Terrace Borough	Y	Y	Y	Y	N	N	N	N	N	Y	-	Y	Y	Y	Y	-	-	Y	Y	-	-	-
Kistler Borough	Y	-	-	-	Y	N	Y	Y	N	Y	-	N	-	-	-	-	-	Y	-	-	-	-
Lewistown Borough	Y	-	-	-	Y	Y	Y	Y	Y	Y	-	Y	-	-	-	-	-	Y	-	-	-	-
McVeytown Borough	Y	-	-	-	Y	N	Y	Y	N	N	-	N	-	-	-	-	-	Y	-	-	-	-
Menno Township	Y	-	-	-	Y	N	Y	N	Y	Y	-	Y	-	-	-	-	-	Y	-	-	-	-
Newton Hamilton Borough	Y	-	-	-	Y	N	Y	N	N	Y	-	N	-	-	-	-	-	Y	-	-	-	-
Oliver Township	Y	-	-	-	Y	N	Y	N	Y	N	-	Y	-	-	-	-	Y	Y	-	-	-	-
Union Township	Y	-	-	-	Y	Y	Y	Y	Y	Y	-	Y	-	-	-	-	-	Y	-	-	-	-
Wayne Township	Y	Y	-	-	Y	N	Y	N	N	Y	-	N	-	-	-	-	Y	Y	-	-	-	-

(Y) = Plan is in place, (-) = no response

5.2.2 Administrative and Technical Capability

Responses to this section of the survey can be found in Table 5.2.2-1.

Planners with knowledge of land development/management practices

County Planning Commission

In Pennsylvania, planning responsibilities traditionally have been delegated to each county and local municipality through the MPC.

A planning agency acts as an advisor to the governing body on matters of community growth and development. A governing body may appoint individuals to serve as legal and engineering advisors to the planning agency. In addition to the duties and responsibilities authorized by Article II of the MPC, a governing body may, by ordinance, delegate approval authority to a planning agency for subdivision and land development applications. A governing body has considerable flexibility, not only as to which powers and duties are assigned to a planning agency, but also as to what form an agency will possess. A governing body can create a planning commission, a planning department, or both.

The purpose of the Mifflin County Planning Commission is to receive and make recommendations on public and private proposals for development, and to prepare and administer planning regulations. Subdivision and land development plans are also reviewed and approved by the Mifflin County Planning Commission, which works in conjunction with the municipal planning commissions, where applicable.

Municipal Planning Commission

The MPC conveys that the planning authority establishes the requirements that a municipality must follow.

Engineers or professionals trained in construction practices related to buildings and/or infrastructure (includes building inspectors)

A municipal engineer performs duties as directed in the areas of construction, reconstruction, maintenance and repair of streets, roads, pavements, sanitary sewers, bridges, culverts, and other engineering work. The municipal engineer reviews and/or prepares plans, specifications, and estimates of the work undertaken within the municipality.

Planners or engineers with an understanding of natural and/or human-caused hazards

When staff members who are responsible for community planning or engineering the structures on which people rely are familiar with the hazards that can impact the community, there is a great potential for synergy. These staff members will design the communities and structures with hazard impacts in mind, resulting in more sustainable communities and stronger structures.

Emergency manager

A municipal EMC is responsible for emergency management – preparedness, response, recovery, and mitigation within his/her respective Authority Having Jurisdiction (AHJ) (See Table 7.2-1 for EMC in each municipality within Mifflin County). The responsibilities of the EMC are outlined in PA Title 35 §7503:

- Prepare and maintain a current disaster emergency management plan
- Establish, equip, and staff an EOC
- Provide individual and organizational training programs
- Organize and coordinate all locally available manpower, materials, supplies, equipment, and services necessary for disaster emergency readiness, response, and recovery
- Adopt and implement precautionary measures to mitigate the anticipated effects of a disaster
- Cooperate and coordinate with any public and private agency or entity
- Provide prompt information regarding local disaster emergencies to appropriate Commonwealth and local officials or 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

Floodplain manager

Floodplain managers are experts in the rules and regulations of development in a floodplain and can provide vast amounts of information on the risks and impacts of building within those hazard areas. They are an integral part of the mitigation Steering Committee and can make recommendations based on the needs and conditions of the community.

Land surveyors

Land surveyors determine, among other things, the elevation of a given point (e.g., a structure). This is especially useful in determining what development lies in the floodplain but can also be useful in examining vulnerability to other hazards as well.

Scientist familiar with the hazards of the community

Natural and human-caused hazards' characteristics and impacts can be highly technical. Meteorology, aerodynamics, fluid dynamics, physics and health physics, chemistry, and several other scientific fields are involved in determining the impacts of a hazard event. Having access to a scientist who can describe the technical aspects of hazards in lay terms is important to having a sound mitigation strategy.

Staff with the education or expertise to assess the community's vulnerability to hazards

The basis of hazard mitigation is hazard identification and vulnerability assessment. Conducting the vulnerability assessment is a complicated process. Planners must know where to find data on the hazards and their impacts, and the characteristics of the community. More importantly, they must be able to combine these two sets of knowledge to make the analysis useful.

Personnel skilled in Geographic Information Systems (GIS) and/or FEMA's HAZUS program

Spatial and tabular data are linked in a computerized, visual format through the use of sophisticated GIS technology. Through GIS projects, it is possible to accomplish environmental restoration, economic development, "smart growth" land use planning, infrastructure development, and training to use GIS for decision support. Mifflin County has GIS capabilities that can assist the municipalities.

Resource development staff or grant writers

Few communities have the financial resources that are required to implement all of its potential programs (e.g., mitigation measures). Therefore, they must rely on grants and other fundraising opportunities to obtain the money necessary to perform mitigation projects. Many grants are competitive, and individuals can provide donations to a vast array of causes, so the community must demonstrate that it can use those funds better than other applicants. This may be difficult but having a specialist on staff will likely increase the community's chances of receiving funding.

Fiscal staff to handle large/complex grants

Many of the funding streams that can be used for hazard mitigation have substantial management and reporting requirements. Employing or having access to staff specializing in grants management will help the community ensure that it does not lose a grant opportunity because it did not meet the administrative requirements of that grant.

Table 5.2.2-1: Administrative and Technical Capability (Capability Assessment developed in 2014 and reviewed in 2019)

	Planners with land use/land development knowledge	Planners or engineers with natural and/or human caused hazard	Engineers or professionals trained in building and/or infrastructure	Emergency Manager	Floodplain Manager	Land Surveyors	Scientists or staff familiar with the hazards of the community	Personnel skilled in GIS or HAZUS program	Grant writers or fiscal staff to handle large/complex grants	Other
Armagh Township	Y	N	Y	Y*	Y*	N	N	Y	Y	-
Bratton Township	N	N	N	Y*	Y*	N	N	N	N	N
Brown Township	N	N	N	Y	Y*	N	N	N	N	-
Burnham Borough	N	N	Y	Y*	Y*	N	N	N	N	N
Decatur Township	-	-	-	Y*	Y*	-	-	-	-	-
Derry Township	-	-	-	Y*	Y*	-	-	-	-	-
Granville Township	N	N	N	Y	Y	N	N	N	Y	-
Juniata Terrace Borough	Y	Y	Y	Y	Y*	Y	Y	Y	Y	Y
Kistler Borough	-	-	-	Y*	Y*	-	-	-	-	-
Lewistown Borough	-	-	-	Y*	Y*	-	-	-	-	-
McVeytown Borough	N	N	N	Y	N	N	N	N	N	-
Menno Township	-	-	-	-	Y*	-	-	-	-	-
Newton Hamilton Borough	-	-	-	-	Y*	-	-	-	-	-
Oliver Township	Y	Y	Y	Y	Y	N	N	Y	N	-
Union Township	-	-	-	Y*	Y*	-	-	-	-	-
Wayne Township	N	N	N	Y	Y*	N	N	N	N	N

(-) = No response

*Updated using PA DCED, 2019, and by municipal review

Political Capability

Political capability refers to a jurisdiction's incentive or willingness to accomplish hazard mitigation objectives. It is measured by the degree to which local political leadership (including appointed boards) is willing to enact policies and programs that reduce hazard vulnerabilities in the community, even if met with some opposition. Examples may include guiding development away from identified hazard areas, restricting public investments or capital improvements within hazard areas, or enforcing local development standards that go beyond minimum state or federal requirements (e.g., building codes, floodplain management, etc.).

Local decision makers may not rank hazard mitigation as a high-priority task if there are other, more immediate political concerns. Unfortunately, it often takes a disaster to get people thinking about

hazard mitigation. Responding to and recovering from a disastrous event can exhaust local resources, thereby elevating hazard mitigation to the forefront.

Cooperation among planning commission officials, emergency management officials, and other officials is essential to achieving hazard mitigation objectives. Maintaining open lines of communication and sharing up-to-date information is key. Responses to this section of the survey can be found in Table 5.2.2-2.

Table 5.2.2-2: Community Political Capability (Capability Assessment developed in 2014 and reviewed in 2019)

	5 – Definitely Willing	4 – Very Willing	3 – Moderately Willing	2 – Somewhat Willing	1 – Not Very Willing	0 – Unwilling to Adopt Policies/Programs
Armagh Township	-	-	X	-	-	-
Bratton Township	-	-	X	-	-	-
Brown Township		X				
Burnham Borough	-	-	-	-	-	-
Decatur Township	-	-	-	-	-	-
Derry Township	-	-	-	-	-	-
Granville Township			X			
Juniata Terrace Borough	-	-	X	-	-	-
Kistler Borough	-	-	-	-	-	-
Lewistown Borough	-	-	X	-	-	-
McVeytown Borough	-	-	-	-	-	-
Menno Township	-	-	-	-	-	-
Newton Hamilton Borough	-	-	-	-	-	-
Oliver Township	-	-	X	-	-	-
Union Township	-	-	-	-	-	-
Wayne Township	-	-	-	-	-	-

(-) = no response

5.2.3 Financial Capability

Financial capability is important to the implementation of hazard mitigation activities, and every jurisdiction must operate within the constraints of limited financial resources. The following information pertains to various financial assistance programs pertinent to hazard mitigation. Responses to this section of the survey can be found in Table 5.2.3-1.

Grant programs that may be utilized to accomplish hazard mitigation objectives include the PA DCED's Land Use Planning and Technical Assistance (LUPTAP), Shared Municipal Services (SMS), Community Revitalization (CR) and Floodplain Land Use Assistance Programs; the PA DEP's Growing Greener, Act 167 Stormwater Management, Source Water Protection, and Flood Protection Programs; the PA DCNR's Community Conservation Partnership Program; PEMA's Pre-Disaster Mitigation (PDM) Grant, Flood Mitigation Assistance Grant Programs (FMA), and Hazard Mitigation Grant Program (HMGP); the Pennsylvania Infrastructure Investment Authority's (PennVEST) low interest loan and grant program; HUD's Community Development Block Grant Disaster Recovery Program (CDBG-DR); and various other federal and state programs that are listed below. Mifflin County employs a grant writer that can assist with pursuing grant opportunities such as these.

State programs which may provide financial support for mitigation activities include but are not limited to the list below.

- CFA/DCED Flood Mitigation Program,
- CFA/DCED H2O PA Flood Control Projects,
- CFA/DCED H2O PA High Hazard Unsafe Dam Projects,
- CFA/DCED H2O PA Water Supply, Sanitary Sewer and Storm Water Projects,
- CFA/DCED PA Small Water and Sewer,
- DCNR Community Conservation Partnerships Program,
- DCNR Pennsylvania Heritage Areas Program
- DCNR Pennsylvania Recreational Trails Program
- DCNR Land & Water Conservation Fund (LWCF)
- DCED Business Financing
- DCED Keystone Communities Program,
- DCED Local Government Capital Project Loan Program,
- DCED Municipal Assistance Program,
- DEP Growing Greener Program,
- Pennsylvania Governor's Center for Local Government Services Land Use Planning and Technical Assistance Program
- PennDOT Pennsylvania Infrastructure Bank (PIB) Loan,
- Pennsylvania Infrastructure Investment Authority (PENNVEST), and
- Pennsylvania Redevelopment Assistance Capital Program (RACP).
- Broadband programs: Broadband USA promotes innovation and economic growth by supporting efforts to expand broadband connectivity and digital inclusion across America. The Governor's Office of Broadband Initiatives administers the Pennsylvania Broadband Investment Incentive Program, the Pennsylvania Public Utilities Commission administers the Pennsylvania Universal Service Fund and the Pennsylvania Department of Labor and Industry, Office of Vocational Rehabilitation administers the Wireless Telecommunications Device Distribution Program. (Broadband USA, 2019)

Federal programs which may provide financial support for mitigation activities include but are not limited to the list below.

- Department of Commerce (DOC)/Economic Development Authority (EDA) Construction Grant Program
- Department of Energy Weatherization Assistance Program
- Department of Homeland Security Grant Program (HSGP)
- Department of Transportation/Federal Highway Administration Emergency Relief Program
- DOC/EDA Planning Grants
- DOC/EDA Revolving Loan Fund
- DOC/EDA Technical Assistance Grants
- FEMA Community Assistance Program – State Support Services Element (CAP-SSSE)
- FEMA Community Disaster Loan Program
- FEMA Community Rating System
- FEMA Emergency Management Performance Grants (EMPG)
- FEMA Environmental Planning and Historic Preservation Program (EHP)
- FEMA Flood Mitigation Assistance Program
- FEMA Hazard Mitigation Grant Program (HMGP)
- FEMA Individuals and Households Program (IHAP)
- FEMA National Dam Safety Program
- FEMA National Flood Insurance Program
- FEMA Pre-Disaster Mitigation Program
- FEMA Public Assistance Program (PA)
- FEMA Regional Catastrophic Preparedness Grant Program
- FEMA Repetitive Flood Claims Program (RFC)
- FEMA Severe Repetitive Loss Grant Program
- Housing and Urban Development (HUD) 5-H Homeownership Program
- HUD Community Development Block Grants (CDBG)
- HUD Community Development Block Grant Disaster Recovery Program (CDBG-DR)
- HUD Disaster Housing Assistance Program
- HUD/Federal Housing Administration (FHA) Title 1 Home Repair Loan Program
- HUD/FHA Section 203(h) Mortgage Insurance for Disaster Victims
- HUD/FHA Section 203(k) Rehabilitation Mortgage Insurance Program
- HUD Partnership for Advancing Technology in Housing
- HUD Section 108 Loan Guarantee Programs
- Internal Revenue Service Casualty Loss-Special Disaster Provisions
- National Oceanic and Atmosphere Administration (NOAA) StormReady Program
- Natural Resources Conservation Service (NRCS) easement programs
- Small Business Administration Disaster Loan Programs
- United States Army Corps of Engineers (USACE) General Investigation (GI)

- USACE Continuing Authorities Program
- USACE Flood Plain Management Services Program (FPMS)
- USACE Inspection of Completed Works Program (ICW)
- USACE National Levee Safety Program
- USACE Planning Assistance to States
- USACE Rehabilitation and Inspection Program (RIP)
- United States Department of Agriculture (USDA)/Farm Service Agency (FSA) Emergency Conservation Program
- USDA Emergency Conservation Program
- USDA/FSA Emergency Farm Loans
- USDA Non-insured Crop Disaster Assistance Program (NAP)
- USDA/NRCS Emergency Watershed Protection Program
- USDA Repair and Rehabilitation Loan
- USDA/Rural Housing Service (RHS) Community Facilities Loans and Grants
- USDA/RHS Rural Rental Loans
- USDA/RHS Section 502 Single-Family Housing Direct and Guaranteed Loans
- USDA/RHS Section 504 Repair Loans and Grants
- USDA/RHS Self-Help Housing Loans
- USDA/Risk Management Agency Federal Multi-Peril Crop Insurance
- USDA/Rural Business Service Business and Industrial Loans
- USDA Watershed Protection and Flood Prevention Program
- South Central Mountain Counter-Terrorism Task Force: Regional task force formed to integrate federal/state/county response to terrorism, institutionalize mutual aid, establish standing regional response groups, and encourage regional networking and communication. Homeland Security grants can be utilized through this group.

Capital improvement programming

Most capital improvement projects involve the outlay of substantial funds, and local government can seldom budget for these improvements in the annual operating budget. Therefore, numerous techniques have evolved to enable local governments to finance for capital improvements over a time period exceeding one year. Public finance literature and state laws governing local government finance classify techniques that are allowed to finance capital improvements. These techniques include revenue bonds; lease-purchase, authorities and special districts; current revenue (pay-as-you-go); reserve funds; and tax increment financing.

Some projects may be financed with general obligation bonds. With this method, the jurisdiction's taxing power is pledged to pay interest and principal to retire debt. General obligation bonds can be sold to finance permanent types of improvements, such as schools, municipal buildings, parks, and recreation facilities. Voter approval may be required.

Municipal Authorities

Municipal authorities are most often used when major capital investments are required. In addition to sewage treatment, municipal authorities have been formed for water supply, airports, bus transit systems, swimming pools, and other purposes. Municipal authorities have powers to receive grants, borrow money, and operate revenue-generating programs and are authorized to sell bonds, acquire property, sign contracts, and take similar actions. Authorities are governed by authority board members who are appointed by the elected officials of the member municipalities.

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 little individual cost.

Gas/electric utility fees

In the same way that special taxes can be levied to fund mitigation projects, another avenue for financing a project that a community may utilize is to dedicate a portion of homeowners' gas and electric utilities' fees to upgrade and maintain the related infrastructure. Burying transmission lines, thereby mitigating from the effects of winds and ice storms, is expensive. These fees help to offset that cost.

Water/sewer fees

Water Authorities and Fees

Water authorities are multipurpose authorities with water projects, many of which operate both water and sewer systems. The financing of water systems for lease back to the municipality is among the principal activities of the local government facilities' financing authorities. An operating water authority issues bonds to purchase existing facilities or to construct, extend, or improve a system. The primary source of revenue is user fees based on metered usage.

The cost of constructing or extending water supply lines can be funded by special assessments against abutting property owners. Tapping fees also help fund water system capital costs. Water utilities are directly operated by municipal governments and by privately owned public utilities regulated by the Pennsylvania Public Utility Commission. The Pennsylvania Department of Environmental Protection 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. The 16 municipalities within Mifflin County comprise 6 boroughs, and 10 townships. 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.

Circuit Rider Program

The Circuit Rider Program is an example of intergovernmental cooperation. This program offers municipalities the ability to join together to accomplish a common goal. The Circuit Rider is a municipal engineer who serves several small municipalities simultaneously. These are municipalities that may be too small to hire a professional engineer for their own operations yet need the skills and expertise the engineer can offer. Municipalities can jointly obtain what no single municipality could obtain on its own. Currently, only state-funded Circuit Rider Programs are offered through the PA Department of Conservation and Natural Resources Partnerships Program and the PA Department of Environmental Protection's Circuit Rider Program for Water and Wastewater Facilities.

Table 5.2.3-1: Financial Capability (Capability Assessment developed in 2014 and reviewed in 2019)

	Capital improvement programming	Community Development Block Grants (CDBGs)	Special purpose taxes	Gas/electric utility fees	Water/sewer fees	Stormwater utility fees	Development impact fees	General obligation, revenue, and/or special tax	Partnering arrangements or inter-governmental	Other
Armagh Township	-	Y	N	N	N	N	N	N	-	-
Bratton Township	N	N	N	N	N	N	N	N	N	N
Brown Township	N	Y	N	N	Y	N	N	N	N	N
Burnham Borough	N	N	Y	N	Y	N	N	N	N	N
Decatur Township	-	-	-	-	-	-	-	-	-	-
Derry Township	-	-	-	-	-	-	-	-	-	-
Granville Township	N	Y	N	N	Y	N	N	N	N	-
Juniata Terrace Borough	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Kistler Borough	-	-	-	-	-	-	-	-	-	-
Lewistown Borough	-	-	-	-	-	-	-	-	-	-
McVeytown Borough	N	N	N	N	Y	N	N	N	N	-
Menno Township	-	-	-	-	-	-	-	-	-	-
Newton Hamilton Borough	-	-	-	-	-	-	-	-	-	-
Oliver Township	N	N	N	N	N	N	Y	Y	N	-
Union Township	-	-	-	-	-	-	-	-	-	-
Wayne Township	-	-	-	-	-	-	-	-	-	-

**To be confirmed by municipalities in 2019*

(-) = No response

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 fire safety programs that fire departments deliver to students at local schools; participation in community programs, such as Firewise Communities Certification or StormReady Certification; and activities conducted as part of hazard awareness campaigns, such as Tornado or Flood Awareness Month. Informational resources include websites, brochures, pamphlets, workshops, and public service announcements.

There are several relevant websites available to the residents of Mifflin County:

- The Mifflin County website is located at http://www.co.mifflin.pa.us/Pages/default.aspx
- The Mifflin County Department of Public Safety has an informational website located at http://www.co.mifflin.pa.us/dept/PS/Pages/default.aspx as well as a Facebook page at Mifflin County 9-1-1 Facebook page at https://www.facebook.com/MifflinCountyPublicSafety/

- There is a social media group on Facebook, Mifflin County Alerts, located at https://www.facebook.com/groups/mifflincountyalerts. According to email correspondence from Colby Guyer (personal communication, July 3, 2019), member of the Lewistown Borough Planning Commission, the Facebook group has a very active local membership with over 15,000 residents in Mifflin County along with many close by. Many local radio stations, police, and organizations are already on and using the site.
- Information on hazard mitigation and how to protect oneself and one's home from common hazards was referenced at the websites for FEMA (www.fema.gov) and the Pennsylvania Emergency Management Agency (PEMA) (www.pema.state.pa.us).

5.2.5 Plan Integration

Plan integration recognizes that hazard mitigation is most effective when it works in efficient coordination with other plans, regulations, and programs. Plan integration promotes safe, resilient growth, effective emergency management, and an overall reduction of risk by ensuring that the goals and actions established in the MJHMP are included in comprehensive planning efforts so they can affect future land use and development. Some of the most important areas of planning and regulatory capabilities to integrate hazard mitigation goals and actions into include comprehensive plans, the hazard mitigation plans from all surrounding or encompassing areas, emergency operations plans, building codes, floodplain ordinances, subdivision and land development ordinances, stormwater management plans and ordinances, and zoning ordinances. All of these tools provide mechanisms for the implementation of adopted mitigation strategies. While Section 5.2.1 provides an overview of these types of regulations and tools, and details the work done by Mifflin County and its municipalities in these areas, the following section provides a discussion of how the Mifflin County 2019 MJHMP relates to some of these plans, how these plans and regulations were integrated into the MJHMP, and how these plans can be updated to further integrate hazard mitigation goals to reduce Mifflin County's vulnerability to hazards. The Mifflin County Comprehensive Plan is considered a prime candidate for plan integration, so emphasis was placed on this plan.

Mifflin County Comprehensive Plan

Method

The Mifflin County Planning Commission is responsible for maintaining and updating the County Comprehensive Plan. The Planning Commission meets regularly to review, discuss, and comment on municipal subdivision and land development plans, municipal floodplain ordinances, municipal stormwater management plans and ordinances, and other community planning and development matters. Mifflin County's Comprehensive Plan is dated April 24, 2014. This plan provides general direction and a blueprint for the future of Mifflin County and constituent communities. During the 2014 revision process the Mifflin County Hazard Mitigation Plan was used as a planning tool for the Comprehensive Plan revisions. As an example, the top four hazards profiled for the County were also profiled in the Comprehensive Plan, and land use ordinances for several municipalities were also updated and enacted.

The Planning Commission's meetings are open to the public and are advertised according to the Pennsylvania Sunshine Act (65 PA C.S.A.). All 16 municipalities in Mifflin County are covered by the County Comprehensive Plan. These practices will continue using the information in the MJHMP. During the development of both the 2014 MJHMP Update and the 2014 County Comprehensive Plan, there were several discussions between the MJHMP Steering Committee and Gannett Fleming, the consultant hired to develop the 2014 Mifflin County Comprehensive Plan. During these discussions, information was shared and incorporated into the respective plans.

Maintenance Schedule

Article III of the Pennsylvania Municipalities Planning Code (Act 247 of 1968, as reenacted and amended) requires all Pennsylvania counties (except Philadelphia) to adopt a comprehensive plan and update it at least every 10 years. Coupling this requirement with the Disaster Mitigation Act of 2000 (DMA 2000)-required five-year update cycle for MJHMPs, when possible, will allow the County to better integrate the County Comprehensive Plan and MJHMP planning processes and strengthen public participation for both efforts.

Alignment of Goals and Objectives

The 2014 Mifflin County Comprehensive Plan establishes the overall vision, goals, and objectives for the County's growth. Table 5.2.5-1 outlines those goals and objectives from the Comprehensive Plan which are supportive of hazard mitigation planning goals and principles.

Table 5.2.5-1: Mifflin County Comprehensive Plan Goals and Objectives which are Relevant to Hazard Mitigation Planning (Mifflin County Planning Commission, 2014)
Housing
Goal 1: To provide adequate safe housing at an affordable price.
Objective 1: Improve the condition of existing housing and neighborhoods.
Economic Development
Goal 1: To provide opportunities that diversify the County's economic base by building a more highly skilled workforce to attract new business and industry, and by creating new sites and marketing for industrial/commercial growth and development.
Objective 3: Designate and prepare new sites for industry and prioritize sites for redevelopment.
Land Use
Goal 1: To encourage sound, balanced land use and development practices in planned growth and planned conservation areas.
Objective 1: **Land Use Planning and Development:** Provide leadership and technical assistance to local municipalities in land use and development matters.
Objective 2: **Planned Growth Areas:** Encourage infrastructure and service intensive land uses to use, reuse and redevelop sites in compatible patterns within planned growth areas. Planned growth areas include the following, as shown on the Future Land Use map: • Urban Center Growth Areas that accommodate intensive uses and serve them with water and sewer utilities, a multi-modal transportation network, and proximity to public and community services. • High Growth Areas, further sub-classified as Residential or Commercial/Industrial, that accommodate community and economic development in urban and suburban patterns; • Village Center Growth Areas that accommodate intensive uses in smaller communities and typically serve them with water and/or sewer utilities, some transportation facilities, and proximity to some public and community services; • Limited Growth Areas that accommodate pockets of intensive uses with water and/or sewer utilities and some transportation facilities.
Objective 3: **Planned Conservation Areas:** Conserve, steward and wisely use the rural landscape as planned conservation areas for resource dependent land uses. Planned conservation areas include: • Agricultural and Rural Development Areas that support agriculture, forestry, mineral extraction and resource-based recreation and tourism uses, as well as low density residential uses. • Natural Resource Conservation Areas that conserve sensitive natural resources for their valued ecological functions and protect them from most development and its impacts.
Community Facilities, Services, and Utilities
Goal 1: To provide adequate infrastructure, and community facilities and services to meet the service demands required by existing and future development, as indicated by the Land Use Plan.
Objective 1: Provide efficient and effective emergency services, including prevention and response to public safety, fire, medical, hazardous materials, and natural disaster emergencies.
Objective 5: Encourage the planning, provision and maintenance of public drinking water supply systems to serve existing and planned development.

Table 5.2.5-1: Mifflin County Comprehensive Plan Goals and Objectives which are Relevant to Hazard Mitigation Planning (Mifflin County Planning Commission, 2014)
Objective 6: Advocate effective stormwater management planning and practices to manage the volume and rate of stormwater runoff generated by development and to prevent the degradation of surface water and groundwater quality, as well as to minimize and mitigate flooding hazards.
Objective 8: Promote the expansion of telecommunication, gas, and electrical services and the compatible integration of such utilities into new and existing communities to support planned economic development and enhance public safety.
Objective 9: Provide regional county parks and trails and encourage municipalities to provide local parks and recreation facilities to meet residents varied recreational needs.
Cultural and Historic Resources Plan
Goal 1: To preserve Mifflin County's cultural heritage and conserve its historic resources.
Objective 1: Preserve cultural and historic resources and their settings.
Objective 4: Encourage compatible development within and adjacent to historic districts and significant cultural landscapes.
Environmental Resources
Goal 1: To preserve, protect, and enhance environmental resources while accommodating planned growth.
Objective 1: Protect sensitive natural features from development and its adverse impacts; restore natural features and systems where feasible.
Objective 2: Protect scenic natural features, including steep slopes and ridgetops, from development and adverse impacts.
Objective 3: Conserve quality soils for agriculture and other open space benefits.
Objective 4: Protect surface water and groundwater resources.
Objective 5: Increase environmental awareness among residents.
Transportation
Goal 1: To achieve and sustain a complete, safe, and efficient multi-modal transportation system.
Objective 3: **Safety**: Support mobility and safety improvements across the transportation system.

As shown in the table above, there are many goals and objectives in the Mifflin County Comprehensive Plan (2014) that are supportive of hazard mitigation. All of the objectives which thoughtfully guide development or protect natural resources could mitigate numerous hazards. The community services Objective 1 to provide efficient and effective emergency services, including prevention and response to public safety, fire, medical, hazardous materials, and natural disaster emergencies, and Objective 6 to advocate effective stormwater management are directly related to hazard mitigation.

The next update of the Mifflin County Comprehensive Plan, presumably in 2023-2024, could utilize data from and further correlate with the goals and objectives of the 2019 MJHMP, or the 2024 MJHMP Update which may be underway simultaneously.

For example, the Comprehensive Plan's cultural and historic resources Objectives 1 and 4 could be supported by the analysis of historic structures within the SFHA, completed as part of the 2019 MJHMP Update (see Section 4.3.14).

Likewise, public services Objective 9 to provide regional county parks and trails and encourage municipalities to provide local parks and recreation facilities to meet residents varied recreational needs could be correlated to the new 2019 mitigation action to acquire tax repository properties that are within the SFHA for conversion to open space. As detailed in Section 4.3.3.5 (See Tables 4.3.3-8 and 4.3.3-10), a key tool for enabling the acquisition, management and repurposing of Repository List properties (or any vacant or blighted property) are land banks authorized through the Pennsylvania Land Bank Law (Act 153-2012). Since the law's enactment in 2012, approximately 21 land bank programs have been organized to facilitate the strategic acquisition, reclamation and repurposing of abandoned, tax-delinquent, unmarketable or other distressed properties, and temporarily hold and manage certain types of properties designated for reuse. Organizing a land bank program for Mifflin County may also be a useful tool to in part help the County and its municipalities mitigate flood risks to blighted and vacant properties located within the SFHA. This strategy could be explored further in the Comprehensive Plan.

As another example, the Comprehensive Plan's environmental resources Objective 5 to increase environmental awareness among residents could easily promote hazard mitigation awareness simultaneously. Flyers or township newsletter articles about the invasive spotted lanternfly, water conservation measures during a drought, and radon exposure are a few simple examples.

Additionally, the updated Comprehensive Plan could identify the places of higher vulnerability that are identified in the 2019 MJHMP for all of the high-risk hazards, and include objectives aimed at reducing the risk to these vulnerable areas. For example, an objective of the Comprehensive Plan could be to encourage elevation and flood proofing of structures in the SFHA by seeking Flood Mitigation Assistance (FMA) grants and strictly enforcing floodplain management ordinances in communities with a large percentage of its population and structures located in the SFHA, as quantified in Section 4.3.3.5 of the 2019 MJHMP.

During the 2019 MJHMP Update, data from the County Comprehensive Plan was incorporated into multiple aspects of this MJHMP such as to formulate the County profile, to detail the population projections, to identify medical facilities, and more.

Another key opportunity for further integration of hazard mitigation into planning and regulatory tools is to incorporate hazard mitigation goals and objectives into the next Mifflin County Comprehensive Plan update. The following table outlines which element of the Mifflin County Comprehensive Plan (2014) may be appropriate to incorporate goals and objectives from the 2019 Mifflin County MJHMP.

Table 5.2.5-2: 2019 MJHMP Mitigation Goals, Objectives, and Integration Opportunities into the Mifflin County Comprehensive Plan

Goals and Objectives from the 2019 MJHMP	Comprehensive Plan Integration Opportunity
Goal 1: Strengthen County and local capabilities to reduce the potential impact of flooding on existing and future public/partner assets, including structures, critical facilities, and technological hazards	Housing; Economic Development; Land Use; Community Facilities, Services, and Utilities; Cultural and Historic Resources; Environmental Resources
Objective 1.1: Protect existing structures from damage that can be caused by hazards	Housing; Cultural and Historic Resources
Objective 1.2: Promote management and regulatory procedures that would reduce the impacts of hazards on public and private property	Housing; Economic Development; Land Use; Community Facilities, Services, and Utilities; Cultural and Historic Resources; Environmental Resources
Objective 1.3: Develop local structural projects to reduce the impacts of natural and human-caused hazards on public and private property	Housing; Community Facilities, Services, and Utilities; Cultural and Historic Resources; Environmental Resources
Objective 1.4: Maintain streams and culverts to reduce back-up and flooding	Community Facilities, Services, and Utilities; Environmental Resources
Objective 1.5: Protect critical facilities from the impacts of natural and human-caused hazards	Land Use; Community Facilities, Services, and Utilities; Environmental Resources
Goal 2: Protect the citizens of Mifflin County as well as public and private property from the impacts of natural and human-caused hazards	Land Use
Objective 2.1: Develop regulations limiting development in hazard-prone areas	Economic Development; Land Use; Community Facilities, Services, and Utilities; Environmental Resources
Objective 2.2: Lessen impacts on natural resources and open space from natural and human-caused hazards	Economic Development; Land Use; Community Facilities, Services, and Utilities; Environmental Resources
Objective 2.3: Direct new growth away from hazard-prone areas	Economic Development; Land Use; Community Facilities, Services, and Utilities; Environmental Resources
Goal 3: Enhance planning and emergency response efforts among state, county, and local emergency management personnel to protect public health and safety	Land Use; Community Facilities, Services, and Utilities
Objective 3.1: Improve coordination and communication between departments and private industry	Land Use; Community Facilities, Services, and Utilities
Objective 3.2: Ensure adequate training and resources for those involved in emergency response, services, relief, or hazard mitigation	Land Use; Community Facilities, Services, and Utilities
Objective 3.3: Ensure adequacy of equipment and technology	Community Facilities, Services, and Utilities
Objective 3.4: Ensure that residents receive relief and are evacuated as quickly as possible in the event of a disaster	Community Facilities, Services, and Utilities; Transportation
Objective 3.5: Continue to foster development of information and resources for subsequent Hazard Mitigation Plans	Land Use; Community Facilities, Services, and Utilities

Table 5.2.5-2: 2019 MJHMP Mitigation Goals, Objectives, and Integration Opportunities into the Mifflin County Comprehensive Plan	
Goals and Objectives from the 2019 MJHMP	**Comprehensive Plan Integration Opportunity**
Goal 4: Build Mifflin County's spatial informational resources to strengthen public and private hazard mitigation planning and decision support capabilities	Land Use; Community Facilities, Services, and Utilities
Objective 4.1: Develop data management policies to ensure adequate data management	Land Use; Community Facilities, Services, and Utilities
Objective 4.2: Develop and update detailed databases related to hazards and hazard mitigation	Land Use; Community Facilities, Services, and Utilities
Goal 5: Increase public awareness on both the potential impacts of natural hazards and activities to reduce those hazards	Land Use; Community Facilities, Services, and Utilities; Environmental Resources
Objective 5.1: Develop public and business education and outreach programs on hazards and hazard mitigation	Land Use; Community Facilities, Services, and Utilities; Environmental Resources
Objective 5.2: Educate property owners in hazard-risk areas regarding their risks and the precautions they can take	Land Use; Community Facilities, Services, and Utilities; Environmental Resources
Objective 5.3: Encourage property owners in the 1% annual chance floodplain to purchase flood insurance	Land Use
Goal 6: Increase intergovernmental cooperation and build public-private partnerships to implement activities that will reduce the impact of natural, man-made, and technological disasters	Land Use; Community Facilities, Services, and Utilities
Objective 6.1: Improve hazard mitigation awareness and response for the private sector of Mifflin County	Land Use; Community Facilities, Services, and Utilities; Environmental Resources
Objective 6.2: Maintain open lines of communication between the County and the municipalities regarding hazard mitigation	Land Use; Community Facilities, Services, and Utilities
Objective 6.3: Discuss partnering opportunities with private entities	Land Use; Community Facilities, Services, and Utilities

Mifflin County Emergency Operations Plan

Method

The Pennsylvania Emergency Management Services Code (35 PA C.S. Sections 7701-7707, as amended) requires each county and municipality to prepare, maintain, and keep current an Emergency Operations Plan (EOP). The Mifflin County Department of Public Safety is responsible for preparing and maintaining the County EOP. The risk assessment information presented in the MJHMP can be used to update the hazard vulnerability assessment section of the County EOP. The risk assessment information will affect subsequent updates to the EOP.

Maintenance Schedule

The EOP is reviewed at least biennially. Whenever portions of the plan are implemented in an emergency event or training exercise, a review is performed, and changes are made where necessary. These changes are then distributed to the County's 16 municipal Emergency Management Coordinators (EMCs).

The Mifflin County Planning and Development Department and the Department of Public Safety should consider the County's MJHMP during its biennial review of the County EOP. Recommended changes to the MJHMP, based on changes to the EOP, will then be coordinated with the Steering Committee.

Act 167 Stormwater Management Plans

Method

Act 167 requires that all stormwater management plans include an analysis of present and projected land development in flood hazard areas and its sensitivity to damages from future flooding or increased runoff. In drafting Act 167 Stormwater Management Plans, the MJHMP's hazard profile on floods was consulted to identify the location and extent of flooding, range of magnitude, past occurrences, likelihood of future occurrences, and vulnerability assessment due to flooding events. The floodplain maps included in this MJHMP can be used as a reference to meet Act 167 requirements.

Maintenance Schedule

Like the MJHMP, stormwater management plans must be reviewed (and revised, if necessary) every five years. The Act 167 Stormwater Management Plan for Mifflin County is currently under consideration for an update (William Gomes, personal communication, August 19, 2019).

As these plans are reviewed by the Mifflin County Planning Commission, information gathered in the revision of these plans will be incorporated into the revision of the MJHMP, and vice versa.

Plan Interrelationships

Figure 5.2.5-1 illustrates the interrelationships between the MJHMP, County Comprehensive Plan, County EOP, and other community planning mechanisms and tools, such as the special needs database. Ensuring consistency between these planning mechanisms is critical. In fact, Section 301 (4.1) of the Pennsylvania Municipalities Planning Code requires that comprehensive plans include a discussion of the interrelationships among their various plan components, "which may include an estimate of the environmental, energy conservation, fiscal, economic development, and social consequences on the environment."

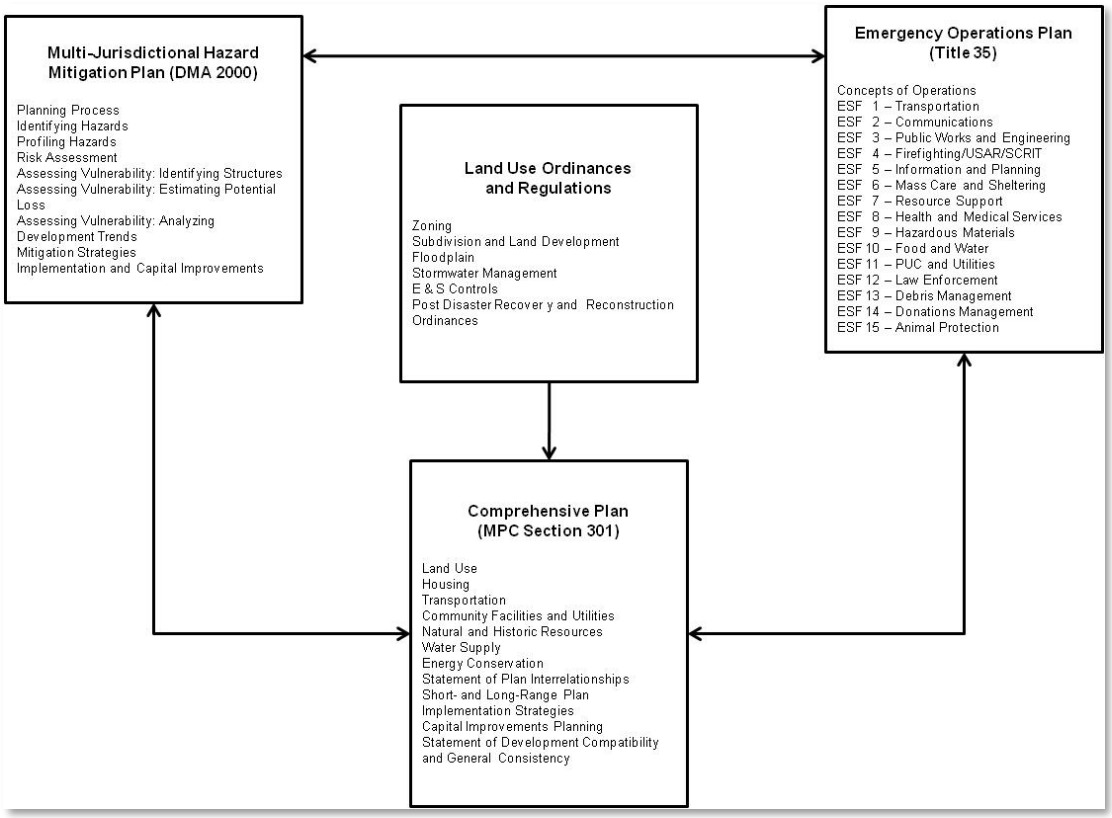
When developing the MJHMP, certain sections of the County Comprehensive Plan, EOP, and various land use ordinances and regulations provided key information. Moving forward, each of these documents should not be treated as unrelated and updated separately. The County and each participating municipality are responsible for incorporating the specific mitigation actions recommended in this Plan into the necessary planning documents, including the appropriate comprehensive plan, the County EOP, the County special needs database, and any land use ordinances and regulations.

For example, zoning and other land use regulations will be amended to reflect the newly identified hazard areas, to ensure that development in those areas is minimized or at least conducted in a way that otherwise mitigates against the effects of hazards (e.g., requiring structures built in the floodplain to be elevated). As proposed changes to building codes are presented, their potential for mitigating

damage due to hazards will be examined, and the changes will only be adopted if they are shown to lower risk. Changes to stormwater management plans will incorporate identified mitigation actions and will encourage increased participation in the NFIP.

To that end, Mifflin County and its municipalities must ensure that the components of the MJHMP are integrated into existing community planning mechanisms and are generally consistent with goals, policies, or recommended actions. Mifflin County and the Steering Committee will utilize the existing maintenance schedule of each plan to incorporate the goals, policies, or recommended actions as each plan is updated.

Figure 5.2.5-1: Plan Interrelationships (Mifflin County MJHMP, 2014)



6. MITIGATION STRATEGY

This section of the Mifflin County MJHMP identifies the goals, objectives, actions, and mitigation action plan for mitigating against the impacts of hazards.

Goals are general guidelines that explain what the County wants to achieve. Goals are usually expressed as broad policy statements representing desired long-term results.

Objectives describe strategies or implementation steps to attain the identified goals. Objectives are more specific statements than goals; the described steps are usually measurable and can have a defined completion date.

Actions provide more detailed descriptions of specific work tasks to help a community achieve the goals and objectives. For each objective statement, there are alternatives for mitigation actions that must be evaluated to determine the best choices for each situation.

The Mitigation Action Plan includes a listing and description of the preferred mitigation actions and the strategy for implementation (e.g., who is responsible, how will they proceed, when should action be initiated and/or completed, etc.).

6.1. UPDATE PROCESS SUMMARY

The goals, objectives, and actions listed in the 2014 MJHMP were discussed at the Kick-off Meeting for the Steering Committee on January 15, 2019, and again at the Risk Assessment and Mitigation Solutions Workshops for the Steering Committee and Additional Stakeholders in February-April 2019. During this review, the Steering Committee members and stakeholders were invited to comment on the goals, objectives, and actions that were listed in the 2014 MJHMP. No comments were received on the goals or objectives, so these were carried over from the 2014 MJHMP (see Table 6.2-1 in Section 6.2).

The *Mitigation Action Progress Report Form* was also distributed at these meetings and was completed by Kay Hamilton of Brown Township and Ron Napikoski of Derry Township and Geisinger-Lewistown Hospital (see Appendix C), both of whom indicated that their township had completed the 2014 action of "ensure County and municipal subdivision and land development ordinances are consistent with Chapter 102 Erosion and Sedimentation Control Requirements." Additionally, Mr. Napikoski indicated that Derry Township had completed the 2014 action of "encourage municipalities to develop and enact storm water management ordinances consistent with Act 167 Storm Water Management Plans." Mr. Napikoski commented that Derry Township is working with Mifflin County on grants for routine inspection and maintenance of bridges and that Geisinger-Lewistown Hospital encourages exercises and drills. Mr. Napikoski also noted that Geisinger-Lewistown Hospital participates in developing Memorandums of Understanding/Memorandums of Agreement (MOUs/MOAs) with neighboring counties and jurisdictions regarding information sharing, resource allocation, and Continuity of Operations Planning locations for use during times of disaster; working with medical suppliers to develop MOUs/MOAs for use during disasters; and working with non-medical suppliers to develop MOUs/MOAs for use during disasters.

Although this mitigation action was not specifically listed in the 2014 MJHMP, Brown Township has made progress on one mitigation project in recent years. Brown Township applied for a Flood Mitigation Grant in 2017, proposing to install an impermeable sheet piling barrier in Reedsville, to protect 81 structures between Honey Creek and Willow Lane from flooding. Brown Township received only a portion of the requested grant funding, so they have adapted the funded project description to include improvements to existing stormwater piping and inlets, spot repairs of the existing berm, geotechnical investigation/testing of the berm, and final engineering design, as ongoing Phase I. Brown Township also submitted a *New Mitigation Action* form as part of the 2019 MJHMP Update, for Phase II, to install the impermeable sheet piling barrier as additional funding becomes available.

At the Steering Committee Kick-off Meeting and at the Risk Assessment and Mitigation Solutions Workshops, there was consensus that the 39 mitigation actions included in the 2014 MJHMP had not really been pursued since 2014, because responsible parties were not identified, and the level of detail was not sufficient for any actionable steps towards their implementation. It was agreed that these actions should be replaced entirely with new actions clearly identifying the applicable municipality and responsible entity. To this end, 36 *New Mitigation Action* forms were submitted during the 2019 MJHMP Update, by the municipalities and the County, and 19 new actions were proposed by MBI based on conversations throughout the update process, to ensure that the 2019 MJHMP includes at least 1 action for each hazard profiled, to promote outreach with the County's sizeable Amish population, and to encourage follow through with annual MJHMP update meetings and plan integration. All actions moving forward have a clear agency and clear responsibility. Table 6.1-1 lists the 2014 MJHMP mitigation actions, which were all discontinued. The 2019 MJHMP actions are discussed in Section 6.4.

Table 6.1-1: Mitigation Actions from the 2014 MJHMP
Action 1.1.1 - Continue to encourage routine inspection and maintenance of bridges.
Action 1.1.2 - Continue open communications with dam owners to ensure all of the County's dams are structurally sound.
Action 1.2.1 - Encourage municipalities to develop and enact storm water management ordinances consistent with Act 167 Storm water Management Plans
Action 1.2.2 - Collect and analyze data on the specific locations and damages caused by flooding in each of the municipalities in Mifflin County to include in the 5-year update of the Hazard Mitigation Plan
Action 1.2.3 - Adopt a county-wide post-disaster recovery and reconstruction ordinance using the model ordinance included in the APA/FEMA PAS Report No. 483/484
Action 1.2.4 - Ensure County and municipal subdivision and land development ordinances are consistent with Chapter 102 Erosion & Sedimentation Control Requirements
Action 1.3.1 - Encourage the acquisition and demolition, or elevation of structures in flood prone areas
Action 1.4.1 - Work with municipalities to regularly inspect culverts
Action 1.4.2 - Work with municipalities to create and maintain a County-wide database of streams prone to back-up and flooding
Action 1.5.1 - Conduct a thorough critical facilities vulnerability assessment and impact analysis using HMP's GIS-based critical infrastructure history
Action 1.5.2 - Conduct analysis on the future demand for expanded infrastructure and critical facilities in Mifflin County
Action 2.1.1 - Continue to encourage the development of safety buffers between industrial facilities and the population
Action 2.1.2 - Encourage and enforce as necessary the requirement of special use permits for hazard-prone areas
Action 2.2.1 - Continue to encourage the review of planned infrastructure to ensure that it will be developed outside of hazard-prone areas
Action 2.3.1 - Evaluate and refine the County's repetitive loss structures list by ranking properties based on the number of losses and the value of the claims paid and target the priority properties for buyout opportunities
Action 2.3.2 - Coordinate with the municipal zoning boards to stop growth in the floodplain
Action 3.1.1 - Implement a County Coalition program to staff and fund a full-time county engineer that would be shared by both county and participating municipalities to provide technical reviews and inspections
Action 3.1.2 - Continue the integration of the 5-year maintenance cycle of the Hazard Mitigation Plan with both the 10-year and biennial review and maintenance cycles of the County Comprehensive Plan and the County Emergency Operations Plan, respectively.
Action 3.2.1 - Update the Mifflin County's Emergency Operations Plan to be consistent with the National Response Plan
Action 3.2.2 - Continue to encourage multi-jurisdictional exercises and drills
Action 3.3.1 - Maintain an inventory of equipment used for emergency response

Table 6.1-1: Mitigation Actions from the 2014 MJHMP
Action 3.4.1 - Maintain a web-based inventory of the County's at-risk populations to strengthen emergency response and evacuations
Action 3.5.1 - Maintain a list of repetitive loss structures from the Governor's Center for Local Government Service's NFIP Coordinator and incorporate the data into the County Hazard Mitigation Planning Project.
Action 3.5.2 - Continue to work with municipalities to identify and incorporate hazard mitigation project opportunities to include in the 5-year update of the HMP
Action 3.5.3 - Collect and analyze data on the specific impacts that all identified hazards have on Mifflin County and its municipalities to include in the 5-year update of the Hazard Mitigation Plan
Action 4.1.1 - Implement a County-wide electronic damage assessment management tool to increase the efficiency of county and municipal damage survey and reporting
Action 4.2.1 - Create a GIS dataset of the locations of the SARA facilities in Mifflin County to analyze their vulnerability to potential hazards
Action 4.2.2 - Review and approve the Mifflin County DFIRM information and incorporate the data into the County GIS
Action 5.1.1 - Cooperate with local media to produce regular public service announcements or news releases on hazard risk, safety, and the importance of mitigation
Action 5.2.1 - Continue to disseminate information on the County website for residents that explains the risk of hazards, outlines precautionary measures that can be taken to help reduce impacts of disaster to themselves and their property, and emphasizes the value of hazard mitigation.
Action 5.3.1 - Conduct outreach to municipalities to ensure compliance with NFIP
Action 5.3.2 - Develop informational workshops on risk and mitigation for property owners in areas prone to flooding
Action 6.1.1 - Establish relationships with civic groups to encourage mitigation actions.
Action 6.1.2 - Promote C.E.R.T recruitment and training
Action 6.2.1 - Continue to include municipal leaders regarding risk, severity, and preparedness tips for seasonal hazards
Action 6.2.2 - Develop MOUs/MOAs with neighboring counties and jurisdictions regarding information sharing, resource allocation, and COOP locations for use during times of disaster
Action 6.3.1 - Work with the medical suppliers to develop MOUs/MOAs for use during disasters
Action 6.3.2 - Work with non-medical suppliers to develop MOUs/MOAs for use during disasters
Action 6.3.3 - Develop workshops with the Chamber of Commerce emphasizing the importance of Continuity of Operations planning for all businesses

6.2. MITIGATION GOALS AND OBJECTIVES

The 6 goals and 21 objectives from the 2014 MJHMP will be carried over to the 2019 MJHMP, as listed in Table 6.2-1.

Table 6.2-1: Goals and Objectives from the 2014 MJHMP, Retained for the 2019 MJHMP
Goal 1: Strengthen County and local capabilities to reduce the potential impact of flooding on existing and future public/partner assets, including structures, critical facilities, and technological hazards
Objective 1.1: Protect existing structures from damage that can be caused by hazards
Objective 1.2: Promote management and regulatory procedures that would reduce the impacts of hazards on public and private property
Objective 1.3: Develop local structural projects to reduce the impacts of natural and human-caused hazards on public and private property
Objective 1.4: Maintain streams and culverts to reduce back-up and flooding
Objective 1.5: Protect critical facilities from the impacts of natural and human-caused hazards
Goal 2: Protect the citizens of Mifflin County as well as public and private property from the impacts of natural and human-caused hazards
Objective 2.1: Develop regulations limiting development in hazard-prone areas
Objective 2.2: Lessen impacts on natural resources and open space from natural and human-caused hazards
Objective 2.3: Direct new growth away from hazard-prone areas
Goal 3: Enhance planning and emergency response efforts among state, county, and local emergency management personnel to protect public health and safety
Objective 3.1: Improve coordination and communication between departments and private industry
Objective 3.2: Ensure adequate training and resources for those involved in emergency response, services, relief, or hazard mitigation
Objective 3.3: Ensure adequacy of equipment and technology
Objective 3.4: Ensure that residents receive relief and are evacuated as quickly as possible in the event of a disaster
Objective 3.5: Continue to foster development of information and resources for subsequent Hazard Mitigation Plans
Goal 4: Build Mifflin County's spatial informational resources to strengthen public and private hazard mitigation planning and decision support capabilities
Objective 4.1: Develop data management policies to ensure adequate data management

Table 6.2-1: Goals and Objectives from the 2014 MJHMP, Retained for the 2019 MJHMP
Objective 4.2: Develop and update detailed databases related to hazards and hazard mitigation
Goal 5: Increase public awareness on both the potential impacts of natural hazards and activities to reduce those hazards
Objective 5.1: Develop public and business education and outreach programs on hazards and hazard mitigation
Objective 5.2: Educate property owners in hazard-risk areas regarding their risks and the precautions they can take
Objective 5.3: Encourage property owners in the 1% annual chance floodplain to purchase flood insurance
Goal 6: Increase intergovernmental cooperation and build public-private partnerships to implement activities that will reduce the impact of natural, man-made, and technological disasters
Objective 6.1: Improve hazard mitigation awareness and response for the private sector of Mifflin County
Objective 6.2: Maintain open lines of communication between the County and the municipalities regarding hazard mitigation
Objective 6.3: Discuss partnering opportunities with private entities

6.3. IDENTIFICATION AND ANALYSIS OF MITIGATION TECHNIQUES

The mitigation strategy in the updated MJHMP should include analysis of a comprehensive range of specific techniques or actions. FEMA, through the March 2013 *Local Mitigation Handbook*, and PEMA, through the October 2013 *Standard Operating Guide*, identify four categories of hazard mitigation techniques.

- **Local plans and regulations**: Government authorities, policies, or codes that influence the way land and buildings are developed and built. Examples include, but are not limited to: comprehensive plans, subdivision regulations, building codes and enforcement, and NFIP and CRS.
- **Structure and infrastructure**: Modifying existing structures and infrastructure or constructing new structures to reduce hazard vulnerability. Examples include but are not limited to: acquisition and elevation of structures in flood prone areas, utility undergrounding, structural retrofits, floodwalls and retaining walls, detention and retention structures, and culverts.
- **Natural systems protection**: Actions that minimize damage and losses and also preserve or restore the functions of natural systems. Examples include but are not limited to: sediment and erosion control, stream corridor restoration, forest management, conservation easements, and wetland restoration and preservation.
- **Education and awareness**: Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate the hazards, and may also include participation in national programs. Examples include but are not limited to: radio or television

spots, websites with maps and information, information and training, NFIP outreach, StormReady, and Firewise Communities.

Table 6.3-1 provides a matrix identifying the mitigation techniques used for the hazards identified in the risk assessment. The specific actions associated with these techniques are included in Table 6.4-1.

Table 6.3-1: Mitigation Techniques Used for Profiled Hazards in 2019

Hazard *(In Order of Risk Factor Ranking)*	Mitigation Technique			
	Plans and Regulations	Structure and Infrastructure	Natural Systems Protection	Education and Awareness
Flood, Flash Flood, Ice Jam	X	X	X	X
Hurricane, Tropical Storm, Nor'easter	X			X
Winter Storm	X	X		X
Wildfire	X		X	X
Radon Exposure	X			X
Utility Interruption	X	X		X
Tornado	X			X
Pandemic	X			X
Dam Failure	X	X		X
Drought	X			X
Environmental Hazards	X	X		X
Transportation Accidents	X	X		X
Urban Fire and Explosion	X			X
Subsidence, Sink Holes	X	X		X
Extreme Temperatures	X			X
Civil Disturbances	X			X
Invasive Species	X		X	X
Landslide	X			X
Lightning Strike	X	X		X
Building or Structure Collapse	X	X		X
Drowning	X			X

6.4. MITIGATION ACTION PLAN

During the Risk Assessment-Mitigation Solutions Workshops in March and April 2019, municipal officials cited several concerns. John Allison, who works in Rothrock State Forest, cited his biggest concern for Menno Township as wildfire, as the Emerald Ash Borer and other pests result in a lot of dead trees in the forest. Mayor John Wagner, Juniata Terrace Borough, explained that the Borough has many row homes, so an outbreak of flu or other contagious disease could spread very rapidly. Mayor John Wagner also explained that the Borough is surrounded by Norfolk Southern. With the prevailing winds from the west, the Borough could be susceptible to air-borne contaminants in the event of a train accident involving hazardous materials. Mayor John Wagner suggested a mitigation action to update stormwater management systems, thereby mitigating against sinkholes, and he did subsequently provide a *New Mitigation Action* form on this topic. The Mayor also indicated concerns about wildfire, as there are many downed trees in the Borough. In each instance, conversation ensued about how these concerns could be translated into *New Mitigation Action* forms, but forms on most these topics were not submitted. Meeting Summaries and completed *New Mitigation Action* forms are included in Appendix C.

There was consensus among the 2019 meeting participants to generate an entirely new set of specific, actionable, mitigation actions which clearly identify applicable municipalities and responsible parties. To that end, 36 *New Mitigation Action* forms were submitted during the 2019 MJHMP Update, by the municipalities and the County. See actions 1 through 36 in Table 6.4-1 with the corresponding *New Mitigation Action* forms in Appendix C. Additionally, 19 new mitigation actions were drafted by MBI based on conversations throughout the update process, to ensure that the 2019 MJHMP includes at least 1 action for each hazard profiled, to promote outreach with the County's sizeable Amish population, and to encourage follow through with annual MJHMP update meetings and plan integration. See actions 37 through 55 in Table 6.4-1. The actions proposed by MBI were reviewed by the proposed responsible parties during the public comment period.

At least one mitigation action was established for each hazard in Mifflin County identified in the Risk Assessment. More than one action is identified for several hazards, with flooding as the most commonly addressed hazard. Every participating jurisdiction has at least one mitigation action. Each mitigation action is intended to address one or more of the goals and objectives identified in Section 6.2.

The Mitigation Action Plan, detailed in Table 6.4-1, includes a summary of each identified action, the municipality that the action pertains to, the mitigation technique the action pertains to, the hazard the action addresses, the department and Emergency Management Coordinator (EMC) responsible for implementing the action, the implementation schedule, potential funding sources for implementing the action, and the total priority score derived using the Multi-Objective Mitigation Action Prioritization criteria (explained following Table 6.4-1). The actions in Table 6.4-1 are listed in alphabetical order, by municipality, for Actions 1-36 (locally generated) and actions 37-55 (consultant generated with local input).

The Steering Committee is encouraged to track the status of these actions during the annual MJHMP review, via Table 7.2-2 in the Plan Maintenance section.

Table 6.4-1: Mifflin County 2019 Mitigation Action Plan

Action Number	Action	Municipality	Category	Hazard(s) Addressed	Lead Agency/ Department	Implementation Schedule	Funding Source	Total Priority Score
1	Remove debris from the Creek Drive sinkhole. Laurel Creek empties into this sinkhole, and during major rain storms the blockage results in flooding of 81 structures on Creek Drive.	Armagh Township	Natural Systems Protection	Flood	Armagh Township Supervisors (EMC: Lanny McCoy)	October 2021	Municipal General Fund, grants	**2.0**
2	Install concrete chunks in wire mesh, along the sides of township road T-467 to prevent flash flooding damage to road, pipes, and lawns.	Armagh Township	Structure and Infrastructure	Flash Flood	Armagh Township Supervisors (EMC: Lanny McCoy)	October 2021	Municipal General Fund, grants	**2.3**
3	Relocate and elevate River Road (T-477), which floods during heavy rain or dam releases, to prevent roadway damage and 12+ road closures per year.	Bratton Township	Structure and Infrastructure	Flood	Bratton Township (EMC: James Crozier)	December 2024	Municipal General and State fund, any available grant monies	**2.0**
4	Install an impermeable sheet piling barrier to protect 81 structures between Honey Creek and Willow Lane from flooding.	Brown Township	Structure and Infrastructure	Flood	Brown Township (EMC: Gib Rhoades)	December 2024	Municipal General Fund, grants	**2.0**
5	Remove fallen trees and debris and install riprap, to stabilize the banks of Hundry Run. This will alleviate stream bank erosion and prevent the tree/debris buildup that causes flooding. See Appendix C for photos.	Burnham Borough	Natural Systems Protection	Flood	Burnham Borough (EMC: Robert Soccio)	Fall 2019	Municipal General Fund	**2.3**
6	Acquire, via voluntary buyout, the McCardle Mobile Home Court in Burnham. This property is in the Kishacoquillas Creek floodplain and regularly floods.	Burnham Borough	Structure and Infrastructure	Flood	Burnham Borough (EMC: Robert Soccio)	December 2024	Flood Mitigation Program	**2.0**
7	Replace the structurally deficient bridge carrying Shindle Road over an Unnamed Tributary to Jack's Creek, in order to improve the hydraulic capacity and reduce flooding to adjacent properties.	Decatur Township	Structure and Infrastructure	Flood	Decatur Township (EMC: Harold Kurtz)	Complete by Fall 2020	Mifflin County Commissioners, Township Liquid Fuel Funds	**2.6**

Table 6.4-1: Mifflin County 2019 Mitigation Action Plan

Action Number	Action	Municipality	Category	Hazard(s) Addressed	Lead Agency/ Department	Implementation Schedule	Funding Source	Total Priority Score
8	Identify and educate residents within or adjacent to the Meadow Creek and Jack's Creek floodplains. Develop a mailer to send to affected landowners, to educate them about flood mitigation techniques.	Decatur Township	Education and Awareness	Flood	Decatur Township (EMC: Harold Kurtz)	2020	Township General Funds, County Grant	**1.9**
9	Identify areas where existing watercourses run near or adjacent to existing Township Roadway networks. Develop a database, assess and monitor existing conditions, and rehabilitate problem areas.	Decatur Township	Education and Awareness, Natural Systems Protection, Structure and Infrastructure	Flood	Decatur Township (EMC: Harold Kurtz)	2020	Township General Funds, County Grant	**2.4**
10	Develop a drought emergency plan to identify responses and prioritize actions	Decatur Township	Local Planning and Regulations	Drought	Decatur Township (EMC: Harold Kurtz)	2022	Township General Funds, County Grant	**1.7**
11	Map, assess, and plan responses to address wildfires. Educate residents on fire safety construction and techniques.	Decatur Township	Local Planning and Regulations, Education and Awareness	Wildfire	Decatur Township (EMC: Harold Kurtz)	2022	Township General Funds, County Grant	**2.1**
12	Take actions to preserve and protect major Township infrastructure by inspecting and, as necessary, repairing structural issues with the bridge carrying Alfarata Road over Jack's Creek. Replace existing superstructure, remove existing pier to eliminate collecting debris and exacerbating flooding, and stabilize scour at existing abutments.	Decatur Township	Structure and Infrastructure	Flood	Decatur Township (EMC: Harold Kurtz)	2022	Penn DOT 80 / 20 Program, Mifflin County Bridge Fund; Decatur Township Liquid Fuels Account	**2.6**

Table 6.4-1: Mifflin County 2019 Mitigation Action Plan

Action Number	Action	Municipality	Category	Hazard(s) Addressed	Lead Agency/ Department	Implementation Schedule	Funding Source	Total Priority Score
13	Take actions to preserve and protect major Township infrastructure by inspecting and, as necessary, repairing structural issues with the bridge carrying Hoffman Road over Jack's Creek. Replace existing deficient superstructure and stabilize scour at existing abutments.	Decatur Township	Structure and Infrastructure	Flood	Decatur Township (EMC: Harold Kurtz)	2021	Penn DOT 80 / 20 Program, Mifflin County Bridge Fund; Decatur Township Liquid Fuels Account	**2.6**
14	Take actions to preserve and protect major Township infrastructure by inspecting and, as necessary, repairing structural issues with the bridge carrying Ertley Road over Belltown Run. Replace existing deficient superstructure and stabilize scour at existing abutments.	Decatur Township	Structure and Infrastructure	Flood	Decatur Township (EMC: Harold Kurtz)	2022	Penn DOT 80 / 20 Program, Mifflin County Bridge Fund; Decatur Township Liquid Fuels Account	**2.6**
15	Take actions to preserve and protect major Township infrastructure by inspecting and, as necessary, repairing structural issues with the bridge carrying Snook Road over Belltown Run. Replace existing deficient superstructure and the existing pier and stabilize scour at existing abutments.	Decatur Township	Structure and Infrastructure	Flood	Decatur Township (EMC: Harold Kurtz)	2023	Penn DOT 80 / 20 Program, Mifflin County Bridge Fund; Decatur Township Liquid Fuels Account	**2.6**
16	Establish tree program and replanting plan to address current inventory and health of trees in Kish Park, due to removal of 200+ ash trees killed by the Emerald Ash Borer. In addition to providing shade, some of these trees will stabilize stream banks in the park.	Derry Township	Natural Systems Protection	Flood	Derry Township (EMC: James L. Treaster)	Ongoing, bi-annual evaluation	DCNR, private donations	**1.8**
17	Prevent further stream bank erosion in Kish Park by installing plantings and managing wildlife.	Derry Township	Natural Systems Protection	Flood	Derry Township (EMC: James L. Treaster)	2019	USDA, DCNR	**1.8**

Table 6.4-1: Mifflin County 2019 Mitigation Action Plan

Action Number	Action	Municipality	Category	Hazard(s) Addressed	Lead Agency/ Department	Implementation Schedule	Funding Source	Total Priority Score
18	Repurpose a former industrial site in the floodplain, Phillips Industrial Property along US 22 on the bank of the Juniata River in Lewistown, to greenspace. Complete a real estate appraisal and a Phase 1 Environmental Site Assessment, demolish structures, remediate the property, and construct and maintain the intended greenspace.	Derry Township	Structure and Infrastructure	Flood	Derry Township (EMC: James L. Treaster) and Mifflin County (William A. Gomes)	5-10 years	Flood Mitigation Grant, PA Redevelopment Assistance Capital Program	**1.5**
19	Stabilize Middle Road and embankment, to prevent continued collapse into Strodes Run Creek.	Granville Township	Structure and Infrastructure	Flood	Granville Township (EMC: Craig A. Weston)	Summer 2019 (temporary), summer 2020 (full repair)	Dirt and Gravel Road Program, General Fund, State Liquid Fuel	**2.6**
20	Upgrade storm sewers to improve drainage and avoid sinkholes.	Juniata Terrace Borough	Structure and Infrastructure	Sinkhole	Juniata Terrace Borough (EMC: Marvin Lantz)	Ongoing study and 2024 implement-tation	Grants	**2.5**
21	Prevent the backup of sewage into lines and homes if the pump station is flooded or the power is out for a long period. Floodproof the wastewater treatment facility and lift stations located in flood hazard areas. Restore power as soon as possible, which may require use of generators.	Kistler Borough	Structure and Infrastructure	Flood, Utility Interruption	Kistler Borough (EMC: Martin Young)	December 2024	Sewer funds	**2.5**
22	Install three inlets and pave Virginia Avenue, to fix dramatic road deterioration due to water and to reduce icy roadway conditions in winter.	Borough of Lewistown	Structure and Infrastructure	Flood, Transportation Accidents	Borough of Lewistown Streets Supervisor and Borough Manager (EMC: Deborah Bargo)	June 2023	GB, SLF Funds	**2.8**

Table 6.4-1: Mifflin County 2019 Mitigation Action Plan

Action Number	Action	Municipality	Category	Hazard(s) Addressed	Lead Agency/ Department	Implementation Schedule	Funding Source	Total Priority Score
23	Conduct smoke testing of sewer lines and inspect homes, to identify homes with basement floor drains and sump pumps that are connected to the Municipal Sewer system. This is a concern due to the potential for home heating oil to contaminate the system. Create a corrective action plan.	McVeytown Borough	Structure and Infrastructure	Environmental Hazard – Hazardous Material Release	McVeytown Water and Sewer Authority (EMC: Brian Anders)	December 2024	McVeytown Water and Sewer Authority	2.5
24	Replace bridges on Hickory Lane (T464) and Renno Road (T453) with PennDOT approved aluminum box culvert structures. Current deterioration has caused some of the decking and wing walls to fall into the stream, causing flooding onto public roads and local farm fields. Hickory Lane bridge is currently closed to all traffic with signs and barriers.	Menno Township	Structure and Infrastructure	Flood	Menno Township (EMC: Dave Pennebaker)	December 2024	Liquid fuels, Mifflin County Commissioners, Pennsylvania Infrastructure Bank (PIB) Loan Program	2.6
25	Replace the Church Street Bridge, which has become unstable due to age and erosion of the foundations.	Newton Hamilton Borough	Structure and Infrastructure	Flood, Transportation Accidents	Newton Hamilton Borough (EMC: Phillip Miner)	December 2024	Grants	2.8
26	Implement Oliver Township road and infrastructure drainage improvements, to reduce water and ice hazards on roads as well as infrastructure damage due to washouts.	Oliver Township	Structure and Infrastructure	Flood, Transportation Accidents	Oliver Township (EMC: Samuel Whiteman) and contractor	July 2021	Oliver Township, PennDOT multimodal funding, Dirt and Gravel road grants, Pennsylvania Infrastructure Bank (PIB)	2.2
27	Safely demolish aging, unused smoke stacks and tanks located at the former Fairmont facility.	Union Township	Structure and Infrastructure	Building or Structure Collapse	Kerfam, Inc. (Union EMC: Dave Pennebaker)	2019-2022	Kerfam Inc., PDM Grants, County Grants	1.4

Table 6.4-1: Mifflin County 2019 Mitigation Action Plan

Action Number	Action	Municipality	Category	Hazard(s) Addressed	Lead Agency/ Department	Implementation Schedule	Funding Source	Total Priority Score
28	Improve / replace / re-route an existing private storm water conveyance system through the lands of Kerfam, Inc. to reduce the threat of nuisance / possibly catastrophic flooding to adjacent properties. Increase or improve / optimize the hydraulic capacity of the existing swales; Reroute the existing pipes under the existing buildings.	Union Township	Structure and Infrastructure	Flood	Kerfam, Inc. (Union EMC: Dave Pennebaker)	Complete by Fall 2020	Private	**1.7**
29	Improve / replace an existing culvert under SR 655 at the SR 655 / South Penn Street Intersection, to reduce the threat of nuisance / possibly catastrophic flooding to adjacent properties. Existing culvert capacity is significantly reduced due to sedimentation. Increase or improve / optimize the hydraulic capacity by culvert under SR 655; confirm the structural adequacy; improve outfall.	Union Township	Structure and Infrastructure	Flood	PennDOT District 2-0 (Union EMC: Dave Pennebaker)	Complete by Fall 2020	Public	**1.7**
30	Remove / replace existing structurally / hydraulically deficient bridge carrying Spring Run Road over Kishacoquillas Creek. Existing bridge is the sole access to several residential / recreational properties.	Union Township	Structure and Infrastructure	Flood	Union Township (EMC: Dave Pennebaker)	Complete by Fall 2021	County Funding / Liquid Fuels Monies / 80 / 20 grants	**2.0**
31	Install a culvert under Ferguson Valley Road (T-328), which floods during heavy rain events. Stormwater runoff from agricultural fields crosses and closes the road and can cause washout.	Wayne Township	Structure and Infrastructure, Local Plans and Regulations	Flood, Flash Flood, Transportation Accident	Wayne Township (EMC: William Benson)	Water easement obtained, construction 2024	Municipal General Fund, grants	**2.8**

Table 6.4-1: Mifflin County 2019 Mitigation Action Plan

Action Number	Action	Municipality	Category	Hazard(s) Addressed	Lead Agency/ Department	Implementation Schedule	Funding Source	Total Priority Score
32	Coordinate with the PA Historic and Museum Commission to establish whether or not the Juniata Canal Lockkeeper's House is considered historic. Its location in a floodplain dictates "substantial improvement" if significant renovations are made, unless it can be defined as a historic structure. Convert the house into a museum.	Wayne Township	Structure and Infrastructure	Flood	Newton-Wayne Historical Society (Wayne EMC: William Benson)	July 2024	Act 13 grant funding, PHMC Keystone Historic Preservation Grant, Louis J. Appell, Jr., Preservation Fund for Central PA, Flood Mitigation Program	**1.3**
33	Update the database of special needs populations in Mifflin County, by location and need. The database could be used during extended disaster events, in the event that residents are asked to shelter in place or to evacuate. The County could send resource-specific support for the evacuation or to check on special needs residents' welfare during the crisis.	Mifflin County	Education and Awareness	Flood, Flash Flood, Ice Jam; Hurricane, Tropical Storm, Nor'easter; Wildfire	Mifflin County Department of Public Safety (Phil Lucas)	2019	N/A – will be done in-house	**2.8**
34	Provide smoke detectors and basic fire safety training to residents.	Mifflin County	Education and Awareness	Urban Fire and Explosion, Wildfire	American Red Cross (Chriss Schultz)	2019	Red Cross & Local Fire Departments, Local Municipalities	**2.3**
35	Acquire and demolish structures on the tax repository and within the SFHA, to convert land to open space / recreational use.	Mifflin County	Structure and Infrastructure	Flood	Mifflin County Tax Services	Year to year	Act 152	**2.0**

Table 6.4-1: Mifflin County 2019 Mitigation Action Plan

Action Number	Action	Municipality	Category	Hazard(s) Addressed	Lead Agency/ Department	Implementation Schedule	Funding Source	Total Priority Score
36	Extend broadband access into new areas by placing new fiber optic cabling on existing pole lines. Necessary work/costs would include: assessment by pole owner of potential make-ready work, deploying technicians to hang new cable, annual pole attachment fee and placing cost for new cabling. Existing gaps in coverage hinder emergency response to certain areas and in doing so, pose substantial risk to public safety.	Mifflin County	Structure and Infrastructure	Utility Interruption	Mifflin County Department of Planning and Development (William A. Gomes)	December 2024	Federal Communications Commission- High Cost Program (Connect America Fund), USDA- Community Connect Grant Program, Rural Broadband Access Loan & Loan Guarantee Program, Distance Learning & Telemedicine Loans and Grants Program, Farm Bill Broadband Loan Program, Telecom Infrastructure Loan Program, U.S. HRSA- Telehealth Network Grant Program U.S. HUD - Community Development Block Grant (CDBG)	**1.5**

Table 6.4-1: Mifflin County 2019 Mitigation Action Plan

Action Number	Action	Municipality	Category	Hazard(s) Addressed	Lead Agency/ Department	Implementation Schedule	Funding Source	Total Priority Score
37	Enforce the floodplain ordinances to ensure that all new construction or substantial improvements to existing structures that are located in the 1-percent-annual-chance floodplain are built with first-floor elevations at or above the Base Flood Elevation (BFE).	Armagh Township, Bratton Township, Brown Township, Burnham Borough, Decatur Township, Derry Township, Granville Township, Kistler Borough, Lewistown Borough, McVeytown Borough, Menno Township, Newton Hamilton Borough, Oliver Township, Union Township, Wayne Township	Plans and Regulations	Flood	Municipal EMCs (see Table 7.2-1)	ongoing	N/A – will be done in-house	**2.5**
38	Utilize subsidence and sinkhole hazard maps to determine if additional requirements should be added to obtain building permits in sinkhole and subsidence prone areas of community.	Armagh Township and Brown Township	Plans and Regulations	Subsidence, Sinkhole	Armagh Township Supervisors (EMC: Lanny McCoy) and Brown Township (EMC: Gib Rhoades)	December 2021	N/A – will be done in-house	**2.1**

Table 6.4-1: Mifflin County 2019 Mitigation Action Plan

Action Number	Action	Municipality	Category	Hazard(s) Addressed	Lead Agency/ Department	Implementation Schedule	Funding Source	Total Priority Score
39	Reduce vulnerabilities from high hazard potential dams that pose an unacceptable risk to the public by securing Rehabilitation of High Hazard Potential Dam Grant Program (HHPD) funding for rehabilitation projects.	Armagh Township and Wayne Township	Structure and Infrastructure	Dam Failure	Armagh Township Supervisors (EMC: Lanny McCoy), Wayne Township (EMC: William Benson)	October 2021	HHPD	**2.5**
40	Determine if historic public buildings would benefit from mitigation to handle snow loads and apply for grants as needed.	Juniata Terrace Borough	Structure and Infrastructure	Winter Storm	Juniata Terrace Borough (EMC: Marvin Lantz)	December 2024	Grants	**2.0**
41	Encourage the use of non-combustible materials (i.e. stone, brick, and stucco) for new construction, upgrades, and remodels in urban areas.	Juniata Terrace Borough and Lewistown Borough	Local Planning and Regulations	Urban Fire and Explosion	Juniata Terrace Borough (EMC: Marvin Lantz) and Borough of Lewistown (EMC: Deborah Bargo)	ongoing	N/A	**2.0**
42	Clear brush and downed trees as appropriate for wildfire mitigation.	Juniata Terrace Borough and Menno Township	Natural Systems Protection	Wildfire	Juniata Terrace Borough (EMC: Marvin Lantz), Menno Township (EMC: Dave Pennebaker)	December 2021	N/A – will be done in-house	**1.5**
43	Utilize elevation, acquisition, relocation, and other mitigation methods to mitigate flood prone properties.	Mifflin County and All Municipalities	Structure and Infrastructure	Flood	Mifflin County Department of Planning and Development (William A. Gomes), Municipalities	December 2024	HMGP, PDM, FMA, CDBG-DR	**2.0**

Table 6.4-1: Mifflin County 2019 Mitigation Action Plan

Action Number	Action	Municipality	Category	Hazard(s) Addressed	Lead Agency/ Department	Implementation Schedule	Funding Source	Total Priority Score
44	Publicize volunteer days on behalf of publicly-owned lands. For example, past and planned volunteer activities in Rothrock State Forest include treatment for invasive species (Hemlock Woolly Adelgid) in fall 2018 and fall 2019 and trail maintenance including dead tree removal. Additionally, Forest Fire Prevention and other education programs are offered across the Rothrock State Forest service area. The County could promote these invasive species and wildfire mitigation activities by announcing upcoming events on the County website, the Mifflin Alerts Facebook page, and/or the Mifflin County 9-1-1 (Public Safety) Facebook page.	Mifflin County, Armagh Township, Brown Township, Derry Township, Granville Township, Lewistown Borough, McVeytown Borough, Menno Township, Oliver Township, Union Township, Wayne Township	Education and Awareness, Natural Systems Protection	Invasive Species, Wildfire	Mifflin County Department of Planning and Development (William A. Gomes)	Routine website maintenance	County	**2.3**
45	Conduct outreach and provide education about radon. For example, include an informative blurb and link (i.e. https://www.dep.pa.gov/Business/RadiationProtection/RadonDivision/Pages/Radon-in-the-home.aspx) on County and municipal web pages about the dangers of radon and how to get free test kits.	Mifflin County, Brown Township, Lewistown Borough; and Union Township	Education and Awareness	Radon	Mifflin County Department of Public Safety (Phil Lucas); Brown Township (EMC: Gib Rhoades); Borough of Lewistown Streets Supervisor and Borough Manager (EMC: Deborah Bargo); and Union Township (EMC: Dave Pennebaker)	March 2020	County, Municipalities, DEP Bureau of Radiation Protection,	**2.3**

Table 6.4-1: Mifflin County 2019 Mitigation Action Plan

Action Number	Action	Municipality	Category	Hazard(s) Addressed	Lead Agency/ Department	Implementation Schedule	Funding Source	Total Priority Score
46	Conduct outreach and provide education about swimming and boating safety, invasive species, water conservation during drought, and emergency preparedness.	Mifflin County	Education and Awareness	All Hazards	Mifflin County Department of Public Safety (Phil Lucas)	October 2021	StormReady Program, County, Municipalities, School Districts	**2.3**
47	Provide property owners with information about weatherizing their homes and potential funding sources (i.e. SEDA-Council of Governments).	Mifflin County	Education and Awareness	Winter Storm, Extreme Temperature	Mifflin County Department of Planning and Development (William A. Gomes)	October 2021	SEDA-Council of Governments	**2.3**
48	Conduct targeted outreach activities with Plain Sect populations to enhance mitigation, preparedness, response, and recovery communication capabilities. Activities may include organizing meetings with Plain Sect community leaders, attending Plain Sect community events, and distributing educational materials to Plain Sect households.	Mifflin County	Education and Awareness	All Hazards	Mifflin County Department of Planning and Development (William A. Gomes)	October 2021	County	**2.3**
49	Increase municipal participation in the CRS Program by working with the municipalities to achieve the program requirements.	Mifflin County	Local Planning and Regulations, Structure and Infrastructure, Natural Systems Protection, Education and Awareness	Flood	Mifflin County Department of Planning and Development (William A. Gomes)	December 2024	County	**2.3**
50	Develop Lowest Floor Elevation Data as part of the County's Next Generation 911 data project.	Mifflin County	Plans and Regulations	Flood	Mifflin County GIS Department (Laura Simonetti)	2022 or later	911 Grant Program	**1.7**

Table 6.4-1: Mifflin County 2019 Mitigation Action Plan

Action Number	Action	Municipality	Category	Hazard(s) Addressed	Lead Agency/ Department	Implementation Schedule	Funding Source	Total Priority Score
51	Incorporate hazard mitigation goals and principles into the Mifflin County Comprehensive Plan Update. See Section 5.2.5 for Plan Integration ideas.	Mifflin County	Plans and Regulations	All Hazards	Mifflin County Board of Commissioners	2024 Comp. Plan Update	Mifflin County Board of Commissioners, including grants and funding from partners	**2.5**
52	Compile a list of landslide incidents within Mifflin County, including information such as municipality, latitude/longitude, topography, weather conditions, loss of life, property damage costs, and other factors useful in analysis of past occurrence and vulnerability.	Mifflin County	Plans and Regulations	Landslide	Mifflin County Department of Public Safety (Phil Lucas)	March 2020	N/A – will be done in-house	**2.1**
53	Install lightning protection devices and methods, such as lightning rods and grounding, on communications infrastructure and other critical facilities.	Mifflin County	Structure and Infrastructure	Lightning Strike	Mifflin County Department of Public Safety (Phil Lucas)	December 2021	County	**2.0**
54	Educate and encourage residents to sign up for the AlertPA notification system by CodeRED, which provides emergency and weather-related alerts. Text and email alerts are automatically provided when your address falls in the path of severe weather. Provide the web link on the County website, the Mifflin Alerts Facebook page, and/or the Mifflin County 9-1-1 (Public Safety) Facebook page (https://www.ready.pa.gov/BeInformed/Signup-For-Alerts/Pages/default.aspx).	Mifflin County	Plans and Regulations	Flash Flood; Tornado, Windstorm;	Mifflin County Department of Public Safety (Phil Lucas)	March 2020	N/A – will be done in-house	**2.5**
55	Hold annual meetings of the hazard mitigation steering committee, update the MJHMP annually and after disasters, and document meetings and progress.	Mifflin County	Plans and Regulations	All Hazards	Mifflin County Department of Planning and Development (William A. Gomes)	Annually and after disasters	County	**2.5**

The mitigation actions detailed in Table 6.4-1 were evaluated using the Multi-Objective Mitigation Action Prioritization criteria from the PEMA's Standard Operating Guide, with the Priority Score listed in the far-right column in red, orange, or yellow. The five Multi-Objective Mitigation Action Prioritization criteria are as follows:

- **Effectiveness (weight: 20% of score):** The extent to which an action reduces the vulnerability of people and property.
- **Efficiency (weight: 30% of score):** The extent to which time, effort, and cost is well used as a means of reducing vulnerability.
- **Multi-Hazard Mitigation (weight: 20% of score):** The action reduces vulnerability for more than one hazard.
- **Addresses High Risk Hazard (weight: 15% of score):** The action reduces vulnerability for people and property from a hazard(s) identified as high risk.
- **Addresses Critical Communications/Critical Infrastructure (weight: 15% of score):** The action pertains to the maintenance of critical functions and structures such as transportation, supply chain management, data circuits, etc.

Scores of 1, 2, or 3 were assigned for each multi-objective mitigation action prioritization criterion where 1 is a low score and 3 is a high score. The Efficiency criterion, which considers the cost and effort of each action versus its overall vulnerability reduction benefit, is the most highly weighted criterion as part of the total prioritization score. Actions were prioritized using the cumulative score assigned to each. Each mitigation action was given a priority ranking (Low, Medium, and High) based on the following:

- High Priority (highlighted red): 2.5 – 3.0
- Medium Priority (highlighted orange): 1.9 – 2.4
- Low Priority (highlighted yellow): 0.0 – 1.8

The Multi-Objective Mitigation Action Prioritization criteria and the Total Priority Score for each action are shown in Table 6.4-2 below. The Total Priority Score is also shown in Table 6.4-1 above. While Table 6.4-1 lists actions alphabetically by municipality, Table 6.4-2 lists actions by their Total Priority Score.

Table 6.4-2: Mitigation Action Prioritization

Mitigation Actions		Multi-Objective Mitigation Action Prioritization Criteria Low = 0-1.8 Medium = 1.9-2.4 High = 2.5-3					
No.	**Action**	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High Risk Hazard	Addresses Critical Communications/Critical Infrastructure	**Total Priority Score**
22	Install three inlets and pave Virginia Avenue, to fix dramatic road deterioration due to water and to reduce icy roadway conditions in winter.	3	3	2	3	3	**2.8**
25	Replace the Church Street Bridge, which has become unstable due to age and erosion of the foundations.	3	3	2	3	3	**2.8**
31	Install a culvert under Ferguson Valley Road (T-328), which floods during heavy rain events. Stormwater runoff from agricultural fields crosses and closes the road and can cause washout.	3	3	2	3	3	**2.8**
33	Update the database of special needs populations in Mifflin County, by location and need. The database could be used during extended disaster events, in the event that residents are asked to shelter in place or to evacuate. The County could send resource-specific support for the evacuation or to check on special needs residents' welfare during the crisis.	2	3	3	3	3	**2.8**
7	Replace the structurally deficient bridge carrying Shindle Road over an Unnamed Tributary to Jack's Creek, in order to improve the hydraulic capacity and reduce flooding to adjacent properties.	3	3	1	3	3	**2.6**
12	Take actions to preserve and protect major Township infrastructure by inspecting and, as necessary, repairing structural issues with the bridge carrying Alfarata Road over Jack's Creek. Replace existing superstructure, remove existing pier to eliminate collecting debris and exacerbating flooding, and stabilize scour at existing abutments.	3	3	1	3	3	**2.6**
13	Take actions to preserve and protect major Township infrastructure by inspecting and, as necessary, repairing structural issues with the bridge carrying Hoffman Road over Jack's Creek. Replace existing deficient superstructure and stabilize scour at existing abutments.	3	3	1	3	3	**2.6**

Table 6.4-2: Mitigation Action Prioritization

Mitigation Actions		Multi-Objective Mitigation Action Prioritization Criteria Low = 0-1.8 Medium = 1.9-2.4 High = 2.5-3					
No.	**Action**	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High Risk Hazard	Addresses Critical Communications/Critical Infrastructure	**Total Priority Score**
14	Take actions to preserve and protect major Township infrastructure by inspecting and, as necessary, repairing structural issues with the bridge carrying Ertley Road over Belltown Run. Replace existing deficient superstructure and stabilize scour at existing abutments.	3	3	1	3	3	**2.6**
15	Take actions to preserve and protect major Township infrastructure by inspecting and, as necessary, repairing structural issues with the bridge carrying Snook Road over Belltown Run. Replace existing deficient superstructure and the existing pier and stabilize scour at existing abutments.	3	3	1	3	3	**2.6**
19	Stabilize Middle Road and embankment, to prevent continued collapse into Strodes Run Creek.	3	3	1	3	3	**2.6**
24	Replace bridges on Hickory Lane (T464) and Renno Road (T453) with PennDOT approved aluminum box culvert structures. Current deterioration has caused some of the decking and wing walls to fall into the stream, causing flooding onto public roads and local farm fields. Hickory Lane bridge is currently closed to all traffic with signs and barriers.	3	3	1	3	3	**2.6**
20	Upgrade storm sewers to improve drainage and avoid sinkholes.	3	3	1	2	3	**2.5**
21	Prevent the backup of sewage into lines and homes if the pump station is flooded or the power is out for a long period. Floodproof the wastewater treatment facility and lift stations located in flood hazard areas. Restore power as soon as possible, which may require use of generators.	3	2	2	3	3	**2.5**
23	Conduct smoke testing of sewer lines and inspect homes, to identify homes with basement floor drains and sump pumps that are connected to the Municipal Sewer system. This is a concern due to the potential for home heating oil to contaminate the system. Create a corrective action plan.	3	3	1	2	3	**2.5**
37	Enforce the floodplain ordinances to ensure that all new construction or substantial improvements to existing structures that are located in the 1-percent-annual-chance	3	3	1	3	2	**2.5**

Table 6.4-2: Mitigation Action Prioritization

Mitigation Actions		Multi-Objective Mitigation Action Prioritization Criteria Low = 0-1.8 Medium = 1.9-2.4 High = 2.5-3					
No.	**Action**	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High Risk Hazard	Addresses Critical Communications/Critical Infrastructure	**Total Priority Score**
	floodplain are built with first-floor elevations at or above the Base Flood Elevation (BFE).						
39	Reduce vulnerabilities from high hazard potential dams that pose an unacceptable risk to the public by securing Rehabilitation of High Hazard Potential Dam Grant Program (HHPD) funding for rehabilitation projects.	3	3	1	2	3	**2.5**
51	Incorporate hazard mitigation goals and principles into the Mifflin County Comprehensive Plan Update. See Section 5.2.5 for Plan Integration ideas.	2	3	3	3	1	**2.5**
54	Educate and encourage residents to sign up for the AlertPA notification system by CodeRED, which provides emergency and weather-related alerts. Text and email alerts are automatically provided when your address falls in the path of severe weather. Provide the web link on the County website, the Mifflin Alerts Facebook page, and/or the Mifflin County 9-1-1 (Public Safety) Facebook page (https://www.ready.pa.gov/BeInformed/Signup-For-Alerts/Pages/default.aspx).	2	3	3	3	1	**2.5**
55	Hold annual meetings of the hazard mitigation steering committee, update the MJHMP annually and after disasters, and document meetings and progress.	2	3	3	3	1	**2.5**
9	Identify areas where existing watercourses run near or adjacent to existing Township Roadway networks. Develop a database, assess and monitor existing conditions, and rehabilitate problem areas.	2	3	1	3	3	**2.4**
2	Install concrete chunks in wire mesh, along the sides of township road T-467 to prevent flash flooding damage to road, pipes, and lawns.	3	2	1	3	3	**2.3**
5	Remove fallen trees and debris and install riprap, to stabilize the banks of Hundry Run. This will alleviate stream bank erosion and prevent the tree/debris buildup that causes flooding. See Appendix C for photos.	3	3	1	3	1	**2.3**
34	Provide smoke detectors and basic fire safety training to residents.	2	3	2	3	1	**2.3**

Table 6.4-2: Mitigation Action Prioritization

Mitigation Actions		Multi-Objective Mitigation Action Prioritization Criteria Low = 0-1.8 Medium = 1.9-2.4 High = 2.5-3					
No.	Action	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High Risk Hazard	Addresses Critical Communications/Critical Infrastructure	Total Priority Score
44	Publicize volunteer days on behalf of publicly-owned lands. For example, past and planned volunteer activities in Rothrock State Forest include treatment for invasive species (Hemlock Woolly Adelgid) in fall 2018 and fall 2019 and trail maintenance including dead tree removal. Additionally, Forest Fire Prevention and other education programs are offered across the Rothrock State Forest service area. The County could promote these invasive species and wildfire mitigation activities by announcing upcoming events on the County website, the Mifflin Alerts Facebook page, and/or the Mifflin County 9-1-1 (Public Safety) Facebook page.	2	3	2	3	1	**2.3**
45	Conduct outreach and provide education about radon. For example, include an informative blurb and link (i.e. https://www.dep.pa.gov/Business/RadiationProtection/RadonDivision/Pages/Radon-in-the-home.aspx) on County and municipal web pages about the dangers of radon and how to get free test kits.	1	3	3	3	1	**2.3**
46	Conduct outreach and provide education about swimming and boating safety, invasive species, water conservation during drought, and emergency preparedness.	1	3	3	3	1	**2.3**
47	Provide property owners with information about weatherizing their homes and potential funding sources (i.e. SEDA-Council of Governments).	2	3	2	3	1	**2.3**
48	Conduct targeted outreach activities with Plain Sect populations to enhance mitigation, preparedness, response, and recovery communication capabilities. Activities may include organizing meetings with Plain Sect community leaders, attending Plain Sect community events, and distributing educational materials to Plain Sect households.	1	3	3	3	1	**2.3**
49	Increase municipal participation in the CRS Program by working with the municipalities to achieve the program requirements.	3	2	1	3	3	**2.3**

Table 6.4-2: Mitigation Action Prioritization

Mitigation Actions		Multi-Objective Mitigation Action Prioritization Criteria Low = 0-1.8 Medium = 1.9-2.4 High = 2.5-3					
No.	**Action**	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High Risk Hazard	Addresses Critical Communications/Critical Infrastructure	**Total Priority Score**
26	Implement Oliver Township road and infrastructure drainage improvements, to reduce water and ice hazards on roads as well as infrastructure damage due to washouts.	3	1	2	3	3	**2.2**
11	Map, assess, and plan responses to address wildfires. Educate residents on fire safety construction and techniques.	2	3	1	3	1	**2.1**
38	Utilize subsidence and sinkhole hazard maps to determine if additional requirements should be added to obtain building permits in sinkhole and subsidence prone areas of community.	2	3	1	2	2	**2.1**
52	Compile a list of landslide incidents within Mifflin County, including information such as municipality, latitude/longitude, topography, weather conditions, loss of life, property damage costs, and other factors useful in analysis of past occurrence and vulnerability.	2	3	1	1	3	**2.1**
1	Remove debris from the Creek Drive sinkhole. Laurel Creek empties into this sinkhole, and during major rain storms the blockage results in flooding of 81 structures on Creek Drive.	3	2	1	3	1	**2.0**
3	Relocate and elevate River Road (T-477), which floods during heavy rain or dam releases, to prevent roadway damage and 12+ road closures per year.	3	1	1	3	3	**2.0**
4	Install an impermeable sheet piling barrier to protect 81 structures between Honey Creek and Willow Lane from flooding.	3	2	1	3	1	**2.0**
6	Acquire, via voluntary buyout, the McCardle Mobile Home Court in Burnham. This property is in the Kishacoquillas Creek floodplain and regularly floods.	3	2	1	3	1	**2.0**
30	Remove / replace existing structurally / hydraulically deficient bridge carrying Spring Run Road over Kishacoquillas Creek. Existing bridge is the sole access to several residential / recreational properties.	3	1	1	3	3	**2.0**
35	Acquire and demolish structures on the tax repository and within the SFHA, to convert land to open space / recreational use.	3	2	1	3	1	**2.0**
40	Determine if historic public buildings would benefit from mitigation to handle snow loads and apply for grants as needed.	2	2	1	3	2	**2.0**

Table 6.4-2: Mitigation Action Prioritization

Mitigation Actions		Multi-Objective Mitigation Action Prioritization Criteria Low = 0-1.8 Medium = 1.9-2.4 High = 2.5-3					
No.	**Action**	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High Risk Hazard	Addresses Critical Communications/Critical Infrastructure	**Total Priority Score**
42	Encourage the use of non-combustible materials (i.e. stone, brick, and stucco) for new construction, upgrades, and remodels in urban areas.	2	3	1	2	1	**2.0**
43	Utilize elevation, acquisition, relocation, and other mitigation methods to mitigate flood prone properties.	3	2	1	3	1	**2.0**
53	Install lightning protection devices and methods, such as lightning rods and grounding, on communications infrastructure and other critical facilities.	3	2	1	1	3	**2.0**
8	Identify and educate residents within or adjacent to the Meadow Creek and Jack's Creek floodplains. Develop a mailer to send to affected landowners, to educate them about flood mitigation techniques.	1	3	1	3	1	**1.9**
16	Establish tree program and replanting plan to address current inventory and health of trees in Kish Park, due to removal of 200+ ash trees killed by the Emerald Ash Borer. In addition to providing shade, some of these trees will stabilize stream banks in the park.	2	2	1	3	1	**1.8**
17	Prevent further stream bank erosion in Kish Park by installing plantings and managing wildlife.	2	2	1	3	1	**1.8**
10	Develop a drought emergency plan to identify responses and prioritize actions	2	2	1	2	1	**1.7**
28	Improve / replace / re-route an existing private storm water conveyance system through the lands of Kerfam, Inc. to reduce the threat of nuisance / possibly catastrophic flooding to adjacent properties. Increase or improve / optimize the hydraulic capacity of the existing swales; Reroute the existing pipes under the existing buildings.	3	1	1	3	1	**1.7**

Table 6.4-2: Mitigation Action Prioritization

Mitigation Actions		Multi-Objective Mitigation Action Prioritization Criteria Low = 0-1.8 Medium = 1.9-2.4 High = 2.5-3					
No.	**Action**	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High Risk Hazard	Addresses Critical Communications/Critical Infrastructure	**Total Priority Score**
29	Improve / replace an existing culvert under SR 655 at the SR 655 / South Penn Street Intersection, to reduce the threat of nuisance / possibly catastrophic flooding to adjacent properties. Existing culvert capacity is significantly reduced due to sedimentation. Increase or improve / optimize the hydraulic capacity by culvert under SR 655; confirm the structural adequacy; improve outfall.	3	1	1	3	1	**1.7**
50	Develop Lowest Floor Elevation Data as part of the County's Next Generation 911 data project.	2	1	1	3	2	**1.7**
18	Repurpose a former industrial site in the floodplain, Phillips Industrial Property along US 22 on the bank of the Juniata River in Lewistown, to greenspace. Complete a real estate appraisal and a Phase 1 Environmental Site Assessment, demolish structures, remediate the property, and construct and maintain the intended greenspace.	2	1	1	3	1	**1.5**
36	Extend broadband access into new areas by placing new fiber optic cabling on existing pole lines. Necessary work/costs would include: assessment by pole owner of potential make-ready work, deploying technicians to hang new cable, annual pole attachment fee and placing cost for new cabling. Existing gaps in coverage hinder emergency response to certain areas and in doing so, pose substantial risk to public safety.	1	1	1	2	3	**1.5**
42	Clear brush and downed trees as appropriate for wildfire mitigation.	2	1	1	3	1	**1.5**
27	Safely demolish aging, unused smoke stacks and tanks located at the former Fairmont facility.	3	1	1	1	1	**1.4**

Table 6.4-2: Mitigation Action Prioritization

Mitigation Actions		Multi-Objective Mitigation Action Prioritization Criteria Low = 0-1.8 Medium = 1.9-2.4 High = 2.5-3					
No.	**Action**	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High Risk Hazard	Addresses Critical Communications/Critical Infrastructure	**Total Priority Score**
32	Coordinate with the PA Historic and Museum Commission to establish whether or not the Juniata Canal Lockkeeper's House is considered historic. Its location in a floodplain dictates "substantial improvement" if significant renovations are made, unless it can be defined as a historic structure. Convert the house into a museum.	1	1	1	3	1	**1.3**

7. PLAN MAINTENANCE

7.1. UPDATE PROCESS SUMMARY

Monitoring, evaluating, and updating this plan is important to maintaining its value and to progressing Mifflin County's hazard mitigation efforts. Based on discussions with William A. Gomes, Mifflin County Planning and Development Department, the primary reasons why the 2014 MJHMP was not updated annually were because the 2014 actions were not identified by municipality or responsible party and there was no mitigation action tracking table in the 2014 MJHMP. In the 2019 MJHMP the mitigation actions have now been clearly identified by municipality and responsible party in Table 6.4-1, and a directory of responsible municipal Emergency Management Coordinators (EMC) has been added as Table 7.2-1, per County request. A mitigation action tracking table has been added in the 2019 MJHMP as Table 7.2-2. Likewise, a table was added to Section 8 in order to facilitate tracking of plan adoption dates as Table 8.0-1, and a table of MJHMP Update Mechanisms was added as Table 7.2-3.

During the meetings detailed in Section 3.3, MBI recommended that Mifflin County review the MJHMP annually and that the municipalities routinely communicate progress on mitigation actions as well as providing new mitigation actions as potential projects arise. Additionally, the 2019 MJHMP should be integrated when next updating the Mifflin County Comprehensive Plan, Emergency Operations Plan, and other local planning documents.

The Steering Committee, municipal representatives, and other stakeholders were offered the opportunity to review and comment on this section along with the rest of the MJHMP during the public comment period.

7.2. MONITORING, EVALUATING, AND UPDATING THE PLAN

Hazard mitigation planning in Mifflin County is the responsibility of all levels of government (i.e., county and local), as well as the citizens of the County. As listed in FEMA 386-4, the Mifflin County Multi-Jurisdictional Hazard Mitigation Steering Committee must continuously monitor and document the progress of the MJHMP's recommended actions. The Steering Committee listed in Section 3.2, led by the Director of the Mifflin County Planning and Development Department, will meet annually and following each emergency declaration, with the purpose of reviewing the Plan. At least annually, the County will solicit new projects from the municipalities by sending *New Mitigation Action* forms and informing the municipalities of the opportunity to update existing and add new mitigation actions. Progress and new actions will be solicited from the municipal EMC contacts listed in Table 7.2-1, responses will be noted in Table 7.2-2, and this information will be incorporated into the 2024 MJHMP Update. Completed actions should be accompanied by an assessment of how effective those actions were in mitigating losses both qualitatively and quantitatively and whether the completed action satisfied the goals and objectives of the MJHMP. As one example, the municipality could quantitatively cite past insurance losses for a structure in the SFHA that has been acquired and demolished for recreational use, while also qualitatively describing community benefits from the new recreational space. This completed action would satisfy Goal 1 to strengthen County and local capabilities to reduce the impact of flooding and Objective 1.3 to develop local structural projects to reduce the impacts of natural and human-caused

hazards on public and private property. Different scenarios could call for consideration of impacts to property values, frequency of road closures, public awareness, environmental preservation, public safety, and other factors. During the annual review, the Steering Committee may also consider whether grant applications should be submitted for any of the remaining mitigation actions. All awarded state and federal funding should be noted for the 2024 MJHMP Update.

Table 7.2-1: Municipal Emergency Management Coordinator Directory (PA DCED, 2019 and Mifflin County Office of Public Safety files, 2019)

Municipality	EMC	Phone Number	Email
Armagh Township	Lanny McCoy	(717) 667-6260	-
Bratton Township	James Crozier	(717) 899-6815	-
Brown Township	Gib Rhoades	(717) 667-2531	-
Burnham Borough	Robert Soccio	(717) 248-2692	-
Decatur Township	Harold Kurtz	(717) 543-5433	hrkurtz@acsworld.net
Derry Township	James L Treaster	(717) 248-8151	twpmanager@derrytwp.info
Granville Township	Craig A. Weston	(717) 242-2334	cweston519@comcast.net
Juniata Terrace Borough	Marvin Lantz	(717) 248-4383	-
Kistler Borough	Martin Young	(814) 542-8615	-
Lewistown Borough	Deborah Bargo	(717) 248-3434	dbargo@lewistownborough.com
McVeytown Borough	Brian Anders	(717) 899-6323	-
Menno Township	Dave Pennebaker	(717) 483-6015	-
Newton Hamilton Borough	Phillip Miner	(814) 542-9219	-
Oliver Township	Samuel Whiteman	(717) 899-6086	-
Union Township	Dave Pennebaker	(717) 935-5622	-
Wayne Township	William Benson	(717) 899-7430	bensonpsp@yahoo.com

Mitigation actions and responsible parties are detailed in Section 6.4, Table 6.4-1. During the annual update process, the Steering Committee should contact the EMCs in order to note mitigation action status in Table 7.2-2. For completed actions, this table should include the realized benefits of the completed action in both qualitative and quantitative terms and should cite grant funding received, if applicable.

Table 7.2-2: Mitigation Action Review and New Actions							
No.	Mitigation Action	Status					Review Comments
		No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
1	Remove debris from the Creek Drive sinkhole. Laurel Creek empties into this sinkhole, and during major rain storms the blockage results in flooding of 81 structures on Creek Drive.						
2	Install concrete chunks in wire mesh, along the sides of township road T-467 to prevent flash flooding damage to road, pipes, and lawns.						
3	Relocate and elevate River Road (T-477), which floods during heavy rain or dam releases, to prevent roadway damage and 12+ road closures per year.						
4	Install an impermeable sheet piling barrier to protect 81 structures between Honey Creek and Willow Lane from flooding.						
5	Remove fallen trees and debris and install riprap, to stabilize the banks of Hundry Run. This will alleviate stream bank erosion and prevent the tree/debris buildup that causes flooding. See Appendix C for photos.						
6	Acquire, via voluntary buyout, the McCardle Mobile Home Court in Burnham. This property is in the Kishacoquillas Creek floodplain and regularly floods.						
7	Replace the structurally deficient bridge carrying Shindle Road over an Unnamed Tributary to Jack's Creek, in order to improve the hydraulic capacity and reduce flooding to adjacent properties.						

Table 7.2-2: Mitigation Action Review and New Actions							
No.	Mitigation Action	Status					Review Comments
		No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
8	Identify and educate residents within or adjacent to the Meadow Creek and Jack's Creek floodplains. Develop a mailer to send to affected landowners, to educate them about flood mitigation techniques.						
9	Identify areas where existing watercourses run near or adjacent to existing Township Roadway networks. Develop a database, assess and monitor existing conditions, and rehabilitate problem areas.						
10	Develop a drought emergency plan to identify responses and prioritize actions						
11	Map, assess, and plan responses to address wildfires. Educate residents on fire safety construction and techniques.						
12	Take actions to preserve and protect major Township infrastructure by inspecting and, as necessary, repairing structural issues with the bridge carrying Alfarata Road over Jack's Creek. Replace existing superstructure, remove existing pier to eliminate collecting debris and exacerbating flooding, and stabilize scour at existing abutments.						
13	Take actions to preserve and protect major Township infrastructure by inspecting and, as necessary, repairing structural issues with the bridge carrying Hoffman Road over Jack's Creek.						

Table 7.2-2: Mitigation Action Review and New Actions							
No.	Mitigation Action	Status					Review Comments
		No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
	Replace existing deficient superstructure and stabilize scour at existing abutments.						
14	Take actions to preserve and protect major Township infrastructure by inspecting and, as necessary, repairing structural issues with the bridge carrying Ertley Road over Belltown Run. Replace existing deficient superstructure and stabilize scour at existing abutments.						
15	Take actions to preserve and protect major Township infrastructure by inspecting and, as necessary, repairing structural issues with the bridge carrying Snook Road over Belltown Run. Replace existing deficient superstructure and the existing pier and stabilize scour at existing abutments.						
16	Establish tree program and replanting plan to address current inventory and health of trees in Kish Park, due to removal of 200+ ash trees killed by the Emerald Ash Borer. In addition to providing shade, some of these trees will stabilize stream banks in the park.						
17	Prevent further stream bank erosion in Kish Park by installing plantings and managing wildlife.						
18	Repurpose a former industrial site in the floodplain, Phillips Industrial Property along US 22 on the bank of the Juniata River in Lewistown, to greenspace. Complete a real estate appraisal and						

Table 7.2-2: Mitigation Action Review and New Actions							
No.	Mitigation Action	Status					Review Comments
		No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
	a Phase 1 Environmental Site Assessment, demolish structures, remediate the property, and construct and maintain the intended greenspace.						
19	Stabilize Middle Road and embankment, to prevent continued collapse into Strodes Run Creek.						
20	Upgrade storm sewers to improve drainage and avoid sinkholes.						
21	Prevent the backup of sewage into lines and homes if the pump station is flooded or the power is out for a long period. Floodproof the wastewater treatment facility and lift stations located in flood hazard areas. Restore power as soon as possible, which may require use of generators.						
22	Install three inlets and pave Virginia Avenue, to fix dramatic road deterioration due to water and to reduce icy roadway conditions in winter.						
23	Conduct smoke testing of sewer lines and inspect homes, to identify homes with basement floor drains and sump pumps that are connected to the Municipal Sewer system. This is a concern due to the potential for home heating oil to contaminate the system. Create a corrective action plan.						
24	Replace bridges on Hickory Lane (T464) and Renno Road (T453) with PennDOT approved aluminum box culvert structures. Current						

Table 7.2-2: Mitigation Action Review and New Actions							
No.	Mitigation Action	Status					Review Comments
		No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
	deterioration has caused some of the decking and wing walls to fall into the stream, causing flooding onto public roads and local farm fields. Hickory Lane bridge is currently closed to all traffic with signs and barriers.						
25	Replace the Church Street Bridge, which has become unstable due to age and erosion of the foundations.						
26	Implement Oliver Township road and infrastructure drainage improvements, to reduce water and ice hazards on roads as well as infrastructure damage due to washouts.						
27	Safely demolish aging, unused smoke stacks and tanks located at the former Fairmont facility.						
28	Improve / replace / re-route an existing private storm water conveyance system through the lands of Kerfam, Inc. to reduce the threat of nuisance / possibly catastrophic flooding to adjacent properties. Increase or improve / optimize the hydraulic capacity of the existing swales; Reroute the existing pipes under the existing buildings.						
29	Improve / replace an existing culvert under SR 655 at the SR 655 / South Penn Street Intersection, to reduce the threat of nuisance / possibly catastrophic flooding to adjacent properties. Existing culvert capacity is significantly reduced due to sedimentation. Increase or improve /						

Table 7.2-2: Mitigation Action Review and New Actions							
No.	Mitigation Action	Status					Review Comments
		No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
	optimize the hydraulic capacity by culvert under SR 655; confirm the structural adequacy; improve outfall.						
30	Remove / replace existing structurally / hydraulically deficient bridge carrying Spring Run Road over Kishacoquillas Creek. Existing bridge is the sole access to several residential / recreational properties.						
31	Install a culvert under Ferguson Valley Road (T-328), which floods during heavy rain events. Stormwater runoff from agricultural fields crosses and closes the road and can cause washout.						
32	Coordinate with the PA Historic and Museum Commission to establish whether or not the Juniata Canal Lockkeeper's House is considered historic. Its location in a floodplain dictates "substantial improvement" if significant renovations are made, unless it can be defined as a historic structure. Convert the house into a museum.						
33	Update the database of special needs populations in Mifflin County, by location and need. The database could be used during extended disaster events, in the event that residents are asked to shelter in place or to evacuate. The County could send resource-specific support for the evacuation or to check on special needs residents' welfare during the crisis.						

Table 7.2-2: Mitigation Action Review and New Actions							
No.	Mitigation Action	Status					Review Comments
		No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
34	Provide smoke detectors and basic fire safety training to residents.						
35	Acquire and demolish structures on the tax repository and within the SFHA, to convert land to open space / recreational use.						
36	Extend broadband access into new areas by placing new fiber optic cabling on existing pole lines. Necessary work/costs would include: assessment by pole owner of potential make-ready work, deploying technicians to hang new cable, annual pole attachment fee and placing cost for new cabling. Existing gaps in coverage hinder emergency response to certain areas and in doing so, pose substantial risk to public safety.						
37	Enforce the floodplain ordinances to ensure that all new construction or substantial improvements to existing structures that are located in the 1-percent-annual-chance floodplain are built with first-floor elevations at or above the Base Flood Elevation (BFE).						
38	Utilize subsidence and sinkhole hazard maps to determine if additional requirements should be added to obtain building permits in sinkhole and subsidence prone areas of community.						
39	Reduce vulnerabilities from high hazard potential dams that pose an unacceptable risk to the public by securing Rehabilitation of High Hazard						

Table 7.2-2: Mitigation Action Review and New Actions							
No.	Mitigation Action	Status					Review Comments
		No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
	Potential Dam Grant Program (HHPD) funding for rehabilitation projects.						
40	Determine if historic public buildings would benefit from mitigation to handle snow loads and apply for grants as needed.						
41	Encourage the use of non-combustible materials (i.e. stone, brick, and stucco) for new construction, upgrades, and remodels in urban areas.						
42	Clear brush and downed trees as appropriate for wildfire mitigation.						
43	Utilize elevation, acquisition, relocation, and other mitigation methods to mitigate flood prone properties.						
44	Publicize volunteer days on behalf of publicly-owned lands. For example, past and planned volunteer activities in Rothrock State Forest include treatment for invasive species (Hemlock Woolly Adelgid) in fall 2018 and fall 2019 and trail maintenance including dead tree removal. Additionally, Forest Fire Prevention and other education programs are offered across the Rothrock State Forest service area. The County could promote these invasive species and wildfire mitigation activities by announcing upcoming events on the County website, the Mifflin Alerts Facebook page, and/or the Mifflin County 9-1-1 (Public Safety) Facebook page.						

Table 7.2-2: Mitigation Action Review and New Actions							
No.	Mitigation Action	Status					Review Comments
		No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
45	Conduct outreach and provide education about radon. For example, include an informative blurb and link (i.e. https://www.dep.pa.gov/Business/RadiationProtection/RadonDivision/Pages/Radon-in-the-home.aspx) on County and municipal web pages about the dangers of radon and how to get free test kits.						
46	Conduct outreach and provide education about swimming and boating safety, invasive species, water conservation during drought, and emergency preparedness.						
47	Provide property owners with information about weatherizing their homes and potential funding sources (i.e. SEDA-Council of Governments).						
48	Conduct targeted outreach activities with Plain Sect populations to enhance mitigation, preparedness, response, and recovery communication capabilities. Activities may include organizing meetings with Plain Sect community leaders, attending Plain Sect community events, and distributing educational materials to Plain Sect households.						
49	Increase municipal participation in the CRS Program by working with the municipalities to achieve the program requirements.						
50	Develop Lowest Floor Elevation Data as part of the County's Next Generation 911 data project.						

Table 7.2-2: Mitigation Action Review and New Actions							
No.	Mitigation Action	Status					Review Comments
		No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
51	Incorporate hazard mitigation goals and principles into the Mifflin County Comprehensive Plan Update. See Section 5.2.5 for Plan Integration ideas.						
52	Compile a list of landslide incidents within Mifflin County, including information such as municipality, latitude/longitude, topography, weather conditions, loss of life, property damage costs, and other factors useful in analysis of past occurrence and vulnerability.						
53	Install lightning protection devices and methods, such as lightning rods and grounding, on communications infrastructure and other critical facilities.						
54	Educate and encourage residents to sign up for the AlertPA notification system by CodeRED, which provides emergency and weather-related alerts. Text and email alerts are automatically provided when your address falls in the path of severe weather. Provide the web link on the County website, the Mifflin Alerts Facebook page, and/or the Mifflin County 9-1-1 (Public Safety) Facebook page (https://www.ready.pa.gov/BeInformed/Signup-For-Alerts/Pages/default.aspx).						

Table 7.2-2: Mitigation Action Review and New Actions							
No.	Mitigation Action	Status					Review Comments
		No Progress/ Unknown	In Progress/ Not Yet Complete	Continuous	Completed	Discontinued	
55	Hold annual meetings of the hazard mitigation steering committee, update the MJHMP annually and after disasters, and document meetings and progress.						
NEW							
NEW							
NEW							
NEW							
NEW							
NEW							

Additionally, any comments received from the public should be maintained and considered by the Steering Committee when updating the MJHMP (see Section 7.3).

Furthermore, if the Mifflin County Comprehensive Plan (Mifflin County Planning Commission, 2014) is updated before the end of the five-year MJHMP update cycle, then updates to some sections of the MJHMP may be warranted.

The annual review process will ensure that the Risk Assessment reflects current conditions in the County and the municipalities, the Capability Assessment accurately reflects local circumstances, and the hazard mitigation strategy is updated based on the County's damage assessment reports and local mitigation project priorities. The annual review meetings will be noted on the Certification of Annual Review Meetings table with details provided in the Record of Changes table, included as pages i and ii of the 2019 MJHMP. All associated meeting agendas, sign-in sheets, handouts, and summaries will be retained as documentation of these efforts.

The MJHMP must be thoroughly updated on a five-year cycle, as required by DMA 2000. This MJHMP will be updated and resubmitted to FEMA for approval within the five-year period. The 2024 update will account for the outcomes of the annual Steering Committee meetings, any new hazard vulnerabilities, and new information that becomes available.

In Summary, the Steering Committee, led by the Mifflin County Planning and Development Department, will track updates via the means noted in Table 7.2-3.

Table 7.2-3: MJHMP Update Tracking Mechanisms

Update	Tracking Mechanism	Location
Adoption dates	Table 8.0-1: Adoption Date of the Multi-Jurisdictional Hazard Mitigation Plan by Mifflin County and Local Municipalities	Section 8
Annual review meetings	Certification of Annual Review Meetings table	Page i
Annual review details	Record of Changes table and file of meeting agendas, sign-in sheets, handouts, and summaries	Page ii
Mitigation action progress and new actions	Table 7.2-2: Mitigation Action Review and New Actions	Section 7.2

7.3. CONTINUED PUBLIC INVOLVEMENT

During the 2019 MJHMP Update, the Mifflin County Planning and Development Department website included the approved 2014 MJHMP, and the project website included the 2019 MJHMP for a 30-day public review period starting July 30, 2019. Following FEMA approval, the Mifflin County Planning and Development Department website will post the 2019 MJHMP for ongoing citizen access, review, and comment at http://www.co.mifflin.pa.us/dept/PlanningDev/Pages/HazardMitigation.aspx.

The citizens of Mifflin County are encouraged to submit their comments to the Mifflin County Department of Planning and Development at any point during the five-year update cycle. All comments received will be maintained and considered by the Steering Committee when updating the MJHMP.

Additionally, the County will solicit new projects from the municipalities each year by sending *New Mitigation Action* forms and informing the municipalities of the opportunity to update existing and add new mitigation actions.

8. PLAN ADOPTION

The Plan was submitted to the Pennsylvania State Hazard Mitigation Officer on September 30, 2019.

This section of the plan includes copies of the local adoption resolutions passed by Mifflin County and its municipal governments. Adoption resolution templates are provided to assist the County and municipal governments with recommended language for future adoption of the MJHMP.

Mifflin County 2019 Multi-Jurisdictional Hazard Mitigation Plan

County Adoption Resolution

Resolution No. _____

Mifflin County, Pennsylvania

WHEREAS, the municipalities of Mifflin County, Pennsylvania, are most vulnerable to natural and human-caused 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, Mifflin County acknowledges the requirement of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Mifflin County Hazard Mitigation Plan has been developed by the Mifflin County Planning and Development Department and the Mifflin County Department of Public Safety in cooperation with other County departments, local municipal officials, and the citizens of Mifflin County, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Mifflin County Hazard Mitigation Plan, and

WHEREAS, the Mifflin County Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural and human-caused hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for the County of Mifflin that:

- The Mifflin 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 Mifflin County Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2019

ATTEST:

_____

MIFFLIN COUNTY COMMISSIONERS

By _____

By _____

By _____

Mifflin County 2019 Multi-Jurisdictional Hazard Mitigation Plan

Municipal Adoption Resolution

Resolution No. _____

<Borough/Township of Municipality Name>, Mifflin County, Pennsylvania

WHEREAS, the *<Borough/Township of Municipality Name>*, Mifflin County, Pennsylvania, is most vulnerable to natural and human-caused hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, the *<Borough/Township of Municipality Name>* acknowledges the requirement of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Mifflin County Hazard Mitigation Plan has been developed by the Mifflin County Planning and Development Department and the Mifflin County Department of Public Safety in cooperation with other County departments, and officials and citizens of *<Borough/Township of Municipality Name>*, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Mifflin County Hazard Mitigation Plan, and

WHEREAS, the Mifflin County Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural and human-caused hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for the *<Borough/Township of Municipality Name>*:

- The Mifflin County Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the *<Borough/Township of Municipality Name>*, and
- The respective officials and agencies identified in the implementation strategy of the Mifflin County Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2019

ATTEST: ***<BOROUGH/TOWNSHIP OF MUNICIPALITY NAME>***

_____ By _____

By _____

The date each jurisdiction adopted the 2019 MJHMP is listed in Table 8.0-1.

Table 8.0-1: Adoption Date of the Multi-Jurisdictional Hazard Mitigation Plan by Mifflin County and Local Municipalities

Jurisdiction	2019 MJHMP Adoption Date
Mifflin County	
Armagh Township	
Bratton Township	
Brown Township	
Burnham Borough	
Decatur Township	
Derry Township	
Granville Township	
Juniata Terrace Borough	
Kistler Borough	
Lewistown Borough	
McVeytown Borough	
Menno Township	
Newton Hamilton Borough	
Oliver Township	
Union Township	
Wayne Township	