LYCOMING COUNTY 2026

HAZARD MITIGATION PLAN UPDATE



PREPARED FOR:

Lycoming County
Planning & Community Development
48 W. Third Street
Williamsport, PA 17701

PREPARED BY:

Michael Baker International, Inc.
1818 Market Street, Suite 3110
Philadelphia, Pennsylvania 19103

Michael Baker INTERNATIONAL

CERTIFICATION OF ANNUAL REVIEW MEETINGS

The Lycoming County Hazard Mitigation Planning Team HMPT has reviewed this Hazard Mitigation Plan. See Section 8 for further details regarding this form. The director of the team hereby certifies the review.

YEAR	DATE OF MEETING	AUDIENCE	SIGNATURE
2020	N/A	N/A	To the best knowledge of the Lycoming County HMSC no HMP meetings were held before the beginning of the HMP Update process. See Section 3 of the Lycoming County 2026 HMP Update for details regarding the meetings held during this process.
2021	N/A	N/A	
2022	N/A	N/A	
2023	N/A	N/A	
2024	N/A	N/A	
2025	N/A	N/A	
2026	See Section 3	See Section 3	

RECORD OF CHANGES

DATE	DESCRIPTION OF CHANGE MADE, MITIGATION ACTION COMPLETED, OR PUBLIC OUTREACH PERFORMED	CHANGE MADE BY (PRINT NAME)	CHANGE MADE BY (SIGNATURE)
2020-2026	To the best knowledge of the Lycoming County HMSC no HMP progress reports were submitted from municipalities for the period from 2020 through 2026, although mitigation actions were accomplished in this period. Progress on actions is discussed in detail in Section 6.1 of this plan.	N/A	N/A

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

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ACRONYMS

Table of Acronyms			
ACRONYM	**FULL NAME**	**ACRONYM**	**FULL NAME**
ACS	US Census American Community Survey	NFIP	National Flood Insurance Program
CDC	Centers for Disease Control and Prevention	NFPA	National Fire Protection Association
CFR	Code of Federal Regulations	NIDIS	National Integrated Drought Information System
CRS	Community Rating System	NOAA	National Oceanic and Atmospheric Administration
DCED	Department of Community and Economic Development	NWS	National Weather Service
DCNR	Department of Conservation and Natural Resources	PA DEP	Pennsylvania Department of Environmental Protection
DMA	Disaster Mitigation Act	PaGWIS	Pennsylvania Groundwater Information System
DOH	Department of Health	PASDA	Pennsylvania Spatial Data Access
EF-Scale	Enhanced Fujita Scale	PDSI	Palmer Drought Severity Index
EOP	Emergency Operations Plan	PEMA	Pennsylvania Emergency Management Agency
EOC	Emergency Operations Center	PennDOT	Pennsylvania Department of Transportation
EMC	Emergency Management Coordinator	pCi/L	pico Curies per Liter
EPA	Environmental Protection Agency	RF	Risk Factor
EPZ	Emergency Planning Zone	RL	Repetitive Loss
FEMA	Federal Emergency Management Agency	SFHA	Special Flood Hazard Area
FIRM	Flood Insurance Rate Map	SOG	Standard Operating Guide
FMA	Flood Mitigation Assistance Program	SRL	Severe Repetitive Loss
GIS	Geographic Information Systems	TRI	Toxic Release Inventory
HMGP	Hazard Mitigation Grant Program	UCC	Uniform Construction Code
HMP	Hazard Mitigation Plan	USACE	United States Army Corps of Engineers
HMPT	Hazard Mitigation Planning Team	USDA	United States Department of Agriculture
HMSC	Hazard Mitigation Steering Committee	USGS	United States Geological Survey
ICC	International Code Council	WATS-MPO	Williamsport Area Transportation Study Metropolitan Planning Organization
IBC	International Building Code	WOG	Watershed Outreach Groups
MSA	Metropolitan Statistical Area	WYO	Write Your Own
NDMC	National Drought Mitigation Center		

1. INTRODUCTION

1.1. BACKGROUND

Hazard Mitigation is defined by the Federal Emergency Management Agency (FEMA) as "sustained action taken to reduce or eliminate long-term risk to people and property from hazards and their effects." The hazard mitigation planning process involves the coordination of actions taken to reduce injuries, deaths, property damage, economic losses, and degradation of natural resources caused by natural and human-caused disasters. Hazard mitigation is considered one of four phases in the emergency management cycle. Others include emergency preparedness, response, and recovery.

Lycoming County Department of Planning & Community Development has taken an all-hazards approach to this Hazard Mitigation Plan Update.

- Hazard mitigation activities involve actions that reduce or eliminate the likelihood of an occurrence or reduce the impact of a disaster. The goal of the mitigation phase is to make communities more resistant to disasters and thereby decrease the need for a response. Mitigation reduces losses before a disaster.
- Preparedness activities include planning and preparing for when a disaster strikes and includes response capability actions to ensure an effective and efficient use of resources and efforts to minimize damage. Preparedness activities occur before a disaster.
- Emergency response activities include providing emergency assistance to victims and minimizing property loss. The response phase begins during or immediately after the onset of a disaster.
- Recovery activities include short and long-term activities that help people and places return to normal as soon as possible. Recovery actions involve clean-up efforts, temporary housing, and replacement (or upgrade) of infrastructure. Recovery activities typically commence several days or weeks after a disaster and are long-term.



Source: FEMA, 2025

The emergency management community, citizens, elected officials and other stakeholders in Lycoming County recognize the impact of disasters on their community and support proactive efforts needed to reduce the impact of natural and human-made hazards.

Accordingly, the Lycoming County Hazard Mitigation Steering Committee (HMSC) have led the preparation of this Hazard Mitigation Plan (HMP) Update. Members of the HMSC are listed in Table 3.2-1. The Plan is the result of work by local officials and citizens of the county to develop a pre-disaster multi-hazard mitigation plan that will not only guide the county towards greater disaster resistance but will also respect the character and needs of the community.

This plan is the fourth update to the Lycoming County HMP. The plan was initially drafted in 2004, and has been updated in 2010, 2015 and 2020. The 2026 Plan Update is intended to enable the county and its municipalities to effectively reduce the potential risks of identified hazards to the health, safety, and property of the residents. The Plan Update will also allow Lycoming County municipalities to be eligible for a range of financial assistance following hazard events.

The 2026 Plan Update consists of a thorough review and evaluation of the 2020 Plan. Each chapter in the 2026 HMP has been updated to incorporate new plans and data released since the 2020 plan and to address updates to FEMA's local mitigation policy (2025). A summary is included at the beginning of each chapter to indicate how this plan was updated from the 2020 version.

1.1. PURPOSE

This plan was developed for the purpose of:

- Providing a blueprint for reducing property damage and saving lives from the effects of future natural and human-made hazards in Lycoming County.
- Complying with state and federal legislative requirements for county mitigation so that the county is eligible for federal funding and technical assistance from State and Federal hazard mitigation programs.
- Identifying, introducing, and implementing cost-effective hazard mitigation measures to accomplish county goals and objectives and to raise awareness and acceptance of hazard mitigation.
- Improving community resiliency following a disaster event.

Adoption of this plan ensures that Lycoming County and participating jurisdictions continue to be eligible for and receive certain federal grant funds that are administered by the Commonwealth of Pennsylvania for FEMA. This plan complies with the requirements of the Disaster Mitigation Act of 2000 and its implementing regulations published in Title 44 of the Code of Federal Regulations (CFR) Section 201.6.

1.2. SCOPE

The Lycoming County 2026 Hazard Mitigation Plan Update has been prepared to meet requirements set forth by FEMA and the Pennsylvania Emergency Management Agency (PEMA) for the county to be eligible for funding and technical assistance from state and federal hazard mitigation programs. The Plan Update is a multi- jurisdictional plan that covers Lycoming County and its 52 municipalities. Review will take place annually and following significant disasters, and a full update will occur, as required, every five years.

In accordance with the Disaster Mitigation Act (DMA) of 2000, the HMP Update documents the following topics:

- Planning Process.
- Hazard Identification.
- Risk Assessment.
- Mitigation Strategy: Goals, Objectives, and Actions.
- Formal Adoption by Participating Jurisdictions.
- PEMA and FEMA approval.

The report format is structured in accordance with the most current planning guidance from FEMA (the 2025 Local Mitigation Planning Policy Guide), and PEMA (the Commonwealth of Pennsylvania's 2025 All-Hazard Mitigation Planning Standard Operating Guide (SOG)). The overall format between the 2020 HMP update and the 2026 HMP update has remained largely unchanged.

It should be noted that future funding for certain mitigation projects will be contingent upon having each jurisdiction in Lycoming County adopt the plan after the county adopts the Plan Update. Any jurisdiction that does not adopt the 2026 Plan Update will become ineligible for FEMA pre- and post-disaster mitigation funds.

1.3. 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.
- CFR, Title 44, Parts 60, 77, 201 and 206.
- Disaster Mitigation Act of 2000, Public Law 106-390, as amended.
- National Flood Insurance Act of 1968, as amended, 42 U.S.C. 4001 *et seq*.
- National Dam Safety Program Act (Pub. L. 92-367), as amended.

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.

- Pennsylvania Floodplain Management Act of 1978. P.L. 851, No. 166.
- Pennsylvania Hazardous Material Emergency Planning and Response Act of 1990 (Act 165).

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

- FEMA: *Integrating Hazard Mitigation into Local Planning: Case Studies and Tools for Community Officials*. March 2013.
- FEMA: *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards*. January 2013.
- FEMA: *National Fire Incident Reporting System 5.0: Complete Reference Guide*. January 2015.
- FEMA: *Local Mitigation Planning Handbook*. May 2023.
- FEMA: *Local Mitigation Planning Policy Guide*. 2025.
- FEMA. *Region 3 High Hazard Potential Dams: Local and Tribal Mitigation Planning Tips*. July 2024.
- FEMA. *Rehabilitation of High Hazard Potential Dams (HHPD) Grant Program FAQ*. June 2020.

The following Pennsylvania Emergency Management Agency (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 2009.
- PEMA. *Administrative Processes*. December 20, 2019.
- PEMA: *Pennsylvania's Hazard Mitigation Planning Standard Operating Guide*. August 2025.
- PEMA: *Pennsylvania State Hazard Mitigation Plan, 2023 Update*.

The following additional guidance documents were used to update this plan:

- National Fire Protection Association 1600: *Standard on Disaster/Emergency Management and Business Continuity Programs*. 2007.

2. COMMUNITY PROFILE

This section profiles Lycoming County and its municipalities. Information on the county's geographic profile, climate, demographic profile, and employment and industry profile are provided.

2.1. GEOGRAPHY AND ENVIRONMENT

Situated in north-central Pennsylvania at the convergence of two geomorphologic provinces, the Allegheny Plateau and the Valley and Ridge province, Lycoming County boasts a scenic landscape characterized by steep slopes, deep river valleys, and abundant forestland. At 1,244 square miles, Lycoming is the largest of Pennsylvania's 67 counties, equivalent in size to the state of Rhode Island. Figure 2.1-1 provides a base map of Lycoming County.

The Lycoming County lies entirely within the Susquehanna River Basin, one of four major drainage basins in Pennsylvania. Over 2,200 miles of streams traverse the county, whose fertile valleys were settled long before land use controls and floodplain regulations were in place. The county's most populated watershed is the West Branch of the Susquehanna River, which flows for 38 miles through the county. Major tributaries of the West Branch include Pine Creek, Little Pine Creek, Larry's Creek, Lycoming Creek, Loyalsock Creek, Muncy Creek, Little Muncy Creek, White Deer Hole Creek, and Antes Creek. Several of these tributaries comprise watersheds that have been designated "exceptional and high quality" watersheds by the Pennsylvania Environmental Quality Board. Figure 2.1-2 shows the county's Watershed Outreach Groups (WOG).

In addition to the Lycoming County Comprehensive Plan, there are several multi-municipal planning areas that each have an individual comprehensive plan and planning process for the jurisdictions within each region. The multi-municipal planning areas include the Greater Williamsport Alliance Planning Area, Montoursville-Muncy Planning Area, US-220/I-99 Planning Area, US-15 South Planning Area, Lower Lycoming Creek Planning Area, and Muncy Creek Planning Area. Figure 2.1-3 displays these planning areas on a map.

Figure 2.1-1 Base Map of Lycoming County

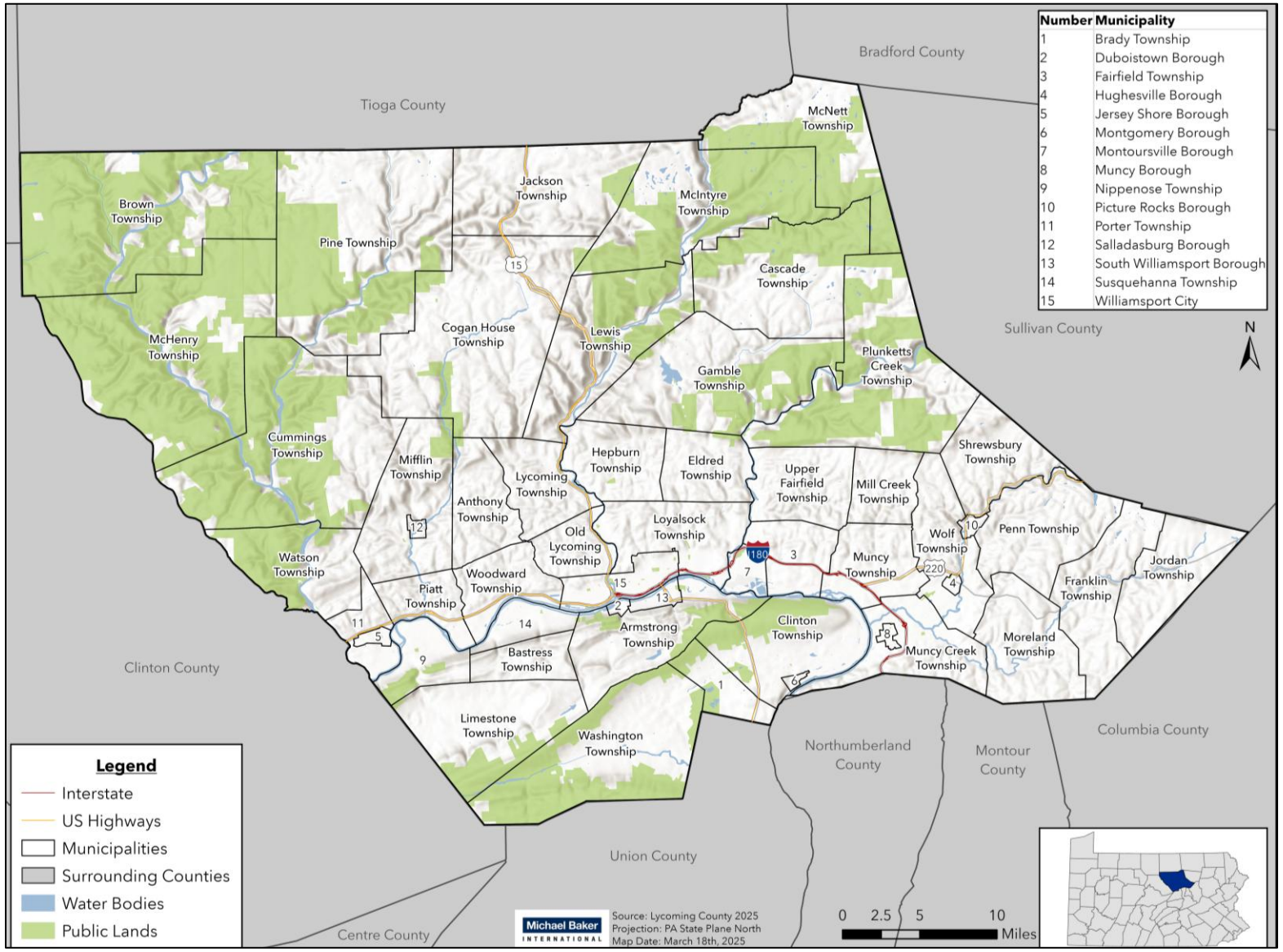


Figure 2.1-2 Lycoming County Watersheds by Watershed Outreach Group

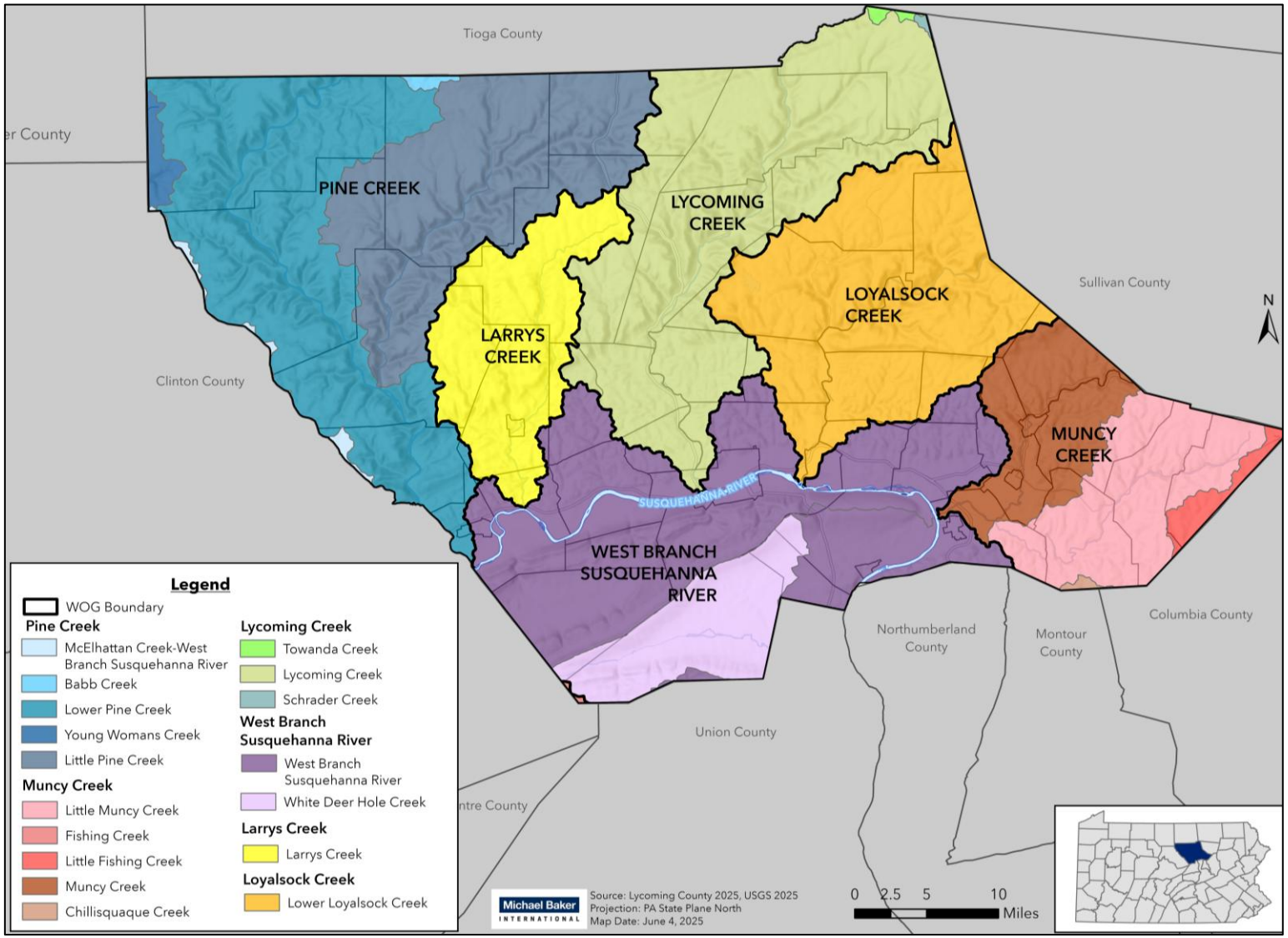
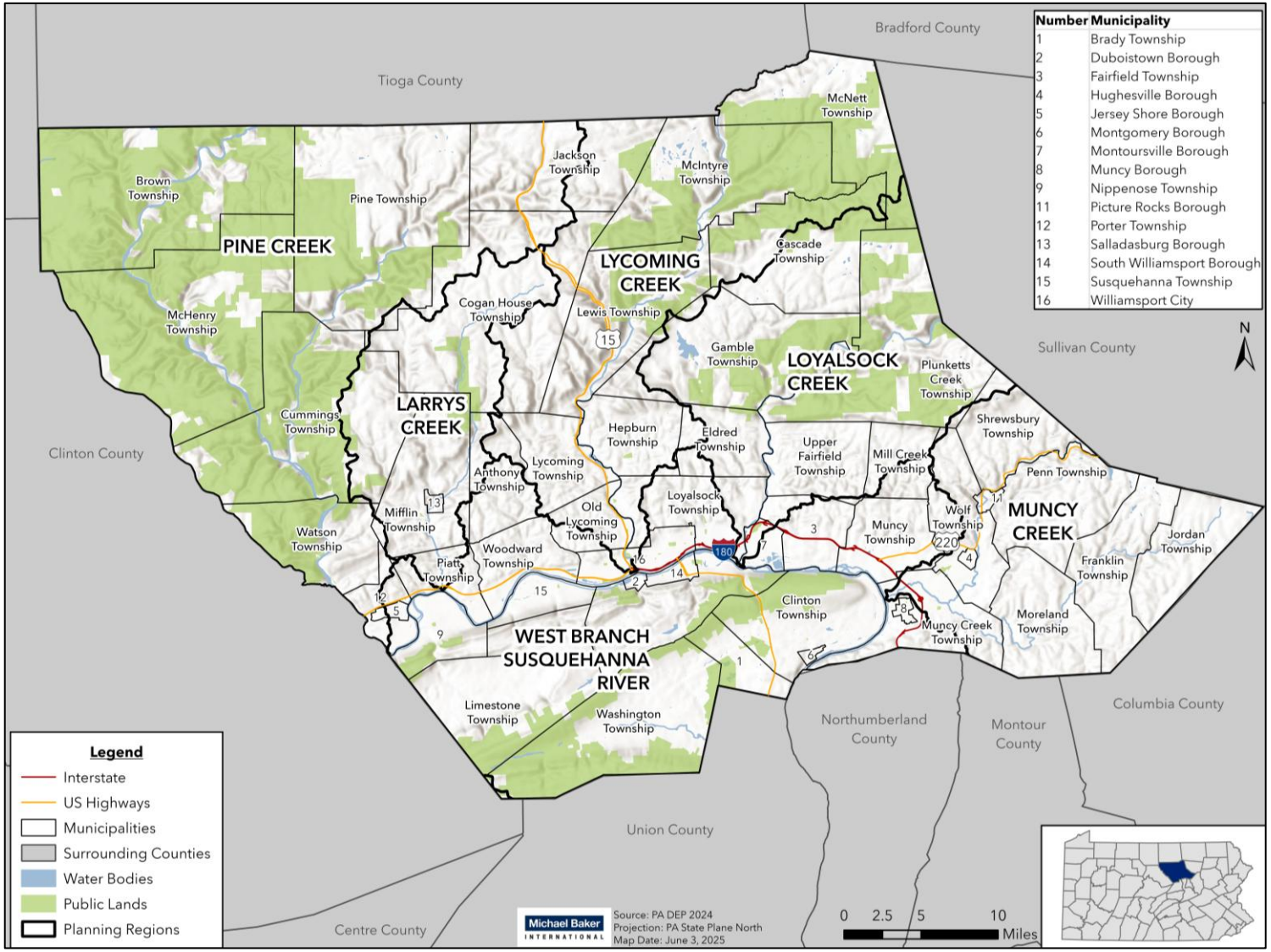


Figure 2.1-3 Lycoming County Planning Regions Map



2.2. COMMUNITY FACTS

Lycoming County was formed on April 13, 1795, from parts of Northumberland County and was named after Lycoming Creek. The name is derived from a Delaware Indian word meaning "sandy or gravelly creek." Williamsport, the county seat, was laid out in 1795, incorporated as a borough on March 1, 1806, and became a city on January 15, 1866 (Pennsylvania Historical and Museum Commission (PHMC), n.d.).

Historically, lumber was the backbone of the economy. Sawmills sprang up along the river as early as the late 1830's. Production increased after the Susquehanna Boom was built at Williamsport. This was a series of log cribs, extending seven miles upriver from Williamsport. The boom stored as much as 300 million board feet of lumber that had been floated downstream for eventual distribution to the approximately 60 sawmills lining the river from Newberry to Montoursville. Thus, Williamsport became the Lumber Capital of the World in the 1870's. However, clearing of the forests and the disastrous flood of 1889 resulted in the decline of the lumber industry that had produced so many millionaires. The city then turned its efforts to diversifying its industry. Today, Lycoming County continues to have diverse industries. Business firms manufacture airplane motors, valves, furniture, apparel, boilers, wire rope, electronic components, metal fabrications and much more (Williamsport/Lycoming Chamber of Commerce (WLCC), 2025).

Additionally, the Williamsport Area Transportation Study Metropolitan Planning Organization (WATS MPO) has responsibility for coordinating transportation planning efforts throughout all of Lycoming County, including the Lycoming County Long Range Transportation Plan 2023-2045 (adopted December 2023) and the 2025-2028 Transportation Improvement Program.

Despite its rural location, the county is quite accessible from urban areas throughout the Susquehanna River Valley. As Figure 2.1-1 illustrates, U.S. Route 15 provides access to points north and south while Interstate 180 and U.S. Route 220 link the county with Interstate 80, a major east-west trending highway that extends from New Jersey to the Ohio state line and beyond, all the way to California. The county is comprised of 52 municipalities, including 42 townships, 9 boroughs, and the City of Williamsport, the metropolitan center and county seat.

There are eleven public school districts throughout the county: Canton Area School District, East Lycoming School District, Jersey Shore Area School District, Loyalsock Township School District, Montgomery Area School District, Montoursville Area School District, Muncy School District, South Williamsport Area School District, Southern Tioga School District, Wellsboro Area School District, and Williamsport Area School District. The county is also home to two colleges: Lycoming College and Pennsylvania College of Technology.

2.3. POPULATION AND DEMOGRAPHICS

Population and demographic information provide baseline information 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 Lycoming County is provided in Table 2.3-1.

Table 2.3-1 Lycoming County Demographic Summary (U.S. Census Bureau, ACS, 2023)

DEMOGRAPHIC DATA POINT	2013	2023
Total Population	116,604	113,570
Female	59,380	57,643
Male	57,224	55,927
Median Age (years)	41.2	41.3
Under 5 years	6,457	5,905
5 – 19 years	21,394	20,839
20 – 64 years	69,415	63,872
65 years and older	19,338	22,954

Lycoming County has an estimated 2023 population of 113,570, making it the most populated county in the Pennsylvania Wilds region. This region consists of Cameron, Clarion, Clearfield, Clinton, Elk, Forest, Jefferson, Lycoming, McKean, Potter, Tioga, and Warren Counties. Clearfield, with a population of approximately 77,090, has the next largest population estimate in the region.

Table 2.3-3 provides the total population for each jurisdiction in Lycoming County for the American Community Survey (ACS) 5-Year Estimates of 2013 and 2023 . As seen in the table, much of Lycoming County's population can be attributed to the City of Williamsport. The City of Williamsport had a total population of approximately 27,754 in 2023. The Williamsport Metropolitan Statistical Area (MSA) consists of all of Lycoming County and therefore, also has an estimated population of 113,570 in 2023 (U.S. Census Bureau, ACS, 2023). The two closest MSAs to the Williamsport MSA are the Scranton-Wilkes Barre-Hazleton MSA to the east and the State College MSA to the west of Lycoming County. Both MSAs are larger than the Williamsport MSA.

In 2023, approximately 20 percent of Lycoming County's population was 65 or older (U.S. Census Bureau, ACS, 2023). This is an increase from 2013 where approximately 17 percent of the county was 65 or older. These residents often have special needs. For example, some may have decreased mobility (ex. requiring walkers or wheelchairs, unable to drive), dementia or other cognitive impairments, preexisting chronic health issues, live in isolation, depend on someone else, depend on medication, or be economically insecure (Boyle, 2024). Therefore, special evacuation plans may need to be created for them. Children under the age of 5 are similarly dependent populations. Lycoming County's combined under 5-years-of-age and over-65 populations represent approximately 25 percent of its population (U.S. Census Bureau, ACS, 2023).

The Center for Rural Pennsylvania, partnered with the Pennsylvania State Data Center, created the *Pennsylvania Population Projections 2050: A First Look* in October 2023. Population estimates show that Lycoming County is projected to continue to decline in population. Census-based projections estimate that the county's population will be 112,305 in 2050. This indicates an over 1.6% decrease in the population from 2020 to 2050 (Center for Rural Pennsylvania, 2023). The 2023 population of 113,570 indicates that the population might be decreasing at a faster rate than estimated (U.S. Census Bureau, ACS, 2023). A deeper discussion of this expected population loss, and its impacts on future development, risk, and vulnerability is discussed in Section 4.4.4.

Table 2.3-2 displays the housing characteristics for Lycoming County. In 2023, Lycoming County had 52,692 residential units. These properties may be vulnerable to various natural hazards, in particular flooding and windstorms. Damage to residential properties is not only expensive to repair or rebuild but also can be devastating to the displaced family. Meanwhile, approximately 6,400 of the county's residential properties are vacant. Vacant buildings are particularly vulnerable to arson and criminal activity. Since many vacant properties may not have been maintained, they may be structurally deficient and at risk of collapsing during a hazard event.

Table 2.3-2 Housing Characteristics (U.S. Census Bureau, ACS, 2023)

HOUSING CHARACTERISTIC	2013	2023
Total Housing Units	52,723	52,692
Occupied Housing Units	46,046	46,201
Vacant Housing Units	6,111	6,491
Owner-Occupied Housing Units	32,540	31,970
Renter-Occupied Housing Units	14,072	14,231
Median Home Value	$119,200	$195,600

Table 2.3-3 Municipal Population in Lycoming County (U.S. Census Bureau, ACS, 2023)

MUNICIPALITY	POPULATION	
	2013	2023
Boroughs		
Duboistown Borough	1,230	1,404
Hughesville Borough	1,787	2,439
Jersey Shore Borough	4,354	4,133
Montgomery Borough	1,556	1,379
Montoursville Borough	4,619	4,711
Muncy Borough	2,651	2,687
Picture Rocks Borough	689	718

Table 2.3-3 Municipal Population in Lycoming County (U.S. Census Bureau, ACS, 2023)		
MUNICIPALITY	**POPULATION**	
	2013	**2023**
Salladasburg Borough	236	188
South Williamsport Borough	6,369	6,216
Williamsport, City of	29,429	27,629
City and Boroughs Total	***52,920***	***51,504***
Townships		
Anthony Township	864	915
Armstrong Township	689	519
Bastress Township	465	562
Brady Township	577	460
Brown Township	54	99
Cascade Township	529	379
Clinton Township	3,730	3,655
Cogan House Township	892	900
Cummings Township	236	252
Eldred Township	2,078	1,841
Fairfield Township	2,797	2,818
Franklin Township	943	865
Gamble Township	834	792
Hepburn Township	2,758	2,563
Jackson Township	368	378
Jordan Township	858	805
Lewis Township	1,113	981
Limestone Township	2,005	1,870
Loyalsock Township	11,109	11,493
Lycoming Township	1,485	1,523
McHenry Township	191	123
McIntyre Township	671	405
McNett Township	118	122
Mifflin Township	1,079	1,060
Mill Creek Township	610	437
Moreland Township	1,005	1,114
Muncy Creek Township	3,499	3,553
Muncy Township	995	1,112
Nippenose Township	684	579
Old Lycoming Township	4,998	4,958
Penn Township	878	798
Piatt Township	1,109	962
Pine Township	285	283

Table 2.3-3 Municipal Population in Lycoming County (U.S. Census Bureau, ACS, 2023)		
MUNICIPALITY	**POPULATION**	
	2013	**2023**
Plunketts Creek Township	621	560
Porter Township	1,996	1,352
Shrewsbury Township	425	423
Susquehanna Township	994	1,122
Upper Fairfield Township	1,783	1,761
Washington Township	1,765	1,995
Watson Township	537	543
Wolf Township	2,961	3,097
Woodward Township	2,096	2,037
Townships Total	***63,684***	***62,066***
Countywide Total	**116,604**	**113,570**

Approximately 30 percent of the county's population rent (U.S. Census Bureau, ACS, 2023). Renters are often more transient than homeowners; therefore, communicating with renters may be more difficult. They may also have less control over their housing and less able to make mitigation improvements. Similarly, tourists would be a harder population to communicate with during an emergency event. Additionally, 3.5 percent of Lycoming County's population speaks a language other than English (U.S. Census Bureau, ACS, 2023).

Table 2.3-4 displays Lycoming County's and Pennsylvania's income levels in 2013 and 2023. The county's estimated per capita income of $34,853 is lower than the Commonwealth's per capita income of $43,104 in 2023. Both the median household income and median family income in Lycoming County is lower than Pennsylvania.

Table 2.3-4 Income Levels (U.S. Census Bureau, ACS, 2023)				
INCOME	**LYCOMING COUNTY**		**PENNSYLVANIA**	
	2013	**2023**	**2013**	**2023**
Median Household Income	$45,430	$64,412	$52,548	$76,081
Median Family Income	$57,160	$80,388	$66,646	$97,349

Furthermore, Figure 2.3-1 displays where jobs are concentrated in Lycoming County as of 2022. Jobs are mostly concentrated in the southcentral area of the county around Williamsport and along the major roadways of State Route 44, Interstate 180, U.S. Route 220, and U.S. Route 15 (U.S. Census, OnTheMap, 2025). Municipalities along these routes include Jersey Shore Borough, Montoursville Borough, and Muncy Borough. Small pockets of jobs can be found throughout the county, with notable areas including Salladasburg Borough and Hughesville Borough.

Figure 2.3-2 lists all jobs by industry sector for 2022, the most recent data available. In 2022, Lycoming County had a total of 47,753 jobs. The three biggest sectors included Healthcare and Social Assistance with 9,512 (19.9%), Manufacturing with 7,575 (15.9%), and Retail Trade with 5,329 (11.2%). Furthermore, out of the 47,753 jobs in Lycoming County, 59.6% (28,438) of people both live and are employed within Lycoming County. While 40.4% (19,315) of people employed in Lycoming County live outside of the area, out of 50,947 people living in the area, 44.2% (22,509) of them are employed outside of it (OnTheMap, 2025). This indicates that there is a decent amount of daily mobility for employment purposes. Outreach and education efforts for risk reduction activities should be mindful of these commute patterns.

Figure 2.3-1 Lycoming County Job Locations (U.S. Census Bureau OnTheMap, 2025)

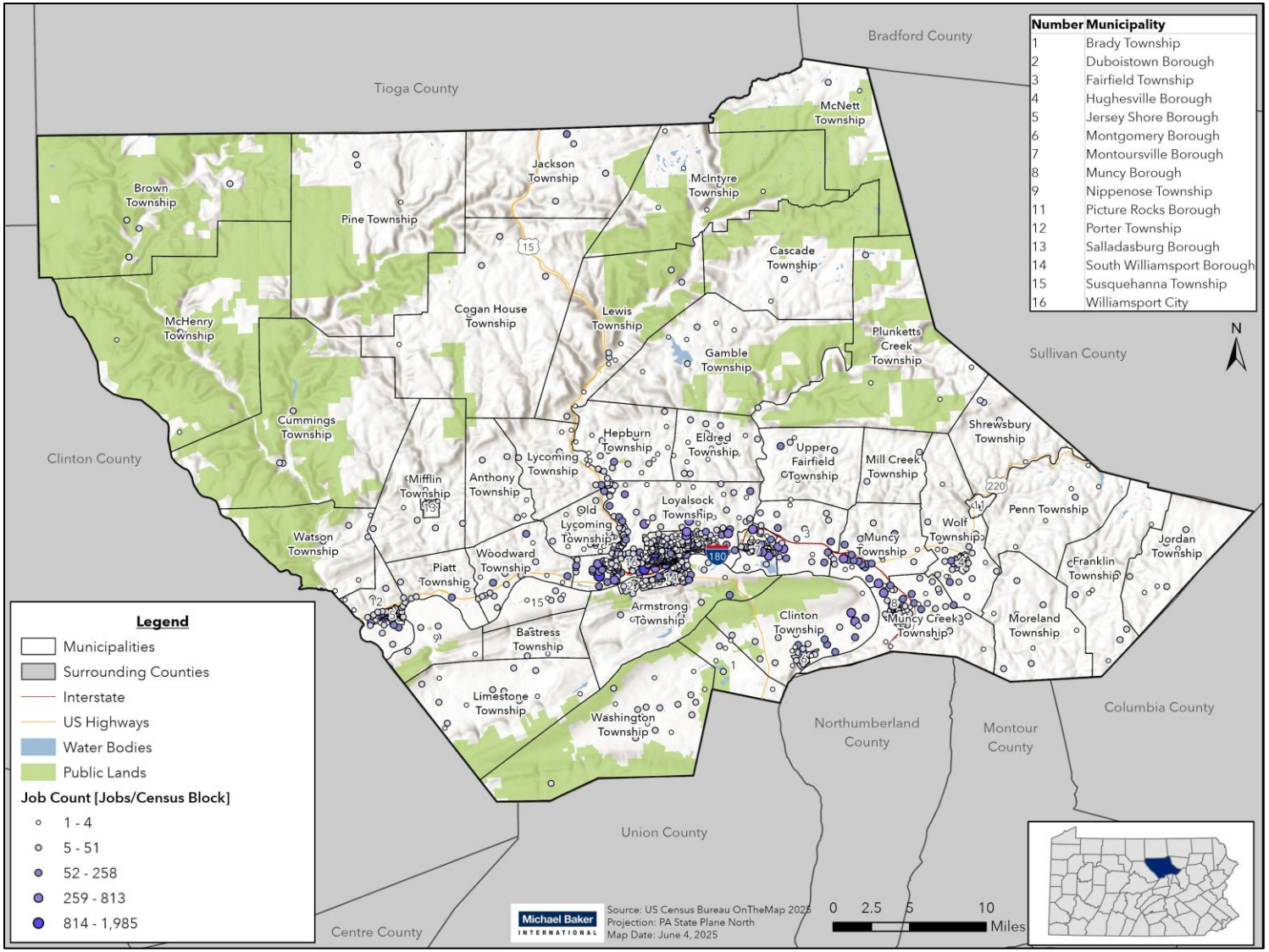


Table 2.3-5 Lycoming County Jobs by Industry Sector (U.S. Census Bureau OnTheMap, 2025)		
INDUSTRY SECTOR	**NUMBER OF JOBS**	**PERCENTAGE**
Agriculture, Forestry, Fishing, and Hunting	92	0.2%
Mining, Quarrying, and Oil, Gas Extraction	755	1.6%
Utilities	298	0.6%
Construction	1,930	4.0%
Manufacturing	7,573	15.9%
Wholesale Trade	1,777	3.7%
Retail Trade	5,329	11.2%
Transportation and Warehousing	1,206	2.5%
Information	324	0.7%
Finance and Insurance	1,237	2.6%
Real Estate and Rental and Leasing	633	1.3%
Professional, Scientific, and Technical Services	2,093	4.4%
Management of Companies and Enterprises	236	0.5%
Administration & Support, Waste Management and Remediation	2,294	4.8%
Educational Services	4,264	8.9%
Health Care and Social Assistance	9,512	19.9%
Arts, Entertainment, and Recreation	284	0.6%
Accommodation and Food Services	3,801	8.0%
Other Services (excluding Public Administration)	1,962	4.1%
Public Administration	2,153	4.5%
TOTAL	**47,753**	**100%**

2.4. EQUITY IN HAZARD MITIGATION PLANNING

When planning for natural disasters or other hazardous events, accounting for underserved and socially vulnerable communities through an equitable approach is critical for minimizing negative impacts. Underserved communities refers to populations sharing a particular characteristic, as well as geographic communities that have historically been systematically denied a full opportunity to participate in aspects of economic, social and civic life. Social vulnerability is understood as the potential for loss within an individual or social group, recognizing that some characteristics influence an individual's or group's ability to prepare, respond, cope or recover from an event. These characteristics can overlap within populations to create heightened vulnerability, which may be compounded by infrastructure deficiencies within communities and historic or existing discriminatory government policies. Looking at these communities through an equitable approach consists of ensuring the fair and just

distribution of resources, opportunities, and support tailored to meet the unique needs of different groups ensuring that everyone has the opportunity to thrive.

FEMA's Community Resilience Challenges Index (CRCI) provides a measure for these kinds of characteristics (see below). Lycoming County has census tracts with mostly low challenges or in the 5th to 15th percentile, shown in Figure 2.4-1. One census tract is considered to have medium challenges or are in the 30th to 70th percentile for challenges, The CRCI uses the following 22 indicators:

- Population:
  - No High School Diploma.
  - Age 65 or older.
  - Disabilities.
- Household:
  - No Vehicle.
  - Limited English.
  - Single Parent Households.
  - No Smartphone.
- Housing:
  - Mobile Home Share.
  - Owner-Occupied Housing.
- Healthcare:
  - Number of Hospitals.
  - Medical Professionals per 1,000.
  - Population without Insurance.
- Economic:
  - Unemployment.
  - Income Inequality.
  - Median Household Income.
  - Unemployed Women.
  - Population Below Poverty Level.
  - Employment in Predominant Sector.
- Connection to Community:
  - Inactive Voters.
  - Civic and Social Organizations.
  - No Religious Affiliation.
  - Population Change.

Figure 2.4-1 FEMA CRCI Census Tracts in Lycoming County (FEMA CRCI, 2025).

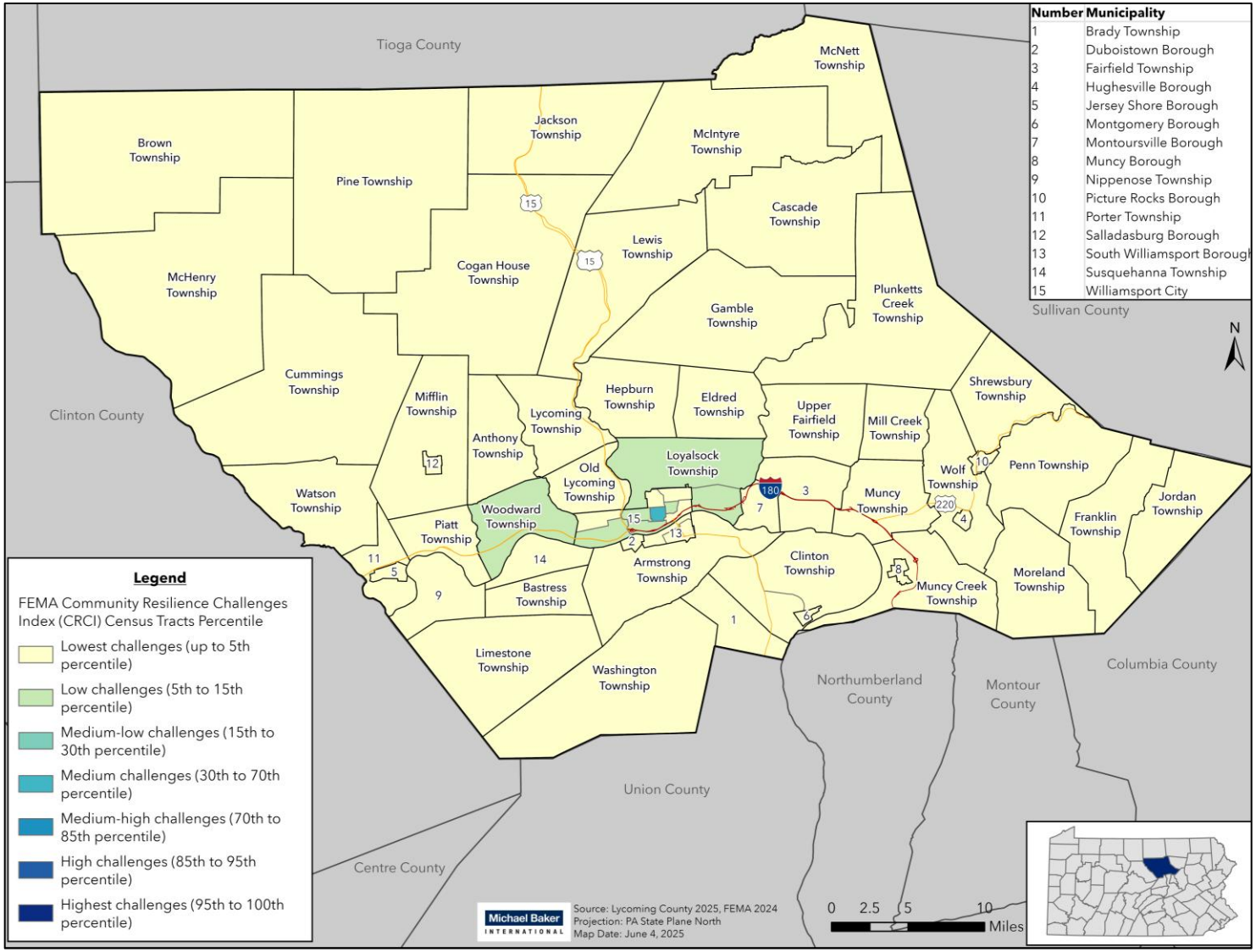


Table 2.4-1: Underserved and Socially Vulnerable Census Tracts in Lycoming County (FEMA CRCI, 2025)			
CENSUS TRACT	**MUNICIPALITY**	**CHALLENGE PERCENTILE**	**INDICATORS PRESENT**
Census Tract 3	City of Williamsport	5th – 15th	No High School Diploma, Population over 65 Years Old, Disabilities, No Vehicle, Single Parents, No Smartphone, Number of Hospitals, Median Income, Unemployed Women, Poverty, Presence of Civic and Social Organizations, No Religious Affiliation
Census Tract 4	City of Williamsport	30th – 70th	No High School Diploma, Disabilities, No Vehicle, Limited English, Single Parents, No Smartphone, Number of Hospitals, Unemployment, Median Income, Income Inequality, Unemployed Women, Poverty, Predominant Sector Employment, Presence of Civic and Social Organizations, No Religious Affiliation
Census Tract 5	City of Williamsport	5th – 15th	No High School Diploma, Disabilities, No Vehicle, No Smartphone, Number of Hospitals, Unemployment, Median Income, Unemployed Women, Poverty, Predominant Sector Employment, Presence of Civic and Social Organizations, No Religious Affiliation
Census Tract 8	City of Williamsport	5th – 15th	No Vehicle, Single Parents, Number of Hospitals, Unemployment, Median Income, Poverty, Predominant Sector Employment, Presence of Civic and Social Organizations, No Religious Affiliation
Census Tract 9	City of Williamsport	5th – 15th	No High School Diploma, Population over 65 Years Old, Disabilities, No Vehicle, No Smartphone, Number of Hospitals, Health Insurance, Unemployment, Median Income, Poverty, Presence of Civic and Social Organizations, No Religious Affiliation
Census Tract 111	Loyalsock Township	5th – 15th	Population over 65 Years Old, Disabilities, No Smartphone, Owner-Occupied Housing, Number of Hospitals, Medical Professionals, Unemployment, Median Income, Unemployed Women, Predominant Sector Employment, Presence of Civic and Social Organizations, No Religious Affiliation
Census Tract 112	Loyalsock Township	5th – 15th	Population over 65 Years Old, Disabilities, No Vehicle, No Smartphone, Number of Hospitals, Medical Professionals, Unemployment, Income Inequality, Unemployed Women, Predominant Sector Employment, Presence of Civic and Social Organizations, No Religious Affiliation
Census Tract 113.01	Woodward Township	5th – 15th	Population over 65 Years Old, Disabilities, Single Parents, No Smartphone, Mobile Homes, Owner-Occupied Housing, Number of Hospitals, Unemployment, Median Income, Unemployed Women, Presence of Civic and Social Organizations, No Religious Affiliation

The map and table show the most vulnerable census tracts but each census tract in the county has at least one of the 22 indicators in the CRCI. It is important for municipalities to be aware of and understand their vulnerable populations. In each hazard profile, municipalities with communities that may be particularly vulnerable to the hazard's impacts are identified. For example, Loyalsock Township's census tracts in the table above don't include "Limited English" as an indicator, but the township still considers the needs of these populations in its operations.

Incorporating equity into mitigation plans ensures that these populations receive the attention and resources necessary to reduce their risk and enhance their resilience. This approach not only addresses existing social inequalities but also leads to more effective and sustainable disaster management outcomes, ensuring that all communities have the opportunity to thrive in the face of adversity.

To adequately target these underserved communities, targeted outreach was a fundamental part of the county's hazard mitigation plan. The HMP's outreach and engagement plan (**Appendix I**) discusses the HMSC's work to identify underserved communities using local knowledge and tools.

2.5. LAND USE AND DEVELOPMENT

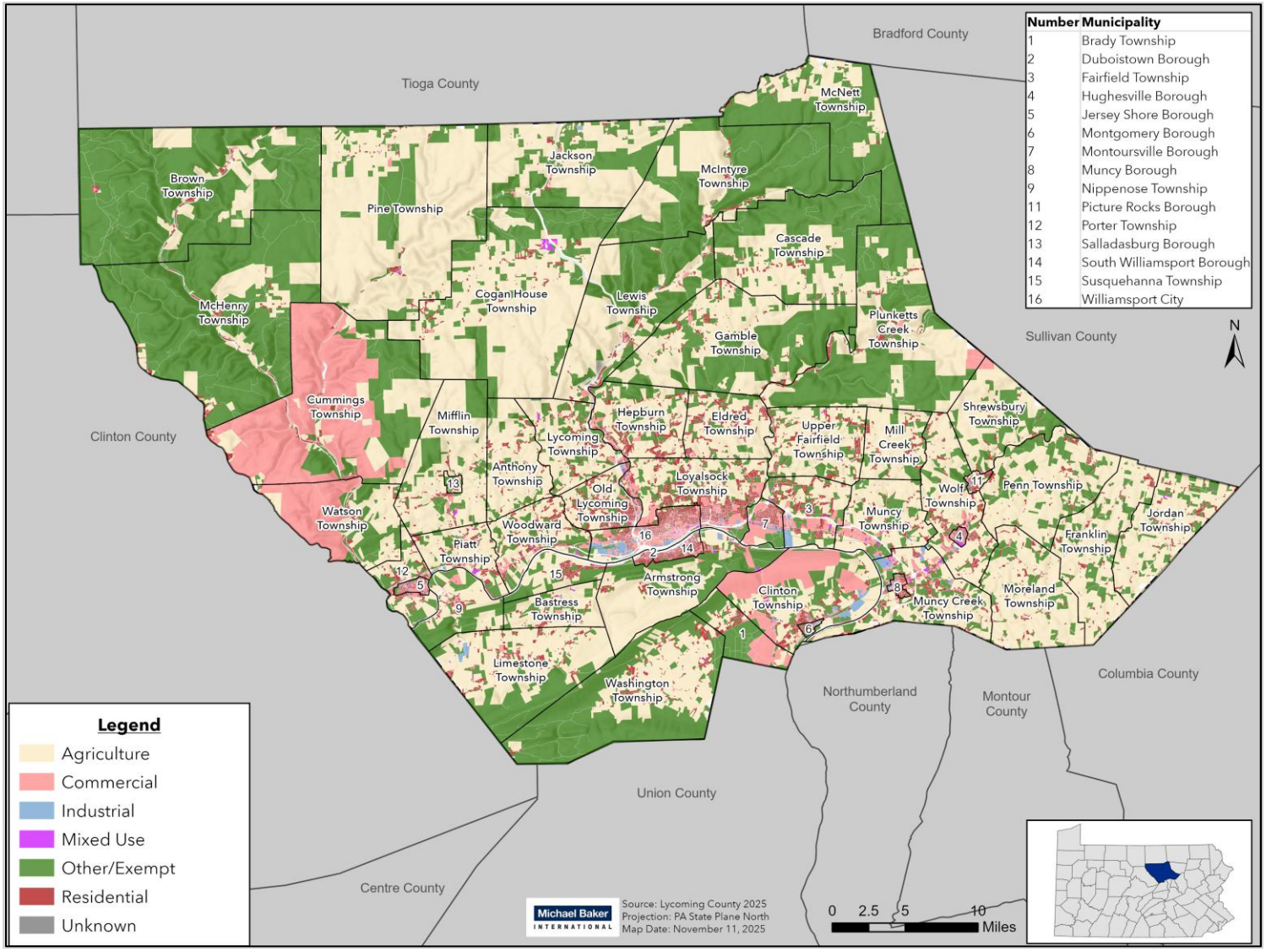
Lycoming County is mostly rural with the majority of its population located in the south-central area of the county, centered along the West Branch of the Susquehanna River and U.S. Route 15, Interstate 180, and U.S. Route 220. Figure 2.5-1 shows the current pattern of land use in the county by displaying the property type of the county's parcels as of 2025. The county's vision for future development, as documented in the 2018 Comprehensive Plan, is to keep growth centralized and protect its natural resource areas in the outer regions while steering development outside of flood prone areas. To do so, the county has designated growth areas where the county will target economic development activity. These growth areas are focused on development around Interstate 180, U.S. Route 15, U.S. Route 220, the future development of Interstate 99, and the Greater Williamsport, Montoursville, Muncy, and Lower Lycoming Creek communities. The six multi-jurisdictional planning regions shown in Figure 2.1-3 have been identified to help guide this development.

A special transportation impact study was also conducted in 2021 for the Central Susquehanna Valley Transportation (CSVT) Project. The CSVT involves the phased construction of approximately 12.4 miles of new four-lane, limited access highway from the northern terminus of the Selinsgrove Bypass (US 11/15) in Monroe Township, Snyder County to PA 147 just south of the PA 45 interchange near Montandon, Northumberland County (CSVT Special Impact Study, 2021). The project also includes a connector to PA 61 in the greater Shamokin Dam area and a new bridge crossing over the West Branch Susquehanna River extending from Union Township, Union County to Point Township, Northumberland County. The purpose of this special study was to evaluate the overall land use and transportation system impacts resulting

from the completion of the CSVT project on growth areas for impacted regions, including Lycoming County. For Lycoming County, the Interstate 180 corridor from the Lycoming/Northumberland County line to its connection with US 15 as well as the US 15 corridor between the Lycoming/Union County line and its connection with Interstate 180 were examined. The study identified numerous anticipated future traffic pattern changes due to the completion of CSVT and many anticipated land use changes as a result of the traffic pattern changes. From these anticipated impacts, a set of recommended projects was developed so that communities will be prepared for the impacts of CSVT when it opens to traffic. This included recommendations to address deficiencies within the comprehensive plan of Lycoming County, specifically potential impacts from anticipated increased traffic and land use conflicts within the study area (Lycoming County Planning Commission, 2021).

The county has many land development regulations in place to protect its natural, historic, and environmentally sensitive areas. These regulations for floodplain management exceed federal standards and are described in detail in Section 5.2.1. For more information on how future development patterns impact vulnerability to hazards, please see Section 4.4.4.

Figure 2.5-1 Current Land Uses in Lycoming County



2.6. DATA SOURCES AND LIMITATIONS

Lycoming County Department of Public Safety's Buildings (point data) and parcels (polygon layer) databases were used as an inventory of properties throughout the county. The buildings data did not include type or value. However, the Lycoming County Geographic Information Systems (GIS) Department recommended using a spatial join between the buildings and the parcel database to associate a building use with each building using the property type codes assigned to each parcel. These property types were assigned a generalized land use code of agricultural, commercial, industrial, residential, transportation/utilities, and unknown (for parcels with no property type code). While this allows for generalized discussion of the type of buildings at risk in Lycoming County, the number of buildings by type used throughout this HMP should be considered estimates. The actual building and land use may differ than information contained in the database. The property type was also used to extract numbers of mobile homes. The buildings layer also did not have a value associated with each structure. As a result, loss estimates were derived from the parcel database.

Some information, such as the study area boundaries and geography, has remained unchanged from the 2020 Plan. Other information such as the demographic and employment and industry information has been developed using the latest U.S. Census, the Comprehensive Plans, Lycoming County Countywide Action Plan, the 2023 Long-Range Transportation Plan, Lycoming County Annual Reports, 2021 CSVT Special Impact Study, FEMA CRCI, and other recent Economic Development Strategy and Planning documents.

Flood hazard data used in this plan is from the Flood Insurance Study and Flood Insurance Rate Maps (FIRMs) pulled from FEMA's Mapping Services Center, effective June 2, 2016. The FIRM provides a digital representation of features.

Lycoming County provided GIS datasets including community facilities, current land use and future land use, growth areas zoning, parcels, landslide hazard data, public water supply, repetitive loss, and severe repetitive loss hot spots. Additional data for the base map was provided by the Pennsylvania Department of Transportation (PennDOT), Pennsylvania Game Commission, the Pennsylvania Department of Conservation and Natural Resources (DCNR), and the US Census.

Lycoming County considers ten types of facilities critical, meaning they are essential to the health and welfare of the community:

- Child Care Facilities.
- Congregate Care Facilities.
- Emergency Operations Centers (EOC).
- Fire Stations.
- Hospitals.
- Misc.
- Municipal Buildings.
- Police Stations.
- Prisons.
- Private Schools.
- Public Schools.
- Pump Station.
- Shelters.
- TRI Facilities.

Additional information used to complete the risk assessment for this plan was gathered from various government and non-government agency sources. Those sources are cited where appropriate throughout the plan and on each map with full references listed in Appendix A – Bibliography. It should be noted that numerous GIS datasets were obtained from the Pennsylvania Spatial Data Access (PASDA) website (http://www.pasda.psu.edu/). PASDA is the official public access geospatial information clearinghouse for the Commonwealth of Pennsylvania. PASDA was developed by the Pennsylvania State University as a service to the citizens, governments, and businesses of the Commonwealth. PASDA is a cooperative project of the Governor's Office of Administration, Office for Information Technology, Geospatial Technologies Office and the Penn State Institutes of Energy and the Environment of the Pennsylvania State University.

In order to assess the vulnerability of different jurisdictions to the hazards, data on past occurrences of damaging hazard events was gathered. For a number of historic natural hazard events, the National Centers for Environmental Education (NCEI) database was utilized. NCEI is a division of the US Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). Information on hazard events is compiled by NCEI from data gathered by the National Weather Service (NWS), another division of NOAA. NCEI then presents it on their website in various formats. The data used for this plan came from the US Storm Events database, which "documents the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, and/or disruption to commerce" (NOAA, 2006). Due to changes in the data collection procedures over time, there may be more events available for certain kinds of natural hazards; incidences listed in this plan reflect data housed in the NCEI Storm Events Database as of August 2025.

Hazus is a powerful risk assessment methodology for analyzing potential losses from floods, hurricane winds and earthquakes. In Hazus, current scientific and engineering knowledge is coupled with the latest GIS technology to produce estimates of hazard-related damage before, or after, a disaster occurs. Hazus version 6.1 was used to estimate losses for floods in Lycoming County; this plan incorporates an enhanced analysis, meaning that county-specific data was incorporated into the model to make it more precise. In addition, the planning team developed a 1%-annual chance flood depth grid, based off of the effective DFIRM, to incorporate the most accurate and precise flood estimations in the county. For more information on the enhanced analysis methodology used for this plan's flood model, please see **Appendix G**.

Throughout the risk and vulnerability assessments included in Section 4 descriptions of data indicate some areas in which the county and municipalities can improve their ability to identify vulnerable structures and improve loss estimates. As the county and municipal governments work to increase their overall technical capacity and implement comprehensive planning goals, they will also attempt to improve the ability to identify areas of increased vulnerability.

The hazard mitigation plan takes assets into consideration. The plan describes the vulnerability of assets to the identified hazards and looks at the risk that makes them susceptible to damage from the identified hazards. Assets considered include:

- People (including underserved communities and socially vulnerable populations).
- Structures (including facilities, lifelines and critical infrastructure).
- Systems (including networks and capabilities).
- Natural, historic, and cultural resources.
- Activities that have value to the community.

Assets were identified using multiple methods. One of those methods was through reviewing FEMA's community lifelines. FEMA community lifelines are essential services that enable the continuous operation of critical government and business functions, which are crucial for human health, safety, and well-being. These lifelines, which are listed in Figure 2.6-1, form the backbone of a community's resilience to disasters. Additionally, community lifelines will serve as a focal point for assessing vulnerabilities and implementing strategies to minimize disruptions.

Figure 2.6-1 Community Lifelines

 Law Enforcement/ Security, Fire Service, Search and Rescue, Government Service, Community Safety	 Food, Hydration, Shelter, Agriculture	 Medical Care, Public Health, Patient Movement, Medical Supply Chain, Fatality Management	 Power Grid, Fuel
 Infrastructure, Responder Communications, Alerts Warnings and Messages, Finance, 911 and Dispatch	 Highway/Roadway/ Motor Vehicle, Mass Transit, Railway, Aviation, Maritime	 Facilities, HAZMAT, Pollutants, Contaminants	 Potable Water Infrastructure, Wastewater Management

This HMP evaluates the vulnerability of the county's critical facilities. The list of critical facilities provided in **Appendix F** was developed based on information provided by the Lycoming County GIS Department. For the purposes of this plan, critical facilities are those entities that are essential to the health and welfare of the community. This includes emergency operation centers, fire stations, hospitals, prisons, municipal buildings, congregate care facilities, police stations, pre-schools, and childcare, Toxic Release Inventory (TRI) Facilities, and public schools, private schools, and shelters. Table 2.6-1 summarizes the critical facilities in Lycoming County by type and by municipality. For a complete listing of critical facilities and their vulnerability to individual hazards, please see **Appendix F**.

Table 2.6-1 Number of Critical Facilities in Lycoming County by Type and Data Source

TYPE	NUMBER IN COUNTY	DATA SOURCE
Child Care Facilities	34	County
Congregate Care Facilities	16	County
EOC	77	County
Fire Stations	33	County
Hospitals	7	County
Misc	33	County
Municipal Buildings	54	County
Police Stations	13	County
Prisons	3	County
Private Schools	20	Homeland Infrastructure Foundation-Level Data (HIFLD), County
Public Schools	37	HIFLD, County
Pump Station	5	FEMA's Comprehensive Data Management System, a tool within Hazus
Shelters	38	County
TRI Facilities	18	Environmental Protection Agency (EPA)

Table 2.6-2 Types of Critical Facilities in Lycoming County		
TYPE	**DEFINITION**	**WHY IT IS CRITICAL**
Child Care Facilities	An institution providing pre-kindergarten education to children, which may also include day care services.	Buildings where many people and young vulnerable populations are present during the day.
Congregate Care Facilities	A facility licensed by the department or the Department of Human Services, including, but not limited to, a long-term care nursing facility, a skilled nursing facility, an assisted living facility, a personal care home, an independent long-term care facility or an intermediate care facility for individuals with intellectual disabilities.	Provides safety and shelter for vulnerable populations, especially those that require 24/7 care and monitoring.
Emergency Operations Centers	A facility where emergency medical service (EMS) personnel are stationed or based out of, or where equipment that such personnel use in carrying out their jobs is stored for ready use.	Important for the storage and maintenance of EMS equipment.
Fire Stations	A facility where fire engines and other equipment of a fire department are housed.	Important for the storage and maintenance of firefighting equipment.
Hospitals	A place where sick or injured people are given care or treatment.	Buildings where people may be present 24/7, provide important care services, and may serve as a local shelter.
Municipal Buildings	A building that houses government functions and services.	Important for the continuation of government operations and services in times of emergency. Also, may house important documents and other resources.
Police Departments	A building which serves to accommodate police officers, other members of police staff, and their equipment.	Important for the storage and maintenance of emergency response equipment.
Prisons	A place for the confinement of people accused or convicted of a crime.	Buildings where many people are present 24/7.
Private Schools	An institution supported by a private organization or individuals to provide education to children and adults.	Buildings where many people and young vulnerable populations are present during the day, may also serve as a local shelter.

Table 2.6-2 Types of Critical Facilities in Lycoming County		
TYPE	**DEFINITION**	**WHY IT IS CRITICAL**
	Includes kindergarten through high school, higher education, and vocational schools	
Public Schools	A publicly funded institution providing education to children and adults. Includes kindergarten through high school, higher education, and vocational schools	Buildings where many people and young vulnerable populations are present during the day, may also serve as a local shelter.
Pump Stations	A facility designed to move water from one location to another.	These systems are important to the everyday function of communities, as they help supply water to homes and businesses and manage wastewater. They can also help prevent flooding.
Shelters	A place giving temporary protection from bad weather or danger.	Provide physical safety from hazards, including place to sleep, meals, access to clean clothes, and/or medical care or counseling. A place where many people may gather during a hazard event.
TRI Facilities	A facility that stores toxic chemicals listed on the publicly available TRI database that may pose a threat to human health and the environment.	Provide safe storage of chemicals that are harmful to the environment and public health.

Table 2.6-3 Critical Facilities by Municipality and Type															
MUNICIPALITY	CHILD CARE	CONGREGATE CARE	EOC	FIRE STATIONS	HOSPITALS	MISC	MUNICIPAL BUILDINGS	POLICE STATIONS	PRISONS	PRIVATE SCHOOLS	PUBLIC SCHOOLS	PUMP STATIONS	SHELTERS	TRI FACILITY	TOTAL
Anthony Township	0	0	2	0	0	0	1	0	0	0	0	0	1	0	4
Armstrong Township	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Bastress Township	0	0	2	0	0	0	1	0	0	0	0	0	0	0	3
Brady Township	0	0	2	0	0	0	1	0	0	0	0	0	0	0	3
Brown Township	0	0	1	2	0	0	1	0	0	0	0	0	1	0	5
Cascade Township	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Clinton Township	1	0	2	1	0	2	1	0	1	3	3	0	1	3	18
Cogan House Township	0	0	3	0	0	0	1	0	0	0	0	0	4	0	8
Cummings Township	0	0	2	1	0	0	1	0	0	0	0	0	1	0	5
Duboistown Borough	0	0	1	1	0	0	1	1	0	0	0	0	0	0	4
Eldred Township	0	0	1	1	0	0	1	0	0	0	0	0	1	0	4
Fairfield Township	2	0	1	0	0	0	1	0	0	0	0	0	0	0	4
Franklin Township	0	0	1	1	0	0	1	0	0	0	1	0	1	0	5
Gamble Township	0	0	2	0	0	0	1	0	0	0	0	0	0	0	3
Hepburn Township	0	0	2	1	0	0	1	0	0	0	1	0	1	0	6
Hughesville Borough	0	0	2	1	0	1	1	1	0	0	1	0	2	0	9
Jackson Township	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Jersey Shore Borough	4	1	2	3	1	0	1	1	0	1	1	0	2	0	17
Jordan Township	0	0	2	1	0	0	1	0	0	0	0	0	0	0	4
Lewis Township	0	0	1	1	0	4	3	0	0	0	1	0	0	0	10
Limestone Township	0	1	0	0	0	2	1	0	0	1	0	0	0	0	5

Table 2.6-3 Critical Facilities by Municipality and Type															
MUNICIPALITY	CHILD CARE	CONGREGATE CARE	EOC	FIRE STATIONS	HOSPITALS	MISC	MUNICIPAL BUILDINGS	POLICE STATIONS	PRISONS	PRIVATE SCHOOLS	PUBLIC SCHOOLS	PUMP STATIONS	SHELTERS	TRI FACILITY	TOTAL
Loyalsock Township	2	8	2	1	1	2	2	0	1	1	7	1	5	2	35
Lycoming Township	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
McHenry Township	0	0	2	1	0	0	1	0	0	0	0	0	0	0	4
McIntyre Township	0	0	2	1	0	0	1	0	0	0	0	0	0	0	4
McNett Township	0	0	1	0	0	0	1	0	0	0	0	0	0	0	2
Mifflin Township	0	0	2	0	0	0	1	0	0	0	1	0	0	0	4
Mill Creek Township	0	0	2	0	0	0	1	0	0	0	0	0	1	0	4
Montgomery Borough	0	0	2	1	0	0	1	0	0	0	0	0	0	0	4
Montoursville Borough	1	0	2	2	0	0	1	2	0	0	3	0	5	1	17
Moreland Township	0	0	2	0	0	0	1	0	0	0	0	0	2	0	5
Muncy Borough	0	0	2	1	0	0	1	1	0	0	2	0	2	3	12
Muncy Creek Township	0	2	1	1	1	0	1	0	0	0	0	0	0	0	6
Muncy Township	1	2	2	1	1	2	1	1	0	0	0	0	1	0	12
Nippenose Township	1	0	2	1	0	0	1	0	0	0	0	0	0	0	5
Old Lycoming Township	2	0	2	1	0	0	1	1	0	0	0	1	0	0	8
Penn Township	0	0	1	0	0	0	1	0	0	0	0	0	0	0	2
Piatt Township	0	0	0	0	0	0	1	0	0	1	0	0	0	0	2
Picture Rocks Borough	0	0	1	1	0	0	1	0	0	0	1	0	2	0	6
Pine Township	0	0	1	0	0	0	1	0	0	0	0	0	0	0	2
Plunketts Creek Township	0	0	2	1	0	0	1	0	0	0	0	0	1	0	5
Porter Township	0	0	3	0	0	0	1	0	0	0	1	0	0	0	5

Table 2.6-3 Critical Facilities by Municipality and Type															
MUNICIPALITY	CHILD CARE	CONGREGATE CARE	EOC	FIRE STATIONS	HOSPITALS	MISC	MUNICIPAL BUILDINGS	POLICE STATIONS	PRISONS	PRIVATE SCHOOLS	PUBLIC SCHOOLS	PUMP STATIONS	SHELTERS	TRI FACILITY	TOTAL
Salladasburg Borough	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Shrewsbury Township	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
South Williamsport Borough	2	1	2	1	0	0	1	1	0	1	3	3	3	0	18
Susquehanna Township	0	0	1	1	0	0	1	0	0	0	1	0	0	0	4
Upper Fairfield Township	0	0	2	0	0	0	1	0	0	0	1	0	1	0	5
Washington Township	0	0	2	1	0	0	1	0	0	4	0	0	0	0	8
Watson Township	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Williamsport City	14	1	2	2	3	20	4	4	1	8	8	0	0	7	74
Wolf Township	4	0	1	0	0	0	1	0	0	0	1	0	0	1	8
Woodward Township	0	0	2	1	0	0	1	0	0	0	0	0	0	1	5
TOTAL	34	16	77	33	7	33	54	13	3	20	37	5	38	18	388

3. PLANNING PROCESS

3.1. UPDATE PROCESS SUMMARY

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 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 an updated set of common community values and widespread support for directing financial, technical, and human resources to an agreed-upon action. The planning process has been an integral part of updating the Lycoming County HMP, which was originally adopted on September 24, 2004. This section describes Lycoming County's update process and how the HMP evolved since it was first approved by FEMA.

This 2026 HMP update was funded by a FEMA grant. The Lycoming County HMSC, consisting of Lycoming County Department of Public Safety staff, was responsible for the development of 2026 HMP Update in partnership with the Hazard Mitigation Planning Team (HMPT) that included representatives from the Lycoming County municipalities and other local and regional stakeholders. Specifically, the 2026 HMPT included stakeholders from the groups listed in Figure 3.1-1. A full list of stakeholders invited to participate is included in Appendix C – Meeting and Other Participation Documentation. The contact list in Appendix C specifies which stakeholder category (1 through 5 listed in Figure 3.1-1) each contact falls within.

Figure 3.1-1 Lycoming County HMP Stakeholder Types



All 52 municipalities in Lycoming County were considered in the vulnerability assessment and the development of the mitigation strategy to address vulnerabilities. In addition, River Valley Transit Authority participated as a special district. Details on the members of the HMSC and HMPT are included in Section 3.2 – The Planning Team.

To begin this process, Lycoming County Department of Planning & Community Development hosted an internal kick-off meeting with the consultant support to begin the update process on January 21, 2025. During this meeting, attendees reviewed the planning process, as well as changes to that process promoted by FEMA's updated Local Mitigation Planning Policy Guide. Additionally, the attendees discussed the scheduling of HMSC, HMPT and public meetings and participation for the 2026 update process. Details on this and other meetings are included in **Section 3.3 – Meetings and Documentation**.

Detailed information about stakeholder participation is included in **Section 3.4 – Public and Stakeholder Participation**. The municipal involvement in developing the 2026 HMP Update is detailed in **Section 3.5 – Multi-Jurisdictional Planning**.

The HMSC used worksheets to gather information from each municipality and participant in the planning process. These worksheets were designed to gather information about the hazards that affected the entire county, and how those hazards affected each of the municipalities, as well as information about the mitigation strategy. The use of these forms is detailed in **Section 3.3 – Meetings and Documentation** and the submitted forms are included in **Appendix C – Meeting and Other Participation Documentation**.

To clearly identify and document an approach for the planning process, the Lycoming County 2026 HMP Update Stakeholder Outreach and Engagement Strategy was developed. This strategy established methods for ongoing opportunities for input, collaboration, and feedback during the HMP update. There are two main sections of the strategy. The Plan Participant Identification section focuses on target audiences, HMSC roles and responsibilities, building the HMPT, public involvement and identifying and including underserved communities. The Outreach and Engagement Methods section focuses on key meetings and touchpoints and leveraging different outreach tools. This strategy can be referenced in **Appendix I – Outreach and Engagement Plan**.

The Outreach and Engagement Plan is new to the 2026 planning process, and it significantly informed how outreach was approached. The planning team focused a considerable amount of time on implementing the Outreach and Engagement Plan throughout the planning process. Details on how the Outreach and Engagement Plan was implemented through the planning process is documented in **Section 3.2 – The Planning Team, Section 3.3 – Meetings and Documentation, Section 3.4 – Public & Stakeholder Participation, Section 3.5 – Multi-Jurisdictional Planning, and Appendix C – Meeting and Other Participation Documentation**.

3.2. THE PLANNING TEAM

Members of the HMPSC are listed below in Table 3.2-1. The HMPSC met January 21, 2025 to discuss the planning process including FEMA and PEMA requirements and guidance, a schedule for deliverables and meetings, participation, and contacts for the HMPT, and currently available data and documentation to inform the 2026 update.

Table 3.2-1 Lycoming County Hazard Mitigation Plan Steering Committee

PARTICIPANT	TITLE
LYCOMING COUNTY DEPARTMENT OF PUBLIC SAFETY	
Kelsey Green, CFM	Hazard Reduction Planner
MICHAEL BAKER INTERNATIONAL	
Devon Benne, AICP	Project Manager
Kyle Dool, AICP	Outreach Lead

The HMPT assembled for the 2026 HMP included representatives from Lycoming County, the Lycoming County municipalities, and additional stakeholders representing the groups identified in Figure 3.1-1. The stakeholders listed in Table 3.2-2 served on the HMPT and actively participated in the planning process through attendance at meetings, completion of assessment surveys, or submission of comments. Participants representing multiple jurisdictions are listed more than once. Stakeholder and other participation documentation is provided in **Appendix C – Meeting and Other Participation Documentation**.

51 of 52 municipalities fully participated the hazard mitigation planning process. Batress Township was the only municipality to have partially participated in the planning process (highlighted yellow). Phone calls were held with the Chair of the Board of Supervisors and a member of the Board of Supervisors. They were provided with a jurisdictional profile to review but did not take the opportunity to provide any written feedback on the plan. River Valley Transit Authority fully participated in the plan update as a special district. The participants listed in Table 3.2-2 served on the 2026 HMPT and actively participated in the planning process.

Table 3.2-2 Hazard Mitigation Planning Process Participation

JURISDICTION/ORGANIZATION	PARTICIPANT(S)
JURISDICTIONS	
Anthony Township	Dennis Buttorff, Emergency Management Coordinator
Armstrong Township	James Pfleegor, Emergency Management Coordinator; Jonathan Zook, Chair, Board of Supervisors
Bastress Township	John Deitrick, Chair, Board of Supervisors; Gary Kolczynski, Board of Supervisors
Brady Township	Christopher Blaker, Supervisor
Brown Township	Sadie Wood-Dentel, Secretary/Treasurer

Table 3.2-2 Hazard Mitigation Planning Process Participation	
JURISDICTION/ORGANIZATION	**PARTICIPANT(S)**
Cascade Township	Joe Colucci, Emergency Management Coordinator
Clinton Township	Hugh Umpstead, Emergency Management Coordinator; Holly Wertz, Secretary
Cogan House Township	Lori Douglass, Supervisor; Howard Fry, Supervisor
Cummings Township	Dennis Buttorff, Emergency Management Coordinator
Duboistown Borough	Dori Rakinen, Vice President, Borough Council
Eldred Township	Charles Whitford, Emergency Management Coordinator; Cody Hoover, Supervisor
Fairfield Township	Kari Carie, Secretary
Franklin Township	Ray Lunger, Emergency Management Coordinator
Gamble Township	Raine Ohnmeiss, Secretary/Treasurer
Hepburn Township	Nathan Confer, Fire Chief & Emergency Management Coordinator; Mark Vollman, Township Manager
Hughesville Borough	Bryan Boyer, Emergency Management Coordinator
Jackson Township	Scott Brion, Chair, Board of Supervisors
Jersey Shore Borough	Dennis Buttorff, Emergency Management Coordinator
Jordan Township	Raine Ohnmeiss, Secretary
Lewis Township	Charles O'Brien, Jr, Supervisor/Emergency Management Coordinator; Steve Sechrist, Supervisor/Roadmaster
Limestone Township	Jeanne Engel, Secretary
Loyalsock Township	Bill Burdett, Township Manager
Lycoming Township	Nathan Confer, Fire Chief & Emergency Management Coordinator
McHenry Township	Dennis Buttorff, Emergency Management Coordinator
McIntyre Township	Joan Sechrist, Emergency Management Coordinator
McNett Township	Joan Sechrist, Emergency Management Coordinator
Mifflin Township	Dennis Buttorff, Emergency Management Coordinator

Table 3.2-2 Hazard Mitigation Planning Process Participation	
JURISDICTION/ORGANIZATION	**PARTICIPANT(S)**
Mill Creek Township	Scott Oldweiler, Fire Chief & Emergency Management Coordinator
Montgomery Borough	Dennis Gruver, Emergency Management Coordinator; Greg Gruver, Deputy Emergency Management Coordinator
Montoursville Borough	Bob Brown, Council Member; Cliff Hoffman, Street & Water Coordinator; David Hines, Zoning Officer; Donna Taggart, Secretary/Treasurer
Moreland Township	Susan Liuzzsa, Secretary; Lynn Reece, Chair, Board of Supervisors
Muncy Borough	Ed Feigles, GIS Specialist; Charley Hall, Borough Manager
Muncy Creek Township	Eric Newcomer, Supervisor
Muncy Township	Scott Oldweiler, Fire Chief & Emergency Management Coordinator
Nippenose Township	Chad Dunlap, Supervisor; Mike Eck, Chair, Board of Supervisors; Sherry Pittenger, Secretary/Treasurer
Old Lycoming Township	Steve Reeser, Emergency Management Coordinator; Shannon Rossman, Manager
Penn Township	Bryan Boyer, Emergency Management Coordinator
Piatt Township	Dennis Buttorff, Emergency Management Coordinator
Picture Rocks Borough	Craig Gansell, President, Borough Council; Linda Sosniak, Council President
Pine Township	Dennis Buttorff, Emergency Management Coordinator
Plunketts Creek Township	Jason Lewis, Supervisor; Thomas Schafer, Emergency Management Coordinator
Porter Township	Dennis Buttorff, Emergency Management Coordinator
Salladasburg Borough	Dennis Buttorff, Emergency Management Coordinator
Shrewsbury Township	Crystal Fisher, Secretary
South Williamsport Borough	Brooke Doebler, Treasurer; Micki Wagner, Secretary

Table 3.2-2 Hazard Mitigation Planning Process Participation	
JURISDICTION/ORGANIZATION	**PARTICIPANT(S)**
Susquehanna Township	Lynn Hill, Chair, Board of Supervisors; James Pfleegor, Emergency Management Coordinator
Upper Fairfield Township	Penny Ruggieri, Secretary; Scott Winters, Emergency Management Coordinator
Washington Township	Craig Stamile, Emergency Management Administrator; Brett Taylor, Chair, Board of Supervisors
Watson Township	Dennis Buttorff, Emergency Management Coordinator
Williamsport City	Sam Aungst, Fire Chief & Emergency Management Coordinator; Valerie Fessler, Director of Community and Economic Development; Scott Williams, Assistant Director for Community and Economic Development
Wolf Township	Bryan Boyer, Emergency Management Coordinator
Woodward Township	Pamela Musser, Secretary; Kelle Robinson, Emergency Management Coordinator
River Valley Transit Authority	Sal Vitko, Planning Director
OTHER STAKEHOLDERS	
Camp Susquehanna	Peter Swift, Camp Director
Commonwealth University - Bloomsburg	Jennifer Haney, Professor; Sidney Springer, Student
FEMA Region III	Stacey Blankin, Community Planning Unit Supervisor; Matthew McCullough, Planner
Hope Enterprises	Bridget Lingle, Quality Management Specialist
Lycoming County Emergency Management	Stacey Folk, Emergency Management Coordinator
Lycoming County Commission	Mark Mussina, County Commissioner
Lycoming County District Attorney's Office	Katie De La Silva, Project Coordinator
Lycoming County Planning & Community Development	Ed Feigles, Deputy Director; Kelsey Green, Hazard Reduction Planner; Jenny Picciano, Director; Garrett Russel, Intern
Lycoming Creek Watershed Association	Mike Ditchfield, President
Lycoming Department of Public Safety	Jeff Hutchins, Public Safety Director
Lycoming Valley Railroad	Dave Lenhart; Adam Pearson, General Manager
Lycoming-Clinton Joinder Programs	Jim Hicklin, County Mental Health Director
Montoursville School District	Daniel Taormina, Superintendent
Muncy School District	Craig Skaluba, Superintendent

Table 3.2-2 Hazard Mitigation Planning Process Participation	
JURISDICTION/ORGANIZATION	**PARTICIPANT(S)**
Office of Representative Jamie Flick	Carrie Pauling, District Office Manager
Office of State Senator Eugene Yaw	Elizabeth Vollman, Constituent Specialist
PA DEP	Lisa Meade, Local Government Liaison, North Central Regional Office; Thomas Mears, Emergency Response Manager, North Central Regional Office
Penn State Extension	Mike Powell, Extension Editor
Pennsylvania College of Technology	Tim Rissell, Executive Director for General Services; Benjamin Thomas, Director of Construction and Planning
Roads to Freedom Center for Independent Living	Jodie Ricketts, Clinical Director
Red Run Mountain, Inc.	Jeff Pifer, Dam Owner
STEP Inc.	Rachelle Abbott, President and CEO; Nikola Cleaver, Office of Aging Directo; Aron Haefner, Chief Operations Officer; Raelyn Jackson, Service Navigation Director; Dan Merk, Program Manager, STEP Transportation
Susquehanna River Basin Commission	Rachel Fedorko, Hydrologist; Ben Pratt, Water Resources Engineer
Tiadaghton Valley Municipal Authority	Shawn Lorson, Executive Director
Tioga County	Scott Zubek, GIS Director & Hazard-Plan Mitigation Advisory Committee Chairperson
Williamsport/Lycoming Chamber of Commerce	Jason Fink, President/CEO
Williamsport Regional Airport (IPT)	Eric McKitish, Executive Director
Williamsport School District	Brandon Pardoe, Director of Student Services
Walls and Associates	Jerry Walls, Joy Walls
Camp Susquehanna	Peter Swift, Camp Director
Commonwealth University - Bloomsburg	Jennifer Haney, Professor; Sidney Springer, Student

3.3. MEETINGS AND DOCUMENTATION

The following meetings were held during the update process. Meetings with an asterisk (*) were open to the public. Invitations, agendas, sign-in sheets, and minutes for these meetings are included in **Appendix C – Meeting and Other Participation Documentation**.

January 21, 2025 – Steering Committee Kick-Off Meeting was held virtually and attended by county representatives and the consultant to go over the planning process and major milestones including the schedule for HMPT meetings and anticipated HMP submission dates. The group also discussed planning requirements, relevant stakeholders, and the availability of geospatial data and other plans and documentation for integration.

February 5, 2025 – PEMA and FEMA Coordination Meeting was held virtually and attended by county representatives, the consultant, PEMA, and FEMA to discuss the project scope, invoicing process, the planning process, lessons learned from previous plans, and the latest FEMA requirements.

February 26, 2025 – Steering Committee Meeting was held virtually and attended by county representatives and the consultant to discuss new hazards being profiled, data collection for the risk assessment, logistics for the planning team kick-off meeting, and the plan drafting deadlines.

March 20, 2025 – Steering Committee Meeting was held virtually and attended by county representatives and the consultant to discuss logistics for the planning team kick-off, the West Branch Susquehanna Builders Association Home Show, the status of data requests, and future risk assessment meetings.

March 21 to 23, 2025 – West Branch Susquehanna Builders Association Home Show was attended by county representatives that staffed a booth. The HMP poster and frequently asked questions were both displayed. This event was marketed to those looking to build or complete home improvement projects including homeowners and construction vendors. Many municipal officials, engineers, construction workers, and members of the public attended this event.

March 24 and 25, 2025 – Planning Team Kick-Off Meetings were held virtually and in person to discuss project scope, schedule, goals, the planning process, participation and engagement, and next steps. Hazards from the 2020 plan were reviewed with the HMPT. During this meeting, county staff, municipal representatives, and interested stakeholders discussed their experience with hazard mitigation. Attendees were introduced to the participation forms that will be reviewed and completed during future meetings.

April 16, 2025 – Steering Committee Meeting was held virtually and attended by county representatives and the consultant to discuss the upcoming Risk Assessment Meetings, data collection, and municipal participation to date.

May 15, 2025 – Steering Committee Meeting was held virtually and attended by county representatives and the consultant to discuss the upcoming Risk Assessment Meetings, data collection, and municipal participation to date.

June 3 and 4, 2025 – Risk Assessment Meetings were held virtually and in person to discuss local hazard risk and vulnerability, and to look at critical facilities and assets. These meetings were leveraged to help jurisdictions meet plan participation requirements. Meeting attendees were asked to complete risk assessment and asset forms. The consultant team also conducted targeted outreach to each municipality following this meeting for feedback on local risk and assets.

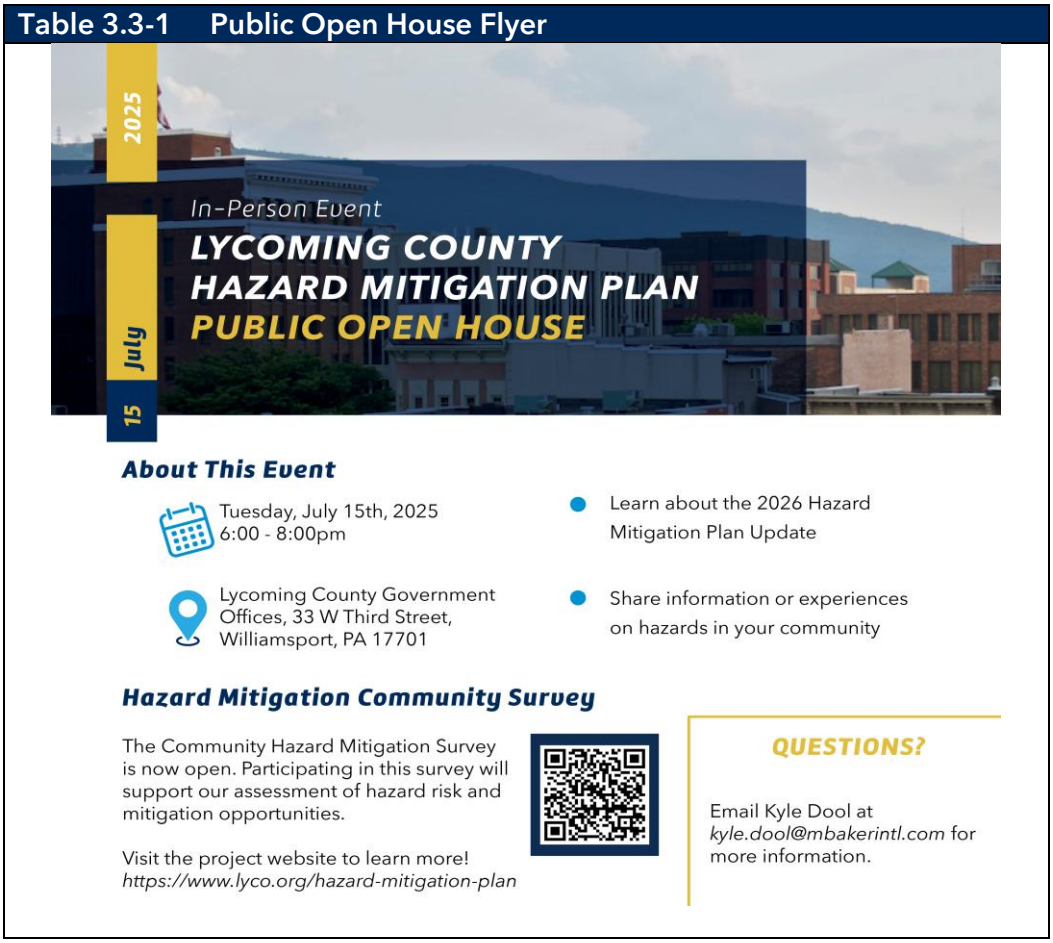
June 19, 2025 – Steering Committee Meeting was held virtually and attended by county representatives and the consultant to discuss Risk Assessment Meeting follow-up and

preparation for the Capability Assessment and Mitigation Strategy Workshop and the Public Open House.

July 9, 2025 – Meeting with STEP was held virtually and attended by county representatives, the consultant, and STEP staff to discuss the work the organization does for underserved communities and the county, how it overlaps with hazard mitigation planning, and potential mitigation actions to include in the plan.

July 15, 2025 – Public Open House*: An Open House was held in person to provide an opportunity for the public to review information on the plan, ask questions, and provide feedback. Resources were provided that detailed the hazard mitigation planning process, information on the current update, the schedule for upcoming meetings, and more. A short looping presentation was available for attendees to review, which provided a general overview on the hazard mitigation plan and update process. Members of the HMSC were in attendance to field questions and engage in discussions. The Open House was advertised on the project website, and by conducting outreach to municipalities to post a flyer on their local websites and social media sites. Figure 3.3-1 shows one of the flyers used to advertise the open house.

Table 3.3-1 Public Open House Flyer



July 14 and 16, 2025 – Capability Assessment and Mitigation Strategy Meetings The were held virtually and in-person, providing a collaborative space for the HMPT to develop the mitigation strategy and review capabilities. They were an opportunity to collectively identify and review relevant plans, policies, and programs already in place. These can be leveraged or built upon in the mitigation strategy. There was also the opportunity to discuss mitigation priorities and identify mitigation actions.

July 15, 2025 – Steering Committee Meeting was held in-person and attended by county representatives and the consultant to discuss the follow-up for both the Capability Assessment and Mitigation Strategy Workshop and the Public Open House, meetings with organizations representing underserved populations, and plan drafting timelines.

August 28, 2025 – Steering Committee Meeting was held virtually and attended by county representatives and the consultant to discuss plan drafting, new mitigation actions, updates for the Capability Assessment, and appendices.

September 18, 2025 – Steering Committee Meeting was held virtually and attended by county representatives and the consultant to discuss plan drafting, municipal and special district outreach, and preparation for the Draft Plan Review Meetings.

October 15, 2025 – Meeting with Camp Susque was held virtually and attended by county representatives, the consultant, and Camp Susque staff to discuss the work the organization does for local communities, how it overlaps with hazard mitigation planning, and potential mitigation actions to include in the plan.

October 22, 2025 – Steering Committee Meeting was held virtually and attended by county representatives and the consultant to discuss plan drafting, municipal and special district outreach, and preparation for the Draft Plan Review Meetings.

November 13, 2025 – Steering Committee Meeting was held virtually and attended by county representatives and the consultant to discuss plan drafting and preparation for the Draft Plan Review Meetings.

November 18 and 19, 2025 – Draft Plan Review Meetings* were held in-person and virtually. The purpose of these final HMPT and public meetings was to provide information about the update process, evaluation, and general findings in the HMP. Additionally, instructions about when and how to review the draft HMP were covered as well as a final timeline for the review and submission to PEMA and FEMA. Invitations were emailed to each municipality and stakeholder on the HMPT, as well as to community members who completed the Public Survey. The meeting was noticed on the website, see Figure 3.3-2. Meeting attendees were asked to provide feedback via the provided digital question/comment form or by sharing via email.

November 18 through December 18, 2025 – Public Review: The draft 2026 HMP Update was posted to the project website on November 18, 2025, so the public could obtain information about the draft, review the HMP, and ask questions or provide comments and feedback. The

availability of planning materials and Draft HMP review were advertised on the project website. A question/comment form was available to provide feedback.

Table 3.3-2 Project Website for the Lycoming County 2026 HMP Update



3.4. PUBLIC AND STAKEHOLDER PARTICIPATION

Stakeholders and the public were given multiple opportunities to participate in the HMP Update process through invitation to the above outlined meetings (the public was invited to meetings with an asterisk (*)), review of risk assessment results and mitigation actions, and an opportunity to comment on a final draft of the 2026 HMP Update. Opportunities open to the public were advertised on the project website, on the county website and through municipal social media accounts. The tools listed below were available on the HMP Update website to solicit information, data, and comments from both local municipalities, other key stakeholders the public in Lycoming County. These forms were also distributed in-person at the HMPT meetings identified and by email correspondence at different touchpoints throughout the planning process. Responses to these worksheets and surveys are included in **Appendix C – Meeting and**

Other Participation Documentation. Information provided in these forms was also thoroughly incorporated throughout the plan. The sections they informed are outlined in the descriptions below.

Evaluation of Identified Hazards and Risk Worksheet: Collects information from the HMPT regarding whether there have been changes to the frequency of occurrence, magnitude of impact, or geographic extent of hazards identified in the 2020 Plan. In addition, the form asks members of the HMPT to identify any additional hazards they believe should be considered in the 2026 Plan. This form informed **Section 4 – Risk Assessment**.

Jurisdictional Hazard Risk Ranking Form: Collects information on the perceived risk of hazards in each municipality compared to the ranked hazards for the county. Communities list whether the jurisdictional risk is greater, equal to, or less than the county's risk. This form informed **Section 4 – Risk Assessment**.

Critical Facilities Review Worksheet: Provides an opportunity for municipalities to review the critical facilities identified in their community. Critical facilities were initially collected from state and national datasets. This worksheet allowed for more local and accurate input. This form informed **Section 4 – Risk Assessment, Section 6 – Mitigation Strategy**, and **Appendix E – Critical Facilities**.

Community Lifelines Form: Collects information on the FEMA Community Lifelines in the county. Communities list assets in their community that fall within the different lifeline categories. **Section 4 – Risk Assessment, Section 6 – Mitigation Strategy**, and **Appendix E – Critical Facilities**.

Capability Assessment Survey: Collects information on local planning, regulatory, administrative, technical, fiscal, political, and resiliency capabilities that can be included in the plan's Capability Assessment section. This form informed **Section 5 – Capability Assessment**.

NFIP Survey: Collects information related to community capabilities towards aspects of the NFIP. This form informed **Section 5 – Capability Assessment**.

Mitigation Action Progress Form: This form is specific to each jurisdiction and includes all actions for that jurisdiction in the 2020 HMP. Space is provided to note the current status of each action and to document any progress made. This form informed **Section 6 – Mitigation Strategy**.

New Mitigation Action Form: Allows communities to propose new mitigation actions for the HMP Update. This form collects details about the action, including priority, responsible parties, potential funding sources, implementation timeframe, and more. This form informed **Section 6 – Mitigation Strategy**.

Plan Comment Form: Provides an opportunity for communities and the public to comment on the plan during the review period.

Community participation and comment was encouraged throughout the planning process, particularly through the project website: https://www.lyco.org/hazard-mitigation-plan. Figure 3.3-2 shows an image of the website's home page. This site was created and made publicly available at the beginning of the planning process and acted as a repository for the entire planning process. The website houses presentations, agendas, minutes, and worksheets from each meeting as well as promulgated meeting dates and important announcements.

The HMSC also developed a Community Hazard Mitigation Survey intended to solicit public input regarding the understanding of hazard risk, which was shared with participants throughout the planning process. The survey received 21 responses. Findings are analyzed in Section 4.4.5 Community Survey.

3.5. MULTI-JURISDICTIONAL PLANNING

This HMP was developed using a multi-jurisdictional approach. Although county-level departments have resources such as technical expertise and data which local jurisdictions may lack, involvement from local municipalities is critical to the collection of local knowledge related to hazard events. Local municipalities also have the legal authority to enforce compliance with land use planning and development issues. The Steering Committee was committed to garnering municipal participation. Table 3.5-1 lists jurisdictional participation in this HMP update. 51of the county's 52 municipalities participated in the HMP Update Process, achieving 98% participation.

Formal HMPT meetings included the Kick-Off Meeting, the Risk Assessment Meeting, the Capability Assessment and Mitigation Strategy Workshop and the Draft Plan Review Meeting. These meetings were held over the course of two sessions, with both in-person and virtual opportunities. All formal HMPT meetings had afternoon and evening meeting sessions to maximize participation. Stakeholders, including neighboring communities, were emailed invitations and reminders to all meetings. This included all neighboring counties: Bradford County, Clinton County, Columbia County, Montour County, Northumberland County, Potter County, Sullivan County, Tioga County, and Union County. Tioga County participated. Surveys and forms were provided at meetings, posted to the project website, emailed or mailed to jurisdictions. Forms and materials were shared with municipalities prior to and after each meeting.

In order to achieve as close to 100% participation as possible, the Steering Committee called any municipalities that did not participate in any of the formal HMPT meetings. These phone calls were used as an opportunity to discuss the HMP update and to coordinate on municipal information and actions included in the plan leveraging the Jurisdictional Profiles (**Appendix J**). These phone calls are categorized as "Other Meetings/Engagement" in Table 3.5-1.

Table 3.5-1 2026 Lycoming County Stakeholder Participation

MUNICIPALITY/AGENCY/ ORGANIZATION	COUNTY HMP MEETINGS					WORKSHEETS AND EXERCISES								
	PLAN KICK-OFF MEETINGS	RISK ASSESSMENT MEETINGS	MITIGATION AND CAPABILITY WORKSHOPS	DRAFT PLAN REVIEW MEETINGS	OTHER MEETINGS/ENGAGEMENT	EVALUATION OF IDENTIFIED HAZARDS AND RISK WORKSHEET	RISK RANKING EVALUATION	CRITICAL FACILITIES FORM	COMMUNITY LIFELINES FORM	CAPABILITY ASSESSMENT SURVEY	NFIP COMPLIANCE AND CAPABILITIES SURVEY	MITIGATION ACTION PROGRESS FORM	NEW MITIGATION ACTION FORM	DRAFT PLAN REVIEW FEEDBACK
JURISDICTIONS														
Anthony Township		X	X			X								
Armstrong Township					X									X
Bastress Township					X									
Brady Township					X	X								
Brown Township					X			X						
Cascade Township	X	X	X	X		X	X	X	X					
Clinton Township					X			X						
Cogan House Township				X	X			X						
Cummings Township		X	X			X						X		
Duboistown Borough				X	X	X								
Eldred Township				X	X				X					
Fairfield Township					X									X
Franklin Township					X							X		
Gamble Township					X	X								

Table 3.5-1 2026 Lycoming County Stakeholder Participation

MUNICIPALITY/AGENCY/ ORGANIZATION	COUNTY HMP MEETINGS					WORKSHEETS AND EXERCISES								
	PLAN KICK-OFF MEETINGS	RISK ASSESSMENT MEETINGS	MITIGATION AND CAPABILITY WORKSHOPS	DRAFT PLAN REVIEW MEETINGS	OTHER MEETINGS/ENGAGEMENT	EVALUATION OF IDENTIFIED HAZARDS AND RISK WORKSHEET	RISK RANKING EVALUATION	CRITICAL FACILITIES FORM	COMMUNITY LIFELINES FORM	CAPABILITY ASSESSMENT SURVEY	NFIP COMPLIANCE AND CAPABILITIES SURVEY	MITIGATION ACTION PROGRESS FORM	NEW MITIGATION ACTION FORM	DRAFT PLAN REVIEW FEEDBACK
Hepburn Township		X				X	X		X	X				
Hughesville Borough		X	X			X	X		X	X		X		
Jackson Township				X			X					X		
Jersey Shore Borough		X	X			X						X		
Jordan Township					X			X						
Lewis Township	X		X	X		X		X			X	X		
Limestone Township					X			X						
Loyalsock Township	X					X		X						
Lycoming Township		X				X	X		X	X				
McHenry Township		X	X			X						X		
McIntyre Township			X	X				X						
McNett Township			X	X		X						X		
Mifflin Township		X	X			X						X		
Mill Creek Township		X		X		X	X		X					

Table 3.5-1 2026 Lycoming County Stakeholder Participation

MUNICIPALITY/AGENCY/ ORGANIZATION	COUNTY HMP MEETINGS					WORKSHEETS AND EXERCISES								
	PLAN KICK-OFF MEETINGS	RISK ASSESSMENT MEETINGS	MITIGATION AND CAPABILITY WORKSHOPS	DRAFT PLAN REVIEW MEETINGS	OTHER MEETINGS/ENGAGEMENT	EVALUATION OF IDENTIFIED HAZARDS AND RISK WORKSHEET	RISK RANKING EVALUATION	CRITICAL FACILITIES FORM	COMMUNITY LIFELINES FORM	CAPABILITY ASSESSMENT SURVEY	NFIP COMPLIANCE AND CAPABILITIES SURVEY	MITIGATION ACTION PROGRESS FORM	NEW MITIGATION ACTION FORM	DRAFT PLAN REVIEW FEEDBACK
Montgomery Borough				X				X						
Montoursville Borough	X	X		X		X	X		X					
Moreland Township				X		X								
Muncy Borough			X					X						
Muncy Creek Township				X	X									X
Muncy Township		X		X		X	X	X	X					
Nippenose Township				X		X								
Old Lycoming Township	X	X		X		X				X	X			
Penn Township		X	X			X	X		X	X		X		
Piatt Township		X	X			X						X		
Picture Rocks Borough	X		X	X		X	X		X	X	X	X	X	
Pine Township		X	X			X						X		
Plunketts Creek Township				X		X						X		
Porter Township		X	X			X						X		

Table 3.5-1 2026 Lycoming County Stakeholder Participation

MUNICIPALITY/AGENCY/ ORGANIZATION	COUNTY HMP MEETINGS					WORKSHEETS AND EXERCISES								
	PLAN KICK-OFF MEETINGS	RISK ASSESSMENT MEETINGS	MITIGATION AND CAPABILITY WORKSHOPS	DRAFT PLAN REVIEW MEETINGS	OTHER MEETINGS/ENGAGEMENT	EVALUATION OF IDENTIFIED HAZARDS AND RISK WORKSHEET	RISK RANKING EVALUATION	CRITICAL FACILITIES FORM	COMMUNITY LIFELINES FORM	CAPABILITY ASSESSMENT SURVEY	NFIP COMPLIANCE AND CAPABILITIES SURVEY	MITIGATION ACTION PROGRESS FORM	NEW MITIGATION ACTION FORM	DRAFT PLAN REVIEW FEEDBACK
Salladasburgh Borough		X	X			X						X		
Shrewsbury Township					X			X						
South Williamsport Borough					X			X						
Susquehanna Township					X									X
Upper Fairfield Township					X	X			X	X	X			
Washington Township				X				X						
Watson Township		X	X			X								
Williamsport City	X	X		X		X	X	X	X	X	X	X		
Wolf Township		X	X			X	X	X	X	X				
Woodward Township				X				X						
River Valley Transit Authority				X	X	X	X			X				
OTHER STAKEHOLDERS														
Camp Susquehanna	X	X	X	X		X	X	X	X					
Commonwealth University - Bloomsburg	X													

Table 3.5-1 2026 Lycoming County Stakeholder Participation

MUNICIPALITY/AGENCY/ ORGANIZATION	COUNTY HMP MEETINGS					WORKSHEETS AND EXERCISES								
	PLAN KICK-OFF MEETINGS	RISK ASSESSMENT MEETINGS	MITIGATION AND CAPABILITY WORKSHOPS	DRAFT PLAN REVIEW MEETINGS	OTHER MEETINGS/ENGAGEMENT	EVALUATION OF IDENTIFIED HAZARDS AND RISK WORKSHEET	RISK RANKING EVALUATION	CRITICAL FACILITIES FORM	COMMUNITY LIFELINES FORM	CAPABILITY ASSESSMENT SURVEY	NFIP COMPLIANCE AND CAPABILITIES SURVEY	MITIGATION ACTION PROGRESS FORM	NEW MITIGATION ACTION FORM	DRAFT PLAN REVIEW FEEDBACK
FEMA Region 3	X		X											
Hope Enterprises	X													
Lycoming County Emergency Management	X													
Lycoming County Commission		X												
Lycoming County District Attorney's Office	X													
Lycoming County Planning & Community Development		X	X			X		X				X		
Lycoming Creek Watershed Association	X													
Lycoming Department of Public Safety		X				X								
Lycoming Valley Railroad		X				X								
Lycoming-Clinton Joinder Programs	X	X				X	X							

Table 3.5-1 2026 Lycoming County Stakeholder Participation

MUNICIPALITY/AGENCY/ ORGANIZATION	COUNTY HMP MEETINGS					WORKSHEETS AND EXERCISES								
	PLAN KICK-OFF MEETINGS	RISK ASSESSMENT MEETINGS	MITIGATION AND CAPABILITY WORKSHOPS	DRAFT PLAN REVIEW MEETINGS	OTHER MEETINGS/ENGAGEMENT	EVALUATION OF IDENTIFIED HAZARDS AND RISK WORKSHEET	RISK RANKING EVALUATION	CRITICAL FACILITIES FORM	COMMUNITY LIFELINES FORM	CAPABILITY ASSESSMENT SURVEY	NFIP COMPLIANCE AND CAPABILITIES SURVEY	MITIGATION ACTION PROGRESS FORM	NEW MITIGATION ACTION FORM	DRAFT PLAN REVIEW FEEDBACK
Montoursville School District	X													
Muncy School District		X												
Office of Representative Jamie Flick		X				X								
Office of State Senator Eugene Yaw	X	X	X	X		X	X		X					
PA DEP	X	X		X										
Penn State Extension		X				X								
Pennsylvania College of Technology	X	X	X	X		X			X					
Roads to Freedom Center for Independent Living				X	X									
Red Run Mountain, Inc.	X													
STEP Inc.	X													
Susquehanna River Basin Commission	X	X	X	X		X	X							

Table 3.5-1 2026 Lycoming County Stakeholder Participation

MUNICIPALITY/AGENCY/ ORGANIZATION	COUNTY HMP MEETINGS					WORKSHEETS AND EXERCISES								
	PLAN KICK-OFF MEETINGS	RISK ASSESSMENT MEETINGS	MITIGATION AND CAPABILITY WORKSHOPS	DRAFT PLAN REVIEW MEETINGS	OTHER MEETINGS/ENGAGEMENT	EVALUATION OF IDENTIFIED HAZARDS AND RISK WORKSHEET	RISK RANKING EVALUATION	CRITICAL FACILITIES FORM	COMMUNITY LIFELINES FORM	CAPABILITY ASSESSMENT SURVEY	NFIP COMPLIANCE AND CAPABILITIES SURVEY	MITIGATION ACTION PROGRESS FORM	NEW MITIGATION ACTION FORM	DRAFT PLAN REVIEW FEEDBACK
Tiadaghton Valley Municipal Authority			X	X						X			X	
Tioga County		X				X								
Williamsport/Lycoming Chamber of Commerce	X		X	X						X				
Williamsport Regional Airport (IPT)				X										
Williamsport School District			X							X	X			
Walls and Associates	X													

4. RISK ASSESSMENT

4.1. UPDATE PROCESS SUMMARY

To reduce the potential for damage due to hazards, it is necessary to identify hazards that may affect the county. This risk assessment provides a factual basis for activities proposed by the county in its mitigation strategy. Hazards that may affect Lycoming County are identified and defined in terms of location and geographic extent, magnitude of impact, previous events, and likelihood of future occurrence. All information from the previous plan has been included or updated in the 2026 Lycoming County HMP Update, unless otherwise indicated.

The Lycoming County HMSC reviewed the hazards profiled in the 2020 Lycoming County HMP Update during the February 26, 2025 Steering Committee Meeting. The Lycoming County HMPT was given the opportunity to review the hazards profiled at the Risk Assessment Meetings held June 3 and 4, 2025. The HMSC and HMPT determined that all the existing hazards should be carried over into the 2026 Plan Update and decided that four additional hazards should be profiled: Extreme Temperatures, Environmental Hazards: Gas and Liquid Pipelines, Environmental Hazards: Hazardous Materials Release and Invasive Species. In addition, the HMSC also reviewed the 2025 Pennsylvania Hazard Mitigation Plan SOG and the 2023 State Hazard Mitigation Plan and, for consistency, updated "Environmental Hazards: Natural Gas Drilling Incidents" to be two profiles – "Environmental Hazards: Conventional Oil and Gas Wells" and "Environmental Hazards: Unconventional Oil and Gas Wells". The "Transportation Accidents" profile was also updated to be "Transportation Incidents".

Hazard profiles were then developed to define the characteristics of each hazard as it applies to Lycoming County. This process was completed using published information and web sites that address hazards globally, nationally, within Pennsylvania, or specifically within Lycoming County as well as anecdotal information provided by members of the HMPT.

Following hazard identification and profiling, a vulnerability assessment was performed to identify the impact of natural hazard events on people, buildings, infrastructure, and the community. Each natural hazard is discussed in terms of its

Hazard profiles in the 2026 HMP include the following Natural and Human-Made Hazards:

- Drought,
- Earthquake.
- Extreme Temperatures.
- Flood, Flash Flood, Ice Jam.
- Hailstorm.
- Invasive Species.
- Landslide.
- Pandemic and Infectious Disease.
- Radon Exposure.
- Subsidence, Sinkhole.
- Tornado, Windstorm.
- Wildfire.
- Winter Storm.
- Dam Failure.
- Disorientation.
- Environmental Hazards: Conventional Oil and Gas Wells.
- Environmental Hazards: Unconventional Oil and Gas Wells.
- Environmental Hazards: Gas and Liquid Pipelines.
- Environmental Hazards: Hazardous Materials Release.
- Levee Failure.
- Nuclear Incident.
- Terrorism.
- Transportation Incidents.
- Utility Interruption.

potential impact on individual communities in Lycoming 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 which identifies structures, critical facilities, or people that may be impacted by hazard events and describes what those events can do to physical, social, and economic assets. Depending upon data availability, assessment results consist of an inventory of vulnerable structures or populations.

Each hazard profile has an "Equity in Vulnerable Communities" section, which expands on how certain socioeconomic factors can result in hazards having a disproportionate impact on certain populations or communities. This assessment allows the county and its municipalities to focus mitigation and preparedness efforts more adequately by allocating resources more fairly, improving emergency responses, and enhancing overall community resilience. Each hazard profile also identifies community lifelines that may be affected by the associated natural hazards. The community lifelines are listed in Figure 2.6-1. Appendix E also includes insights from the Community Lifelines Forms that were completed by communities. The appendix includes a table for each lifeline listing the assets that were identified as being a part of each lifeline per municipality.

4.2. HAZARD IDENTIFICATION

4.2.1. Table of Presidential Disaster Declarations

In the past, natural hazards have led to costly disasters in Lycoming County resulting in a Presidential Declaration or Emergency Declaration of Major Disaster. 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 (FEMA, 2025a). Table 4.2-1 identifies Presidential Disaster and Emergency Declarations issued from 1955 through 2025 that have affected Lycoming County. Additional declarations beyond 2025 can be found on the FEMA website at: https://www.fema.gov/disasters/disaster-declarations.

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

DECLARATION NUMBER	DATE	EVENT
4815	September 2024	Major Disaster Declaration – Pennsylvania Tropical Storm Debby
4506	March 2020	Presidential Declaration – Pennsylvania Covid-19 Pandemic
3441	March 2020	Emergency Declaration – Pennsylvania Covid-19
4408	November 2018	Presidential Disaster – Severe Storms and Flooding
4292	December 2016	Presidential Disaster – Severe Storms and Flooding
3356	October 2012	Emergency Declaration – Hurricane Sandy

Table 4.2-1 Presidential Disaster and Emergency Declarations affecting Lycoming County.		
DECLARATION NUMBER	**DATE**	**EVENT**
3340	September 2011	Emergency Declaration – Remnants of Tropical Storm Lee
4030	September 2011	Presidential Disaster Declaration - Remnants of Tropical Storm Lee
4003	July 2011	Presidential Disaster Declaration – Severe Storms and Flooding
3235	September 2005 (Emergency Declaration)	Emergency Declaration – Hurricane Katrina
1557	September 2004	Presidential Disaster Declaration - Tropical Depression Ivan
1555	September 2005	Presidential Disaster Declaration - Severe Storms and Flooding Associated with Tropical Depression Frances
1485	August 2003	Presidential Disaster Declaration – Severe Storms, Tornadoes, and Flooding
3180	February 2003	Emergency Declaration – Severe Winter Storm
1298	September 1999	Presidential Disaster Declaration – Tropical Depression Dennis and Flash Flooding
1294	September 1999	Presidential Disaster Declaration - Hurricane Floyd
1093	January 1996	Presidential Disaster Declaration - Flooding
1085	January 1996	Presidential Disaster Declaration - Severe Winter Storms
1015	January and February 1994	Presidential Disaster Declaration - Severe Winter Storms
3105	March 1993	Emergency Declaration – Blizzard
737	June 1985	Presidential Disaster Declaration – Severe Storms, High Winds, and Tornadoes
485	September 1975	Presidential Disaster Declaration - Flood (Eloise)
340	June 1972	Presidential Disaster Declaration - Flood (Agnes)
89	January 1959	Presidential Disaster Declaration – Floods
61	August 1956	Presidential Disaster Declaration – Storm
58	May 1956	Presidential Disaster Declaration – Severe Storm

Table 4.2-1 Presidential Disaster and Emergency Declarations affecting Lycoming County.		
DECLARATION NUMBER	**DATE**	**EVENT**
51	March 1956	Presidential Disaster Declaration – Floods and Rains
40	August 1955	Presidential Disaster Declaration – Floods, Rains

The governor of Pennsylvania can also declare an emergency by issuing an Emergency Proclamation. These proclamations can range from weather impacts to health issues. Table 4.2-2 lists these Proclamations that have been issued for the Commonwealth of Pennsylvania and that have impacted Lycoming County between 2018 and 2025 and can be found on the Pennsylvania website at: https://www.pa.gov/agencies/pema/resources/emergency-proclamations.html.

Table 4.2-2 Gubernatorial Disaster Declarations or Proclamations affecting Lycoming County.		
DATE	**EVENT**	**DESCRIPTION**
August 9, 2024	Tropical Storm Debby	Heavy rain event causing severe flooding.
April 15, 2021	Civil Disturbance	Political and social disturbances in response to the murder of George Floyd.
February 1, 2021	Winter Storm	Severe winter weather event causing dangerous conditions including snow, ice accumulation, and high winds.
December 15, 2020	Winter Storm	Severe winter weather event causing snow, ice accumulation, and flooding.
August 31, 2020	Hurricane Ida	Heavy rainfall event causing threat of flooding and flash flooding.
March 6, 2020	COVID-19	Public health emergency caused by the outbreak of the COVID-19 spread to the United States.
January 18, 2019	Winter Storm	Severe winter weather event causing snow, ice accumulation, and flooding.
August 17, 2018	Storm	Slow-moving storms caused record-breaking rainfall and subsequent flooding.
January 10, 2018	Opioid Crisis	Public health emergency identifying opioid overdoses, deaths, and emergencies in a state of disaster.

Lycoming County has also received Small Business Administration (SBA) Assistance for disaster events. A Small Business Administration Disaster Declaration qualifies communities for access to affordable, timely, and accessible financial assistance. The county events receiving Small

Business Administration disaster-related loan assistance are listed below and can be found on the SBA website at: https://www.sba.gov/funding-programs/disaster-assistance.

Small Business Administration Disaster Declarations affecting Lycoming County	
DATE	**EVENT**
August 2024	Tropical Storm Debby.
August 2024	Flooding, Flash Flooding, and Rain

4.2.2. Summary of Hazards

Following review of the hazards evaluated in 2020, the Pennsylvania Standard List of Hazards and completion of the Evaluation of Hazards and Risk Form, the HMSC along with input from the HMPT decided that the 2026 plan should identify, profile and analyze 24 hazards. These 24 hazards include all hazards profiled in the 2020 plan with the addition of four new hazards: Extreme Temperatures, Environmental Hazards: Gas and Liquid Pipelines, Environmental Hazards: Hazardous Materials Release and Invasive Species.

Table 4.2-3 contains a basic description of the 24 hazards that have the potential to impact Lycoming County as identified through previous risk assessments, the county Hazards Vulnerability Analysis, and input from those that participated in the 2026 HMP Update. Hazard profiles are included in Section 4.3 for each of these hazards.

Table 4.2-3 List and description of natural and manmade hazards profiled in the 2026 Hazard Mitigation Plan Update. (PEMA, 2025)	
HAZARD	**HAZARD DESCRIPTION**
NATURAL HAZARDS	
	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.
	An earthquake is the motion or trembling of the ground produced by sudden displacement of rock usually within the upper 10-20 miles of the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of underground caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in loss of life and injury to hundreds of thousands of persons and disrupt the social and economic functioning of the affected area.

Table 4.2-3 List and description of natural and manmade hazards profiled in the 2026 Hazard Mitigation Plan Update. (PEMA, 2025)	
HAZARD	**HAZARD DESCRIPTION**
	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. 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.
	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, 2023). Flash flooding is usually a result of heavy localized precipitation falling in a short time period over a given location, often along mountain streams and in urban areas where much of the ground is covered by impervious surfaces. Winter flooding can include ice jams which occur when warm temperatures and heavy rain cause snow to melt rapidly. Snow melt combined with heavy rains can cause frozen rivers to swell, 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.
	Hail precipitation is often produced at the front of a severe thunderstorm system or in conjunction with a tornado event when ice crystals form within a low-pressure front as warm air rises into the upper atmosphere and is cooled. Frozen droplets gradually accumulate on the ice crystals until, having developed sufficient weight, they fall as precipitation in the form of balls or irregularly shaped masses of ice. Hailstorms can cause significant damage to crops, livestock and property, depending on the size, duration, and intensity of hail precipitation.
	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: amphibian, plant, fish, invertebrate, mammal, bird, disease, or pathogen. 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 or after a wildfire, as the already weakened state of the native ecosystem causes it to succumb to an infestation more easily.

Table 4.2-3 List and description of natural and manmade hazards profiled in the 2026 Hazard Mitigation Plan Update. (PEMA, 2025)	
HAZARD	**HAZARD DESCRIPTION**
	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.
	Pandemic is defined as a disease outbreak affecting or attacking many people across an extensive region, including several countries, and/or continent(s). It is further described as extensively epidemic. Generally, pandemic diseases cause sudden, pervasive illness in all age groups on a global scale. Infectious diseases are also highly virulent, and can be spread from person-to-person.
	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. Approximately 40% of homes in Pennsylvania have radon levels above this guideline level. Three sources of radon in houses are now recognized: • Radon in soil air that flows into the house. • Radon dissolved in water from private wells and exsolved during water usage. This is rarely a problem in Pennsylvania. • Radon emanating from uranium rich building materials (e.g., concrete blocks or gypsum wallboard). This is not known to be a problem in Pennsylvania.
	Land subsidence is a gradual settling or sudden sinking of the Earth's surface due to removal or displacement of subsurface earth materials. Sinkholes are subsidence features resulting from the downward movement of surficial material into a pre-existing subsurface void. There are two common causes of subsidence in Pennsylvania: 1) dissolution of carbonate rock such as limestone or dolomite and 2) mining activity. Collapse sometimes occurs only after a large amount of activity, or when a heavy burden is placed on the overlying material.

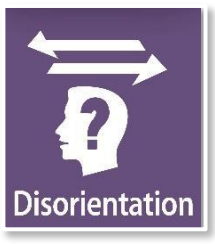
Table 4.2-3 List and description of natural and manmade hazards profiled in the 2026 Hazard Mitigation Plan Update. (PEMA, 2025)	
HAZARD	**HAZARD DESCRIPTION**
	A tornado is a narrow, violently rotating column of air that extends from a thunderstorm to the ground. The impact of tornadoes or windstorms is ultimately dependent on the population or amount of property (i.e., buildings, infrastructure, agricultural land, etc.) present in the area where they occur. Tornado events are often so severe that property loss or human fatality is typically inevitable if evacuation or proper construction standards are not implemented.
	Wildfire occurs throughout wooded and open vegetation areas of Pennsylvania. Open fields, grass, dense brush, and forest-covered areas are typical sites for wildfire events. Under dry conditions or droughts, wildfires have the potential to burn forests as well as croplands. Most wildfires are caused by human carelessness or negligence. However, some are precipitated by lightning strikes. Large events may require evacuation from one or more communities and necessitate regional or national firefighting support.
	Winter storms are regional events and most often impact a large portion or all of Pennsylvania. Winter storms consist of cold temperatures, heavy snow or ice and sometimes strong winds. They begin as low-pressure systems that move through Pennsylvania usually following the jet stream. A winter storm can adversely affect roadways, utilities, business activities, and can cause loss of life, frostbite and freezing conditions. They can result in the closing of secondary roads, particularly in rural locations, loss of utility services and depletion of oil heating supplies.
HUMAN MADE HAZARDS	
	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.
	Large numbers of people are attracted to Pennsylvania's rural areas for recreational purposes such as hiking, camping, hunting, and fishing. As a result, people can become lost or trapped in remote and rugged wilderness areas. Search and rescue may be required for people who suffer from medical problems or injuries and those who become accidentally or intentionally disoriented. Search and rescue efforts are focused in and around state forest and state park lands.

Table 4.2-3 List and description of natural and manmade hazards profiled in the 2026 Hazard Mitigation Plan Update. (PEMA, 2025)	
HAZARD	**HAZARD DESCRIPTION**
	Many of the hazards associated with conventional oil and gas extraction relate to the contamination of surface and subsurface waters. Abandoned oil and gas wells that are not properly plugged can contaminate groundwater and pollute domestic drinking water wells. In addition, surface water and soil can be contaminated by brine, a salty wastewater product of oil and gas well drilling, or by oil spills. This pollution can degrade public drinking water supplies and disrupt aquatic ecosystems.
	In addition to the hazards associated with conventional oil and gas extraction, potential hazards from Marcellus Shale gas wells include surface water depletion affecting drinking water supplies and aquatic ecosystems; contaminated surface and groundwater resulting from hydraulic fracturing and the recovery of contaminated hydraulic fracturing fluid; and mishandling of solid toxic waste.
	Pipeline failures are low-probability, potentially high-consequence events. Although gas and liquid pipeline failures are infrequent, the hazardous and inflammable materials released by these events can pose a significant threat to public safety and the built and natural environment. Explosions associated with pipeline failures, for example, can cause severe injury to nearby residents and destroy homes and other property.
	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 because of human carelessness, intentional acts, or natural hazards. When caused by natural hazards, these incidents are known as secondary events.
	A levee is a human-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water to provide protection from temporary flooding. A levee failure or breach occurs when a levee fails to prevent flooding on the landside of the levee. The consequences of a sudden levee failure can be catastrophic, with the resulting flooding causing loss of life, emergency evacuations, and significant property damage.

Table 4.2-3 List and description of natural and manmade hazards profiled in the 2026 Hazard Mitigation Plan Update. (PEMA, 2025)	
HAZARD	**HAZARD DESCRIPTION**
	Nuclear explosions can cause significant damage and casualties from blast, heat, and radiation. The primary concern following a nuclear accident or nuclear attack is the extent of radiation, inhalation, and ingestion of radioactive isotopes which can cause acute health effects (e.g. death, burns, severe impairment), chronic health effects (e.g. cancer), and psychological effects.
	Terrorism is use of force or violence against persons or property with the intent to intimidate or coerce. Acts of terrorism include threats of terrorism; assassinations; kidnappings; hijackings; bomb scares and bombings; cyber-attacks (computer-based); and the use of chemical, biological, nuclear, and radiological weapons. Cyber-attacks have become an increasingly pressing concern.
	Transportation incidents 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.
	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.

4.3. HAZARD PROFILES AND VULNERABILITY ANALYSIS
NATURAL HAZARDS

4.3.1. Drought



4.3.1.1. Location and Extent

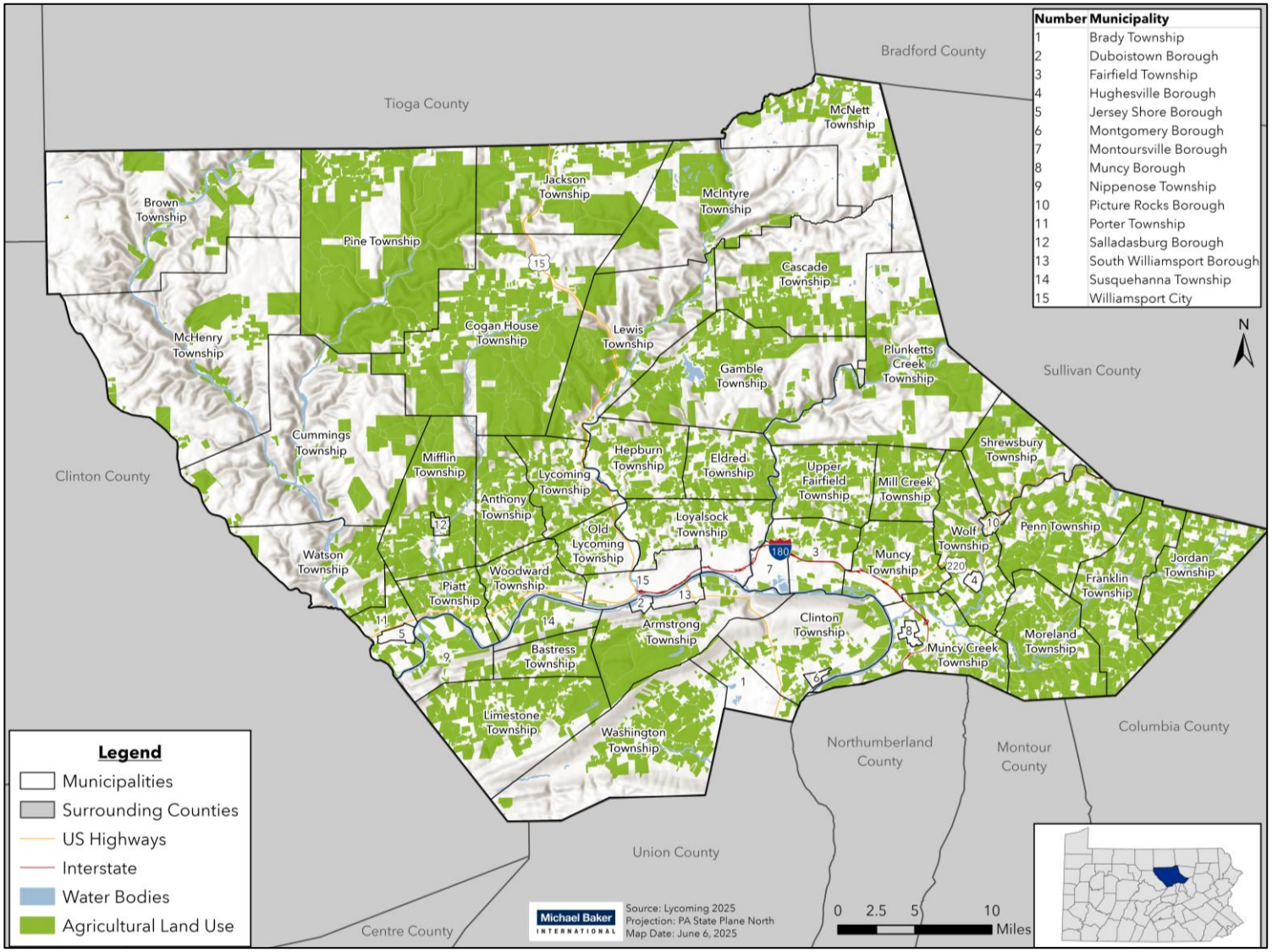
Drought is defined as the consequence of a natural reduction in the amount of precipitation expected over an extended period, usually a season or more in length. Droughts are regional climatic events, so they typically impact all communities in a relatively uniform fashion with only minor localized variations in rainfall events. Droughts often occur across county boundaries, affecting large areas of Pennsylvania at the same time. Therefore, a drought would affect all of Lycoming County, with the largest impact being on areas of the county with extensive agriculture uses.

Locations of droughts nationwide are monitored continuously by USGS, and the PA DEP monitors conditions throughout the state. Maps showing locations currently experiencing drought conditions are posted on various websites (including http://waterwatch.usgs.gov) and show locations where stream flow is below normal and where drought conditions exist or are emerging.

4.3.1.2. Range of Magnitude

Droughts can have varying effects, depending upon what month they occur, severity, duration, and location. Some droughts have their greatest impact on agriculture and even short-term droughts, when coupled with extreme temperatures can be devastating. Others may impact water supply or other water use activities such as recreation. Most droughts cause direct impacts to aquatic resources. Drought events are defined by rainfall amounts, vegetation conditions, soil-moisture conditions, water levels in reservoirs, stream flow, agricultural productivity, or economic impacts. Areas with extensive agricultural land use can experience particularly significant impacts. As shown in Figure 4.3.1-1, these are concentrated in the central and southeastern parts of Lycoming County.

Figure 4.3.1-1 Agricultural Land Uses in Lycoming County (Lycoming County, 2025).



The Palmer Drought Severity Index (PDSI) is used to describe abnormally wet to abnormally dry conditions. Zero represents normal rainfall and temperature conditions; drought condition indices are described in the table below.

Table 4.3.1-1 Palmer Drought Severity Index (NOAA, 2025a)

INDEX	DESCRIPTION OF CONDITIONS
4.0 or more	Extremely moist
3.0 to 3.9	Very moist spell
2.0 to 2.9	Unusual Moist Spell
-1.9 to 1.9	Near normal
-2.0 to -2.9	Moderate drought
-3.0 to -3.9	Severe drought
-4.0 or less	Extreme drought

Data provided by Cornell University shows that drought conditions in the Middle Susquehanna region of Pennsylvania have resulted in PDSI levels as low as -6.10. This was during a drought that lasted for twenty-five months from 1930 - 1932. In the Lycoming County area, the average Palmer Drought Severity Index level for droughts is approximately -4.0 and the average duration of a drought is about 6 months (Cornell University, 2014). In Pennsylvania, PEMA has primary responsibility for managing droughts with direct support from the PA DEP. According to Drought Management in Pennsylvania (2012), PEMA and PA DEP use the following three stages to describe and manage droughts. They are listed below in order of increasing severity (Commonwealth of Pennsylvania, 2025):

- **Drought Watch**: A period to alert government agencies, public water suppliers, water users, and the public regarding the potential for future drought-related problems. Drought Watches are invoked when three or more drought indicators are present for a county or group of counties. The focus is on increased monitoring, awareness, and preparation for response 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 use by five percent in the affected areas. Due to varying conditions, individual water suppliers or municipalities may determine more stringent conservation actions.

- **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 use by 10-15 percent in the affected areas. As with a Drought Watch, varying conditions may cause individual water suppliers or municipalities to determine more stringent conservation actions.

- **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 assure 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 fifteen 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 assure equitable sharing of limited supplies.

- **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), 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 variances to consider individual hardships and economic dislocations (Pennsylvania Code: Chapter 120, 2018).

Environmental impacts of drought include:

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

The potential impacts of drought on community lifelines are as follows:

Table 4.3.1-2 Most Likely Lifelines Impacted by Drought	
LIFELINES	**NOTES**
	Crops may be lost and there are water regulation concerns.
	Food and water shortages could exacerbate health challenges, especially for food-vulnerable populations.

4.3.1.3. Past Occurrence

On July 20, 1999, the Governor of Pennsylvania declared a drought emergency in almost all of Pennsylvania including, Lycoming County, following extended dry weather through much of the summer. Precipitation deficits 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 more than 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. Table 4.3.1-3 lists periods of drought in the Lycoming County area between 2000 and 2024.

Table 4.3.1-3 Lycoming County Declared Drought Status from 2000 to Present (PADEP, 2025a)			
DATE	**DROUGHT STATUS**	**DATE**	**DROUGHT STATUS**
Dec 16, 1999 - Feb 25, 2000	Watch	Dec 16, 2016 – Feb 14, 2017	Normal
Feb 25, 2000 - May 5, 2000	Watch	Feb 14, 2017 – Apr 6, 2017	Normal
Aug 8, 2001 - Aug 24, 2001	Watch	Apr 6, 2017 – May 16, 2017	Normal
Aug 24, 2001 - Nov 6, 2001	Watch	May 16, 2017 – Aug 21, 2020	Normal
Nov 6, 2001 - Dec 5, 2001	Watch	Aug 21, 2020 – Sep 10, 2020	Normal
Dec 5, 2001 - Feb 12, 2002	Watch	Sept 10, 2020 – Sept 30, 2020	Watch
Feb 12, 2002 - May 13, 2002	Watch	Sept 30, 2020 – Oct 28, 2020	Watch
May 13, 2002 - June 14, 2002	Watch	Oct 28, 2020 – Nov 17, 2020	Watch
Sept 5, 2002 - Nov 7, 2002	Watch	Nov 17, 2020 – Jan 7, 2021	Watch

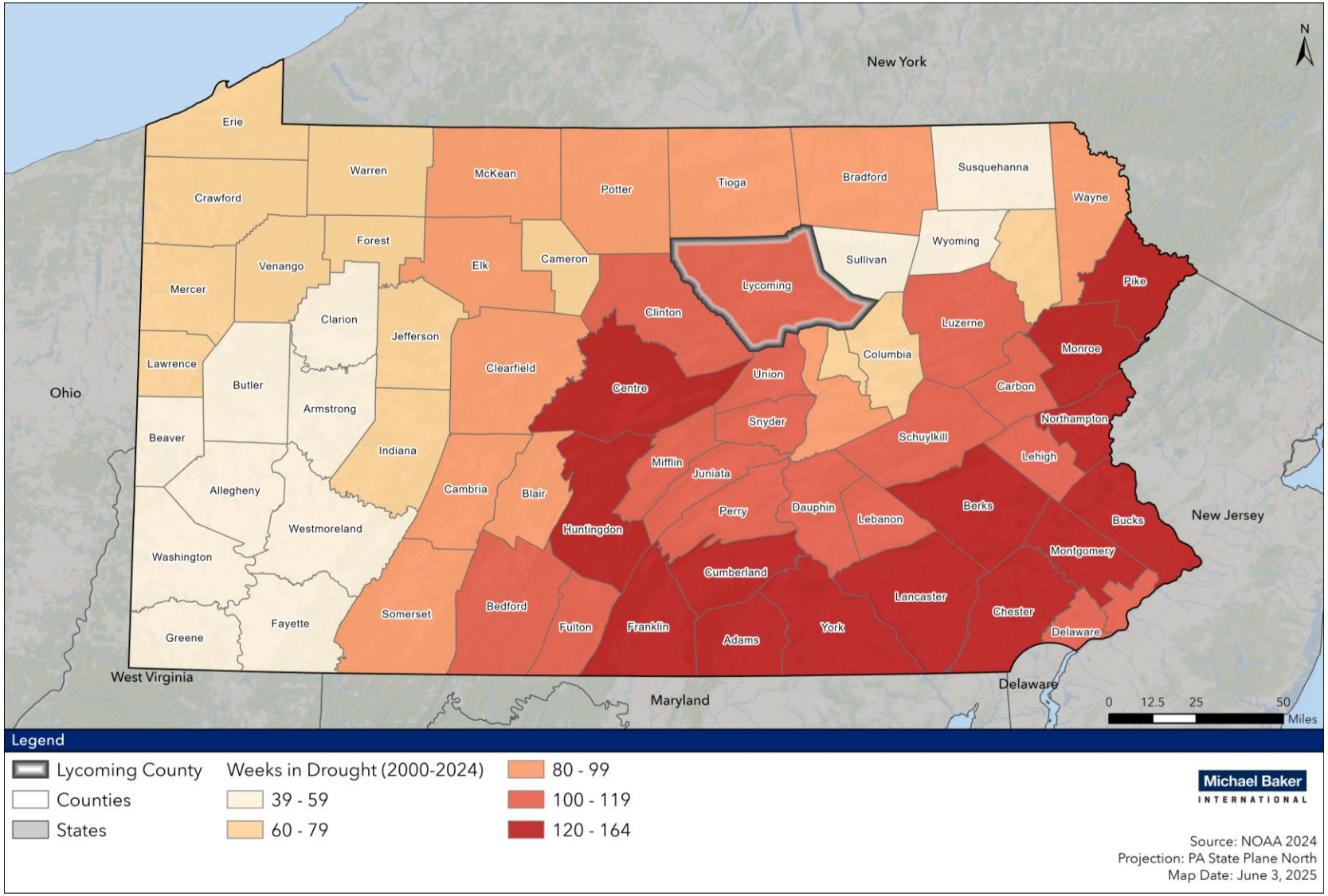
Table 4.3.1-3 Lycoming County Declared Drought Status from 2000 to Present (PADEP, 2025a)			
DATE	**DROUGHT STATUS**	**DATE**	**DROUGHT STATUS**
April 11, 2006 - June 30, 2006	Watch	Jan 7, 2021 – Feb 4, 2021	Normal
Aug 6, 2007 – Sept 5, 2007	Watch	Feb 4, 2021 – Aug 31, 2022	Normal
Sept 5, 2007 – Oct 5, 2007	Watch	Aug 31, 2022 – Oct 17, 2022	Watch
Oct 5, 2007 - Jan 11, 2008	Watch	Oct 17, 2022 – Dec 8, 2022	Watch
Jan 11, 2008 - Feb 15, 2008	Watch	Dec 8, 2022 – Jan 20, 2023	Normal
Sept 16, 2010 - Nov 10, 2010	Watch	Jan 20, 2023 – June 15, 2023	Normal
Aug 5, 2011 – Sept 2, 2011	Watch	June 15, 2023 – Aug 24, 2023	Watch
Mar 24, 2015 – June 17, 2015	Watch	Aug 24, 2023 – Sept 22, 2023	Normal
June 17, 2015 – July 10, 2015	Watch	Sept 22, 2023 – Oct 20, 2023	Normal
Aug 2, 2016 – Sept 6, 2016	Watch	Oct 20, 2023 – Dec 1, 2023	Normal
Sept 6, 2016 – Nov 3, 2016	Watch	Dec 1, 2023 – Mar 6, 2024	Normal
Nov 3, 2016 – Dec 16, 2016	Normal		

As seen in the table above, Lycoming County has not had a severe drought since 2023. In addition to these documented times of drought, a burn ban was issued for Lycoming County on April 16, 2006 due to extremely dry weather conditions.

One way to measure the magnitude of a drought is through the PDSI. This index is based on several meteorological and hydrological factors, including temperature and soil moisture levels, and is computed weekly by the NWS's Climate Prediction Center. The index compares precipitation received against the average amount expected during that period. Droughts are expressed as negative numbers. Palmer values of -2.00 to -2.99 indicate a watch status; values of -3.00 to -3.99 indicate a warning; and values of -4.00 and less indicate an emergency.

According to the PDSI, Lycoming County spent 100 to 119 weeks in drought between 2000 and 2024. Figure 4.3.1-1 displays these findings and Lycoming County in relation to other areas in Pennsylvania.

Figure 4.3.1-2 Drought Frequency in Lycoming County and Pennsylvania from 1900-2024 (NOAA, 2025a).



4.3.1.4. Future Occurrence

The potential for a drought to occur in Lycoming County is high. Lycoming County has been identified by the U.S. Drought Monitor as being abnormally dry in northern and southeastern areas of the county (National Integrated Drought Information System (NIDIS), 2025). Also, over the past five years the declared drought status in Lycoming County has shifted between "Normal" and "Watch" indicating that conditions are relatively consistent over time (PA DEP, 2025a). While there hasn't been a declared drought status in the past five years, indicators show that local conditions make it possible for there to be a drought. Therefore, the probability of drought impacting Lycoming County is considered *possible* as defined by the Risk Factor Methodology probability criteria (see Table 4.4-1).

According to PEMA, uncertainty regarding the future occurrence of droughts exists due to the potential impacts of climate change. The Pennsylvania Climate Impacts Assessment 2024 Update suggests that the likelihood for drought will slightly increase through the 21st century. While average and extreme precipitation are projected to increase, higher temperatures and an increase in days without rain could reduce water availability (PA DEP, 2024a).

The Climate Mapping for Resilience and Adaptation (CMRA) Tool provides county-level assessment reports for certain hazards, including drought. Figure 4.3.1-3 below shows the report for drought in Lycoming County. The future climate indicators that may contribute to drought include precipitation and temperature thresholds. According to CMRA, the number of days per year with no precipitation may increase slightly depending on emission scenarios, even if the total annual precipitation is expected to increase. In addition, the annual number of days above 90 degrees Fahrenheit is expected to significantly increase in the future under all emission scenarios.

Figure 4.3.1-3 Lycoming County Drought Hazard Assessment Report (CMRA, 2025)



Future Climate Indicators

Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Precipitation:							
Average annual total precipitation	**42"** 41 - 44	**44"** 42 - 48	**45"** 42 - 49	**45"** 42 - 50	**46"** 42 - 50	**46"** 42 - 50	**48"** 44 - 53
Days per year with precipitation (wet days)	**198 days** 194 - 202	**197 days** 187 - 209	**197 days** 182 - 205	**197 days** 185 - 207	**196 days** 178 - 206	**196 days** 183 - 205	**195 days** 172 - 217
Days per year with no precipitation (dry days)	**167 days** 163 - 172	**168 days** 157 - 179	**168 days** 160 - 183	**169 days** 158 - 180	**169 days** 159 - 187	**169 days** 161 - 182	**171 days** 148 - 194
Maximum number of consecutive dry days	**10 days** 10 - 12	**11 days** 9 - 13	**11 days** 10 - 13	**11** days 10 - 13	**11 days** 10 - 14	**11 days** 10 - 13	**12 days** 10 - 14
Temperature thresholds:							
Annual days with maximum temperature > 90 °F	**3 days** 3 - 7	**14 days** 6 - 27	**15 days** 7 - 25	**20 days** 8 - 40	**26 days** 11 - 45	**27 days** 10 - 55	**56 days** 18 - 91
Annual days with maximum temperature > 100 °F	**0 days** 0 - 0	**0 days** 0 - 2	**1 days** 0 - 4	**1 days** 0 - 8	**2 days** 0 - 11	**3 days** 0 - 8	**11 days** 0 - 42

N/A = Data Not Available for the selected area

4.3.1.5. Vulnerability Assessment

Drought vulnerability depends on the duration and area of impact. However, other factors contribute to the severity of a drought. Unseasonably high temperatures, prolonged winds, and low humidity can heighten the impact of a drought. Extended periods of drought can lead to lowered stream levels, altering the delicate balance of riverine ecosystems. Certain tree species are susceptible to fungal infections during prolonged periods of soil moisture deficit. Fall droughts pose a particular threat because groundwater levels are typically at their lowest following the height of the summer growing season.

Drought has serious implications for the agricultural sector of Lycoming County's economy. According to the 2022 US Department of Agriculture (USDA) A Census of Agriculture, Lycoming County has 181,550 acres in 918 farms. The market value of all agricultural products sold exceeded $66 million in 2022; some or this entire product is at risk during a drought event. Other important crops include fruits, tree nuts, and berries; hogs and pigs; and other crops and hay. Table 4.3.1-4 lists the top livestock inventory items in Lycoming County. With these agricultural assets, drought events can severely impair the local economy with prolonged drought negatively impacting the livelihood of residents within agricultural communities particularly.

Table 4.3.1-4 Top Livestock Inventory Items in Lycoming County (USDA, 2024).

LIVESTOCK	COUNT
Layers	41,184
Hogs and Pigs	29,871
Cattle and Calves	10,037
Sheep and Lambs	1,176

Table 4.3.1-5 below shows the acreage of agricultural land for each municipality in Lycoming County. There is a total of 638,644.3 acres of agricultural land in the county, with Pine Township's 68,998.3 acres the most of any municipality. Only the boroughs of Hughesville, Jersey Shore, and Muncy have no agricultural land.

Table 4.3.1-5 Agricultural Land By Municipality

MUNICIPALITY	ACRES OF AGRICULTURAL LAND
Anthony Township	14,616.8
Armstrong Township	20,053.0
Bastress Township	5,739.7
Brady Township	1,544.0
Brown Township	10,962.6
Cascade Township	17,555.6
Clinton Township	9,302.5
Cogan House Township	53,772.1
Cummings Township	10,919.0

Table 4.3.1-5 Agricultural Land By Municipality	
MUNICIPALITY	**ACRES OF AGRICULTURAL LAND**
Duboistown Borough	26.4
Eldred Township	10,660.3
Fairfield Township	5,742.4
Franklin Township	19,844.7
Gamble Township	22,699.6
Hepburn Township	10,398.6
Hughesville Borough	0
Jackson Township	25,485.4
Jersey Shore Borough	0
Jordan Township	16,982.0
Lewis Township	17,502.2
Limestone Township	20,162.5
Loyalsock Township	9,810.2
Lycoming Township	10,567.0
McHenry Township	10,807.7
McIntyre Township	16,169.9
McNett Township	10,036.8
Mifflin Township	22,800.4
Mill Creek Township	8,776.3
Montgomery Borough	37.6
Montoursville Borough	252.0
Moreland Township	21,792.1
Muncy Borough	0
Muncy Creek Township	11,784.1
Muncy Township	10,612.0
Nippenose Township	4,873.0
Old Lycoming Township	5,078.4
Penn Township	19,758.1
Piatt Township	6,810.1
Picture Rocks Borough	426.2
Pine Township	68,998.3
Plunketts Creek Township	21,218.8
Porter Township	4,690.0
Salladasburg Borough	283.8
Shrewsbury Township	12,983.9
South Williamsport Borough	53.2
Susquehanna Township	3,264.2
Upper Fairfield Township	14,019.7
Washington Township	17,757.5
Watson Township	6,999.4
City of Williamsport	408.3

Table 4.3.1-5 Agricultural Land By Municipality	
MUNICIPALITY	**ACRES OF AGRICULTURAL LAND**
Wolf Township	15,109.7
Woodward Township	8,496.2
TOTAL	**638,544.3**

Wildfire is the most severe secondary effect associated with drought. Wildfires can devastate wooded and agricultural areas, threatening natural resources and farm production facilities (see Section 4.3.12). Prolonged drought conditions can cause major ecological changes, such as increases in scrub growth, flash flooding, and soil erosion.

Long-term water shortages can have a high impact on agribusinesses, hydropower-dependent utilities, and other industries reliant on water for production services; all critical infrastructure in Lycoming County is vulnerable to the effects of a drought. Drought can cause municipalities to enforce water rationing and distribution. This strains the availability of consumable water for the community and will significantly affect the operations of the five water authorities which include Jersey Shore Area Joint Water Authority, Lycoming County Water and Sewer Authority, and the Williamsport Municipal Water Authority – Williamsport Sanitary Authority. It also increases Lycoming County's vulnerability to other hazards such as severe weather, extreme heat, and public health emergencies.

Lycoming County residents that use private domestic wells are also more vulnerable to droughts. Table 4.3.1-6 shows the number of domestic wells and the number of properties with public water access per municipality. It is important to note that well data is from the Pennsylvania Groundwater Information System (PaGWIS), a database of 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. The municipalities with the highest number of domestic wells include Brown Township, Cummings Township, Hepburn Township, McHenry Township, and Upper Fairfield Township.

Table 4.3.1-6 Number of reported domestic wells in Lycoming County (PaGWIS, 2020).			
MUNICIPALITY	**NUMBER OF REPORTED DOMESTIC WELLS**	**MUNICIPALITY**	**NUMBER OF REPORTED DOMESTIC WELLS**
Anthony Township	56	Mill Creek Township	45
Armstrong Township	40	Montgomery Borough	15
Bastress Township	46	Montoursville Borough	19
Brady Township	41	Moreland Township	47

Table 4.3.1-6 Number of reported domestic wells in Lycoming County (PaGWIS, 2020).			
MUNICIPALITY	**NUMBER OF REPORTED DOMESTIC WELLS**	**MUNICIPALITY**	**NUMBER OF REPORTED DOMESTIC WELLS**
Brown Township	130	Muncy Borough	3
Cascade Township	15	Muncy Creek Township	93
Clinton Township	96	Muncy Township	104
Cogan House Township	51	Nippenose Township	28
Cummings Township	128	Old Lycoming Township	94
Duboistown Borough	16	Penn Township	49
Eldred Township	97	Piatt Township	64
Fairfield Township	109	Picture Rocks Borough	22
Franklin Township	31	Pine Township	73
Gamble Township	45	Plunketts Creek Township	33
Hepburn Township	146	Porter Township	46
Hughesville Borough	6	Salladasburg Borough	1
Jackson Township	26	Shrewsbury Township	22
Jersey Shore Borough	5	South Williamsport Borough	34
Jordan Township	25	Susquehanna Township	48
Lewis Township	38	Upper Fairfield Township	130
Limestone Township	103	Washington Township	92
Loyalsock Township	82	Watson Township	78
Lycoming Township	47	Williamsport City	52
McHenry Township	142	Wolf Township	63
McIntyre Township	15	Woodward Township	74
McNett Township	9	Unknown	59

Table 4.3.1-6 Number of reported domestic wells in Lycoming County (PaGWIS, 2020).			
MUNICIPALITY	**NUMBER OF REPORTED DOMESTIC WELLS**	**MUNICIPALITY**	**NUMBER OF REPORTED DOMESTIC WELLS**
Mifflin Township	53	**TOTAL**	**2,986**

4.3.1.6. Equity in Vulnerable Communities

Rural communities within Lycoming County that are dependent on income from agriculture are more susceptible to drought. Underserved and socially vulnerable communities include communities in the north central part of the county including Pine Township and Cogan House Township, and communities in the eastern part of the county including Jordan Township, Franklin Township, Moreland Township and Penn Township.

4.3.2. Earthquake

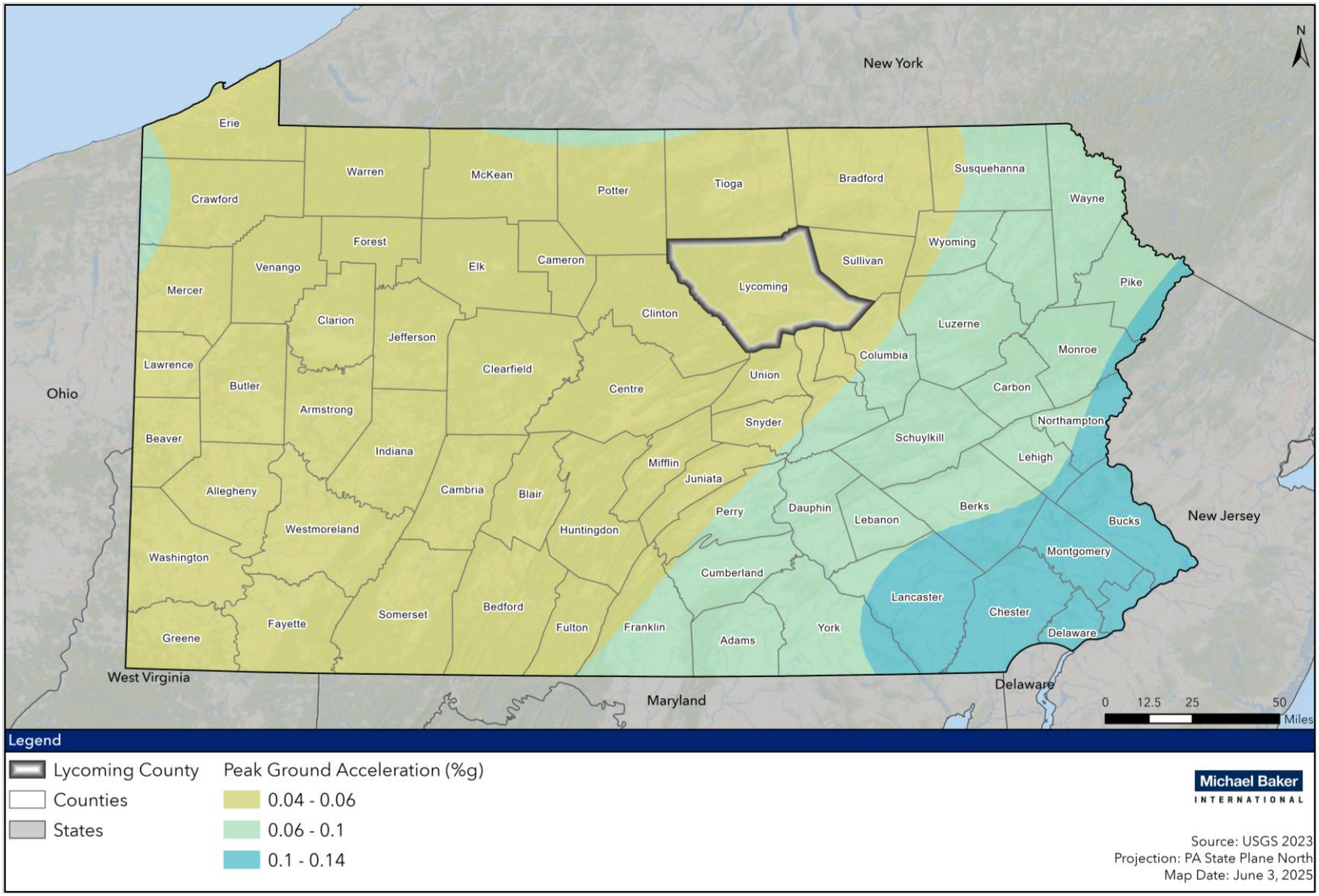
4.3.2.1. Location and Extent



An earthquake is the motion or trembling of the ground produced by sudden displacement of rock usually within the upper 10-20 miles of the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of underground caverns. They can also result from human activity like mine blasts and nuclear experiments. The closest fault line that might contribute to an earthquake in Lycoming County is the Mid-Atlantic Ridge, which is approximately 2,000 miles to the east of Pennsylvania (DCNR, N.d.). As regional hazards, an earthquake would affect all of Lycoming County. Earthquakes can cause damage to buildings and other rigid superstructures, depending on factors like magnitude, distance of local areas to the epicenter, and local geologic conditions. It remains incredibly difficult to predict when and where an earthquake will occur in the northeast U.S. and Pennsylvania.

Earthquake events in Pennsylvania typically do not impact areas greater than 100 km (62 miles) from the epicenter, and earthquake epicenters in Lycoming County are rare. The area is generally not known for seismicity, and USGS downgraded the probabilistic seismic hazard for much of Pennsylvania in 2014. Figure 4.3.2-1 shows the earthquake hazard in Pennsylvania and Lycoming County, expressed as the two-percent probability of exceedance in 50 years of peak ground acceleration (g). This map was digitized from the National Seismic Hazard report. Lycoming County lies in the 0.04 zone, indicating that the hazard is slight. Earthquakes originating from outside Pennsylvania, can also impact the Commonwealth, though they are not expected to cause significant damage. This was the most current data available when updating this plan.

Figure 4.3.2-1 Approximate USGS Seismic Hazard for Pennsylvania



4.3.2.2. Range of Magnitude

There are several different ways of describing the magnitude of an earthquake. One method measures peak ground acceleration. Peak ground acceleration is the maximum horizontal ground acceleration measured in centimeters per second per second (cm/sec^2). Peak ground acceleration can range from zero for an earthquake that is noticed by very few people to 350, which would be categorized as a catastrophic event. A peak ground acceleration of 10 cm/sec^2 means that the shaking is equivalent to about one percent of the acceleration due to gravity. Generally, ground acceleration must exceed 15 cm/sec^2 for significant damage to occur.

Earthquake magnitude is also often measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake. Table 4.3.2-1 below summarizes Richter Scale magnitudes as they relate to the spatial extent of impacted areas. Pennsylvania has not experienced any earthquakes with a magnitude greater than 6.0.

Table 4.3.2-1 Richter scale magnitudes and associated earthquake size effects.

RICHTER MAGNITUDES	EARTHQUAKE EFFECTS
Less than 3.5	Generally, not felt but recorded.
3.5-5.4	Often felt but rarely causes damage.
Under 6.0	At most, slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1-6.9	Can be destructive in areas where people live up to about 100 kilometers across.
7.0-7.9	Major earthquake. Can cause serious damage over large areas.
8.0 or greater	Great earthquake. Can cause serious damage in areas several hundred kilometers across.

The Richter Scale does not give any indication of the impact or damage of an earthquake, although it can be inferred that higher magnitude events cause more damage. Therefore, another way of measuring the intensity of an earthquake is the Modified Mercalli Intensity Scale. Measures on this scale range from I, an earthquake that is not generally noticeable, to XII, an earthquake that causes complete destruction. The table below summarizes Modified Mercalli Intensity Scale impacts of earthquake events, measured in terms of earthquake intensity.

Table 4.3.2-2 Modified Mercalli Intensity Scale with associated impacts (ABAG, N.d.)			
SCALE	**INTENSITY**	**DESCRIPTION OF EFFECTS**	**CORRESPONDING RICHTER SCALE MAGNITUDE**
I	Instrumental	Detected only on seismographs.	<4.2
II	Feeble	Some people feel it.	<4.2
III	Slight	Felt by people resting; like a truck rumbling by.	<4.2
IV	Moderate	Felt by people walking.	<4.2
V	Slightly Strong	Sleepers awake; church bells ring.	<4.8
VI	Strong	Trees sway; suspended objects swing; objects fall off shelves.	<5.4
VII	Very Strong	Mild alarm, walls crack, plaster falls.	<6.1
VIII	Destructive	Moving cars uncontrollable, masonry fractures, poorly constructed buildings damaged.	<6.9
IX	Ruinous	Some houses collapse, ground cracks, pipes break open.	<6.9
X	Disastrous	Ground cracks profusely, many buildings destroyed, liquefaction and landslides widespread.	<7.3
XI	Very Disastrous	Most buildings and bridges collapse, roads, railways, pipes, and cables destroyed, general triggering of other hazards.	<8.1
XII	Catastrophic	Total destruction, trees fall, ground rises and falls in waves.	>8.1

Recent earthquakes in Pennsylvania have been measured from IV to VI on the Modified Mercalli Intensity Scale. However, since the worst earthquake recorded in Pennsylvania was a magnitude 5.2, a worst-case scenario for this hazard would be if an earthquake of similar magnitude occurred in or around Lycoming County near a populated area.

The potential impacts of earthquakes on community lifelines are as follows:

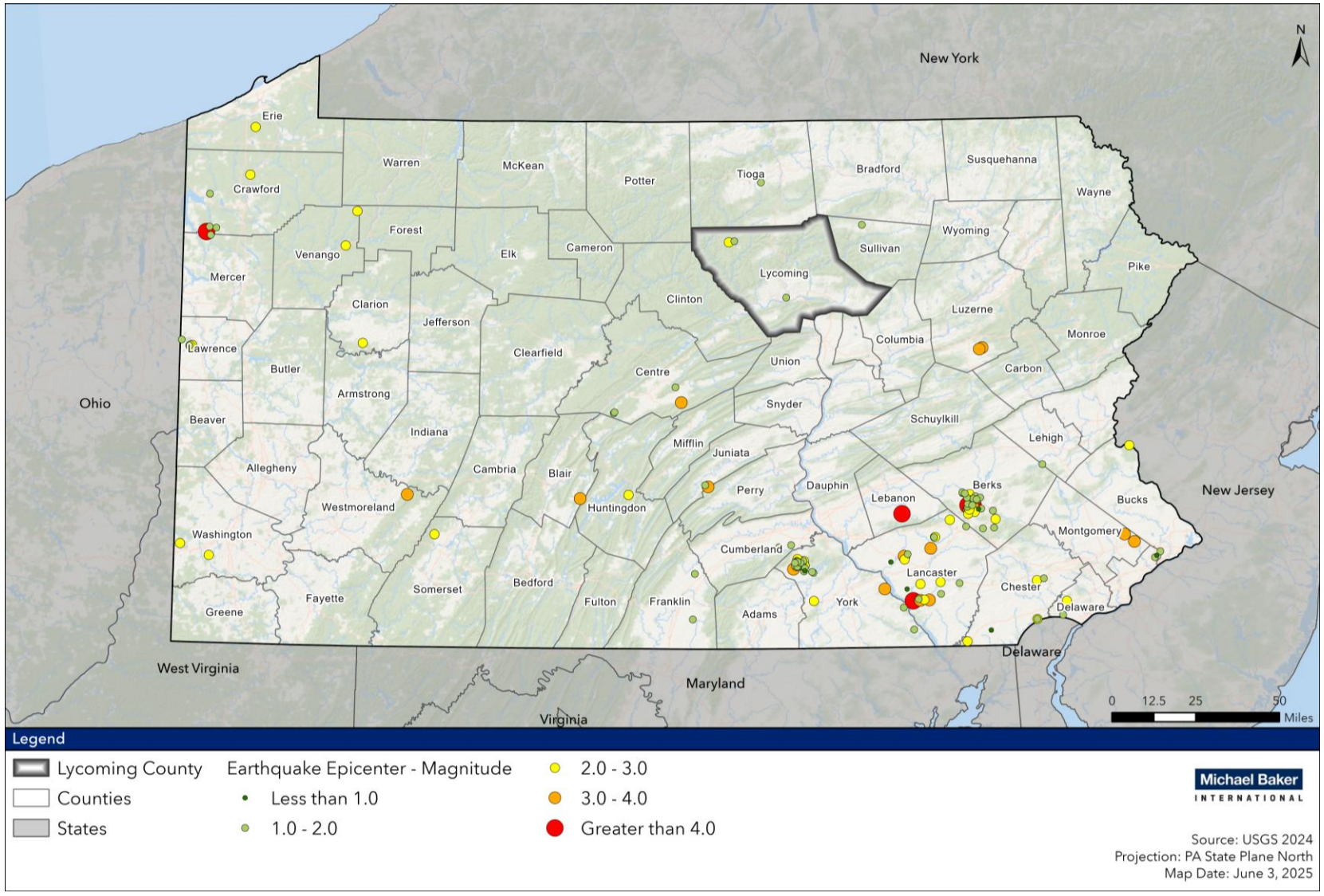
Table 4.3.2-3 Most Likely Lifelines Impacted by Earthquakes	
LIFELINES	**NOTES**
	Shelters may be affected depending on severity. Higher earthquake building standards can aid in mitigation.
	Personnel will likely be overutilized in response and recovery, leading to potential gaps in capability.
	Pipelines may be affected. Mitigation includes requiring earthquake-resistant maintenance, design and construction standards.

4.3.2.3. Past Occurrence

According to records maintained by the Pennsylvania DCNR, there has been one earthquake recorded with its epicenter in Lycoming County. This event occurred in 1907. However, its magnitude was not measured, and no epicenters have occurred within the county since. Parts of the county have likely experienced shock waves from some minor earthquakes that have occurred around the region are in Figure 4.3.2-2 below.

Earthquake events have happened in other areas of Pennsylvania, with a particular concentration of events occurring in the eastern part of the Commonwealth between Lancaster and Reading. In 2011, a magnitude 5.8 earthquake with an epicenter in rural Louisa County, VA was felt throughout Pennsylvania, triggering evacuations, emergency bridge and tunnel inspections, and minor damage to buildings. This shallow earthquake occurring along the Spotsylvania Fault was felt as far north as Ontario, Canada and as far south as Alabama. DCNR's earthquake records end in 2003, but some minor earthquakes have occurred in Pennsylvania and have been documented by USGS's Seismic Hazard Program.

Figure 4.3.2-2 Map of earthquake epicenters in Pennsylvania



4.3.2.4. Future Occurrence

The probability of an earthquake occurring in Lycoming County is very low. Lycoming County does not sit on any fault lines; therefore, it is reasonable to believe that the county will not experience earthquake damage anytime soon. The future occurrence of earthquakes can be considered *unlikely* as defined by the Risk Factor Methodology probability criteria (see Table 4.4-1).

4.3.2.5. Vulnerability Assessment

Geographically, all structures and infrastructure in Lycoming County are equally at risk of experiencing an earthquake. In a mild earthquake of the magnitude typically experienced in Pennsylvania, no structural damage is anticipated. In other cases, damages are expected to be limited. Anticipated damage would look more like broken dishes and windows and toppled file cabinets, rather than full destruction of structures.

However, for earthquakes, the available history covers a period of less than 300 years, which is a relatively short period of time for an examination of earthquakes. Large earthquakes may only affect a location every several centuries or millennia.

Environmental impacts of earthquakes can be numerous, widespread, and devastating, particularly if indirect impacts are considered. Some secondary hazards caused by earthquakes may include fire, hazardous material release, landslides, flash flooding, avalanches, tsunamis, and dam failure. These secondary events could also result in disruptions to natural ecosystems, poor water quality, damage to vegetation, and the release of toxic materials and sewage. Impacts to infrastructure could include train derailments, pipe failures, and utility interruptions. A very large earthquake affecting Lycoming County might cause structural damage in dilapidated structures or structures that do not meet current building codes. Thus, the impact of an earthquake might range from negligible to catastrophic. Based on historical data for Lycoming County, though, damage is likely to be minimal.

Structures identified as potentially at risk of damage due to an earthquake are older structures. All existing buildings have the potential to experience an earthquake. Damage would be highest closest to the epicenter. Given no history of earthquake damage in Lycoming County, damages are estimated to be limited to the more dilapidated structures and structures with unreinforced masonry. 21,502 housing units in Lycoming County were built before 1959, making up 46.5% of structures in the county. These structures could be more susceptible to earthquake impacts due to their age. 10,730 housing units, or 23.2% of housing units in the county, were built between 1960 and 1979 (U.S. Census Bureau, ACS, 2023). Some of these units would be more susceptible to earthquake impacts than structures built in more recent years which adhere to more stringent building codes.

Table 4.3.2-4 below shows the number of housing units that are at least 55 years old in Lycoming County by municipality from the US Census Bureau. The City of Williamsport has by far the highest number of aging housing units in the county.

TABLE 4.3.2-4 Housing Units At Least 55 Years Old by Municipality (U.S. Census Bureau, ACS, 2023)	
MUNICIPALITY	**NUMBER OF STRUCTURES**
Anthony Township	88
Armstrong Township	107
Bastress Township	126
Brady Township	36
Brown Township	219
Cascade Township	66
Clinton Township	423
Cogan House Township	132
Cummings Township	128
Duboistown Borough	469
Eldred Township	113
Fairfield Township	375
Franklin Township	164
Gamble Township	136
Hepburn Township	411
Hughesville Borough	911
Jackson Township	123
Jersey Shore Borough	1,414
Jordan Township	204
Lewis Township	204
Limestone Township	343
Loyalsock Township	2,102
Lycoming Township	294
McHenry Township	243
McIntyre Township	164
McNett Township	94
Mifflin Township	140
Mill Creek Township	48
Montgomery Borough	516
Montoursville Borough	1,778
Moreland Township	160
Muncy Borough	814
Muncy Creek Township	487
Muncy Township	182
Nippenose Township	122
Old Lycoming Township	1,137
Penn Township	157

TABLE 4.3.2-4 Housing Units At Least 55 Years Old by Municipality (U.S. Census Bureau, ACS, 2023)	
MUNICIPALITY	**NUMBER OF STRUCTURES**
Piatt Township	179
Picture Rocks Borough	201
Pine Township	140
Plunketts Creek Township	255
Porter Township	192
Salladasburg Borough	71
Shrewsbury Township	116
South Williamsport Borough	1,906
Susquehanna Township	252
Upper Fairfield Township	289
Washington Township	184
Watson Township	171
City of Williamsport	9,985
Wolf Township	475
Woodward Township	333
TOTAL	29,379

All future structures will also have the potential to experience an earthquake. However, given that new structures must also meet current building codes and given the expected magnitude of earthquakes in the county, any future property damage is expected to be low and focused on contents, not structural damage.

Table 4.3.2-5 below shows the Expected Annual Losses for each census tract in the county according to FEMA's National Risk Index.

Table 4.3.2-5 Expected Annual Losses to Earthquake by Census Tract (FEMA NRI, 2023)			
CENSUS TRACT	**MUNICIPALITIES**	**ESTIMATED ANNUAL LOSSES**	**ESTIMATED ANNUAL LOSS RATING**
1.00	Williamsport City	$690.38	Very Low
2.00	Williamsport City	$554.85	Very Low
3.00	Williamsport City	$1,532.06	Very Low
4.00	Williamsport City	$1,069.86	Very Low
5.00	Williamsport City	$870.47	Very Low
6.00	Williamsport City	$1,605.73	Very Low
8.00	Williamsport City	$1,512.06	Very Low
9.00	Williamsport City	$1,282.04	Very Low
10.00	Williamsport City	$1,102.70	Very Low

Table 4.3.2-5 Expected Annual Losses to Earthquake by Census Tract (FEMA NRI, 2023)			
CENSUS TRACT	**MUNICIPALITIES**	**ESTIMATED ANNUAL LOSSES**	**ESTIMATED ANNUAL LOSS RATING**
101.00	Cogan House Township, Pine Township, Jackson Township, McIntyre Township, McNett Township	$1,378.02	Very Low
102.00	Brown Township, McHenry Township, Cummings Township, Watson Township	$791.87	Very Low
103.00	Anthony Township, Mifflin Township, Piatt Township, Salladasburg Borough	$2,104.63	Very Low
104.00	Hepburn Township, Lycoming Township, Lewis Township	$1,780.57	Very Low
105.01	Cascade Township, Gamble Township, Plunketts Creek Township	$1,617.47	Very Low
105.02	Eldred Township, Upper Fairfield Township	$1,816.86	Very Low
106.00	Shrewsbury Township, Penn Township, Moreland Township, Franklin Township, Jordan Township	$3,260.29	Very Low
107.00	Mill Creek Township, Wolf Township, Picture Rocks Borough, Hughesville Borough	$3,504.31	Very Low
108.00	Muncy Creek Township, Muncy Borough, Muncy Township	$5,239.04	Very Low
109.00	Fairfield Township	$1,239.88	Very Low
110.00	Montoursville Borough	$1,740.72	Very Low
111.00	Loyalsock Township	$2,616.85	Very Low
112.00	Loyalsock Township	$2,006.24	Very Low
113.01	Woodward Township	$820.48	Very Low
113.02	Old Lycoming Township	$1,678.38	Very Low
114.00	Armstrong Township, Susquehanna Township	$556.61	Very Low
116.01	Duboistown Borough	$290.72	Very Low
116.03	South Williamsport Borough	$541.71	Very Low
116.04	South Williamsport Borough	$947.64	Very Low
117.01	Clinton Township, Montgomery Borough	$1,322.65	Very Low
117.02	Brady Township, Washington Township, Clinton Township	$1,594.92	Very Low

Table 4.3.2-5 Expected Annual Losses to Earthquake by Census Tract (FEMA NRI, 2023)			
CENSUS TRACT	**MUNICIPALITIES**	**ESTIMATED ANNUAL LOSSES**	**ESTIMATED ANNUAL LOSS RATING**
118.00	Bastress Township, Nippenose Township, Limestone Township	$2,559.47	Very Low
119.00	Jersey Shore Borough, Porter Township	$4,785.76	Very Low
TOTAL		$54,415.21	

4.3.2.6. Equity in Vulnerable Communities

Communities within Lycoming County with a large renter population may be more at risk during an earthquake due to a lack of control over the seismic safety of their buildings. This includes areas of Williamsport City, Brown, McHenry, Cummings, and Watson Townships. Renters may also be affected due to a lack of renter protections or access to temporary housing after an earthquake. Low-income communities may be at greater risk as these households often live in older or poorly constructed housing, which is more likely to sustain damage during an earthquake. People with disabilities or limited mobility face greater challenges in evacuating during an earthquake and accessing post-disaster services. In terms of emergency notification, households without smartphones and lack of access to the internet will affect how people get emergency communications. Ensuring equitable access to such technologies and providing information in multiple languages and formats is critical.

4.3.3. Extreme Temperature



Extreme temperature hazards can be both hot and cold temperature events. Extreme cold temperatures drop well below what is considered normal for an area during the winter months and often accompany winter storm events. Combined with increases in wind speed, such temperatures in Pennsylvania can be life threatening to those exposed for extended periods of time. Extreme heat can be described as temperatures that are above the average high temperature for a region during the summer months.

4.3.3.1. Location and Extent

All of Lycoming County may be subject to extreme temperatures in the summer and winter seasons. Areas most susceptible to extreme heat include urban environments, as buildings and pavement absorb and retain heat, causing an Urban Heat Island Effect. Areas most susceptible to extreme cold include higher elevations. Different populations and industries may experience extreme temperatures differently. Demographics must also be considered, as the impact of extreme temperatures often manifests as human health issues

Figure 4.3.3-1 and Figure 4.3.3-2 show annual mean maximum and minimum temperatures throughout Pennsylvania and highlight Lycoming County. These maps present the year-round average minimum temperature and average maximum temperature. Elevation and topography account for local differences seen on the maps. However, during the summer (June – August), the average high temperature is 80.0°F and the average low is 56.6°F in Lycoming County. In winter (December – March), the average high in Lycoming County is 38.7°F and the average low is 20.8°F (NOAA NCEI, 2025a).

Figure 4.3.3-1 Average Minimum Temperature in Lycoming County, 2025

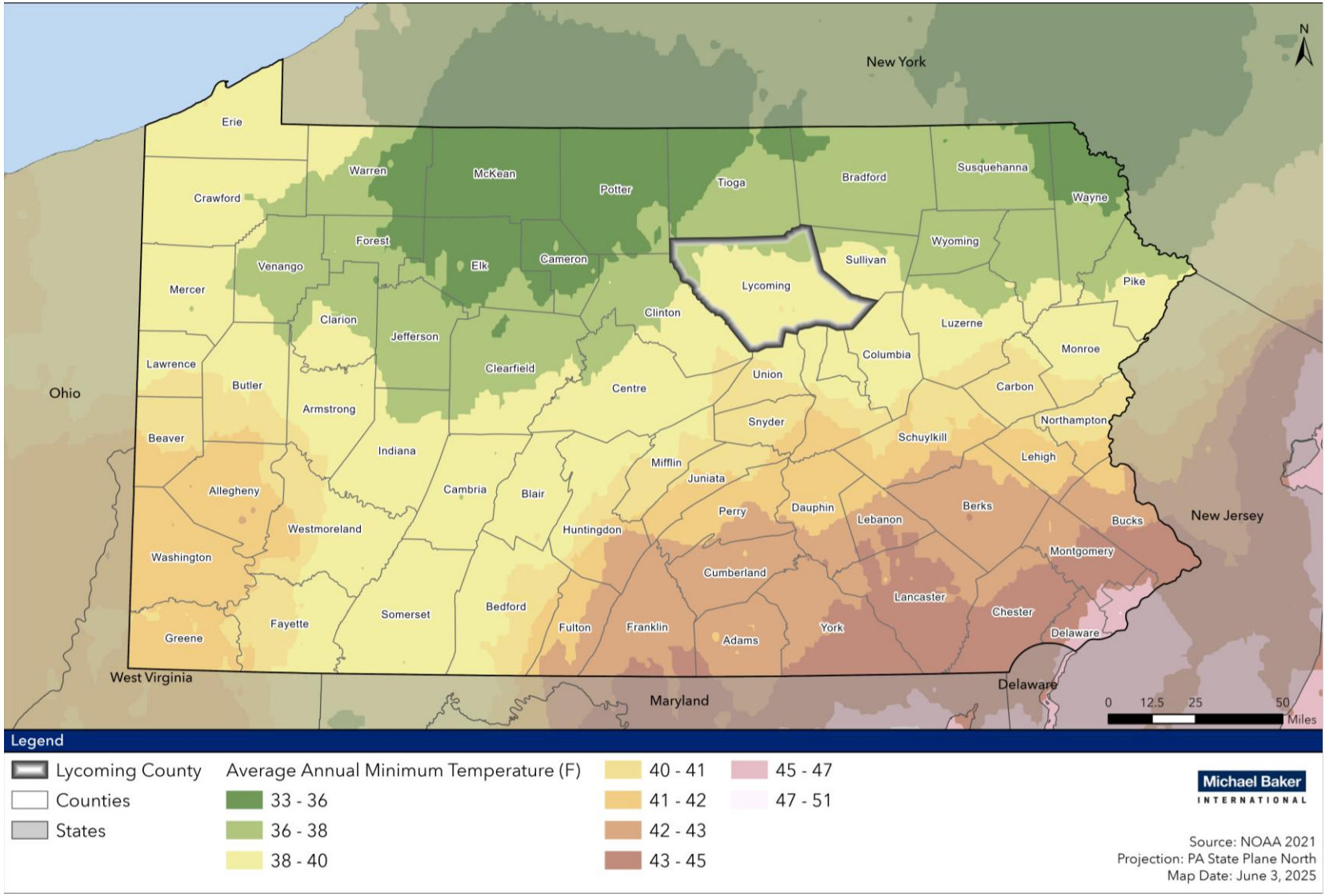
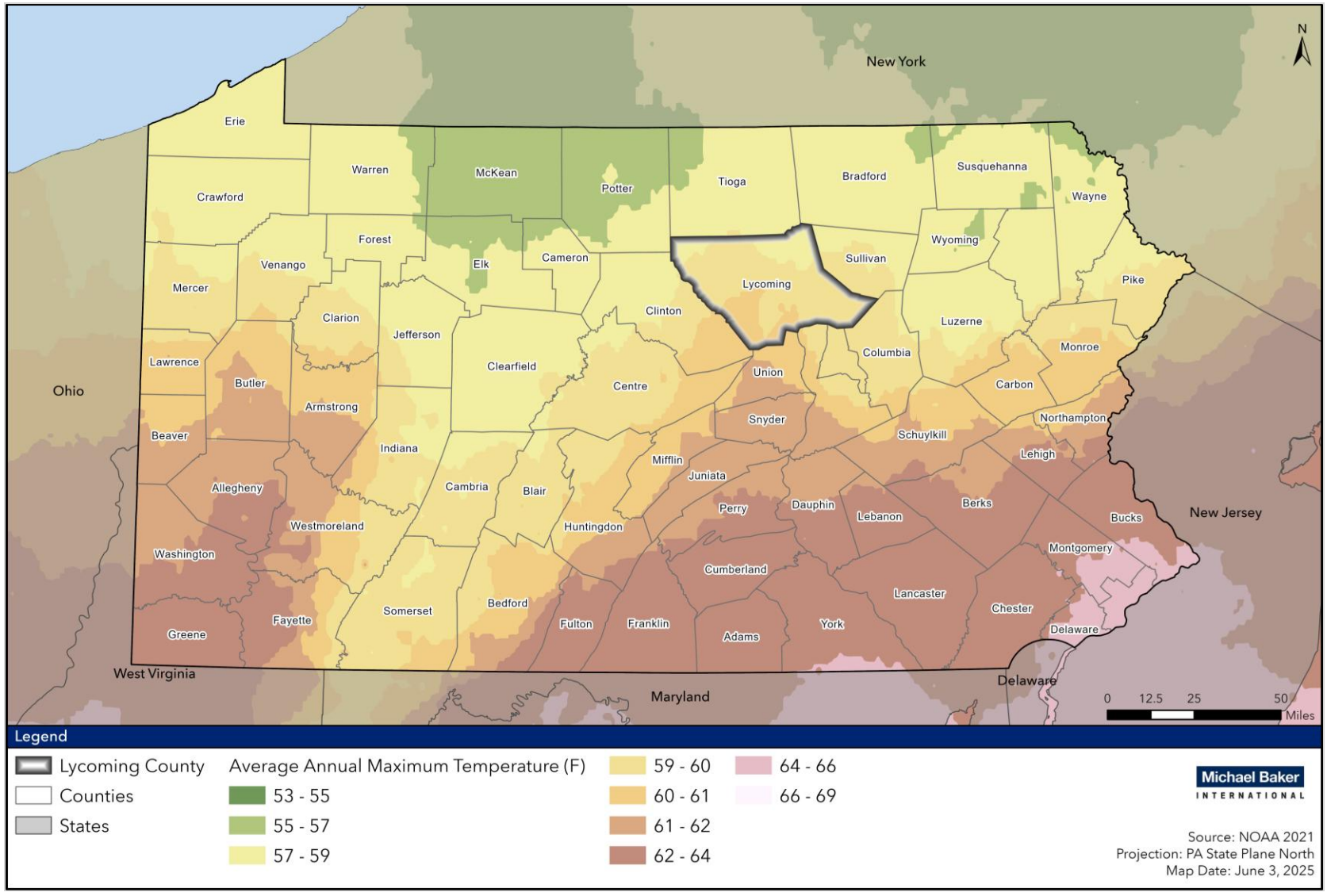


Figure 4.3.3-2 Average Maximum Temperature in Lycoming County, 2025



4.3.3.2. *Range of Magnitude*

Extreme temperatures can be disruptive and/or dangerous, especially for the very old, very young, and people with disabilities and chronic health conditions. In addition, socioeconomic status can greatly influence how well a population can weather temperature extremes. Low-income households may struggle with the high heating and cooling bills that come with temperature extremes or live in structures with inadequate heating and cooling systems. Extreme heat and cold can also impact transportation, agriculture, and energy supplies.

The following impacts can be observed in conjunction with extreme temperature events:

- Health Impacts: Both extreme cold and extreme heat can cause severe health impacts. The impacts of severe cold include hypothermia and frostbite from prolonged exposure. Cold weather also raises the risk of injuries from falls, traffic incidents, carbon monoxide poisoning, and house fires. Health impacts of extreme heat include heat stroke and dehydration. The health impacts of extreme cold are greater in terms of mortality in humans, but often after more prolonged exposure vs. a cold snap. Extreme heat waves, however, can prove more deadly over a shorter duration. Both extreme heat and extreme cold are most likely to impact the elderly, low-income individuals, residents with disabilities and pre-existing medical conditions, and laborers and farm workers.
- Transportation: Cold weather can impact automotive engines, possibly stranding motorists; limit or prevent travel by pedestrians, bicyclists, and users of public transportation; and stress metal bridge structures. Highways and railroad tracks can become distorted in high heat. Disruptions to the transportation network and accidents due to extreme temperatures represent an additional risk.
- Agriculture: Absolute temperature and duration of extreme cold can have devastating effects on trees and winter crops. Livestock is especially vulnerable to heat. Crop yields can be impacted by heat waves or cold snaps that occur during key development stages, even at levels that do not impact most of the population.
- Energy: Energy consumption rises significantly during extreme cold and hot weather, and any fuel shortages or utility failures that prevent the proper temperature control of a dwelling place residents in extreme danger. Extreme heat also can result in utility interruptions, and sagging transmission lines due to the heat can lead to shorting out.

The range of these impacts, especially health effects, can be mitigated through improved forecasts, warnings, community preparedness, and appropriate community response. A worst-case event for Lycoming County would include extreme cold temperatures combined with an interruption in energy supplies and loss of access to medical care from snow or ice impacting travel.

The experience of extreme heat and extreme cold varies considerably depending on humidity and wind conditions, respectively. Figure 4.3.3-3 shows the effects of wind speed on extreme cold events and humidity on extreme heat events. These compounding factors can increase the risk experienced by vulnerable populations and the general public. While the temperatures in

Figure 4.3.3-3 serves as a guide for various danger categories, the impacts of high temperatures will vary from person to person based on individual age, health, and other factors.

NWS issues temperature advisories, watches, and warnings. Exact thresholds vary across the Commonwealth, but in general heat advisories are issued when the heat index will be equal to or greater than 100°F, but less than 105°F, excessive heat warnings are issued when heat indices will attain or exceed 105°F, and excessive heat watches are issued when there is a possibility that excessive heat warning criteria may be experienced within twelve to forty-eight hours. Similarly, NWS issues wind chill warnings, watches, and advisories. A wind chill warning is issued when extremely cold wind chill values are occurring; a watch when extremely cold wind chill values are possible; and an advisory when seasonably cold wind chill values are occurring (NOAA NWS, 2025).

Figure 4.3.3-3 Effects of Wind Speed on Extreme Cold Events (Wind Chill) (NOAA NWS, 2025a)

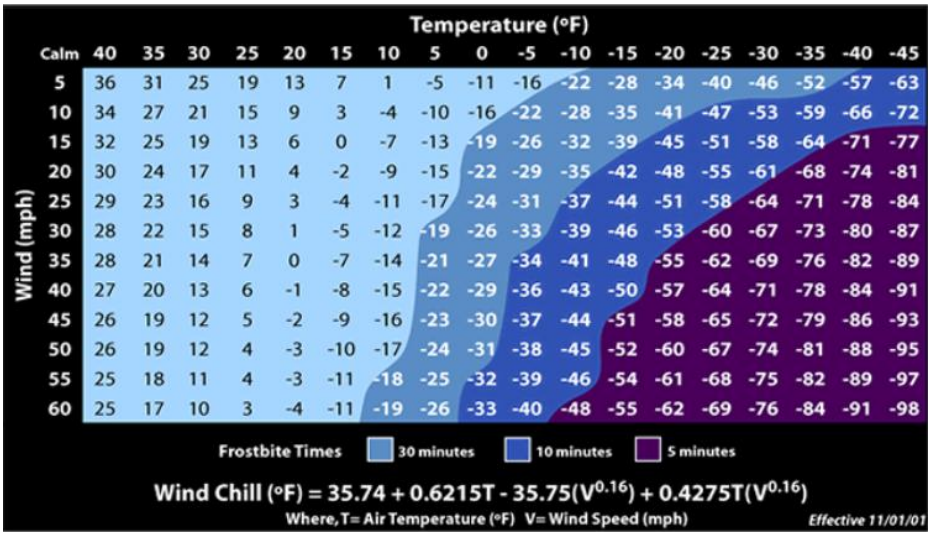
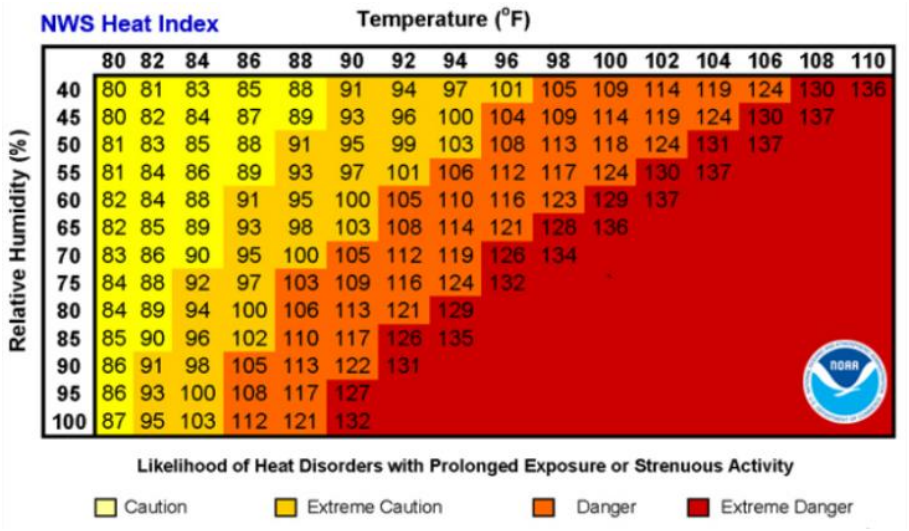


Figure 4.3.3-4 Effects of Wind Speed on Humidity on Extreme Heat Events (Heat Index) (NOAA NWS, 2025b)



Major human risks to extremely high temperatures include heat cramps, heat syncope, heat exhaustion, heatstroke, and death. The elderly, the very young, and those with low or no income are most vulnerable to health-related impacts of extreme temperatures. Cold temperatures can be extremely dangerous to humans and animals exposed to the elements. Without heat and shelter, cold temperatures can cause hypothermia, frost bite, and death. Wind chill temperatures are often used in place of raw temperature values due to the effect of wind can have in drawing heat from the body under cold temperatures.

The potential impacts of extreme temperature on community lifelines are as follows:

Table 4.3.3-1 Most Likely Lifelines Impacted by Extreme Temperature

LIFELINES	NOTES
Safety and Security	Government operations and facilities, including police and fire, will be needed for response and recovery. Landlords and utility companies will need to respond to infrastructure issues for residents.
Health and Medical	Medical care will be needed in extreme events, and the facilities themselves will need effective heating and cooling infrastructure.
Energy (Power & Fuel)	Extreme temperatures will lead to a larger strain on the power grid due to an increased usage of heating and cooling utilities.

4.3.3.3. Past Occurrence

Historically, the highest and lowest recorded temperatures in central Pennsylvania, as observed by NWS in Williamsport, PA were 106 degrees (July 9, 1936) and -20 degrees on January 21, 1994. The highest recorded temperature in the last decade was 100 degrees on July 27, 2020. In 2024, the record highs were set for July 8-10 and 14-16, with each day recording a high temperature of at least 92 degrees. The lowest recorded temperature in the last decade was -7 degrees on January 22, 2025. This broke the record established the previous day of -5 degrees (NOAA NCEI, 2025a).

There have also been numerous cold weather days with extreme wind chills, as shown in Table 4.3.3-2. Since 2015, there have been ten extreme temperature events in the county reported to the NCEI. All were classified as Extreme Cold/Wind Chill. Furthermore, a heat advisory was issued for Lycoming County in late June 2024 as heat index values were greater than 100 (Advance Local Weather Alerts/*PennLive*, 2024).

Table 4.3.3-2 Previous Temperature Extremes Impacting Lycoming County, 2004-2024 (NOAA NCEI, 2025b)						
DATE	EVENT	TEMPERATURE (HEAT INDEX AND WIND CHILL)	DEATHS	INJURIES	PROPERTY DAMAGE RECORDED	CROP DAMAGE RECORDED
12/20/2004	Cold/Wind Chill	Not Reported	0	0	$0.00	$0.00
07/17/2006	Heat	Not Reported	0	0	$0.00	$0.00
08/01/2006	Heat	Not Reported	0	0	$0.00	$0.00
02/03/2007	Extreme Cold/Wind Chill	-15 to -30° F (with wind chill)	0	0	$0.00	$0.00
02/05/2007	Extreme Cold/Wind Chill	-10 to -35° F (with wind chill)	0	0	$0.00	$0.00
2/16/2007	Extreme Cold/Wind Chill	-15° F (with wind chill)	0	0	$0.00	$0.00
03/06/2007	Extreme Cold/Wind Chill	-15 to -20° F (with wind chill)	0	0	$0.00	$0.00
02/10/2008	Extreme Cold/Wind Chill	-10 to -20° F (with wind chill)	0	0	$0.00	$0.00
02/10/2008	Extreme Cold/Wind Chill	-10 to -20° F (with wind chill)	0	0	$0.00	$0.00
12/21/2008	Extreme Cold/Wind Chill	-15 to -20° F (with wind chill)	0	0	$0.00	$0.00
12/21/2008	Extreme Cold/Wind Chill	-15 to -20° F (with wind chill)	0	0	$0.00	$0.00
01/15/2009	Extreme Cold/Wind Chill	-20 to -30° F (with wind chill)	0	0	$0.00	$0.00
01/16/2009	Extreme Cold/Wind Chill	-15 to -25° F (with wind chill)	0	0	$0.00	$0.00
03/02/2009	Extreme Cold/Wind Chill	-15 to -25° F (with wind chill)	0	0	$0.00	$0.00
07/21/2011	Excessive Heat	Not Reported	0	0	$0.00	$0.00
01/06/2014	Extreme Cold/Wind Chill	-40° F (with wind chill)	0	0	$0.00	$0.00
01/06/2014	Extreme Cold/Wind Chill	-30° F (with wind chill)	0	0	$0.00	$0.00
02/15/2015	Extreme Cold/Wind Chill	-25 to -35° F (with wind chill)	0	0	$0.00	$0.00
02/15/2015	Extreme Cold/Wind Chill	-25 to -35° F (with wind chill)	0	0	$0.00	$0.00
02/19/2015	Extreme Cold/Wind Chill	-25 to -35° F (with wind chill)	0	0	$0.00	$0.00

Table 4.3.3-2 Previous Temperature Extremes Impacting Lycoming County, 2004-2024 (NOAA NCEI, 2025b)						
DATE	EVENT	TEMPERATURE (HEAT INDEX AND WIND CHILL)	DEATHS	INJURIES	PROPERTY DAMAGE RECORDED	CROP DAMAGE RECORDED
02/23/2015	Extreme Cold/Wind Chill	-25 to -35° F (with wind chill)	0	0	$0.00	$0.00
02/13/2016	Extreme Cold/Wind Chill	-25 to -35° F (with wind chill)	0	0	$0.00	$0.00
01/05/2018	Extreme Cold/Wind Chill	-25 to -30° F (with wind chill)	0	0	$0.00	$0.00
01/20/2019	Extreme Cold/Wind Chill	-25 to -30° F (with wind chill)	0	0	$0.00	$0.00
01/30/2019	Extreme Cold/Wind Chill	-25 to -30° F (with wind chill)	0	0	$0.00	$0.00
12/23/2022	Extreme Cold/Wind Chill	-25 to -30° F (with wind chill)	0	0	$0.00	$0.00
12/23/2022	Extreme Cold/Wind Chill	-25 to -30° F (with wind chill)	0	0	$0.00	$0.00

4.3.3.4. Future Occurrence

Due to its location and geography, the county is more likely to encounter extreme cold weather than excessive heat. Topography and vegetation can impact temperature differentials across the county. The probability of an extreme temperature event in Lycoming County is considered *likely* as defined by the Risk Factor Methodology probability criteria (see Table 4.4-1).

According to the Fifth National Climate Assessment, which utilized the Intergovernmental Panel on Climate Change's Shared Socioeconomic Pathways Representative Concentration Pathways (RCP) 4.5 and 8.5 scenarios, the annual average temperature across the United States is projected to increase by 2.5°F (RCP 4.5) or 2.9°F (RCP 8.5) between 2021 and 2050, relative to 1976-2005. The RCP 4.5 scenario assumes moderate measures are taken to reduce emissions, while the 8.5 scenario assumes a lower effort and thus more severe impacts. For the Northeast region, the change in annual average temperature is 3.98°F (RCP 4.5) or 5.09°F (RCP 8.5) by 2036-2065 and 5.27°F (RCP 4.5) or 9.11°F (RCP 8.5) by 2071-2100. These changes translate to approximately 20 to 30 more days above 90°F and 20 to 30 fewer days below freezing in the northeastern parts of the United States by mid-century (RCP 8.5) (Jay et al. 2023). In 2025, it is expected that there will be seven hot days. In 30 years, it is expected that there will be 15 hot days a year due to climate change (First Street, 2025).

The CRMA Tool provides a county-level assessment report for extreme heat, shown in Figure 4.3.3-4 below. The future climate indicators that may contribute to extreme heat are temperature thresholds and annual temperature. According to CRMA, the number of days per year above both 90- and 95-degrees Fahrenheit are expected to increase in the future under all emission scenarios. The annual single highest maximum temperature is projected to be nearly 100 degrees Fahrenheit by late century. These changes may intensify the impacts from extreme heat.

Figure 4.3.3-5 Lycoming County Extreme Heat Hazard Assessment Report (CRMA, 2025)



Future Climate Indicators

Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Temperature thresholds:							
Annual days with maximum temperature > 90°F	**3 days** 3 - 7	**14 days** 6 - 27	**15 days** 7 - 25	**20 days** 8 - 40	**26 days** 11 - 45	**27 days** 10 - 55	**56 days** 18 - 91
Annual days with maximum temperature > 95°F	**1 days** 0 - 1	**3 days** 1 - 12	**4 days** 1 - 9	**6 days** 1 - 21	**9 days** 2 - 22	**9 days** 1 - 30	**27 days** 4 - 63
Annual days with maximum temperature > 100°F	**0 days** 0 - 0	**0 days** 0 - 2	**1 days** 0 - 4	**1 days** 0 - 8	**2 days** 0 - 11	**3 days** 0 - 8	**11 days** 0 - 42
Annual days with maximum temperature > 105°F	**0 days** 0 - 0	**0 days** 0 - 0	**0 days** 0 - 1	**0 days** 0 - 1	**0 days** 0 - 5	**0 days** 0 - 4	**4 days** 0 - 26
Annual temperature:							
Annual single highest maximum temperature °F	**93 °F** 91 - 94	**96 °F** 94 - 100	**97 °F** 94 - 101	**98 °F** 94 - 104	**99 °F** 95 - 107	**100 °F** 95 - 106	**105 °F** 96 - 115
Annual highest maximum temperature averaged over a 5-day period °F	**88 °F** 87 - 88	**91 °F** 88 - 95	**92 °F** 89 - 95	**93 °F** 89 - 98	**94 °F** 90 - 101	**94 °F** 90 - 101	**99 °F** 92 - 110
Cooling degree days (CDD)	**435 degree-days** 385 - 471	**689 degree-days** 538 - 925	**726 degree-days** 554 - 951	**836 degree-days** 594 - 1,164	**972 degree-days** 706 - 1,313	**993 degree-days** 631 - 1,478	**1,574 degree-days** 956 - 2,330

N/A = Data Not Available for the selected area

4.3.3.5. Vulnerability Assessment

The potential for extreme heat and cold always exists in and around the summer and winter months. Meteorologists and weather forecasters can normally predict the temperature with excellent accuracy. Adhering to extreme temperature warnings can significantly reduce the risk of temperature related illness or death. Those hardest hit by both heat and cold waves include the elderly, disabled, and those who are socio-economically disadvantaged. Excessive heat exposure also affects people with certain pre-existing medical conditions, including cardiovascular disease, respiratory illnesses, and obesity. All 52 jurisdictions are considered vulnerable to the effects of extreme temperatures, but these vulnerabilities can vary across the general population. Tables 4.3.3-3 and 4.3.3-4 below show the elderly and disabled populations in each municipality. Efforts to mitigate the impacts of extreme temperatures should focus on those most vulnerable groups.

Table 4.3.3-3 Population Aged 65 or Older by Municipality (U.S. Census, ACS, 2023)

MUNICIPALITY	NUMBER OF INDIVIDUALS
Anthony Township	136
Armstrong Township	103
Bastress Township	116
Brady Township	77
Brown Township	59
Cascade Township	115
Clinton Township	479
Cogan House Township	220
Cummings Township	92
Duboistown Borough	210
Eldred Township	447
Fairfield Township	690
Franklin Township	177
Gamble Township	213
Hepburn Township	740
Hughesville Borough	401
Jackson Township	81
Jersey Shore Borough	685
Jordan Township	151
Lewis Township	208
Limestone Township	364
Loyalsock Township	3,697
Lycoming Township	233
McHenry Township	34
McIntyre Township	89

Table 4.3.3-3 Population Aged 65 or Older by Municipality (U.S. Census, ACS, 2023)	
MUNICIPALITY	NUMBER OF INDIVIDUALS
McNett Township	22
Mifflin Township	271
Mill Creek Township	113
Montgomery Borough	207
Montoursville Borough	1,011
Moreland Township	220
Muncy Borough	562
Muncy Creek Township	636
Muncy Township	232
Nippenose Township	153
Old Lycoming Township	1,167
Penn Township	176
Piatt Township	226
Picture Rocks Borough	157
Pine Township	58
Plunketts Creek Township	122
Porter Township	345
Salladasburg Borough	24
Shrewsbury Township	79
South Williamsport Borough	1,207
Susquehanna Township	282
Upper Fairfield Township	378
Washington Township	299
Watson Township	132
Williamsport, City of	3,767
Wolf Township	761
Woodward Township	530
TOTAL	22,954

Table 4.3.3-4 Disabled Population by Municipality (U.S. Census, ACS, 2023)	
MUNICIPALITY	NUMBER OF INDIVIDUALS
Anthony Township	160
Armstrong Township	126
Bastress Township	63
Brady Township	48
Brown Township	8

Table 4.3.3-4 Disabled Population by Municipality (U.S. Census, ACS, 2023)	
MUNICIPALITY	NUMBER OF INDIVIDUALS
Cascade Township	74
Clinton Township	457
Cogan House Township	155
Cummings Township	43
Duboistown Borough	179
Eldred Township	238
Fairfield Township	396
Franklin Township	155
Gamble Township	107
Hepburn Township	397
Hughesville Borough	393
Jackson Township	43
Jersey Shore Borough	610
Jordan Township	167
Lewis Township	138
Limestone Township	255
Loyalsock Township	1,813
Lycoming Township	269
McHenry Township	8
McIntyre Township	105
McNett Township	26
Mifflin Township	172
Mill Creek Township	66
Montgomery Borough	231
Montoursville Borough	674
Moreland Township	141
Muncy Borough	473
Muncy Creek Township	488
Muncy Township	156
Nippenose Township	126
Old Lycoming Township	638
Penn Township	91
Piatt Township	201
Picture Rocks Borough	110
Pine Township	42
Plunketts Creek Township	80
Porter Township	208

Table 4.3.3-4 Disabled Population by Municipality (U.S. Census, ACS, 2023)	
MUNICIPALITY	NUMBER OF INDIVIDUALS
Salladasburg Borough	39
Shrewsbury Township	70
South Williamsport Borough	1,153
Susquehanna Township	284
Upper Fairfield Township	295
Washington Township	159
Watson Township	65
Williamsport, City of	5,480
Wolf Township	520
Woodward Township	483
TOTAL	18,878

Table 4.3.3-5 below shows the Expected Annual Losses to Heat Wave for each census tract in the county according to FEMA's National Risk Index.

Table 4.3.3-5 Expected Annual Losses to Heat Wave by Census Tract (FEMA NRI, 2023)			
CENSUS TRACT	**MUNICIPALITIES**	**ESTIMATED ANNUAL LOSSES**	**ESTIMATED ANNUAL LOSS RATING**
1.00	Williamsport City	$6,215.74	Relatively Low
2.00	Williamsport City	$4,068.69	Relatively Low
3.00	Williamsport City	$11,014.11	Relatively Moderate
4.00	Williamsport City	$7,453.53	Relatively Moderate
5.00	Williamsport City	$4,880.51	Relatively Low
6.00	Williamsport City	$4,727.87	Relatively Low
8.00	Williamsport City	$4,347.85	Relatively Low
9.00	Williamsport City	$4,360.26	Relatively Low
10.00	Williamsport City	$5,902.82	Relatively Low
101.00	Cogan House Township, Pine Township, Jackson Township, McIntyre Township, McNett Township	$0.00	No Expected Annual Losses
102.00	Brown Township, McHenry Township, Cummings Township, Watson Township	$152.42	Very Low
103.00	Anthony Township, Mifflin Township, Piatt Township, Salladasburg Borough	$3,695.81	Relatively Low

Table 4.3.3-5 Expected Annual Losses to Heat Wave by Census Tract (FEMA NRI, 2023)			
CENSUS TRACT	**MUNICIPALITIES**	**ESTIMATED ANNUAL LOSSES**	**ESTIMATED ANNUAL LOSS RATING**
104.00	Hepburn Township, Lycoming Township, Lewis Township	$6,482.43	Relatively Low
105.01	Cascade Township, Gamble Township, Plunketts Creek Township	$282.84	Very Low
105.02	Eldred Township, Upper Fairfield Township	$7,359.65	Relatively Moderate
106.00	Shrewsbury Township, Penn Township, Moreland Township, Franklin Township, Jordan Township	$8,290.66	Relatively Moderate
107.00	Mill Creek Township, Wolf Township, Picture Rocks Borough, Hughesville Borough	$12,040.35	Relatively Moderate
108.00	Muncy Creek Township, Muncy Borough, Muncy Township	$13,909.32	Relatively Moderate
109.00	Fairfield Township	$5,440.98	Relatively Low
110.00	Montoursville Borough	$9,077.65	Relatively Moderate
111.00	Loyalsock Township	$10,886.12	Relatively Moderate
112.00	Loyalsock Township	$11,237.13	Relatively Moderate
113.01	Woodward Township	$3,940.78	Relatively Low
113.02	Old Lycoming Township	$9,523.10	Relatively Moderate
114.00	Armstrong Township, Susquehanna Township	$3,198.58	Relatively Low
116.01	Duboistown Borough	$2,292.39	Relatively Low
116.03	South Williamsport Borough	$4,250.25	Relatively Low
116.04	South Williamsport Borough	$7,709.81	Relatively Moderate
117.01	Clinton Township, Montgomery Borough	$8,193.75	Relatively Moderate
117.02	Brady Township, Washington Township, Clinton Township	$6,460.96	Relatively Low
118.00	Bastress Township, Nippenose Township, Limestone Township	$6,179.52	Relatively Low
119.00	Jersey Shore Borough, Porter Township	$10,909.09	Relatively Moderate
TOTAL		$204,484.94	

Table 4.3.3-6 below shows the Expected Annual Losses to Cold Wave for each census tract in the county according to FEMA's National Risk Index.

Table 4.3.3-6 Expected Annual Losses to Cold Wave by Census Tract (FEMA NRI, 2023)			
CENSUS TRACT	MUNICIPALITIES	ESTIMATED ANNUAL LOSSES	ESTIMATED ANNUAL LOSS RATING
1.00	Williamsport City	$2,198.20	Relatively Low
2.00	Williamsport City	$1,440.00	Relatively Low
3.00	Williamsport City	$3,893.23	Relatively Low
4.00	Williamsport City	$2,636.44	Relatively Low
5.00	Williamsport City	$1,727.37	Relatively Low
6.00	Williamsport City	$1,680.36	Relatively Low
8.00	Williamsport City	$1,544.07	Relatively Low
9.00	Williamsport City	$1,554.60	Relatively Low
10.00	Williamsport City	$2,091.02	Relatively Low
101.00	Cogan House Township, Pine Township, Jackson Township, McIntyre Township, McNett Township	$15,818.94	Relatively Moderate
102.00	Brown Township, McHenry Township, Cummings Township, Watson Township	$4,935.04	Relatively Low
103.00	Anthony Township, Mifflin Township, Piatt Township, Salladasburg Borough	$9,061.06	Relatively Moderate
104.00	Hepburn Township, Lycoming Township, Lewis Township	$10,722.85	Relatively Moderate
105.01	Cascade Township, Gamble Township, Plunketts Creek Township	$9,154.74	Relatively Moderate
105.02	Eldred Township, Upper Fairfield Township	$3,287.03	Relatively Low
106.00	Shrewsbury Township, Penn Township, Moreland Township, Franklin Township, Jordan Township	$5,692.33	Relatively Low
107.00	Mill Creek Township, Wolf Township, Picture Rocks Borough, Hughesville Borough	$4,974.91	Relatively Low
108.00	Muncy Creek Township, Muncy Borough, Muncy Township	$6,253.23	Relatively Moderate
109.00	Fairfield Township	$2,212.39	Relatively Low
110.00	Montoursville Borough	$3,242.42	Relatively Low
111.00	Loyalsock Township	$3,880.43	Relatively Low
112.00	Loyalsock Township	$4,267.02	Relatively Low
113.01	Woodward Township	$1,663.19	Relatively Low

Table 4.3.3-6 Expected Annual Losses to Cold Wave by Census Tract (FEMA NRI, 2023)			
CENSUS TRACT	**MUNICIPALITIES**	**ESTIMATED ANNUAL LOSSES**	**ESTIMATED ANNUAL LOSS RATING**
113.02	Old Lycoming Township	$3,501.50	Relatively Low
114.00	Armstrong Township, Susquehanna Township	$1,392.11	Relatively Low
116.01	Duboistown Borough	$811.80	Relatively Low
116.03	South Williamsport Borough	$1,503.96	Relatively Low
116.04	South Williamsport Borough	$2,728.55	Relatively Low
117.01	Clinton Township, Montgomery Borough	$3,321.55	Relatively Low
117.02	Brady Township, Washington Township, Clinton Township	$3,383.59	Relatively Low
118.00	Bastress Township, Nippenose Township, Limestone Township	$3,238.03	Relatively Low
119.00	Jersey Shore Borough, Porter Township	$4,138.27	Relatively Low
TOTAL		$127,950.23	

4.3.3.6. Equity in Vulnerable Communities

Low-income households may be at greater risk during extreme weather risks, especially when energy bills are disproportionately expensive in proportion to the income in these households. Renters can be more vulnerable because they do not have control over heating and cooling systems. This can be more serious in terms of extreme heat since air condition is not usually a legal requirement in structures, but heat usually is. In the event of heating and cooling system malfunctions, renters may be unable to make key decisions. Elderly populations (those 65+ and older) will need extra consideration as they are more susceptible to negative health effects related to extreme temperatures. This means areas of the City of Williamsport and Loyalsock Township may be particularly vulnerable. Unhoused populations and those without steady access to shelter are perhaps the most vulnerable population because they are exposed to the elements for extended periods of time.

4.3.4. Flood, Flash Flood, Ice Jam



4.3.4.1. 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 the natural hazards in Pennsylvania. Flooding occurs when excess water from snowmelt or rainfall fills a stream, causing it to overflow onto the stream banks and adjacent floodplains. Floodplains are lowlands adjacent to rivers, streams, and creeks that are subject to recurring floods.

Flash flood conditions can result from a large amount of rainfall over a short time span. Though, a small amount of rain can also 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 impervious surfaces such as large parking lots, paved roadways, or other densely developed areas.

Snow melt combined with heavy rains can cause frozen rivers to swell, which can break the ice layer on top of a river. If this occurs, large chunks can float downstream, piling up in narrow passages and near other obstructions such as bridges and dams causing an ice jam.

Furthermore, another flooding issue is stormwater and shallow Flooding. Stormwater flooding is caused by local drainage issues and high groundwater levels. Heavy precipitation may produce flooding in areas other than delineated floodplains or along recognizable channels. If local conditions cannot accommodate intense precipitation through a combination of infiltration and surface runoff, water may accumulate and cause flooding problems. During winter and spring, frozen ground and snow accumulations may contribute to inadequate drainage and localized ponding. Flooding issues of this nature generally occur in areas with flat gradients and generally increase with urbanization, which speeds the accumulation of floodwaters because of impervious areas. Shallow street flooding can occur unless channels have been improved to account for increased flows (FEMA 1997). High groundwater levels can be a concern and cause problems even without surface flooding. Basements are susceptible to high groundwater levels. Seasonally high groundwater is common in many areas, while elsewhere high groundwater occurs only after long periods of above-average precipitation (FEMA 1997). Urban drainage flooding is caused by increased water runoff due to urban development and drainage systems. Drainage systems are designed to remove surface water from developed areas as quickly as possible to prevent localized flooding on streets and other urban areas. They make use of a closed conveyance system that channels water away from an urban area to surrounding streams. This bypasses the natural processes of water filtration through the ground, containment, and evaporation of excess water. Since drainage systems reduce the amount of time the surface water takes to reach surrounding streams, flooding in those streams can occur more quickly and reach greater depths than those prior to development in that area (FEMA 2007).

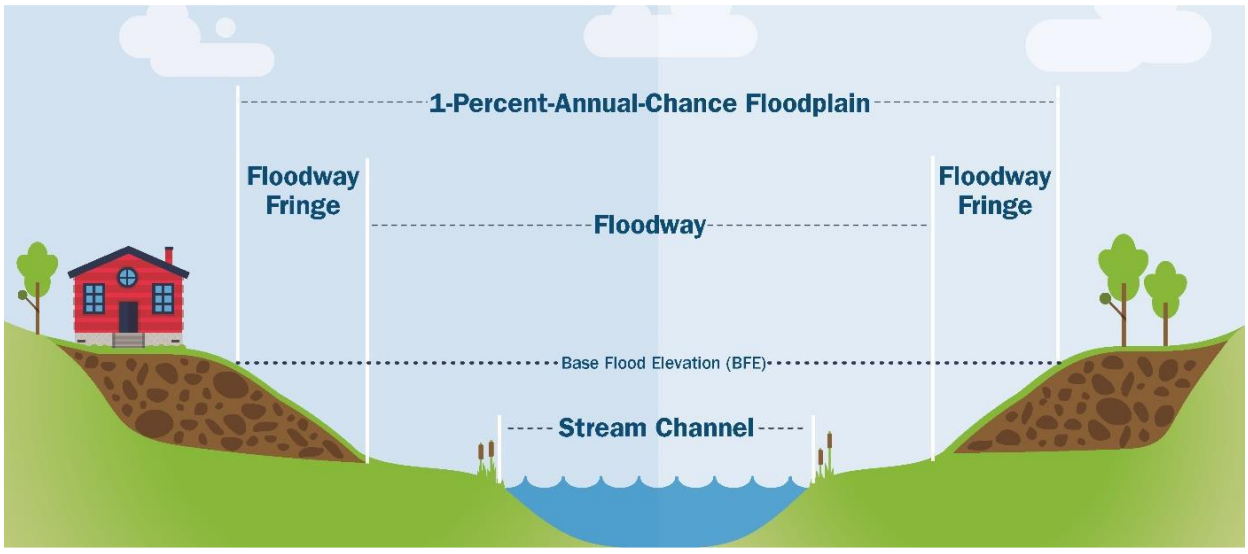
Lycoming County lies within the drainage basin of the Susquehanna River, which is the largest basin on the Atlantic Seaboard of the United States (PACD, 2020). The Susquehanna River

drains directly into the Chesapeake Bay. Most of the county's population is in West Branch Susquehanna River Watershed, but the county is comprised of numerous other watersheds with dedicated outreach groups as illustrated in the Watersheds Map in Section 2, Figure 2.1-2. The county seat, the City of Williamsport, is located along the West Branch of the Susquehanna River in the south-central part of Lycoming County. According to the Pennsylvania Association of Conservation Districts (PACD), the Susquehanna River Watershed is one of the most flood prone areas in the United States, covering over half of Pennsylvania, and regions in New York and Maryland (PACD, 2020).

The various tributary streams and creeks generally flow towards the central valley in Lycoming County, towards the Susquehanna River. Large tributaries in the county include Loyalsock Creek, Lycoming Creek, Muncy Creek, and Pine Creek.

The size of the floodplain is described by the recurrence interval of a given flood. Flood recurrence intervals are explained in more detail in Section 4.3.4.4. However, in assessing the potential spatial extent of flooding it is important to know that a floodplain associated with a 1-percent-annual chance of occurring in a given year is smaller than the floodplain associated with a flood that has a 0.2-percent-annual chance of occurring. The National Flood Insurance Program (NFIP), for which Flood Insurance Rate Maps (FIRM) are published, identifies the risk associated with the 1-percent annual chance flood. This 1-percent-annual chance flood event is used to delineate the *Special Flood Hazard Area* (SFHA) and to identify *Base Flood Elevations* (BFE). Figure 4.3.4-1 illustrates these terms. The SFHA serves as the primary regulatory boundary used by FEMA, the Commonwealth of Pennsylvania, and Lycoming County when determining risk associated with flooding.

Figure 4.3.4-1 Diagram identifying Special Flood Hazard Area, 1% annual chance (100-Year) floodplain, floodway, and flood fringe.

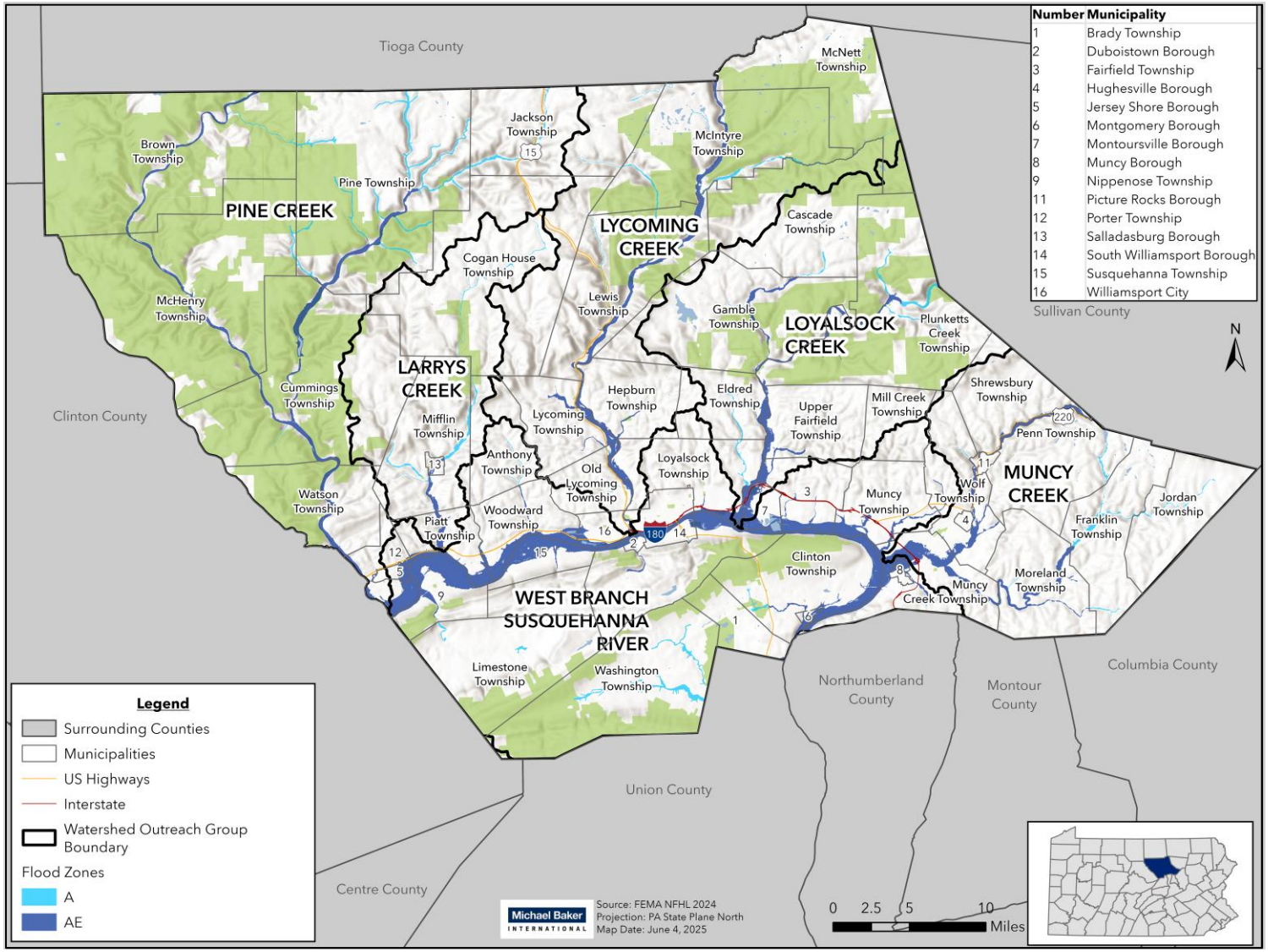


FEMA published the current countywide FIRM and Flood Insurance Study (FIS) report on June 2, 2016 (FEMA, 2016). This best available flood hazard data, which was used to update this flood hazard profile, included current effective FIRM data and incorporated Letters of Map Revision (LOMRs). The FIRM and FIS for the entire county can be obtained from the FEMA Map Service Center (https://msc.fema.gov/portal/home) and can be used to identify the expected spatial extent and elevation of flooding from a 1-percent and 0.2-percent-annual chance event.

Pennsylvania has more stream miles than any other state, and many of its communities are located in floodplains. For waterfront communities, the level of risk constantly changes in response to unpredictable weather patterns and seasonal influences. Over 2,200 miles of stream traverse Lycoming County, more than any other county in Pennsylvania. Major flood-prone areas are communities located in low-lying valleys of major streams and tributaries. Unless protected by a dike or levee, most population concentrations along the Susquehanna River have a high possibility of flooding.

Figure 4.3.4-2 shows the location of watercourses and flood zones in Lycoming County. The location of approximate and detailed SFHAs are shown. Detailed SFHAs are those for which BFEs are delineated.

Figure 4.3.4-2 Map showing the location of watercourses and flood zones throughout Lycoming County



4.3.4.2. Range of Magnitude

Floods are considered hazards when people and property are affected. Nationwide, hundreds of floods occur each year, making them one of the most common hazards in all 50 states and U.S. territories. In Pennsylvania, flooding occurs commonly and can happen during any season of the year from a variety of sources. Every two to three years, serious flooding occurs along one or more of Pennsylvania's major rivers or streams, and it is not unusual for this to occur several years in succession. Injuries and deaths can occur when people are swept away by flood currents or bacteria and disease are spread by moving or stagnant floodwaters (Doocy et al., 2013). 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.

Several factors determine the severity of floods, including rainfall intensity and duration, topography, ground cover and rate of snowmelt (Doocy et al., 2013). Additionally, climate change is expected to intensify the severity of flooding (National Aeronautics and Space Administration (NASA), 2024). Water runoff is greater in areas with steep slopes and little or 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 central Pennsylvania, including Lycoming County, there are seasonal differences in the causes for floods. In the winter and early spring (February to April), major flooding has occurred because of heavy rainfall on dense snowpack throughout contributing watersheds, although the snowpack is generally moderate during most winters. Most storms track from west to east, but some originate in the Great Lakes or Atlantic Ocean. Ice jams and snowmelt can fuel flash floods. A deep snowpack increases runoff produced by melting snow. Heavy spring rains falling on melting snowpack can produce flash flooding. Melting snowpack may also contribute to floods produced by ice jams (NOAA NSSL, 2025a). As ice or debris moves downstream, it may get caught on any sort of obstruction to the water flow. When this occurs, water can be held back, causing upstream flooding. When the jam finally breaks, flash flooding can occur downstream. Ice jams are common during the winter and spring along rivers, streams, and creeks (NOAA NWS, 2025b). Summer floods have occurred from 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.

Rainfall in Pennsylvania is about average for the eastern United States. The American Meteorological Society classifies rainfall intensity into three categories (2012):

- Light rain – when precipitation rate is .01 to .10 inches/hour.
- Moderate rain – when precipitation rate is .11 to .30 inches/hour.
- Heavy rain – when precipitation rate is > .30 inches/hour.

While significant flood events are typically associated with heavy rain, rainfall events of lesser intensity may also cause flooding given sufficient duration. Flood effects can be volume- or force-related, although both play a factor in all flooding events. Flood events that occur along larger streams with wide floodplains tend to result in large-scale inundations, causing widespread damage through soaking and silt deposits in homes, businesses, and industrial plants. The impacts of these events are typically a function of how much water was involved instead of the force of that moving water. On the other hand, flash floods resulting from bursts of heavy rainfall happen suddenly and powerfully as they sweep vehicles away, uproot trees, damage buildings and structures, and more (The Weather Channel, 2015). Flash floods are often unpredictable and, particularly if they occur at night, can cause major panic and loss of life due to low visibility (Špitalar et al., 2014). These events are common in hilly regions where runoff paths are steep, allowing water to reach higher velocity as it flows over the ground. Frozen or very dry surfaces can increase normal runoff velocities as well, particularly in small drainage areas, as water is not able to infiltrate the soil easily (Chen et al., 2017). In addition to slopes and frozen ground, ice and debris jams in channels and culverts can lead to quick-rising floods if they significantly obstruct the flow of water (NOAA NWS, 2025c).

Floods are naturally occurring events that benefit riparian systems that have not been disrupted by human actions; benefits include groundwater recharge and the introduction of nutrient rich sediment improving soil fertility (World Meteorological Organization (WMO), 2006). However, the destruction of riparian buffers, changes to land use and landcover throughout a watershed, and introduction of chemical or biological contaminants that often accompany human presence cause environmental harm when floods occur. Hazardous material facilities are potential sources of contamination during flood events (see Section 4.3.19). Other environmental impacts of flooding include water-borne diseases, heavy siltation, erosion of streambanks and riverbeds, destruction of aquatic habitat, damage to water and sewer infrastructure located in floodplains, damage or loss of crops and vegetation, and drowning of both humans and animals (Washington State Department of Ecology, 2022). Extreme rain events can also lead to the failure of manure lagoons, which are typically built for 25-year storms. These failures can lead to significant runoff that may lead to harmful algae blooms in local waterways. The following community lifelines are affected by floods, flash floods, and ice jams:

Table 4.3.4-1 Most Likely Lifelines Impacted by Floods, Flash Foods, and Ice Jams	
LIFELINES	**NOTES**
	Government operations and facilities, including police, fire, and search and rescue are needed for response and recovery.
	Significant risk to buildings is posed and can create issues for food and water access.
	Transportation routes will be affected due to direct damage from flooding and potential compounding hazards like landslides.
	Floods may affect hazardous materials storage due to damage to facilities.

4.3.4.3. Past Occurrence

During the winter of 1996, unseasonably high temperatures began to melt an immense snowpack that had accumulated during the blizzard of 1996. Accompanying heavy rainfall and high winds carried large volumes of runoff, overwhelming small and large watersheds. Before the week was over, all 67 of Pennsylvania's counties had been declared federal disaster areas. The Susquehanna River Basin was hit particularly hard. Ice jams on the Susquehanna River contributed to rapid water rises, the highest recorded in Harrisburg since 1890. Flood levels in the Lycoming Creek Basin reached 22.6 feet, two feet higher than flood stages recorded during tropical storm Agnes in 1972. Throughout Lycoming County, damage sustained from storms and floods exceeded $100 million. Six lives were lost in the Lycoming Creek Valley.

Table 4.3.4-2 contains information on flooding-related events since 1996 that impacted Lycoming County. These are the oldest floods for which data is available from the NCEI. Reported property damages are estimates reported to the NCEI and housed in the Storm Events database today. A zero-dollar entry may indicate minimal property damage, or that damage costs were not reported. Event details are captured by location, so there may be multiple lines in the table for the same flood event.

Table 4.3.4-2 Flood and flash flood events impacting Lycoming County from 1966-2025 (NOAA NCEI, 2025b). Note that property damage values are estimates based on best available information. "Countywide" indicates several locations in the county were affected.

DATE	LOCATION & DESCRIPTION	ESTIMATED TOTAL DAMAGE ($)
1/19/1996	Northern Lycoming County	0
1/19/1996	Countywide: six fatalities along Lycoming Creek due to flooding.	0
1/19/1996	Southern Lycoming County	0
11/8/1996	Western Lycoming County: minor road flooding occurred due to heavy rainfall over western Lycoming County.	0
12/1/1996	Southeast Lycoming County	0
12/13/1996	Countywide	0
1/8/1998	Countywide	0
2/18/1998	Southern Lycoming County	0
6/16/1998	Muncy; streets and small streams flooded.	0
9/7/1999	Southeast Lycoming County: the remnants of Hurricane Dennis produced 4 to 8 inches of rain across the southeast parts of Lycoming County. Thirty homes were damaged, and one bridge was out of service. Around 80 people were evacuated.	1,000,000
9/16/1999	Countywide	20,000
12/17/2000	Countywide	0
3/26/2002	Northern Lycoming County: total rainfall amounts averaged slightly in excess of 2 inches from this system. Many roads were flooded as several small creeks exceeded their banks.	0
3/26/2002	Southern Lycoming County: total rainfall amounts averaged slightly in excess of 2 inches from this system. Many roads were flooded as several small creeks exceeded their banks.	0
5/13/2002	Montgomery: flash flooding along Black Hole Creek caused the closure of several roads in and around the Montgomery area. Flooded roadways were also reported in the Muncy area.	0
5/30/2002	Elimsport: heavy rain caused extensive flooding along route 44, which eventually caused the closing of the	0

Table 4.3.4-2 Flood and flash flood events impacting Lycoming County from 1966-2025 (NOAA NCEI, 2025b). Note that property damage values are estimates based on best available information. "Countywide" indicates several locations in the county were affected.

DATE	LOCATION & DESCRIPTION	ESTIMATED TOTAL DAMAGE ($)
	roadway. There were also reports of trees down, resulting from saturated ground conditions.	
3/20/2003	Southern Lycoming County: rainfall of three quarters to one inch caused the West Branch Susquehanna River at Montgomery to exceed its flood stage of 17 feet.	0
11/20/2003	Southern Lycoming County: heavy rain caused the West Branch Susquehanna River at Montgomery to exceed its flood stage of 17 feet.	0
3/7/2004	Southern Lycoming County: rain and snow melt caused the West Branch Susquehanna River at Montgomery to exceed flood stage.	0
5/26/2004	Muncy: heavy rain caused flash flooding in Lycoming County. Three mudslides were reported along Route 442 East of Clarkstown. In addition, Fegelman Road between Muncy and Clarkstown was under 3 feet of water and closed by the county.	0
7/31/2004	Hughesville: heavy rain caused flash flooding in eastern Lycoming County from Hughesville to the Sullivan County line. Route 220 was closed due to flood waters, and several secondary roads were washed out.	0
9/8/2004	Northern Lycoming County	0
9/8/2004	Southern Lycoming County	0
9/10/2004	Southern Lycoming County: heavy rain caused the West Branch of the Susquehanna River at Montgomery to exceed its flood stage of 17 feet.	0
9/17/2004	Southern Lycoming County	0
9/17/2004	Northern Lycoming County	0
9/18/2004	Southern Lycoming County: heavy rain caused the Loyalsock Creek at Loyalsockville to exceed its flood stage of 12 feet.	0

Table 4.3.4-2 Flood and flash flood events impacting Lycoming County from 1966-2025 (NOAA NCEI, 2025b). Note that property damage values are estimates based on best available information. "Countywide" indicates several locations in the county were affected.

DATE	LOCATION & DESCRIPTION	ESTIMATED TOTAL DAMAGE ($)
9/18/2004	Southern Lycoming County: heavy rain caused the West Branch of the Susquehanna River at Montgomery to exceed its flood stage of 17 feet.	0
9/18/2004	Southern Lycoming County: heavy rain caused the West Branch of the Susquehanna River at Williamsport to exceed its flood stage of 20 feet.	0
9/18/2004	Southern Lycoming County: heavy rain caused the West Branch of the Susquehanna River at Jersey Shore to exceed its flood stage of 26 feet.	0
9/18/2004	Southern Lycoming County: heavy rain caused the West Branch of the Susquehanna River at Muncy to exceed its flood stage of 20 feet.	0
1/15/2005	Southern Lycoming County: heavy rain caused the West Branch of the Susquehanna River at Montgomery to exceed its flood stage of 17 feet.	0
3/29/2005	Southern Lycoming County	0
3/29/2005	Northern Lycoming County: rainfall amounts from 1 to 3 inches, combined with rapid snowmelt to produce widespread flooding across the region. Numerous roadways were reported closed due to flooding, mainly from late Monday night into Tuesday morning. In addition, several streams overflowed their banks as a result of excessive runoff from the rain and melting snow. In Lycoming County, water covered routes 405 and 442 near Muncy.	0
3/29/2005	Southern Lycoming County: heavy rain caused the West Branch of the Susquehanna River at Montgomery to exceed its flood stage of 17 feet.	0
4/2/2005	Southern Lycoming County	0
4/2/2005	Northern Lycoming County: average rainfall amounts of 2 to 4 inches occurred during this time. This heavy rainfall led to numerous road closures as smaller streams and creeks overflowed their banks.	0

Table 4.3.4-2 Flood and flash flood events impacting Lycoming County from 1966-2025 (NOAA NCEI, 2025b). Note that property damage values are estimates based on best available information. "Countywide" indicates several locations in the county were affected.

DATE	LOCATION & DESCRIPTION	ESTIMATED TOTAL DAMAGE ($)
4/3/2005	Southern Lycoming County: heavy rain caused the West Branch of the Susquehanna River at Montgomery to exceed its flood stage of 17 feet.	0
4/3/2005	Southern Lycoming County: heavy rain caused the West Branch of the Susquehanna River at Muncy to exceed its flood stage of 20 feet.	0
11/30/2005	Southern Lycoming County: heavy rain caused the West Branch of the Susquehanna River at Montgomery to exceed its flood stage of 17 feet.	0
12/1/2005	Southern Lycoming County: heavy rain caused the West Branch of the Susquehanna River at Montgomery to exceed its flood stage of 17 feet.	0
11/16/2006	Muncy: heavy rain caused flash flooding in Lycoming County. Small streams were out of their banks and flooding roads in Muncy. Route 220 was also closed due to flooding.	0
3/5/2008	Cedar Run: heavy rain produced widespread urban, small stream and river flooding closing several roads including Route 220 north of Hughesville, John Brady Drive in Muncy, Chippewa Road in Muncy Creek Township, and Little Pine Creek Road in Pine Township.	0
7/23/2009	Jersey Shore: heavy rain produced flash flooding across southwest Lycoming County. The flooding washed out a portion of Route 44 in Watson Township. A rock slide occurred on Route 973 in Watson and Mifflin Townships. Salladasburg Borough also reported flooding.	25,000
7/23/2009	Jersey Shore: heavy rain produced flash flooding across southwest Lycoming County. The flooding washed out a portion of Route 44 in Watson Township. A rockslide occurred on Route 973 in Watson and Mifflin Townships. Salladasburg Borough also reported flooding.	0

Table 4.3.4-2 Flood and flash flood events impacting Lycoming County from 1966-2025 (NOAA NCEI, 2025b). Note that property damage values are estimates based on best available information. "Countywide" indicates several locations in the county were affected.

DATE	LOCATION & DESCRIPTION	ESTIMATED TOTAL DAMAGE ($)
7/31/2009	Clarkstown: heavy rainfall of 2-3 inches in a short duration produced flash flooding in the Muncy, Hughesville and Clarkstown areas. Several small streams and creeks exceeded bank edges including Muncy Creek along Routes 405 and 422 between Muncy and Hughesville. Nearly three feet of water closed roads in Muncy Creek Township near Clarkstown. Numerous low-lying and poor drainage flooding was also reported.	5,000
1/25/2010	Ellenton: heavy rain along with snow melt caused flooding and closed a number of roads throughout the county. Route 220 near the Sullivan County line was closed, along with Route 14 near the Bradford County line. Several low-lying roads in the vicinity of Williamsport were washed out.	0
12/1/2010	Jersey Shore: rainfall amounts between 2 and 4 inches produced significant flooding. The West Branch Susquehanna at Montgomery, Muncy and Williamsport crested over moderate flood stage. Little Pine Creek at Waterville came out of its banks and flooded nearby areas. Many roads were impassable in Muncy with water surrounding several homes. Other road closures included SR 2012 (Sylvan Dell Road) along the West Branch Susquehanna from Charles Street in South Williamsport to Sylvan Park Road in Armstrong Township, SR 4001 (Little Pine Creek Road) in Pine and Cummings Townships, and SR 44, 287 and 87 along Little Pine Creek and Mill Creek near Montoursville.	10,000
3/6/2011	Garden View: several roads were closed due to high water, including SR4001 in Cummings and Pine Townships, Little Pine Creek Road near Williamsport and SR 4006 (Lick Run Road) in Pine Township between the intersections of Route 287 and Route 184 from a drainage pipe washout.	0

Table 4.3.4-2 Flood and flash flood events impacting Lycoming County from 1966-2025 (NOAA NCEI, 2025b). Note that property damage values are estimates based on best available information. "Countywide" indicates several locations in the county were affected.		
DATE	**LOCATION & DESCRIPTION**	**ESTIMATED TOTAL DAMAGE ($)**
3/10/2011	Quiggleville: many roads were closed around the region due to flooding. Included were SR 2012 (Sylvan Dell Road), Old Montgomery Pike Road in Armstrong Township, SR 3002 (Middle Road) in Limestone Township from Route 880 to Route 44, and SR 4001 (Little Pine Creek Road) from Route 287 at English Center in Pine Township to Little Pine Camp Area Road in Cummings Township.	0
3/11/2011	Muncy: on the West Branch of the Susquehanna River near Muncy the crest was estimated at 22.60 feet. This is categorized as a moderate flood. At 22.0 feet, a number of homes are flooded. Route 405 is affected between Muncy and Montgomery.	0
4/28/2011	Muncy: the West Branch of the Susquehanna River near Muncy crested above moderate flood stage. A number of homes are flooded. Route 405 is affected between Muncy and Montgomery.	0
9/7/2011	Picture Rocks: Loyalsock Creek at Loyalsockville crested at record/major flood level of 19.78 feet. The West Branch of the Susquehanna River at Muncy crested in moderate flood stage of 26.7 feet. This is the 9th highest crest of all time. The West Branch of the Susquehanna River at Montgomery crested in moderate flood stage of 26.7 feet. Muncy Creek flooded extensive areas near Hughesville and Muncy. Residents reported the creek overflowing its banks and rushing down 5th Street flooding homes and yards. One home had its chimney and foundation washed away. Others reported extensive basement flooding. An off-ramp off the Route 405 Bridge was washed away. Glen Mar just north of Muncy was evacuated. The bridge on Route 220 near Hughesville was closed, though it did survive the floods. Picture Rocks suffered extensive damage. Route 87 on the Loyalsock Creek north of Montoursville was hard hit.	11,000,000

Table 4.3.4-2 Flood and flash flood events impacting Lycoming County from 1966-2025 (NOAA NCEI, 2025b). Note that property damage values are estimates based on best available information. "Countywide" indicates several locations in the county were affected.

DATE	LOCATION & DESCRIPTION	ESTIMATED TOTAL DAMAGE ($)
	Many homes outside of the 100-year flood plain reported significant flooding (and did not have flood insurance). Evacuations along the Loyalsock and Muncy Creeks.	
9/28/2011	Montgomery: slow moving heavy rain showers and thunderstorms produced flash flooding and flooding, closing several roadways.	0
7/28/2012	Garden View: heavy thunderstorm rains (1-2 inches in less than one hour) caused urbanized flash flooding in downtown Williamsport. Numerous roads were flooded with approximately 15-20 occupied vehicles stranded in standing water. Local emergency officials and fire departments took part in several water rescues. Some roads were damaged due to washouts from the flash flooding. The Lycoming County Emergency Operations Center was activated for about two hours due to the flooding.	100,000
6/30/2015	Lairdsville: heavy rainfall resulting in flooding in the Lairdsville area. Mill Lane was reported to be flooded.	0
10/21/2016	Bodines: heavy rainfall brought flash flooding to parts of Lycoming County. The Loyalsock and Lycoming Creek watersheds were most heavily impacted. The flooding destroyed or seriously damaged multiple State and local roads and bridges. Over twenty primary residence homes were either destroyed or sustained major damage. Many camps and seasonal homes were also damaged or destroyed along Pleasant Stream, Wallis Run and Slacks Run. A liquid petroleum line was also damaged along the Loyalsock Creek and posed a significant environmental impact. Multiple state and municipal roads and bridges were impacted. For several days after the rain McIntyre, Gamble and Cascade Townships had locally isolated areas with long delays or limited access. Wallis Run Road, Field Station Road, Upper Bodines Roads are	26,000,000

Table 4.3.4-2 Flood and flash flood events impacting Lycoming County from 1966-2025 (NOAA NCEI, 2025b). Note that property damage values are estimates based on best available information. "Countywide" indicates several locations in the county were affected.

DATE	LOCATION & DESCRIPTION	ESTIMATED TOTAL DAMAGE ($)
	temporarily closed with detours. At least three state bridges were destroyed and a historic municipal stone arch bridge over Pleasant Stream in McIntyre and Lewis Townships was destroyed. This impacts accessibility into the community of Marsh Hill. There were 20 other municipality owned bridges damaged. A large earth slide near the junction of Wallis Run Road and Buttermut Grove Road caused a road closure. There were significant agricultural impacts and damages.	
7/23/2018	Unityville: on Beauty Run, floodwaters were flowing through backyards.	0
7/24/2018	Picture Rocks: US-220 was closed north of Picture Rocks. Numerous additional roads were also closed in eastern Lycoming County as a result of flooding occurring alongside Muncy Creek.	0
8/3/2018	Barbours: flash flooding closed Lower Barbours Road along Loyalsock Creek. Many roads were closed across the area.	0
7/6/2019	Linden: stream out of banks and water running over Hulings road.	0
8/15/2019	Williamsport: Grafius Run and Loyalsock Run overflowed their banks.	0
07/13/2021	Muncy: flash flooding brought multiple road closures along Muncy Creek in Muncy Township.	0
07/15/2023	Pennsdale: heavy rain from training thunderstorms led to flash flooding near Pennsdale, with a vehicle becoming stuck in water of unknown depth on Pond Road.	0
07/15/2023	Elimsport: heavy rain from training thunderstorms caused flash flooding in Washington Township, with a stretch of Route 44 near Elimsport becoming covered with water	0

Table 4.3.4-2 Flood and flash flood events impacting Lycoming County from 1966-2025 (NOAA NCEI, 2025b). Note that property damage values are estimates based on best available information. "Countywide" indicates several locations in the county were affected.

DATE	LOCATION & DESCRIPTION	ESTIMATED TOTAL DAMAGE ($)
07/24/2023	East Faxon: heavy rain from a thunderstorm produced sporadic ponding of water on streets around South Williamsport and neighboring communities.	0
08/18/2023	Picture Rocks: Route 220 was closed for nearly four hours between the Sullivan County line and Hughesville due to flooding of low-lying areas along Muncy Creek.	0
09/09/2023	Hepburnville: flooding of a small stream pushed water across a section of Beauty's Run Road.	0
06/26/2024	Muncy: l heavy rain with a thunderstorm produced radar estimated 1-2 inches of rain which led to ponding of water on roads near Muncy and a possible stranded vehicle.	0
08/03/2024	Clarkstown: multiple rounds of thunderstorms with heavy rainfall produced flooding in a pasture west of Muncy.	0
08/09/2024	Newberry: heavy rainfall led to ponding of water at the intersection of Riverside Drive and Beech Creek in South Williamsport.	0
08/09/2024	East Faxon: heavy rainfall led to ponding of water on numerous roadways within Williamsport and Loyalsock Township, including West 4th Street between Wayne and Ridge avenues, Rose Street between 3rd and Dix streets, Sherman Street at Hadtner Avenue, and portions of Reach Road.	0
08/09/2024	Duboistown: flash flooding occurred on roads in the vicinity of the Route 220 ramp at Reach Road in Williamsport.	0
08/09/2024	Buttonwood: flash flooding led to 2 feet of water across Route 15 near Buttonwood.	0
08/09/2024	Trout Run: flash flooding led to the evacuation of much of the town of Trout Run.	0
05/06/2025	Garden View: water reported to be across the road at the intersection of Zuni Lane and Sechler Circle.	0

In addition to the past flood events, the NFIP identifies properties that experience frequent flooding and can be used to determine areas of higher risk. These properties are identified through the NFIP when they receive more than one payment for flood damages. A **Repetitive Loss (RL)** property is defined as "any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling ten-year period, since 1978."

However, for the purposes of grant funding under FEMA's Hazard Mitigation Assistance (HMA) programs, RL is defined as a structure that:

a) Is covered by a contract for flood insurance made available under the NFIP; and
b) Has incurred flood-related damage on two occasions, in which the cost of the repair, on the average, equaled or exceeded 25 percent of the market value of the structure at the time of each such flood event; and
c) At the time of the second incidence of flood-related damage, the contract for flood insurance contains increased cost of compliance coverage. (Note: Homes are eligible for increased cost of compliance coverage after the first loss, however the cost for increased cost of compliance coverage is part of all policies.)

The RL data provided in Table 4.3.4-3 and used throughout the plan represents the NFIP's definition of RL.

A **Severe Repetitive Loss (SRL)** property is a structure that:

a) Is covered under a contract for flood insurance made available under the NFIP; and
b) Has incurred flood related damage (i) For which four or more separate claims payments have been made under flood insurance coverage with the amount of each such claim exceeding $5,000, and with the cumulative amount of such claims payments exceeding $20,000; or (ii) For which at least two separate claims payments have been made under such coverage, with the cumulative amount of such claims exceeding the market value of the insured structure.

FEMA's HMA programs use the same definition as the NFIP does for SRL properties.

Tables 4.3.4-3 and 4.3.4-4 displays repetitive loss and severe repetitive loss properties by jurisdiction and type in Lycoming County as of 2024. This data was pulled prior to Tropical Storm Debby, so it is anticipated that the numbers have changed since this data was obtained. As of 2025, the County had 497 repetitive loss properties. Old Lycoming Township had the most repetitive loss properties (75). Of the 497 repetitive loss structures properties in the county, the most are single family homes (419). There were 72 SRL properties in Lycoming County. Lycoming Township (9) and Old Lycoming Township (15) have the most SRL properties.

Table 4.3.4-3 Summary of the number and type of Repetitive Loss properties by municipality (FEMA, 2024). Please note that only communities with Repetitive Loss properties are shown.						
MUNICIPALITY	TYPE					SUM OF REPETITIVE LOSS PROPERTIES
	2-4 FAMILY	BUSINESS NON-RESIDENTIAL	OTHER NON-RESIDENTIAL	OTHER RESIDENTIAL	SINGLE FAMILY	
Armstrong Township	0	0	0	0	5	5
Clinton Township	0	0	0	1	4	5
Cummings Township	0	0	0	0	5	5
Duboistown Borough	1	0	0	1	3	5
Eldred Township	0	0	0	0	1	1
Fairfield Township	0	0	0	0	7	7
Gamble Township	0	0	0	0	1	1
Hepburn Township	4	0	0	2	28	34
Hughesville Borough	0	0	0	0	1	1
Jersey Shore Borough	6	0	0	3	21	30
Lewis Township	2	0	0	1	20	23
Loyalsock Township	3	0	0	0	34	37
Lycoming Township	0	0	0	2	33	35
McHenry Township	0	0	0	0	3	3
McIntyre Township	0	1	0	1	8	10
Mifflin Township	0	0	0	0	1	1
Montgomery Borough	3	1	0	1	12	17
Montoursville Borough	5	1	1	3	15	25
Muncy Creek Township	3	1	1	4	15	24
Muncy Borough	9	2	1	1	54	67
Muncy Township	0	0	0	1	0	1
Old Lycoming Township	2	2	0	0	71	75
Penn Township	0	0	0	1	1	2
Piatt Township	1	0	0	0	7	8
Pine Township	0	0	0	0	2	2
Plunketts Creek Township	0	0	0	2	18	20
Porter Township	0	0	0	0	2	2

Table 4.3.4-3 Summary of the number and type of Repetitive Loss properties by municipality (FEMA, 2024). Please note that only communities with Repetitive Loss properties are shown.

MUNICIPALITY	TYPE					SUM OF REPETITIVE LOSS PROPERTIES
	2-4 FAMILY	BUSINESS NON-RESIDENTIAL	OTHER NON-RESIDENTIAL	OTHER RESIDENTIAL	SINGLE FAMILY	
South Williamsport Borough	1	0	0	0	5	6
Susquehanna Township	0	0	0	0	6	6
Upper Fairfield Township	0	0	0	0	16	16
Watson Township	0	1	0	0	3	4
Williamsport, City of	2	0	0	0	10	12
Woodward Township	0	0	0	0	7	7
TOTAL	42	9	3	24	419	497

Table 4.3.4-4 Summary of the number and type of Severe Repetitive Loss properties by municipality. Please note that only communities with Severe Repetitive Loss properties are shown.

MUNICIPALITY	TYPE					SUM OF SEVERE REPETITIVE LOSS PROPERTIES
	2-4 FAMILY	BUSINESS NON-RESIDENTIAL	OTHER NON-RESIDENTIAL	OTHER RESIDENTIAL	SINGLE FAMILY	
Duboistown Borough	0	0	0	0	1	1
Fairfield Township	0	0	0	0	1	1
Hepburn Township	0	0	0	0	8	8
Lewis Township	0	0	0	0	6	6
Loyalsock Township	1	0	0	0	6	7
Lycoming Township	0	0	0	0	9	9
McIntyre Township	0	0	0	0	1	1
Montgomery Borough	1	0	0	0	1	2
Muncy Creek Township	0	0	1	0	3	4
Muncy Borough	0	1	0	1	4	6
Old Lycoming Township	1	0	0	0	14	15
Piatt Township	0	0	0	0	1	1
Pine Township	0	0	0	0	1	1

Table 4.3.4-4 Summary of the number and type of Severe Repetitive Loss properties by municipality. Please note that only communities with Severe Repetitive Loss properties are shown.

MUNICIPALITY	TYPE					SUM OF SEVERE REPETITIVE LOSS PROPERTIES
	2-4 FAMILY	BUSINESS NON-RESIDENTIAL	OTHER NON-RESIDENTIAL	OTHER RESIDENTIAL	SINGLE FAMILY	
Plunketts Creek Township	0	0	0	0	1	1
Upper Fairfield Township	0	0	0	0	5	5
Watson Township	0	0	0	0	1	1
Williamsport, City of	0	0	0	0	1	1
Woodward Township	0	0	0	0	2	2
TOTAL	3	1	1	1	66	72

Tables 4.3.4-5 and Table 4.3.4-6 show a summary of total Repetitive Loss (RL) and Severe Repetitive Loss (SRL) payments, respectively, received by property owners by municipality, by property type. In total, property owners across the county have received approximately $27.9 Million in RL payments and $8 Million in SRL payments. Only communities that received RL or SRL payments are listed in the tables below.

Table 4.3.4-5 Summary of total Repetitive Loss payments by municipality. Please note that only communities with Repetitive Loss payments are shown.

MUNICIPALITY	TYPE					SUM OF REPETITIVE LOSS PAYMENTS
	2-4 FAMILY	ASSEMBLED CONDO	NON-RESIDENTIAL	OTHER RESIDENTIAL	SINGLE FAMILY	
Armstrong Township	$0.00	$0.00	$0.00	$0.00	$217,349.76	$217,349.76
Clinton Township	$0.00	$0.00	$0.00	$35,272.97	$77,167.28	$112,440.25
Cummings Township	$0.00	$0.00	$0.00	$0.00	$118,903.00	$118,903.00
Duboistown Borough	$36,473.80	$0.00	$0.00	$86,726.21	$41,486.81	$164,686.82
Eldred Township	$0.00	$0.00	$0.00	$0.00	$31,743.94	$31,743.94
Fairfield Township	$0.00	$0.00	$0.00	$0.00	$706,872.71	$706,872.71
Gamble Township	$0.00	$0.00	$0.00	$0.00	$103,654.77	$103,654.77
Hepburn Township	$216,622.23	$0.00	$0.00	$151,414.53	$1,639,850.28	$2,007,887.04
Hughesville Borough	$0.00	$0.00	$0.00	$0.00	$6,254.06	$6,254.06
Jersey Shore Borough	$66,927.07	$0.00	$0.00	$52,546.71	$449,206.94	$568,680.72
Lewis Township	$85,204.69	$0.00	$0.00	$36,082.03	$1,550,272.36	$1,671,559.08
Loyalsock Township	$377,264.06	$0.00	$0.00	$0.00	$2,090,098.41	$2,467,362.47
Lycoming Township	$0.00	$0.00	$0.00	$98,328.15	$1,819,895.08	$1,918,223.23
McHenry Township	$0.00	$0.00	$0.00	$0.00	$58,022.34	$58,022.34
McIntyre Township	$0.00	$24,200.00	$0.00	$10,300.00	$398,162.80	$432,662.80

Table 4.3.4-5 Summary of total Repetitive Loss payments by municipality. Please note that only communities with Repetitive Loss payments are shown.

MUNICIPALITY	TYPE					SUM OF REPETITIVE LOSS PAYMENTS
	2-4 FAMILY	ASSEMBLED CONDO	NON-RESIDENTIAL	OTHER RESIDENTIAL	SINGLE FAMILY	
Mifflin Township	$0.00	$0.00	$0.00	$0.00	$15,005.20	$15,005.20
Montgomery Borough	$128,388.01	$43,550.89	$0.00	$26,957.39	$575,045.16	$773,941.45
Montoursville Borough	$242,551.44	$100,662.59	$240,373.37	$517,542.01	$856,508.11	$1,957,637.52
Muncy Creek Township	$275,908.40	$145,729.38	$82,845.46	$269,614.77	$753,949.77	$1,528,047.78
Muncy Borough	$210,551.83	$799,668.84	$163,541.25	$113,384.28	$2,230,811.89	$3,517,958.09
Muncy Township	$0.00	$0.00	$0.00	$176,255.83	$0.00	$176,255.83
Old Lycoming Township	$257,224.33	$418,509.53	$0.00	$0.00	$3,759,362.17	$4,435,096.03
Penn Township	$0.00	$0.00	$0.00	$117,139.66	$29,394.26	$146,533.92
Piatt Township	$26,603.64	$0.00	$0.00	$0.00	$213,891.54	$240,495.18
Pine Township	$0.00	$0.00	$0.00	$0.00	$53,953.94	$53,953.94
Plunketts Creek Township	$0.00	$0.00	$0.00	$130,982.96	$1,365,731.67	$1,496,714.63
Porter Township	$0.00	$0.00	$0.00	$0.00	$28,069.84	$28,069.84
South Williamsport Borough	$25,185.71	$0.00	$0.00	$0.00	$149,216.65	$174,402.36
Susquehanna Township	$0.00	$0.00	$0.00	$0.00	$231,248.70	$231,248.70
Upper Fairfield Township	$0.00	$0.00	$0.00	$0.00	$1,560,191.74	$1,560,191.74
Watson Township	$0.00	$25,837.90	$0.00	$0.00	$80,041.96	$105,879.86

Table 4.3.4-5 Summary of total Repetitive Loss payments by municipality. Please note that only communities with Repetitive Loss payments are shown.

MUNICIPALITY	TYPE					SUM OF REPETITIVE LOSS PAYMENTS
	2-4 FAMILY	ASSEMBLED CONDO	NON-RESIDENTIAL	OTHER RESIDENTIAL	SINGLE FAMILY	
Williamsport, City of	$9,239.99	$0.00	$0.00	$0.00	$677,212.97	$686,452.96
Woodward Township	$0.00	$0.00	$0.00	$0.00	$199,584.03	$199,584.03
TOTAL	$1,958,145.20	$1,558,159.13	$486,760.08	$1,822,547.50	$22,088,160.14	$27,913,772.05

Table 4.3.4-6 Summary of total Severe Repetitive Loss payments by municipality (FEMA, 2020). Please note that only communities with Severe Repetitive Loss payments are shown.

MUNICIPALITY	TYPE					SUM OF SEVERE REPETITIVE LOSS PAYMENTS
	2-4 FAMILY	ASSEMBLED CONDO	NON-RESIDENTIAL	OTHER RESIDENTIAL	SINGLE FAMILY	
Duboistown Borough	$0.00	$0.00	$0.00	$0.00	$24,447.75	$24,447.75
Fairfield Township	$0.00	$0.00	$0.00	$0.00	$253,165.89	$253,165.89
Hepburn Township	$0.00	$0.00	$0.00	$0.00	$858,959.49	$858,959.49
Lewis Township	$0.00	$0.00	$0.00	$0.00	$928,758.81	$928,758.81
Loyalsock Township	$191,938.29	$0.00	$0.00	$0.00	$589,972.65	$781,910.94
Lycoming Township	$0.00	$0.00	$0.00	$0.00	$831,692.91	$831,692.91
McIntyre Township	$0.00	$0.00	$0.00	$0.00	$29,000.00	$29,000.00
Montgomery Borough	$83,553.73	$0.00	$0.00	$0.00	$335,496.49	$419,050.22
Muncy Creek Township	$0.00	$0.00	$82,845.46	$0.00	$368,187.81	$451,033.27
Muncy Borough	$0.00	$420,751.21	$0.00	$113,384.28	$438,481.43	$972,616.92
Old Lycoming Township	$212,398.22	$0.00	$0.00	$0.00	$1,058,643.09	$1,271,041.31
Piatt Township	$0.00	$0.00	$0.00	$0.00	$54,186.60	$54,186.60

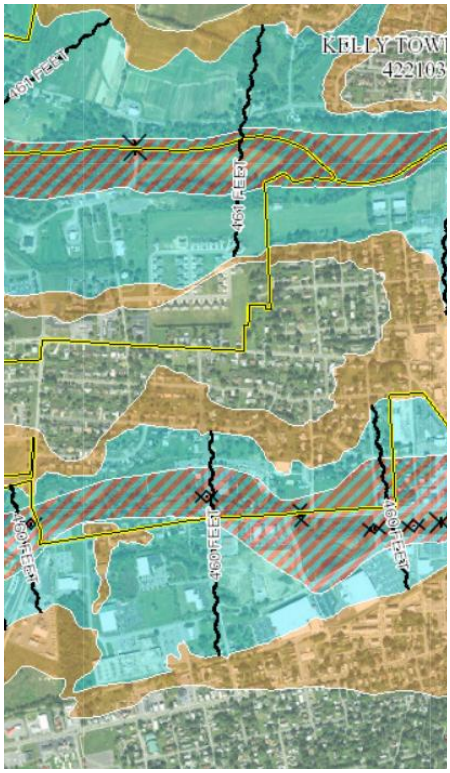
Table 4.3.4-6 Summary of total Severe Repetitive Loss payments by municipality (FEMA, 2020). Please note that only communities with Severe Repetitive Loss payments are shown.

MUNICIPALITY	TYPE					SUM OF SEVERE REPETITIVE LOSS PAYMENTS
	2-4 FAMILY	ASSEMBLED CONDO	NON-RESIDENTIAL	OTHER RESIDENTIAL	SINGLE FAMILY	
Pine Township	$0.00	$0.00	$0.00	$0.00	$48,165.70	$48,165.70
Plunketts Creek Township	$0.00	$0.00	$0.00	$0.00	$218,544.77	$218,544.77
Upper Fairfield Township	$0.00	$0.00	$0.00	$0.00	$730,069.24	$730,069.24
Watson Township	$0.00	$0.00	$0.00	$0.00	$52,580.35	$52,580.35
Williamsport, City of	$0.00	$0.00	$0.00	$0.00	$26,519.98	$26,519.98
Woodward Township	$0.00	$0.00	$0.00	$0.00	$90,860.27	$90,860.27
TOTAL	$487,890.24	$420,751.21	$82,845.46	$113,384.28	$6,937,733.23	$8,042,604.42

Floods are the most common and costly natural catastrophe in the United States. For that reason, flood insurance is a critical way for citizens to protect their property against flood loss. Home and business owners can purchase flood insurance through private insurers or through the NFIP.

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" (that is, issue) and service the NFIP's Standard Flood Insurance Policy under their own names.

Today, nearly 48 WYO insurance companies issue and service the NFIP under their own names (FEMA, 2024a). More than 4.6 million federal flood insurance policies are in force. These policies represent over 1.2 trillion in flood insurance coverage for homeowners, renters, and business owners throughout the United States and its territories (FEMA, 2024b).



Lycoming County's flood zones can be viewed on FEMA's National Flood Hazard Layer: https://www.fema.gov/flood-maps/products-tools/national-flood-hazard-layer.

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 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, or 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.

NFIP policies are 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.

Table 4.3.3-6 lists basic NFIP information for Lycoming County municipalities, all of whom participate in the NFIP.

The minimum floodplain management requirements to be a community in good standing in the NFIP include:

- Review and permit all development in the SFHA.
- Elevate new and substantially improved residential structures above the BFE.
- Elevate or dry floodproof new and substantially improved non-residential 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.

Table 4.3.4-7 Lycoming County Municipal Participation in the National Flood Insurance Program (FEMA CIS, 2025).

COMMUNITY	PARTICIPATION STATUS	CID	INITIAL FIRM IDENTIFIED	CURRENT EFFECTIVE MAP DATE
Anthony Township	Participating	420971	12/1/86	6/2/16
Armstrong Township	Participating	420635	9/28/79	6/2/16
Bastress Township	Participating	422472	9/24/84	N/A, No SFHA
Brady Township	Participating	421169	7/16/79	6/2/16
Brown Township	Participating	420636	3/2/81	6/2/16
Cascade Township	Participating	421837	12/1/86	6/2/16
Clinton Township	Participating	420637	9/28/79	6/2/16
Cogan House Township	Participating	421838	6/1/87	6/2/16
Cummings Township	Participating	420638	9/17/80	6/2/16
Duboistown Borough	Participating	420639	3/1/77	6/2/16
Eldred Township	Participating	421839	9/17/80	6/2/16
Fairfield Township	Participating	420972	6/1/81	6/2/16
Franklin Township	Participating	420973	6/1/87	6/2/16
Gamble Township	Participating	420974	9/30/80	6/2/16
Hepburn Township	Participating	420640	2/17/82	6/2/16
Hughesville Borough	Participating	420641	10/15/81	6/2/16
Jackson Township	Participating	422601	1/1/91	6/2/16
Jersey Shore Borough	Participating	420642	3/5/76	6/2/16
Jordan Township	Participating	422596	12/1/86	6/2/16
Lewis Township	Participating	420643	3/2/83	6/2/16
Limestone Township	Participating	422588	6/1/87	6/2/16
Loyalsock Township	Participating	421040	5/16/77	6/2/16
Lycoming Township	Participating	420644	9/17/80	6/2/16
McHenry Township	Participating	420975	8/15/80	6/2/16
McIntyre Township	Participating	420645	11/4/81	6/2/16
McNett Township	Participating	422597	12/23/83	6/2/16
Mifflin Township	Participating	422590	4/17/85	6/2/16

Table 4.3.4-7 Lycoming County Municipal Participation in the National Flood Insurance Program (FEMA CIS, 2025).				
COMMUNITY	**PARTICIPATION STATUS**	**CID**	**INITIAL FIRM IDENTIFIED**	**CURRENT EFFECTIVE MAP DATE**
Mill Creek Township	Participating	421845	3/2/79	N/A, No SFHA
Montgomery Borough	Participating	420646	6/15/78	6/2/16
Montoursville Borough	Participating	420648	8/15/77	6/2/16
Moreland Township	Participating	421846	3/2/81	6/2/16
Muncy Borough	Participating	420649	2/16/77	6/2/16
Muncy Creek Township	Participating	420650	9/30/80	6/2/16
Muncy Township	Participating	421847	8/19/87	6/2/16
Nippenose Township	Participating	420651	4/15/80	6/2/16
Old Lycoming Township	Participating	420652	4/15/77	6/2/16
Penn Township	Participating	421848	8/15/90	6/2/16
Piatt Township	Participating	420653	4/1/80	6/2/16
Picture Rocks Borough	Participating	420654	9/5/90	6/2/16
Pine Township	Participating	420954	9/17/80	6/2/16
Plunketts Creek Township	Participating	420655	8/2/82	6/2/16
Porter Township	Participating	420656	1/14/77	6/2/16
Salladasburg Borough	Participating	420657	1/5/79	6/2/16
Shrewsbury Township	Participating	421148	12/15/90	6/2/16
South Williamsport Borough	Participating	420658	4/15/77	6/2/16
Susquehanna Township	Participating	420659	9/28/79	6/2/16
Upper Fairfield Township	Participating	420660	9/17/80	6/2/16
Washington Township	Participating	422613	12/1/86	6/2/16
Watson Township	Participating	420661	8/15/80	6/2/16
Williamsport City	Participating	420622	12/1/77	6/2/16
Wolf Township	Participating	420663	12/2/80	6/2/16
Woodward Township	Participating	420664	9/28/79	6/2/16

4.3.4.4. Future Occurrence

In this plan, the term "SFHA" is used rather than floodplain to clarify that the area under consideration is identified on the FIRM as having at least a 1-percent chance of flooding in any given year. Historically, the area with a 1-percent chance of flooding in any given year has been called the "100-year floodplain" or the "base flood" and the area with a 0.2-percent chance of flooding in any given year has been called the "500-year floodplain." As these terms can be misleading by suggesting that there will be a flood only every 100 or 500 years respectively, they are not used in this plan. The 1- and 0.2-percent-annual-chance-floods are delineated on the Lycoming County FIRM. Areas subject to 2 percent- and 10 percent-annual-chance events are not shown on FIRMs, however, water surface elevations associated with these events are included in the flood source profiles contained in the FIS Report. The most recent FIS for each county in Pennsylvania is available from the FEMA Map Service Center (https://msc.fema.gov/portal/home).

The table below shows a range of flood recurrence intervals and associated probabilities of occurrence.

Table 4.3.4-8 Recurrence intervals and associated probabilities of occurrence (USGS, 2024).

RECURRENCE INTERVAL	CHANCE OF OCCURRENCE IN ANY GIVEN YEAR (%)
10 year	10
50 year	2
100 year	1
500 year	0.2

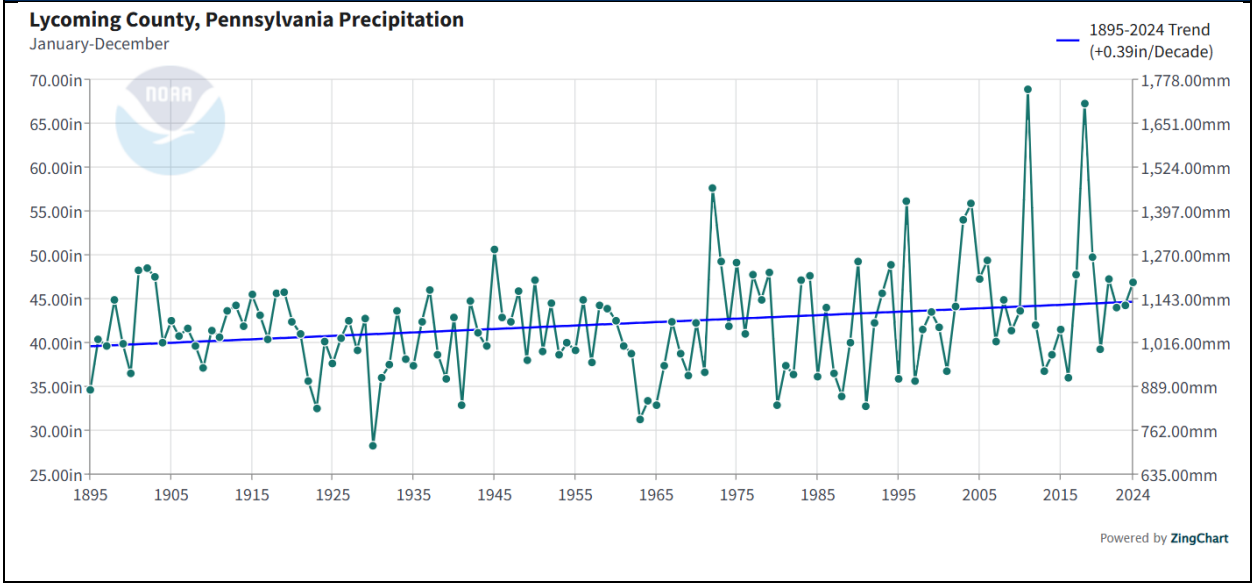
In Lycoming County, flooding occurs commonly and can occur during any season. However, the possibility of flooding is greatly reduced during the winter months. Although most severe floods are attributable to rainfall alone, the spring floods can be compounded by snowmelt and moving ice. The major floods in the late summer and fall are often associated with tropical storms moving up the Atlantic coastline. Within the flood-susceptible areas in Lycoming County, it is expected that the character of flooding will remain essentially unchanged from what has been experienced for many years. However, some increase in the severity and frequency of flooding may result due to planned or recent development within the floodplains of the various streams, as well as increased intensity and frequency of rain events. Therefore, the future occurrence of floods in Lycoming County can be characterized as *likely* as defined by the Risk Factor Methodology probability criteria (see Table 4.4.1-1).

It is important to note that FEMA's flood maps do not project future flooding based on changing climate patterns. They are based on historical data, so they are not a future projection of flood risk. However, changing climates are increasing the frequency and magnitude of flood events. The Fourth National Climate Assessment identified more flooding occurring in the Northeast Region (US Global Change Research Program (GCRP), 2018). Increasing temperatures are

linked to increasing amounts and intensity of precipitation, which could increase frequency and severity of flood events.

Since heavy precipitation events can be precursors to, or causes of, flooding events, changes to precipitation rates can be illustrative of future potential occurrence of flooding conditions, although this relationship is complex as additional factors including soil moisture and land cover affect flooding occurrence as well. Figure 4.3.4-5 shows precipitation in Lycoming County from 1895 to 2024. Overall, Lycoming County has seen a 0.39-inch increase in precipitation from 1895 to 2024.

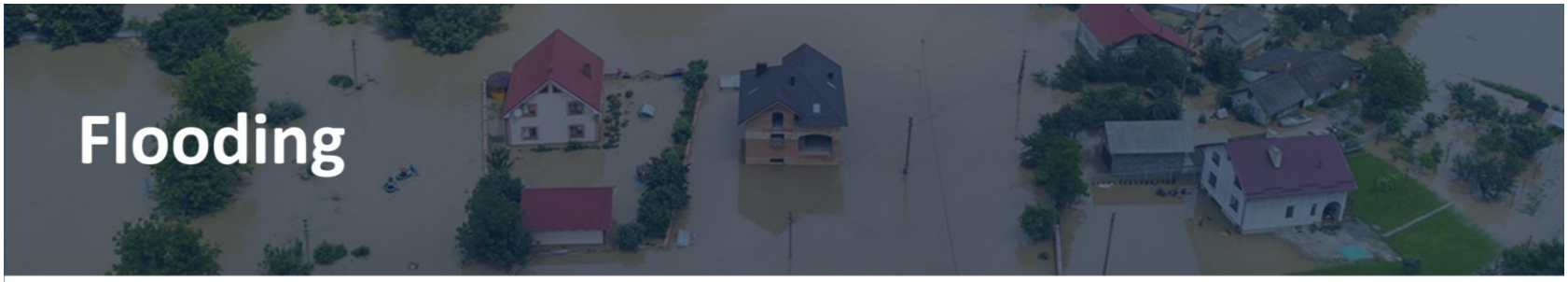
Figure 4.3.4-5: Precipitation from 1895 to 2024 in Lycoming County (NOAA NCEI, 2025a).



There are also some increasing trends in maximum streamflow in the Northeast United States consistent with this increase in observed extreme precipitation (Wehner et al. 2017). The trend of increased frequency and magnitude of heavy precipitation events is highly likely to continue (PA DEP, 2024a). This is due to the increase in atmospheric water vapor from a warming climate which results in a greater amount of rainfall falling in precipitation events. Globally, annual maximum daily precipitation increased 8.5% over the last 110 years, with extreme precipitation events increasing as well (Easterling et al. 2017).

The CRMA Tool provides a county-level assessment report for flooding, shown in Figure 4.3.4-6 below. According to CRMA, the average annual precipitation is expected to increase while the number of days per year with precipitation may decrease. This can indicate more concentrated intense rainfall, which can cause flooding. The annual days that exceed the 99th percentile precipitation is projected to increase as well. Lastly, the number of days with a maximum temperature below 32 degrees Fahrenheit is projected to decrease. These projections combine to show that future precipitation may be more intense and during the winter months it will be less likely to turn into snow.

Figure 4.3.4-6: Lycoming County Flooding Hazard Assessment Report (CRMA, 2025)



Future Climate Indicators

Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Precipitation:							
Annual average total precipitation	**42"** 41 - 44	**44"** 42 - 48	**45"** 42 - 49	**45"** 42 - 50	**46"** 42 - 50	**46"** 42 - 50	**48"** 44 - 53
Days per year with precipitation (wet days)	**198 days** 194 - 202	**197 days** 187 - 209	**197 days** 182 - 205	**197 days** 185 - 207	**196 days** 178 - 206	**196 days** 183 - 205	**195 days** 172 - 217
Maximum period of consecutive wet days	**12 days** 11 - 13	**12 days** 11 - 14	**12 days** 11 - 14	**12 days** 11 - 14	**13 days** 10 - 15	**12 days** 11 - 15	**13 days** 10 - 20
Annual days with:							
Annual days with total precipitation > 1inch	**5 days** 4 - 5	**5 days** 4 - 7	**6 days** 5 - 7	**6 days** 5 - 7	**6 days** 4 - 8	**6 days** 5 - 7	**7 days** 5 - 9
Annual days with total precipitation > 2 inches	**0 days** 0 - 1	**1 days** 0 - 1	**1 days** 0 - 1	**1 days** 0 - 1	**1 days** 0 - 1	**1 days** 0 - 1	**1 days** 0 - 1
Annual days with total precipitation > 3 inches	**0 days** 0 - 0	**0 days** 0 - 0	**0 days** 0 - 0	**0 days** 0 - 0	**0 days** 0 - 0	**0 days** 0 - 0	**0 days** 0 - 0
Annual days that exceed 99th percentile precipitation	**5 days** 5 - 7	**7 days** 6 - 9	**7 days** 6 - 9	**7 days** 6 - 10	**8 days** 7 - 10	**8 days** 7 - 11	**10 days** 8 - 13
Days with maximum temperature below 32 °F	**39 days** 37 - 43	**29 days** 14 - 38	**29 days** 18 - 38	**25 days** 11 - 35	**23 days** 13 - 35	**21 days** 7 - 34	**12 days** 3 - 26

N/A = Data Not Available for the selected area

4.3.4.5. Vulnerability Assessment

Flooding can lead to property loss as well as to loss of life. Flooding damages structures, including homes and businesses, vehicles, and infrastructure, including roadways. People who are surrounded by flood waters may at some point require evacuation, placing their lives and the lives of rescuers in danger. Flooding can disrupt the operation of businesses and schools. Recovery from flood damage can be time consuming and costly.

Flood vulnerability is described in terms of what community assets, structures, and infrastructure are situated in locations where flooding is anticipated. For purposes of assessing vulnerability, this plan focuses on those that are located within the SFHA. Please note that while other floods are possible, information about the extent and depths for the flood frequencies likely to be seen in this floodplain are available for all municipalities countywide, thus providing a consistent basis for analysis. Flood vulnerability maps for each applicable local municipality, showing the SFHA, addressable structures, critical facilities, and transportation routes within it, are included in Appendix D. These maps were created using FEMA countywide data from the current effective FIRMS.

Despite the fact that all of Lycoming County's 52 municipalities participate in the NFIP, communities need to strengthen floodplain management by reviewing current codes and ordinances and by strongly enforcing their floodplain codes on new development to avoid aggravating further flooding. Significant residential growth in the outlying rural townships can increase opportunities for flash flooding if floodplain development and stormwater management are not properly regulated. Numerous times since the January 1996 floods, localized rainstorms that went undetected by NWS created surface flooding, which forced evacuations in several floodplain communities.

The flood hazard vulnerability assessment for the county focused on the community assets that are located in the 1% chance floodplain. While greater and smaller floods are possible, information about the extent and depth for the 1% chance floodplain is available in a similar format for all 52 Lycoming County municipalities, providing a consistent basis for analysis. Table 4.3.4-8 shows the structures, critical facilities, and populations located in the SFHA; there are 5,075 structures in the SFHA county-wide (9% of all structures). Jersey Shore has the highest proportion of structures in the floodplain at 48% of all structures vulnerable to flooding. Cummings Township, Jersey Shore Borough, Lewis Township, Lycoming Township, McIntyre Township, and Muncy Borough all have more than 30% structures in the SFHA. Bastress Township and Mill Creek Borough have zero structures in the SFHA.

When looking at structures by property type, shown in Table 4.3.4-9, the majority of vulnerable structures are unsurprisingly residential in nature, followed by commercial and agricultural uses. A complete listing of critical facilities is in Appendix F.

Table 4.3.4-9 Community Flood Vulnerability for Lycoming County

MUNICIPALITY	TOTAL STRUCTURES IN MUNICIPALITY	STRUCTURES IN SFHA	PERCENT OF STRUCTURES IN SFHA	TOTAL CRITICAL FACILITIES IN MUNICIPALITY	TOTAL CRITICAL FACILITIES IN SFHA	PERCENT CRITICAL FACILITIES IN SFHA	TOTAL POPULATION	POPULATION IN SFHA*	PERCENT POPULATION IN SFHA
Anthony Township	387	5	1%	4	0	0%	867	15	2%
Armstrong Township	429	38	9%	1	0	0%	686	112	6%
Bastress Township	245	0	0%	3	0	0%	527	0	0%
Brady Township	234	1	0%	3	0	0%	501	0	0%
Brown Township	421	39	9%	5	0	0%	93	2	2%
Cascade Township	323	4	1%	0	0	0%	422	4	1%
Clinton Township	1,161	91	8%	18	1	6%	3,720	210	6%
Cogan House Township	636	7	1%	8	0	0%	935	14	1%
Cummings Township	604	186	31%	5	0	0%	265	114	43%
Duboistown Borough	560	71	13%	4	0	0%	1,200	128	11%
Eldred Township	905	21	2%	4	0	0%	1,997	7	0%
Fairfield Township	1,482	29	2%	4	0	0%	2,834	56	2%
Franklin Township	518	30	6%	5	0	0%	903	55	6%
Gamble Township	484	10	2%	3	0	0%	778	1	0%
Hepburn Township	1,267	124	10%	6	0	0%	2,578	231	9%
Hughesville Borough	973	1	0%	9	0	0%	2,154	0	0%
Jackson Township	289	8	3%	1	0	0%	396	4	1%
Jersey Shore Borough	1,792	859	48%	17	3	18%	4,166	1,921	45%
Jordan Township	533	8	2%	4	2	50%	850	9	1%
Lewis Township	648	232	36%	10	8	80%	862	360	42%
Limestone Township	844	29	3%	5	0	0%	1,966	8	1%
Loyalsock Township	5,171	143	3%	35	1	3%	11,561	167	1%

Table 4.3.4-9 Community Flood Vulnerability for Lycoming County

MUNICIPALITY	TOTAL STRUCTURES IN MUNICIPALITY	STRUCTURES IN SFHA	PERCENT OF STRUCTURES IN SFHA	TOTAL CRITICAL FACILITIES IN MUNICIPALITY	TOTAL CRITICAL FACILITIES IN SFHA	PERCENT CRITICAL FACILITIES IN SFHA	TOTAL POPULATION	POPULATION IN SFHA*	PERCENT POPULATION IN SFHA
Lycoming Township	774	290	37%	1	0	0%	1,491	586	39%
McHenry Township	626	97	15%	4	0	0%	122	44	36%
McIntyre Township	383	134	35%	4	2	50%	461	123	27%
McNett Township	219	4	2%	2	0	0%	143	0	0%
Mifflin Township	552	102	18%	4	0	0%	1,089	165	15%
Mill Creek Township	301	0	0%	4	0	0%	582	0	0%
Montgomery Borough	661	189	29%	4	0	0%	1,568	642	0%
Montoursville Borough	2,301	99	4%	17	2	12%	4,750	262	6%
Moreland Township	487	5	1%	5	0	0%	1,015	28	28%
Muncy Borough	1,172	450	38%	12	5	42%	2,440	855	35%
Muncy Creek Township	1,835	301	16%	6	0	0%	3,573	707	20%
Muncy Township	646	8	1%	12	0	0%	1,178	10	0%
Nippenose Township	358	38	11%	5	1	20%	661	138	21%
Old Lycoming Township	2,454	290	12%	8	0	0%	4,975	584	12%
Penn Township	559	14	3%	2	0	0%	895	1	1%
Piatt Township	536	137	26%	2	0	0%	1,047	158	27%
Picture Rocks Borough	285	12	4%	6	0	0%	643	29	5%
Pine Township	465	122	26%	2	0	0%	258	21	8%
Plunketts Creek Township	609	132	22%	5	0	0%	597	52	9%
Porter Township	698	110	16%	5	0	0%	1,528	318	21%
Salladasburg Borough	134	34	25%	1	0	0%	250	77	31%
Shrewsbury Township	304	41	13%	0	0	0%	418	49	12%

Table 4.3.4-9 Community Flood Vulnerability for Lycoming County

MUNICIPALITY	TOTAL STRUCTURES IN MUNICIPALITY	STRUCTURES IN SFHA	PERCENT OF STRUCTURES IN SFHA	TOTAL CRITICAL FACILITIES IN MUNICIPALITY	TOTAL CRITICAL FACILITIES IN SFHA	PERCENT CRITICAL FACILITIES IN SFHA	TOTAL POPULATION	POPULATION IN SFHA*	PERCENT POPULATION IN SFHA
South Williamsport Borough	2,842	40	1%	18	1	6%	6,261	90	1%
Susquehanna Township	494	151	31%	4	1	25%	968	161	17%
Upper Fairfield Township	888	51	6%	5	0	0%	1,807	62	3%
Washington Township	775	34	4%	8	0	0%	1,768	26	1%
Watson Township	364	123	34%	1	0	0%	534	89	17%
Williamsport City	10,860	13	0%	74	0	0%	27,754	11	0%
Wolf Township	1,567	49	3%	8	0	0%	3,105	192	6%
Woodward Township	1,142	69	6%	5	1	20%	2,046	134	7%
TOTAL	55,197	5,075	9%	388	28	7%	114,188	9,046	8%

**Calculated by determining the percentage of buildings in SFHA for each census block, then multiplying that percentage to the population of the census block.*

Table 4.3.4-10 Flood Vulnerability by Land Use

MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER / EXEMPT	RESIDENTIAL	UNKNOWN	TOTAL
Anthony Township	1	0	0	0	1	1	2	5
Armstrong Township	8	2	4	0	0	18	6	38
Bastress Township	0	0	0	0	0	0	0	0

Table 4.3.4-10 Flood Vulnerability by Land Use

MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER / EXEMPT	RESIDENTIAL	UNKNOWN	TOTAL
Brady Township	0	1	0	0	0	0	0	1
Brown Township	0	0	0	0	0	32	7	39
Cascade Township	1	0	0	0	0	1	2	4
Clinton Township	10	8	0	2	3	41	27	91
Cogan House Township	2	2	0	0	0	2	1	7
Cummings Township	1	5	0	2	7	138	33	186
Duboistown Borough	0	10	0	4	1	45	11	71
Eldred Township	1	0	0	0	0	17	3	21
Fairfield Township	2	0	0	0	5	13	9	29
Franklin Township	1	1	1	0	0	18	9	30
Gamble Township	4	1	0	0	0	4	1	10
Hepburn Township	2	10	0	2	6	76	28	124
Hughesville Borough	0	0	0	0	0	1	0	1
Jackson Township	4	1	0	0	0	2	1	8
Jersey Shore Borough	0	66	2	45	7	608	131	859
Jordan Township	2	1	0	0	0	4	1	8
Lewis Township	12	10	0	2	6	149	53	232
Limestone Township	1	2	0	0	0	23	3	29
Loyalsock Township	3	24	2	5	7	84	18	143
Lycoming Township	7	8	1	5	6	214	49	290
McHenry Township	2	1	0	0	2	80	12	97
McIntyre Township	6	5	0	5	14	82	22	134

Table 4.3.4-10 Flood Vulnerability by Land Use								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER / EXEMPT	RESIDENTIAL	UNKNOWN	TOTAL
McNett Township	0	0	0	0	0	0	4	4
Mifflin Township	9	1	0	2	0	77	13	102
Mill Creek Township	0	0	0	0	0	0	0	0
Montgomery Borough	1	13	5	7	0	114	49	189
Montoursville Borough	0	16	2	7	2	41	31	99
Moreland Township	1	0	0	0	0	3	1	5
Muncy Borough	0	53	4	28	9	288	68	450
Muncy Creek Township	14	24	2	11	7	185	58	301
Muncy Township	0	1	0	0	1	2	4	8
Nippenose Township	5	4	0	0	2	20	7	38
Old Lycoming Township	0	19	2	8	7	209	45	290
Penn Township	1	1	1	1	0	7	3	14
Piatt Township	5	6	4	2	1	95	24	137
Picture Rocks Borough	0	1	1	1	0	9	0	12
Pine Township	13	4	0	2	4	63	36	122
Plunketts Creek Township	10	2	0	0	11	88	21	132
Porter Township	0	4	1	0	2	99	4	110
Salladasburg Borough	0	1	1	0	0	23	9	34
Shrewsbury Township	0	3	0	1	4	26	7	41
South Williamsport Borough	1	0	0	0	0	34	5	40
Susquehanna Township	10	3	0	1	4	86	47	151
Upper Fairfield Township	3	1	0	0	11	31	5	51

Table 4.3.4-10 Flood Vulnerability by Land Use

MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER / EXEMPT	RESIDENTIAL	UNKNOWN	TOTAL
Washington Township	10	1	0	0	0	19	4	34
Watson Township	3	5	0	0	2	100	13	123
Williamsport, City of	0	3	3	1	2	2	2	13
Wolf Township	3	1	0	1	0	29	15	49
Woodward Township	3	4	4	1	2	43	12	69
TOTAL	162	329	40	146	136	3,346	916	5,075

Table 4.3.4-11 shows the number of mobile homes located in the SFHA in each municipality. Mobile homes are more vulnerable to flood risk because they can be washed out if the proper protection measures are not taken. FEMA recommends anchoring or elevation techniques to protect mobile homes from flood risk. More information for these techniques can be found online: https://www.fema.gov/manufactured-mobile-home. Lycoming Township has the greatest number of mobile homes in the SFHA (82) and the highest percentage of mobile homes in the SFHA. There are 20 municipalities with greater than 10% of their mobile homes within the SFHA, making them more vulnerable to flood damage. The top ten include Lycoming Township, Salladasburg Borough, Lewis Township, Loyalsock Township, Cummings Township, McIntyre Township, Mifflin Township, Susquehanna Township, Piatt Township, and Pine Township.

Table 4.3.4-11 Mobile Home Flood Vulnerability in Lycoming County

MUNICIPALITY	TOTAL MOBILE HOMES	TOTAL MOBILE HOMES IN SFHA	PERCENT MOBILE HOMES IN SFHA
Anthony Township	21	1	5%
Armstrong Township	26	0	0%
Bastress Township	5	0	0%
Brady Township	22	0	0%
Brown Township	10	1	10%
Cascade Township	35	0	0%
Clinton Township	84	2	2%
Cogan House Township	43	0	0%
Cummings Township	42	21	50%
Duboistown Borough	3	0	0%
Eldred Township	98	0	0%
Fairfield Township	264	0	0%
Franklin Township	35	1	3%
Gamble Township	19	1	5%
Hepburn Township	163	23	14%
Hughesville Borough	0	0	0%
Jackson Township	24	0	0%
Jersey Shore Borough	21	3	14%
Jordan Township	52	0	0%
Lewis Township	81	48	59%
Limestone Township	40	3	8%
Loyalsock Township	34	19	56%
Lycoming Township	109	82	75%
McHenry Township	40	5	13%
McIntyre Township	36	18	50%

Table 4.3.4-11 Mobile Home Flood Vulnerability in Lycoming County			
MUNICIPALITY	TOTAL MOBILE HOMES	TOTAL MOBILE HOMES IN SFHA	PERCENT MOBILE HOMES IN SFHA
McNett Township	18	0	0%
Mifflin Township	101	46	46%
Mill Creek Township	24	0	0%
Montgomery Borough	4	1	25%
Montoursville Borough	1	0	0%
Moreland Township	23	0	0%
Muncy Borough	0	0	0%
Muncy Creek Township	417	21	5%
Muncy Township	15	0	0%
Nippenose Township	39	1	3%
Old Lycoming Township	118	23	19%
Penn Township	27	0	0%
Piatt Township	79	31	39%
Picture Rocks Borough	1	0	0%
Pine Township	43	13	30%
Plunketts Creek Township	48	3	6%
Porter Township	58	7	12%
Salladasburg Borough	15	10	67%
Shrewsbury Township	21	3	14%
South Williamsport Borough	0	0	0%
Susquehanna Township	22	10	45%
Upper Fairfield Township	84	0	0%
Washington Township	52	3	6%
Watson Township	27	8	30%
Williamsport, City of	5	0	0%
Wolf Township	263	3	1%
Woodward Township	247	6	2%
TOTAL	3,059	417	14%

Additional information on flood vulnerability and losses in Lycoming County, including the 1%-annual-chance flood event results from Hazus, FEMA's loss estimation software, is provided in **Section 4.4.3: Potential Loss Estimates**.

4.3.4.6. Equity in Vulnerable Communities

In terms of equity, residents living within mobile homes or other manufactured homes will experience risks associated with floods, flash floods, and ice jams at a disproportionate rate, especially if they are unanchored or improperly installed. The U.S. Census Bureau defines

manufactured homes as "movable dwellings, eight feet or wider and 40 feet or longer, designed to be towed on its own chassis, with transportation gear integral to the unit when it leaves the factory, and without need of a permanent foundation (U.S. Census, 2010)." They can include multi-wide and expandable manufactured homes but exclude travel trailers, motor homes, and modular housing. These structures also tend to be sited on less desirable, more floodprone land to begin with. This means areas of Woodward, Wolf and Fairfield Townships may be particularly vulnerable. Communities with an aged housing stock may also be more susceptible if there has not been appropriate upkeep of infrastructure or if buildings predate modern, disaster-resistant building practices. People currently experiencing homelessness are highly susceptible to flooding as they lack secure shelter. Equitable policies must ensure access to emergency shelters, temporary housing, and long-term housing solutions for people displaced by flooding. In terms of evacuation, households without vehicles or with people who have disabilities will need assistance.

4.3.5. Hailstorm

4.3.5.1. Location and Extent



Hailstorm events can occur in all areas of Lycoming County. Neither the duration of the storm nor the extent of the area affected by such an occurrence can be predicted. Hail precipitation is often produced at the front of a severe thunderstorm system or in conjunction with a tornado event. Hailstorms occur when ice crystals form within a low-pressure front due to the rapid rise of warm air into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until, having developed sufficient weight, they fall as precipitation in the form of balls or irregularly shaped masses of ice. Hailstones are formed most commonly in thunderstorms with intense updraft, high liquid water content, large vertical extent, large water droplets, and cloud layers below freezing (NOAA NSSL, 2025b).

4.3.5.2. Range of Magnitude

Hail is described qualitatively and quantitatively by its size and can range from 0.2 inches to 4.5 inches, as shown in Table 4.3.5-1. The size of hail is dependent on the strength of the upward air movement along the front of a thunderstorm, called the updraft. Hailstone nuclei are buoyed or lifted by the updraft and increase in size the longer the stone is held aloft. Weaker updrafts create smaller hailstones while strong updrafts provide a longer amount of time for hailstone nuclei to grow in diameter (NOAA NSSL, 2025b). Lycoming County has experienced hail ranging in size from 0.15 to 3.00 inches in diameter (NOAA NCEI, 2025b).

Table 4.3.5-1 Hailstone size and relationship to updraft speed (NOAA NSSL, 2025b).

HAILSTONE SIZE	MEASUREMENT (INCHES)	UPDRAFT SPEED (MPH)
Marble	0.50	35
Dime	0.70	38
Penny	0.75	40
Nickel	0.88	46
Quarter	1.00	49
Half Dollar	1.25	54
Walnut	1.50	60
Golf Ball	1.75	64
Hen Egg	2.00	69
Tennis Ball	2.50	77
Baseball	2.75	81
Teacup	3.00	84
Grapefruit	4.00	98
Softball	4.50	103

Hailstorms can cause significant damage to crops, livestock and property. Damage is dependent on the size, duration, and intensity of hail precipitation. Automobiles and aircraft are particularly susceptible to damage. Also, people are at risk for serious injury if they don't seek immediate shelter. Since hail precipitation usually occurs during thunderstorm events, the impacts of other hazards associated with thunderstorms (i.e. strong winds, intense precipitation, etc.) often occur simultaneously (NOAA NSSL, 2025b).

A potential worst-case scenario of a hailstorm would be if a storm carrying hail of over two inches were to occur over a prolonged period in a predominantly agricultural area. Because hail can cause significant crop damage, a storm of this magnitude would potentially destroy agricultural yields and result in significant lost revenue, as well as property damage and injuries.

The potential impacts of hailstorms on community lifelines are as follows:

Table 4.3.5-2 Most Likely Lifelines Impacted by Hailstorm

LIFELINES	NOTES
	Government operations and facilities, including police, may be needed for response and recovery.
	Hailstorms can cause severe crop damage even during minor events. This may impact the availability and cost of food and may cause adverse economic impacts to farmers.
	Hailstorms can cause severe vehicular damage and may render roadways temporarily impassable. This may impact emergency responders' ability to safely transport patients during hailstorm events.
	Hailstorms can cause severe vehicular damage and may render roadways temporarily impassable. This may impact mass transit and railways.

4.3.5.3. Past Occurrence

Table 4.3.5-3 shows a snapshot of the NCEI hailstorm data from 2000-2025 (the dataset goes back to 1956). During tis timeframe there were 74 hail events causing $350,000 in property and crop damage (NOAA NCEI, 2025b).

Table 4.3.5-3 Lycoming County Hail Events 2000-2025 (NOAA NCEI, 2025b).

LOCATION	DATE	SIZE (IN)	PROPERTY AND CROP LOSSES
Montgomery	3/25/2000	0.75 in.	0

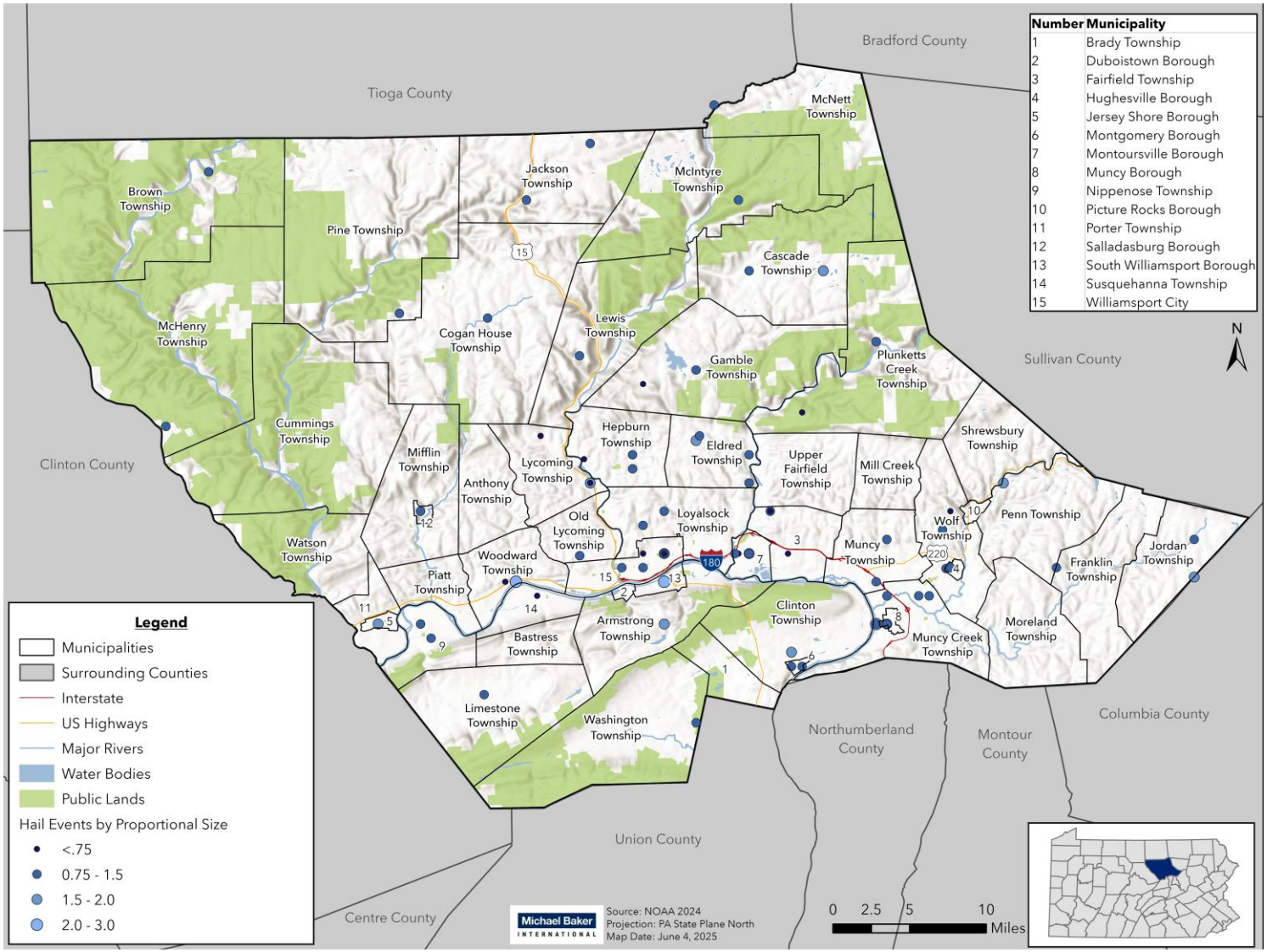
Table 4.3.5-3 Lycoming County Hail Events 2000-2025 (NOAA NCEI, 2025b).			
LOCATION	**DATE**	**SIZE (IN)**	**PROPERTY AND CROP LOSSES**
Warrensville	5/10/2000	1.00 in.	0
Cogan House	5/12/2000	1.00 in.	0
Williamsport	5/12/2000	1.25 in.	0
Williamsport	7/11/2001	1.00 in.	0
Barbours	9/13/2001	1.00 in.	0
Hughesville	9/13/2001	1.00 in.	0
Williamsport	9/13/2001	0.75 in.	0
Unityville	9/13/2001	1.75 in.	0
Williamsport	6/5/2002	1.00 in.	0
Muncy	8/20/2004	0.88 in.	0
Montoursville	6/6/2005	1.00 in.	0
Williamsport	6/6/2005	1.00 in.	0
Montoursville	6/6/2005	0.75 in.	0
Williamsport	5/30/2006	0.75 in.	0
Williamsport	5/30/2006	1.00 in.	0
Williamsport	6/9/2006	0.88 in.	0
Montoursville	6/9/2006	0.88 in.	0
Quiggleville	7/9/2006	0.75 in.	0
Williamsport	7/9/2006	0.75 in.	0
Williamsport	8/3/2006	0.75 in.	0
Balls Mills	5/10/2007	1.00 in.	0
Hughesville	6/12/2007	1.00 in.	0
Lairdsville	6/13/2007	0.88 in.	0
Pennsdale	6/13/2007	0.88 in.	0
Williamsport	6/19/2007	0.75 in.	0
Muncy	6/19/2007	0.75 in.	0
Muncy	8/3/2007	0.88 in.	0
Garden View	8/17/2007	0.88 in.	0
Newberry	8/17/2007	1.00 in.	0
Loyalsockville	8/17/2007	0.88 in.	0
Montgomery	8/17/2007	1.50 in.	0
Muncy	8/17/2007	0.88 in.	0
Muncy	8/17/2007	1.75 in.	350,000
Trout Run	8/30/2007	0.75 in.	0
Balls Mills	9/27/2007	1.00 in.	0
Hughesville	2/6/2008	0.88 in.	0
Buttonwood	6/16/2008	0.88 in.	0

Table 4.3.5-3 Lycoming County Hail Events 2000-2025 (NOAA NCEI, 2025b).			
LOCATION	**DATE**	**SIZE (IN)**	**PROPERTY AND CROP LOSSES**
Salladasburg	6/16/2008	0.88 in.	0
Jersey Shore	6/16/2008	0.88 in.	0
Richards Grove	6/20/2008	0.88 in.	0
Pennsdale	7/26/2008	0.88 in.	0
(IPT) Williamsport Airport	7/11/2009	1.25 in.	0
Newberry	7/24/2009	0.88 in.	0
Muncy	7/24/2009	0.75 in.	0
Hepburnville	10/11/2010	0.75 in.	0
Williamsport	10/11/2010	1.00 in.	0
Leolyn	4/25/2011	0.88 in.	0
Countywide	6/9/2011	0.88 in.	0
Countywide	6/9/2011	0.88 in.	0
Tivoli	7/19/2011	1.75 in.	0
Jersey Shore	8/1/2011	1.00 in.	0
Linden	5/26/2012	0.88 in.	0
Hughesville	5/29/2012	0.88 in.	0
Newberry	7/7/2012	0.88 in.	0
Newberry	7/7/2012	1.00 in.	0
(IPT) Williamsport Airport	7/7/2012	0.75 in.	0
Hughesville	6/24/2013	0.75 in.	0
Countywide	9/11/2013	0.75 in.	0
Countywide	9/11/2013	1.00 in.	0
(IPT) Williamsport Airport	5/22/2014	0.88 in.	0
Muncy	5/22/2014	0.88 in.	0
Muncy	5/22/2014	1.00 in.	0
Jersey Shore	4/20/2015	1.25 in.	0
Jersey Shore	4/20/2015	1.00 in.	0
Montgomery	7/18/2016	0.88 in.	0
Jersey Mills	5/28/2019	1.50 in.	0
Jersey Shore	5/28/2019	1.75 in.	0
Antes Fort	5/28/2019	1.00 in.	0
Linden	5/28/2019	3.00 in.	0
Montgomery	7/13/2021	1.50 in.	0
Trout Run	7/22/2022	1.00 in.	0

Table 4.3.5-3 Lycoming County Hail Events 2000-2025 (NOAA NCEI, 2025b).			
LOCATION	**DATE**	**SIZE (IN)**	**PROPERTY AND CROP LOSSES**
Hughesville	6/22/2024	1.00 in.	0
TOTAL			$350,000

Figure 4.3.5-1 maps the recorded hailstorm events in Lycoming County between 1956 and 2025. A hailstorm even is defined as a storm with hail of ¾ inches or greater in diameter. According to PEMA, approximately 96% of hailstorm events occur between the months of April and September. In addition, approximately 87% of historic events occurred during the afternoon or evening. Both results are consistent with the relationship between hail and thunderstorms, which most often occur during late spring, summer, and early fall months (NOAA NCEI, 2025b).

Figure 4.3.5-1 Number of hailstorm events in Lycoming County between 1950 and 2025 (NOAA NCEI, 2025b).



4.3.5.4. Future Occurrence

It is not possible to predict the formation of a hailstorm with more than a few days' lead time. The past occurrences in the county described above, however, indicate that this event is one that can happen several times in any given year, most likely during the late spring and summer months. Overall, the probability of future hail events can be considered *possible* according to the Risk Factor Methodology (see Table 4.4-1).

As temperatures change hail storms may become more intense and larger. A warmer, moister atmosphere fuels stronger updrafts, allowing hail to stay suspended longer and grow bigger before falling.

4.3.5.5. Vulnerability Assessment

All of Lycoming County, including all critical infrastructure, is vulnerable to the effects of hail, as the storm cells that produce this hazard are spread over a large (multi-county) area. The area of damage due to these storms is relatively small, in that a single storm does not cause widespread devastation but may cause damage in a focused area of the storm.

As a hazard, damage to crops and vehicles are typically the most significant impacts of hailstorms. Damage to trees, shrubbery, and other vegetation may occur during hailstorm events through defoliation. Unless there are compounding stresses, natural vegetation can typically recover over time following the event. However, crops such as corn and soybeans can be damaged to the point of total loss, particularly if an event occurs later in the growing season.

Penn State Extension summarized the Pennsylvania Crop Insurance Education and Participation Program, which estimated that from 2010-2019, 2% of all crop losses in Pennsylvania were due to hail events (Penn State Extension, 2023). Therefore, Lycoming County's $66 million in agricultural products are at risk in hail events.

Potential losses from a hailstorm event can be derived from agricultural sales information as reported in the Drought hazard profile, Section 4.3.1. There are 918 farms located in Lycoming County. These businesses sold approximately $66,067,000 in agricultural products in 2022. Corn and soybean crops are particularly vulnerable, and the USDA Census of Agriculture reported that in 2022, corn and soybeans were two of the top crop five crop items by acres in the county (USDA, 2024).

Table 4.3.1-5 in the Drought Hazard Profile shows the acreage of agricultural land for each municipality in Lycoming County. There is a total of 638,644.3 acres of agricultural land in the county, with Pine Township's 68,998.3 acres the most of any municipality. Only the boroughs of Hughesville, Jersey Shore, and Muncy have no agricultural land.

Table 4.3.5-4 below shows the Expected Annual Losses to Hail for each census tract in the county according to FEMA's National Risk Index.

Table 4.3.5-4	Expected Annual Losses to Hail by Census Tract (FEMA NRI, 2023)		
CENSUS TRACT	MUNICIPALITIES	ESTIMATED ANNUAL LOSSES	ESTIMATED ANNUAL LOSS RATING
1.00	Williamsport City	$1,013.92	Relatively Low
2.00	Williamsport City	$650.57	Very Low
3.00	Williamsport City	$1,302.89	Relatively Low
4.00	Williamsport City	$1,164.68	Relatively Low
5.00	Williamsport City	$859.06	Very Low
6.00	Williamsport City	$1,092.34	Relatively Low
8.00	Williamsport City	$750.11	Very Low
9.00	Williamsport City	$691.65	Very Low
10.00	Williamsport City	$768.66	Very Low
101.00	Cogan House Township, Pine Township, Jackson Township, McIntyre Township, McNett Township	$855.40	Very Low
102.00	Brown Township, McHenry Township, Cummings Township, Watson Township	$395.16	Very Low
103.00	Anthony Township, Mifflin Township, Piatt Township, Salladasburg Borough	$917.29	Very Low
104.00	Hepburn Township, Lycoming Township, Lewis Township	$1,313.55	Relatively Low
105.01	Cascade Township, Gamble Township, Plunketts Creek Township	$730.20	Very Low
105.02	Eldred Township, Upper Fairfield Township	$1,273.23	Relatively Low
106.00	Shrewsbury Township, Penn Township, Moreland Township, Franklin Township, Jordan Township	$1,810.32	Relatively Low
107.00	Mill Creek Township, Wolf Township, Picture Rocks Borough, Hughesville Borough	$2,142.19	Relatively Low
108.00	Muncy Creek Township, Muncy Borough, Muncy Township	$2,779.20	Relatively Low
109.00	Fairfield Township	$1,074.42	Relatively Low

Table 4.3.5-4	Expected Annual Losses to Hail by Census Tract (FEMA NRI, 2023)		
CENSUS TRACT	**MUNICIPALITIES**	**ESTIMATED ANNUAL LOSSES**	**ESTIMATED ANNUAL LOSS RATING**
110.00	Montoursville Borough	$1,647.41	Relatively Low
111.00	Loyalsock Township	$2,011.05	Relatively Low
112.00	Loyalsock Township	$1,874.71	Relatively Low
113.01	Woodward Township	$584.96	Very Low
113.02	Old Lycoming Township	$1,226.63	Relatively Low
114.00	Armstrong Township, Susquehanna Township	$480.18	Very Low
116.01	Duboistown Borough	$282.22	Very Low
116.03	South Williamsport Borough	$681.66	Very Low
116.04	South Williamsport Borough	$1,255.26	Relatively Low
117.01	Clinton Township, Montgomery Borough	$1,298.12	Relatively Low
117.02	Brady Township, Washington Township, Clinton Township	$1,166.48	Relatively Low
118.00	Bastress Township, Nippenose Township, Limestone Township	$909.20	Very Low
119.00	Jersey Shore Borough, Porter Township	$1,444.40	Relatively Low
TOTAL		$36,447.11	

4.3.5.6. Equity in Vulnerable Communities

In terms of equity, unhoused populations may be most at risk of adverse impacts of hailstorms due to their lack of consistent, adequate shelter. Low-income groups who may live in older or less well-maintained dwellings may also be at heightened risk of adverse impacts. This means Williamsport City and Loyalsock Township are vulnerable. Rural areas of the county may be disproportionately impacted by hailstorms due to crop impacts.

4.3.6. Invasive Species

4.3.6.1. Location and Extent



An invasive species is any living species that is not native to an ecosystem and causes damage. The environment, the economy, and even human health can be impacted by invasive species. Often, an invasive species spreads and reproduces quickly. They are not limited to organisms that originate from a foreign country; invasive species can come from a different region in the United States (National Wildlife Federation, N.d.). Pennsylvania hosts several invasive pathogens, insects, plants, invertebrates, fish, and mammals. These species have largely been introduced by the actions of humans.

Pennsylvania Governor's Invasive Species Council (PGISC), also referenced as the Governor's Invasive Species Council of Pennsylvania (PISC), is the lead organization for invasive species threats. The PISC recognizes two types of invasive species: Aquatic and Terrestrial (PISC, 2017).

- Aquatic Invasive Species are nonnative species that have part or all of their life cycle in water and 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 species 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 location and extent of these invasive threats depend on the preferred habitat of the species as well as the species' ease of movement and establishment. Kudzu vine, an aggressive vascular plant that was first introduced to the United States at the 1876 Centennial Exposition in Philadelphia and was promoted for erosion control to Southern farmers, grows incredibly quickly and has been known to overtake trees, buildings, utility lines, road signs, and more (Center for Aquatic and Invasive Plants, 2018). As previously stated, most new introductions of invasive species occur because of human activity. There are a few key pathways to introduction into Pennsylvania (PISC, 2017):

- Contamination of internationally traded products.
- Hull fouling.
- Ship ballast water release.
- Hitchhiking on boats or fishing gear.
- Discarded live fish bait.
- Intentional release.
- Escape from cultivation.
- Movement of soil, compost, wood, vehicles, or other materials and equipment.
- Unregulated sale of organisms.
- Smuggling activities.

- Hobby trading or specimen trading.

4.3.6.2. Range of Magnitude

The magnitude of invasive species threats ranges from nuisance to widespread killer and can have economic, health, and environmental impacts (PISC, 2017). Some invasive species can cause significant changes in the composition of their ecosystems. For example, the spotted lanternfly will inflict weeping wounds on trees, which distresses the tree. The sap will then attract other insects, especially ants and wasps. A study by Penn State found that it could cost the state's economy $325 million annually (Duke, 2020). Hydrilla grows aggressively in shallow water areas, forming thick mats that block sunlight and displace native species. They have also been shown to alter the physical and chemical characteristics of water bodies (USGS, 2020). 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 or after a wildfire, as the already weakened state of the native ecosystem causes it to succumb to an infestation more easily (Flory, et. al, 2022).

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, like the kudzu vine has done across the Southeastern United States (Center for Aquatic and Invasive Plants, 2018). This can affect the health of individual host organisms as well as the overall well-being of the affected ecosystem, as the interdependency of organisms and natural systems is disrupted. Beyond causing human, animal, and plant harm, there are secondary impacts of invasive species that go beyond harm to host species and ecosystems. For example, the impacts caused by invasive species that attack forests. Pennsylvania's forests prevent soil degradation and erosion, protect watersheds, stabilize slopes, and absorb carbon dioxide emissions (PA DCNR, 2022). 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 strong agricultural production, Pennsylvania is at risk of significant economic disruption from invasive species (Duke, 2020).

The following community lifelines are affected by invasive species:

Table 4.3.6-1 Most Likely Lifelines Impacted by Invasive Species

LIFELINES	NOTES
	If an invasive species that causes harm to health impacts the county, then hospitals may be impacted through staffing issues, an increase in patients, and supply chain issues as the disease becomes more widespread.
	Invasive species can harm crop yields, which would in turn potentially harm agricultural production and food supplies.

4.3.6.3. Past Occurrence

Invasive species have been entering Pennsylvania since the arrival of early European settlers, but not all occurrences have required government action. The first invasive species outbreak requiring state attention occurred in 1862 when legislation was enacted to provide for the destruction of and to prevent the spread of Canada Thistle, Johnson Grass, and Marijuana. Since then, there have been 26 acts and quarantines enacted to prevent the spread of invasive species. As illustrated in Table 4.3.8-4, the volume of acts and quarantines has increased since 2000 (PEMA, 2023).

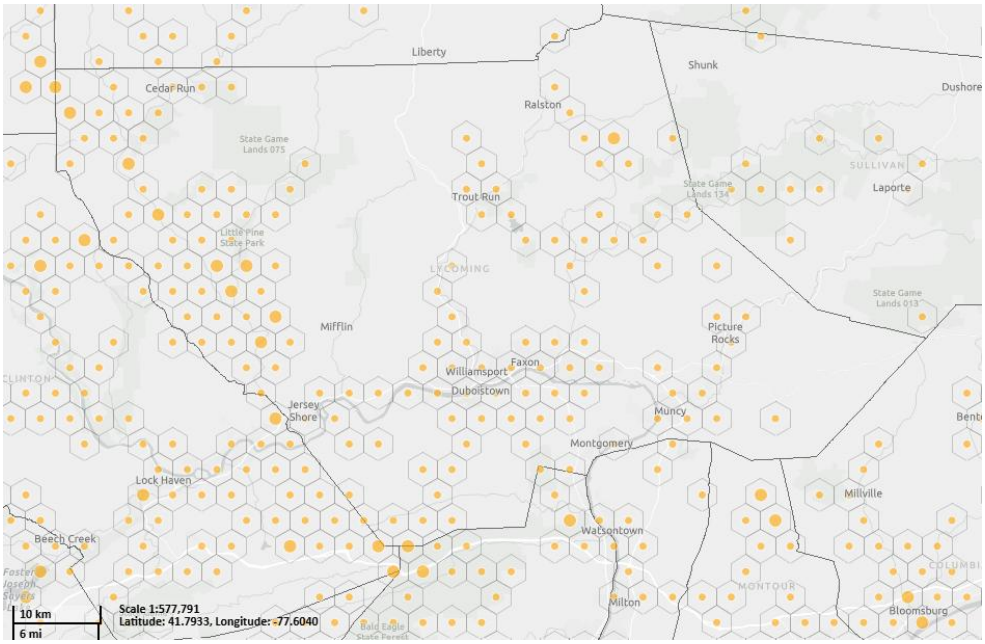
Table 4.3.6-2 Previous Occurrences of Invasive Species Events Requiring State Action or Quarantine.

YEAR	SPECIES	YEAR	SPECIES
1911	Chestnut Blight Disease	2003	Black Carp, Bighead Carp, Silver Carp
1917	Tuberculosis	2005	Eurasian Watermilfoil
1919	European Wart Disease of the Potato	2006	Chronic Wasting Disease
1923	Japanese Beetle	2006	Scarpie
1925	European Corn Borer	2006	Vesicular Stomatitis
1927	Canada Thistle, Wild Garlic, Orange Hockweed, King-Devil, Sow Thistle, Field Bindweed	2007	Emerald Ash Borer
1933	White Pine Blister	2007	Feral Pig
1933	Gypsy Moth	2008	Viral Hemorrhagic Septicemia Virus
1935	Mosquitoes	2009	Avian Influenza
1953	Black Stem Rust	2009	West Nile encephalitis, Chronic Wasting Disease, Spring Viremia of Carp, Viral Hemorrhagic Septicemia, Lymphocytic Choriomeningitis Virus, Equine Rhinopneumonitis
1983-84	Avian Influenza	2009	Emerald Ash Borer (expansion of previous quarantine)
1992	Pine Shoot Beetle	2014	Thousand Canker Disease
1996	Reptile and Amphibian Species	2014	Spotted Lanternfly

Table 4.3.6-2 Previous Occurrences of Invasive Species Events Requiring State Action or Quarantine.			
YEAR	SPECIES	YEAR	SPECIES
1999	Plum Pox Virus		

Invasive species are distributed around Lycoming County, but clusters and patterns occur, specifically along waterways and in open spaces. Figure 4.3.6-1 shows the density of invasive species observed in Lycoming County as collected by iMapInvasives, an organization that consolidates disparate sources of observation data about invasive species. The map shows a clear cluster along the western edge of the county with particular density along Pine Creek and by State Game Lands 068 in the county's northwestern corner (iMapInvasives, 2025).

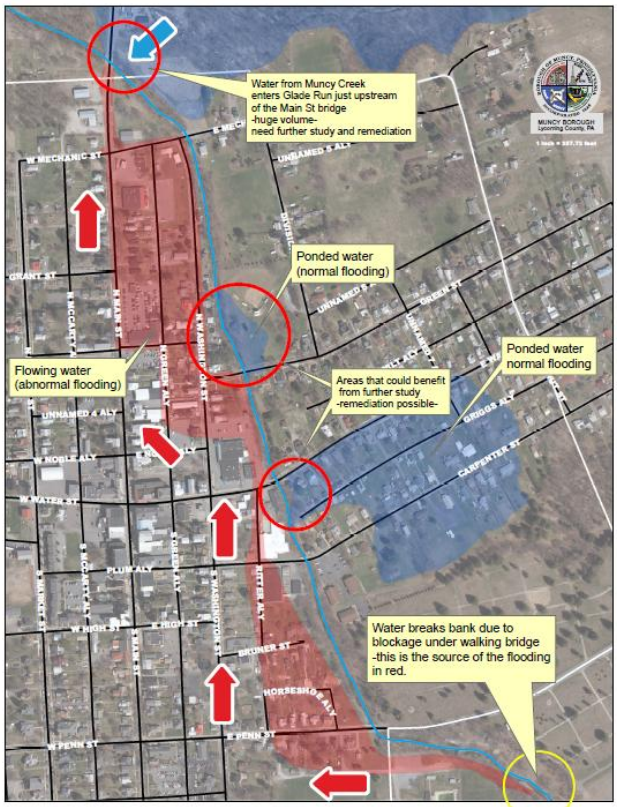
Figure 4.3.6-1 Density of Invasive Species in Lycoming County (iMapInvasives, 2025)



Lycoming County's most prominent types of invasive species are aquatic species and plant species. Due to the county's large and interconnected stream system, aquatic species cluster and spread along waterways. For example, Hydrilla and Common Carp (Cyprinus carpio) have both been extensively observed in Lycoming County's streams and creeks, while Trees-of-Heaven (Ailanthus altissama), Japanese Knotweed (Reynoutria japonica), and Mile-a-Minute vine (Persicaria perfoliate) have grown rapidly on land. Many observations of the Chinese mystery snail (Cipangopaludina chinensis) and Spotted Lanternfly (Lycorma delicatula) have also been recorded. Each of these species have been identified as either established or emerging species by PA DCNR.

Japanese Knotweed has caused particularly acute problems in Lycoming County. Native to Asia, the plant was introduced to North America in the late 1800s. It is particularly hard to manage due to its heartiness in diverse habitats; it can grow in wetlands, riparian areas, and on dry ground. It forms bamboo-like vegetation and quickly takes resources from other native plants (Invasive Species Center, 2025). During a storm event in 2018, the Glade Run watershed received heavy, intense, rainfall, Japanese Knotweed was captured by the swollen creek and formed a dam under the footbridge to Lion's Park in Muncy Creek Township. Water was diverted from the stream and found a path through areas where flooding was not typical. Eventually the water pressure from this impromptu dam forced the bridge off its abutments. The map in Figure 4.3.6-2 shows normal (expected) flooding in blue and abnormal flooding (from an unexpected point source) in red with marked flow direction. This flooding exemplifies how invasive species can move quickly from a nuisance to a risk with the potential for property damage in surrounding communities.

Figure 4.3.6-2 Flooding Caused by Japanese Knotweed in 2018



Like in the rest of the Commonwealth, Spotted Lanternflies are of particular concern in Lycoming County. Hatching around mid-May each year, the reports of lanternfly populations have been steadily growing since 2019. Further, warming climate conditions could cause lanternflies to hatch sooner, raising the potential of stressing young crops in their infant stages (Aucker, 2024). Trees-of-heaven, another invasive species, are prime hosts to spotted

lanternflies, offering ideal environments for mating and laying eggs. As lanternflies feed on the sap of the host tree, they excrete honeydew, which attracts wasps and ants. Trees-of-heaven are remarkably hearty, growing up to eighty feet tall even in poor soil conditions. They often take light and nutrients from native trees, enabling them to take over areas while hosting lanternflies (Crick et al., 2023).

4.3.6.4. Future Occurrence

According to the PISC, the probability of future occurrence for invasive species threats is on the rise because of the growing volume of transported goods, increasing technology, efficiency and speed of transportation and expanding international trade agreements. Expanded global trade has created opportunities for many organisms to be transported to and establish themselves in new countries and regions. In 2021 Pennsylvania imported over $183 billion in goods from abroad, which was dominated by pharmaceuticals and machinery but still included agricultural, forestry, and fisheries goods that commonly carry unknown pests (globalEDGE, 2021).

Furthermore, climate change can contribute to the introduction of new invasive species by modifying competition in a way that native species are more susceptible to expansion of existing invaders or the addition of new invaders (Finch et. al, 2021). The reverse may also be true in some cases. As maximum and minimum seasonal temperatures change and growing seasons lengthen, pests are given more time to outcompete native species in areas with previously inhospitable climates; these shifts are expected to impact the Northeastern and Midwest regions the most (NISAW, 2021). Invasive pests can contribute to heightened levels of CO_2 if they are an invasive that decimates tree populations. However, they can also have a dramatic positive effect on invasive plants that are already outcompeting native species (Finch et. al, 2021). For more information on recent changes in extreme temperatures, see Section 4.3.3. Wildfires and drought, or other conditions that leave bare ground, can exacerbate invasive terrestrial species that are more aggressive than native vegetation (Finch et. al 2021). All of these changes may shift the dominance of ecosystems in favor of nonnative species over time, but how that will play out is difficult to predict because of how many different factors are involved for each type of species and the context in which they are present. Overall, the probability of invasive species impacting Lycoming County can be considered *likely* according to the Risk Factor Methodology (see Table 4.4.1-1).

4.3.6.5. Vulnerability Assessment

Losses due to invasive species threats stem from three sources: (1) lost revenue from diseased, damaged, or deceased crops, livestock, lumber, or other agricultural commodities; (2) economic losses from the cost of eradication programs; and (3) losses in the form of illness or death of humans. Data is most readily available for the first source, agricultural losses. According to the 2022 USDA Census of Agriculture, Lycoming County's market value of agricultural products sold is $66,067,000. Crops represent $37,196,000 while livestock, poultry, and other products are $28,871,000. However, it is unlikely that all crops would be lost due to a single invasive species event, given that each species has different levels of seriousness.

It is difficult to estimate the costs of eradication programs and potential losses to illness or death as these situations depend largely on the species and its location.

4.3.6.6. Equity in Vulnerable Communities

According to the US Department of Agriculture National Invasive Species Information Center, invasive species introduce a variety of social and economic equity concerns. Direct impacts, such as effects on property values, agricultural productivity, and public utility operations may be of particular concern to low-income communities and those who work in the agriculture and utility sectors. Underserved communities are also particularly vulnerable to the economic impacts of invasive species as well as to pathogens related to invasive species.

4.3.7. Landslide

4.3.7.1. 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 slopes due to construction, erosion, earthquakes, and changes in groundwater levels. Mudflows, mudslides, rockfalls, rockslides, and rock topples are all forms of a landslide.

Landslides occur primarily in colluvial (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 bank and lake bluff slumps and other failure areas across much of the northern part of the state.

Landslides usually occur in areas of Lycoming County with moderate to steep slopes and during high precipitation. Many slope failures are associated with precipitation events – periods of sustained above-average precipitation, specific rainstorms, or snowmelt events. Areas experiencing erosion, decline in vegetation cover, and earthquakes are also susceptible to landslides. Human activities that contribute to slope failure include altering the natural slope gradient, increasing soil water content, and removing vegetation cover. The geologic instabilities that cause landslides to occur are often exacerbated by highway projects in which the earth is cut, and soil is loosened.

The USGS identifies Lycoming County as falling into four zones of landslide susceptibility and incidence, each generally running east to west through the county (Figure 4.3.7-1). The southernmost part of the county falls into the *Moderate Incidence/High Susceptibility* zone, meaning this area has high susceptibility to landslides with a moderate incidence of occurrence. A thin strip above this falls in the *Low Incidence* zone, meaning the area has low susceptibility to landslides and a low incidence of occurrence. The northern half of the county lies mainly in the *Moderate Incidence* zone, meaning that this area has moderate susceptibility to landslides with a moderate incidence of occurrence. The northernmost strip of the county lies in the *Low Incidence/Moderate* Susceptibility zone, which has a moderate susceptibility to landslides but a low rate of occurrence.

Given the right conditions, landslides can occur anywhere in the county. Roadways near steep slopes may experience closures due to mudslides or rock falls. However, a slope greater than 7% (approximately around 15 degrees) needs special considerations for building roads according to common engineering practice, and a slope of 15% (approximately around 25 degrees) is generally unstable and highly sensitive to surface changes. Slopes greater than 25% are very unstable. Figure 4.3.7-2 identifies landslide hazard areas throughout Lycoming County. To determine landslide vulnerability for the county, the planning team developed a slope dataset to determine areas of risk. The slope dataset was developed based on the most recent and best quality digital elevation models (DEM). The DEM utilized to create the slope dataset

was sourced from USGS 2021. Generating a slope dataset can identify areas that have a higher gradient or steepness. At a planning level, this can help identify areas at a higher risk of landslide as steeper slopes are inherently more unstable and more prone to landslides.

Appendix E includes landslide vulnerability maps for each municipality in Lycoming County. These show landslide hazard areas as compared to land uses in communities, including residential, commercial, agricultural, and open spaces. Communities with significant portions of residential and commercial areas or transportation routes in landslide hazard areas are the most vulnerable to these types of events.

Figure 4.3.7-1 Landslide Susceptibility and Incidence for Lycoming County

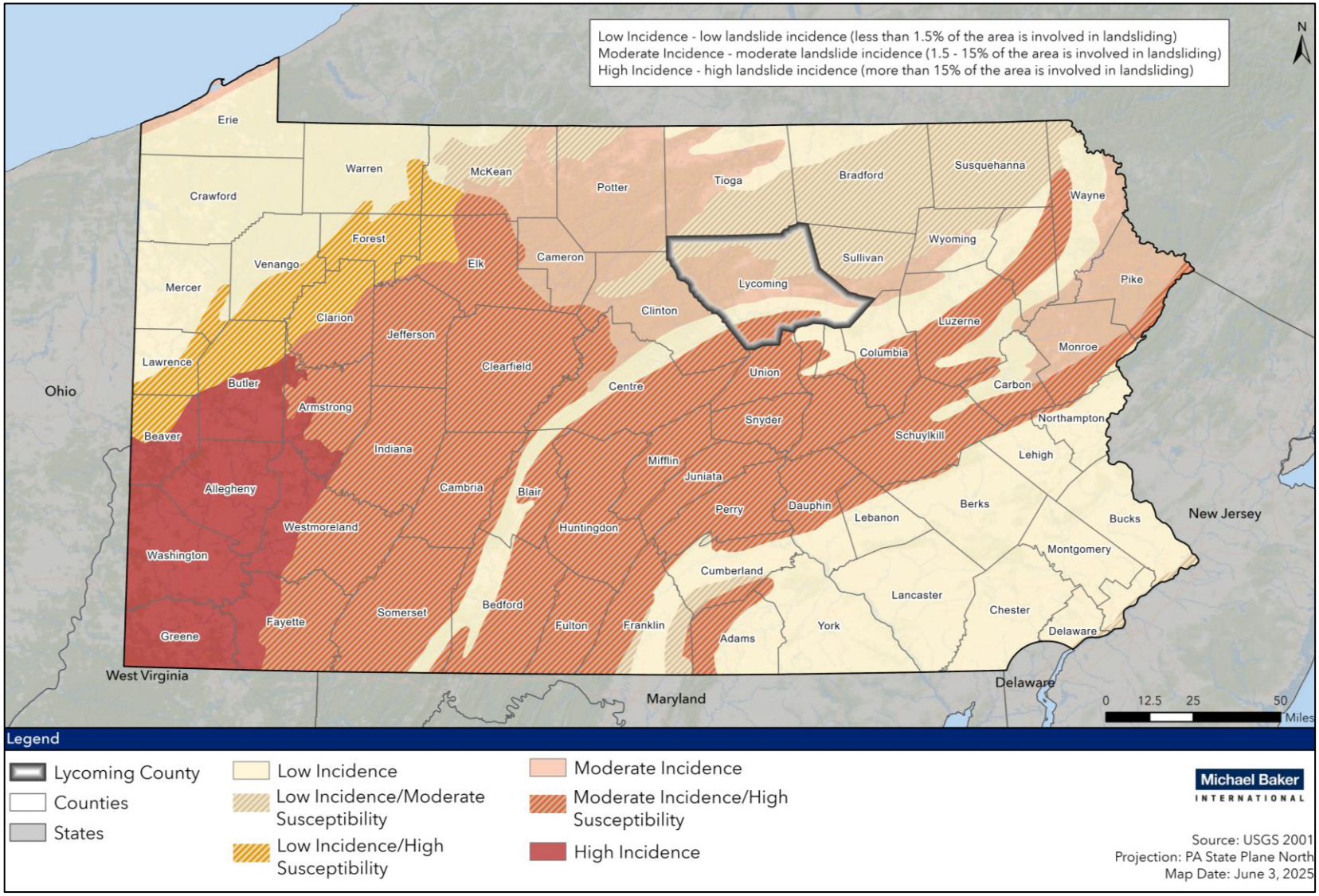
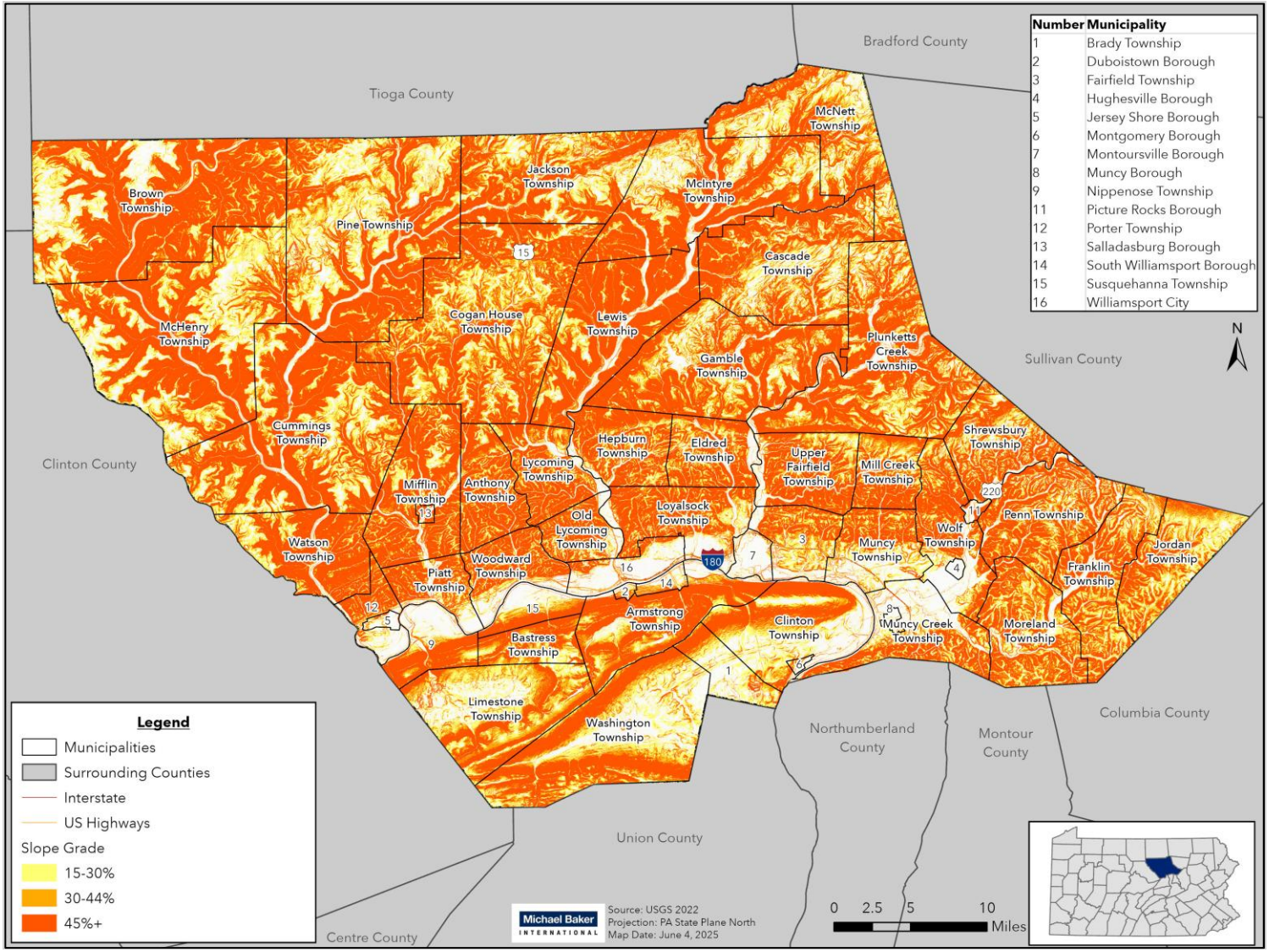


Figure 4.3.7-2 Lycoming County Landslide Hazard Areas



4.3.7.2. Range of Magnitude

Landslide velocity can vary from rapid to slow, and the amount of material moving in a landslide can range from a relatively small amount to a large amount. Landslides can include falling, sliding, or flowing of rocks and soil or a combination of these different types of motion.

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

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

Landslides can have potentially devastating consequences in localized areas. Landslides cause damage to transportation routes, utilities, and buildings and create travel delays and other side effects. Structures or infrastructure built on susceptible land will likely collapse as their footings slide downhill. Structures below the landslide can be crushed. Landslides next to roads and highways have the potential to fall on and damage vehicles or cause crashes.

Landslides in Lycoming County have reportedly involved mudslides and rockfalls resulting in road closures and traffic delays (Papa, 2018). A more damaging scenario could occur in Lycoming County if a landslide occurred along one of the major interstates. The landslide could cause damage to vehicles and the roadway and injuries to people. In addition, the landslide would have secondary effects caused by shutting down the roadway.

According to the DCNR, deaths and injuries due to landslides are rare in Pennsylvania. Most landslide events in the State are moderate to slow moving and damage property rather than people. Almost all known deaths due to landslides have occurred when rock falls or other slides along highways involved vehicles (DCNR, 2001). If residential and recreational development increases on and near steep mountain slopes, the hazard from these rapid events will also increase. Storm-induced debris flows are the only other type of landslide likely to cause death and injuries in Lycoming County.

Property losses due to landslides and associated effects are more common than injuries and deaths. An example of a worst-case scenario, as referenced in a 2001 PA DCNR landslide report, is a small landslide in 1990 that involved a broken petroleum pipeline. Spilled petroleum products entered a major river, causing city water systems to shut down. The identified costs of repairing this landslide damage, clean-up of the spill, technical investigations, legal and court costs, and environmental fines were approximately $12 million. The incalculable costs include lost productivity while people stayed at home because their businesses were closed or to care for children normally in schools that were closed due to lack of water supply, costs for the National Guard to deliver water to neighborhoods, and costs to the pipeline company and its customers due to business loss for several months (DCNR, 2001). Although this example is extreme, associated damages such as this occur with many landslides.

Most damages are less expensive, but significant. "Backyard" landslides are usually repaired incompletely or not at all. Cost estimates of several hundred thousand dollars for stabilization and repair of a landslide affecting two or three properties are typical. With repair estimates exceeding the value of the properties, abandonment is a frequent "solution." Sometimes local governments assist with relocation costs or "buy out" homeowners. Insurance for landslide damage may be limited for homeowners and businesses (DCNR, 2001).

PennDOT and large municipalities incur substantial costs due to landslide damage and to extra construction costs for new roads in known landslide-prone areas.

The following community lifelines are affected by landslides:

Table 4.3.7-1 Most Likely Lifelines Impacted by Landslide

LIFELINES	NOTES
	Shelters may be impacted by landslides as their structure may be impacted, or access may be impacted.
	Access to key transportation routes may be limited in the event of a landslide.

4.3.7.3. Past Occurrence

A comprehensive inventory of landslide events in Pennsylvania does not exist. DCNR does not record landslide events or related damages. Past studies have focused on the most vulnerable areas in Pennsylvania, so past occurrence data is not readily available for Lycoming County through these sources.

The NCEI database captures landslides as they occur in conjunction with severe storms. The only report of a landslide related event in Lycoming County is in the narrative of a flash flood event in May 2004, which resulted in three mudslides in the Muncy area (NOAA NCEI, 2025b). In addition, NASA has a Cooperative Open Online Landslide Repository. This voluntary-entry database indicates two events in Lycoming County, both in 2018 (NASA, 2025). On May 22 there was a significant mudslide in Cogan House Township caused by the collapse of half of an embankment. On September 13, a section of Route 87 in Plunketts Creek Township was closed for a few days following a mudslide.

Representatives from the county and municipal officials noted that several landslide incidents have occurred and some are under review for potential roadway changes.

4.3.7.4. Future Occurrence

Since the exact number of previous landslides over a definite time interval is not known, it is not possible to determine a quantitative probability of future occurrence for landslides in Lycoming County. With several landslide events in the past, the presence of areas susceptible to landslides, and increasing human development near hillsides, landslides causing varying levels of damage are likely to continue to occur in the absence of mitigation activities. Changing weather patterns have resulted in increased precipitation in the region. Climate specialists predict that precipitation intensity will double in the Lycoming County region by 2050 (Climate Central, 2019). More frequent and intense rainfall is leading to severe flooding and can trigger flash floods and river overflow. Saturated soils create prime conditions for landslides and mudflows. As intense rainfall continues to increase in Lycoming County, it can be expected that there will be an increase in landslide occurrence during and after rain events. Mismanaged intense development in steeply sloped areas could increase the frequency of occurrence. Utilizing the Risk Factor Methodology, the probability for a landslide event to occur is *possible* (see Table 4.4-1)

4.3.7.5. Vulnerability Assessment

A landslide vulnerability assessment involved determining the location of susceptible lands and then determining what community assets are located on those susceptible lands. The following steps are typically followed to determine the spatial extent of landslide hazards:

- Identify existing or old landslides:
    - On or at the base of slopes.
    - In or at the base of minor drainage hollows.
    - At the base or top of an old fill slope.
    - At the base or top of a steep cut slope.
    - Developed hillsides where leach field septic systems are used.
- Map the topography, since steeper slopes have greater probability of landslides.
- Map the geology, because in addition to the slope angle, the presence of rock or soil that weakens when saturated, as well as poorly drained rock or soil where indicators of slope instability as well.
- Contact local and state geological survey, other persons who might be knowledgeable about the local conditions in relation to landslides.

Conditions that may exacerbate or mitigate the severity and effects of landslides include erosion, unstable slopes, earthquakes, increase of weight of slopes, hydrologic factors, and human activity. Human activities are responsible for initiating or intensifying certain conditions where otherwise there would have been little or no risk. Activities that increase vulnerability by triggering landslides include:

- Excavations and developments in unstable slope materials.
- Haphazard construction or improper use of pipelines.

- Disruption of surface or subsurface drainage (streams and springs) e.g. by filling.
- Overuse of fill materials on slopes, particularly at the heads of existing slide masses.
- Removal of materials at the bases of slopes.
- Vibrations from heavy traffic, blasting, and driving piles near unstable slopes.

Landslide vulnerability is highly site-specific, but this HMP provides an estimate of structures or critical facilities that may be vulnerable to landslides by being located on slopes of 15% or steeper, where it is much more likely that a landslide event will occur. Municipalities with the most structures and critical facilities along steep slopes are more likely to incur damages from a landslide event. Appendix E includes maps showing landslide hazard areas by land use in each municipality. The most vulnerable communities are those that have significant portions of residential or commercial areas in landslide hazard areas. Cummings Township and Watson Township have the largest amounts of land in landslide hazard areas. Penn Township has several landslide hazard areas throughout residential neighborhoods. Municipalities should use these maps to inform future land use controls, which can reduce development in hazardous areas.

Table 4.3.7-2 shows the number of structures and people vulnerable to landslides in each municipality. About 43% of structures in Lycoming County are in landslide prone areas, and there are no critical facilities in these areas. In terms of population, about 50% of the county is considered to live near areas with a steep slope with residential structures being the highest vulnerable land use type, as seen in Table 4.3.7-3.

Table 4.3.7-2 Structures and critical facilities vulnerable to landslides.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES IN LANDSLIDE PRONE AREAS	PERCENT STRUCTURES IN LANDSLIDE PRONE AREAS	TOTAL CRITICAL FACILITIES	TOTAL CRITICAL FACILITIES IN STEEP SLOPE AREAS OVER 15%	PERCENT CRITICAL FACILITIES IN STEEP SLOPE AREAS OVER 15%	TOTAL POPULATION	POPULATION IN STEEP SLOPE AREAS OVER 15%	PERCENT POPULATION STEEP SLOPE AREAS OVER 15%
Anthony Township	387	333	86%	4	4	100%	867	847	98%
Armstrong Township	429	301	70%	1	0	0%	686	584	85%
Bastress Township	245	195	80%	3	2	67%	527	486	92%
Brady Township	234	115	49%	3	0	0%	501	286	57%
Brown Township	421	292	69%	5	4	80%	93	46	49%
Cascade Township	323	204	63%	0	0	0%	422	366	87%
Clinton Township	1,161	589	51%	18	5	28%	3,720	2,670	72%
Cogan House Township	636	465	73%	8	5	63%	935	849	91%
Cummings Township	604	315	52%	5	5	100%	265	148	56%
Duboistown Borough	560	417	74%	4	0	0%	1,200	964	80%
Eldred Township	905	538	59%	4	0	0%	1,997	1,443	72%
Fairfield Township	1,482	998	67%	4	3	75%	2,834	2,569	91%
Franklin Township	518	376	73%	5	0	0%	903	744	82%
Gamble Township	484	330	68%	3	3	100%	778	656	84%
Hepburn Township	1,267	794	63%	6	4	67%	2,578	1,857	72%
Hughesville Borough	973	38	4%	9	4	44%	2,154	53	2%
Jackson Township	289	201	70%	1	1	100%	396	322	81%
Jersey Shore Borough	1,792	420	23%	17	6	35%	4,166	1,060	25%
Jordan Township	533	411	77%	4	0	0%	850	738	87%
Lewis Township	648	285	44%	10	4	40%	862	484	56%
Limestone Township	844	402	48%	5	1	20%	1,966	1,186	60%
Loyalsock Township	5,171	2,221	43%	35	12	34%	11,561	6,790	59%

Table 4.3.7-2 Structures and critical facilities vulnerable to landslides.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES IN LANDSLIDE PRONE AREAS	PERCENT STRUCTURES IN LANDSLIDE PRONE AREAS	TOTAL CRITICAL FACILITIES	TOTAL CRITICAL FACILITIES IN STEEP SLOPE AREAS OVER 15%	PERCENT CRITICAL FACILITIES IN STEEP SLOPE AREAS OVER 15%	TOTAL POPULATION	POPULATION IN STEEP SLOPE AREAS OVER 15%	PERCENT POPULATION STEEP SLOPE AREAS OVER 15%
Lycoming Township	774	405	52%	1	0	0%	1,491	906	61%
McHenry Township	626	371	59%	4	3	75%	122	82	67%
McIntyre Township	383	127	33%	4	0	0%	461	192	42%
McNett Township	219	140	64%	2	0	0%	143	131	92%
Mifflin Township	552	317	57%	4	0	0%	1,089	743	68%
Mill Creek Township	301	247	82%	4	2	50%	582	491	84%
Montgomery Borough	661	443	67%	4	4	100%	1,568	1,094	70%
Montoursville Borough	2,301	150	7%	17	2	12%	4,750	417	9%
Moreland Township	487	373	77%	5	3	60%	1,015	908	89%
Muncy Borough	1,172	236	20%	12	1	8%	2,440	668	27%
Muncy Creek Township	1,835	472	26%	6	1	17%	3,573	1,301	36%
Muncy Township	646	312	48%	12	4	33%	1,178	931	79%
Nippenose Township	358	162	45%	5	1	20%	661	376	57%
Old Lycoming Township	2,454	1,277	52%	8	1	13%	4,975	3,159	63%
Penn Township	559	414	74%	2	0	0%	895	763	85%
Piatt Township	536	331	62%	2	1	50%	1,047	710	68%
Picture Rocks Borough	285	52	18%	6	1	17%	643	227	35%
Pine Township	465	250	54%	2	0	0%	258	177	69%
Plunketts Creek Township	609	306	50%	5	0	0%	597	426	71%
Porter Township	698	339	49%	5	0	0%	1,528	997	65%
Salladasburg Borough	134	29	22%	1	0	0%	250	55	22%
Shrewsbury Township	304	188	62%	0	0	0%	418	324	78%

Table 4.3.7-2 Structures and critical facilities vulnerable to landslides.

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES IN LANDSLIDE PRONE AREAS	PERCENT STRUCTURES IN LANDSLIDE PRONE AREAS	TOTAL CRITICAL FACILITIES	TOTAL CRITICAL FACILITIES IN STEEP SLOPE AREAS OVER 15%	PERCENT CRITICAL FACILITIES IN STEEP SLOPE AREAS OVER 15%	TOTAL POPULATION	POPULATION IN STEEP SLOPE AREAS OVER 15%	PERCENT POPULATION STEEP SLOPE AREAS OVER 15%
South Williamsport Borough	2,842	1,486	52%	18	4	22%	6,261	3,603	58%
Susquehanna Township	494	281	57%	4	2	50%	968	873	90%
Upper Fairfield Township	888	541	61%	5	1	20%	1,807	1,542	85%
Washington Township	775	368	47%	8	1	13%	1,768	1,063	60%
Watson Township	364	243	67%	1	1	100%	534	445	83%
Williamsport, City of	10,860	2,423	22%	74	5	7%	27,754	6,962	25%
Wolf Township	1,567	577	37%	8	1	13%	3,105	1,364	44%
Woodward Township	1,142	689	60%	5	1	20%	2,046	1,273	62%
TOTAL	55,197	23,789	43%	388	107	28%	114,188	57,351	50%

Table 4.3.7-3 Structures Landslide Vulnerability for Lycoming County								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER	RESIDENTIAL	UNKNOWN	TOTAL
Anthony Township	129	4	0	1	4	169	26	333
Armstrong Township	28	6	1	1	10	176	79	301
Bastress Township	45	2	0	4	2	128	14	195
Brady Township	14	3	0	1	0	84	13	115
Brown Township	34	1	1	1	5	214	36	292
Cascade Township	84	1	0	0	6	78	35	204
Clinton Township	58	17	1	8	5	436	64	589
Cogan House Township	169	10	0	0	7	210	69	465
Cummings Township	48	6	0	0	2	176	83	315
Duboistown Borough	0	9	0	4	1	373	30	417
Eldred Township	81	4	1	2	1	416	33	538
Fairfield Township	60	26	0	13	24	757	118	998
Franklin Township	160	5	0	3	7	152	49	376
Gamble Township	101	5	0	1	5	183	35	330
Hepburn Township	122	15	2	3	10	585	57	794
Hughesville Borough	0	4	0	0	0	28	6	38
Jackson Township	61	5	0	0	4	91	40	201
Jersey Shore Borough	0	30	1	18	5	320	46	420
Jordan Township	160	9	0	8	4	161	69	411
Lewis Township	41	5	0	3	5	187	44	285
Limestone Township	109	3	0	5	5	243	37	402
Loyalsock Township	107	35	1	22	74	1,611	371	2,221
Lycoming Township	76	4	0	3	9	276	37	405

Table 4.3.7-3 Structures Landslide Vulnerability for Lycoming County								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER	RESIDENTIAL	UNKNOWN	TOTAL
McHenry Township	42	2	0	1	11	272	43	371
McIntyre Township	13	1	0	1	8	74	30	127
McNett Township	54	1	0	0	3	50	32	140
Mifflin Township	102	3	1	2	7	161	41	317
Mill Creek Township	80	2	0	0	5	136	24	247
Montgomery Borough	0	33	1	26	2	331	50	443
Montoursville Borough	0	5	2	2	1	123	17	150
Moreland Township	150	4	0	2	1	177	39	373
Muncy Borough	0	13	0	9	2	205	7	236
Muncy Creek Township	71	9	0	5	5	326	56	472
Muncy Township	56	15	2	3	4	193	39	312
Nippenose Township	16	4	0	2	4	112	24	162
Old Lycoming Township	84	22	2	4	16	1,059	90	1,277
Penn Township	137	3	0	0	12	215	47	414
Piatt Township	57	5	0	2	4	214	49	331
Picture Rocks Borough	7	1	0	1	0	39	4	52
Pine Township	72	1	0	2	8	120	47	250
Plunketts Creek Township	69	2	0	0	16	176	43	306
Porter Township	30	10	1	1	3	272	22	339
Salladasburg Borough	3	0	0	1	0	19	6	29
Shrewsbury Township	60	2	0	4	6	75	41	188
South Williamsport Borough	0	28	1	9	11	1,302	135	1,486
Susquehanna Township	11	4	0	3	4	215	44	281

Table 4.3.7-3 Structures Landslide Vulnerability for Lycoming County								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER	RESIDENTIAL	UNKNOWN	TOTAL
Upper Fairfield Township	131	6	0	3	18	322	61	541
Washington Township	111	4	0	3	3	215	32	368
Watson Township	57	3	0	1	3	148	31	243
Williamsport, City of	4	95	2	24	39	1,961	298	2,423
Wolf Township	120	4	1	5	18	380	49	577
Woodward Township	93	22	1	5	8	459	101	689
TOTAL	**3,317**	**513**	**22**	**222**	**417**	**16,405**	**2,893**	**23,789**
**Calculated by overlaying Lycoming County GIS structure data with Slope Grade areas above 15%*								

Table 4.3.7-4 below shows the Expected Annual Losses to Landslide for each census tract in the county according to FEMA's National Risk Index.

Table 4.3.7-4 Expected Annual Losses to Landslide by Census Tract (FEMA NRI, 2023)

CENSUS TRACT	MUNICIPALITIES	ESTIMATED ANNUAL LOSSES	ESTIMATED ANNUAL LOSS RATING
1.00	Williamsport City	$1,701.31	Relatively Moderate
2.00	Williamsport City	$1,246.89	Relatively Moderate
3.00	Williamsport City	$1,957.04	Relatively Moderate
4.00	Williamsport City	$22.04	Very Low
5.00	Williamsport City	$0.00	No Expected Annual Losses
6.00	Williamsport City	$541.38	Relatively Low
8.00	Williamsport City	$794.37	Relatively Low
9.00	Williamsport City	$1,949.54	Relatively Moderate
10.00	Williamsport City	$3,636.61	Relatively Moderate
101.00	Cogan House Township, Pine Township, Jackson Township, McIntyre Township, McNett Township	$38,292.53	Relatively High
102.00	Brown Township, McHenry Township, Cummings Township, Watson Township	$3,972.39	Relatively Moderate
103.00	Anthony Township, Mifflin Township, Piatt Township, Salladasburg Borough	$5,651.67	Relatively High
104.00	Hepburn Township, Lycoming Township, Lewis Township	$6,737.88	Relatively High
105.01	Cascade Township, Gamble Township, Plunketts Creek Township	$35,879.30	Relatively High
105.02	Eldred Township, Upper Fairfield Township	$4,284.30	Relatively Moderate
106.00	Shrewsbury Township, Penn Township, Moreland Township, Franklin Township, Jordan Township	$9,475.58	Relatively High
107.00	Mill Creek Township, Wolf Township, Picture Rocks Borough, Hughesville Borough	$5,196.76	Relatively Moderate
108.00	Muncy Creek Township, Muncy Borough, Muncy Township	$5,254.23	Relatively High
109.00	Fairfield Township	$5,362.22	Relatively High
110.00	Montoursville Borough	$3,063.51	Relatively Moderate
111.00	Loyalsock Township	$4,206.73	Relatively Moderate

Table 4.3.7-4 Expected Annual Losses to Landslide by Census Tract (FEMA NRI, 2023)			
CENSUS TRACT	**MUNICIPALITIES**	**ESTIMATED ANNUAL LOSSES**	**ESTIMATED ANNUAL LOSS RATING**
112.00	Loyalsock Township	$9,025.80	Relatively High
113.01	Woodward Township	$2,372.31	Relatively Moderate
113.02	Old Lycoming Township	$7,723.59	Relatively High
114.00	Armstrong Township, Susquehanna Township	$2,113.59	Relatively Moderate
116.01	Duboistown Borough	$2,082.62	Relatively Moderate
116.03	South Williamsport Borough	$3,281.79	Relatively Moderate
116.04	South Williamsport Borough	$6,941.81	Relatively High
117.01	Clinton Township, Montgomery Borough	$3,602.31	Relatively Moderate
117.02	Brady Township, Washington Township, Clinton Township	$1,273.68	Relatively Moderate
118.00	Bastress Township, Nippenose Township, Limestone Township	$3,500.58	Relatively Moderate
119.00	Jersey Shore Borough, Porter Township	$6,526.85	Relatively High
TOTAL		$187,671.21	

4.3.7.6. Equity in Vulnerable Communities

Equity considerations include those who live in manufactured homes as they are highly susceptible to any ground disturbances. This means areas of Woodward and Fairfield Townships may be particularly vulnerable. Low-income communities may not have the capital to maintain roads and keep drainage systems adequate. This can exacerbate landslide risks. In terms of immediate safety risks, vulnerable populations, such as the elderly, people with disabilities, or those without access to emergency shelters, may face greater risks. This means areas of the City of Williamsport and Loyalsock Township may be particularly vulnerable.

4.3.8. Pandemic and Infectious Disease

4.3.8.1. Location and Extent



Pandemics are defined as a disease affecting or attacking the population of an extensive region, including several countries, and/or continent(s). It is further described as extensively epidemic. Generally, pandemic diseases cause sudden, pervasive illness in all age groups on a global scale. Infectious diseases are also highly virulent and can spread either directly or indirectly from person to person.

Pandemic and infectious disease events cover a wide geographical area and can affect large populations, potentially including the entire population of the county. 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. Pandemic events can also occur after other natural disasters, particularly floods, when there is the potential for bacteria to grow and contaminate water.

Lycoming County is primarily concerned with the possibility of a pandemic flu outbreak. 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. Influenza is considered to have pandemic potential if it is novel, meaning that people have no immunity to it, virulent, meaning that is causes deaths in normally healthy individuals, and easily transmittable from person-to-person (CDC, 2024a).

Different strands of influenza mutate over time and replace older strands of the virus and thus have drastically different effects. The H1N1 virus, colloquially known as swine flu, is of particular concern. This virus was first detected in people in the United States in April 2009. On June 11, 2009, the World Health Organization signaled that a pandemic of 2009 H1N1 flu was underway (CDC, 2009). Avian influenza, also known as bird flu, infects birds. A recent strain, H5N1, has caused concern due to its ability to pass from wild birds to poultry then on to people. This virus has killed more than half of the people infected with it, although the avian flu is less likely to infect humans (Mayo Clinic, 2024).

At the time of the last HMP update, a novel coronavirus spread into a worldwide pandemic. Named COVID-19, this type of coronavirus is a new virus that causes respiratory illness and is extremely contagious. Flu like in nature, symptoms of the virus include fever, cough, shortness of breath, and diarrhea (CDC, 2025). This virus became a great concern due to its high rates of transmission, in addition to so little being known about it. People were advised to practice social distancing; only leaving the house for essentials like grocery shopping, and no gathering even in small groups. Even when going on walks, health care professionals recommended that

individuals wear masks and remain six feet apart to slow the spread of transmission. While COVID-19 is no longer novel, it is still present in the county.

4.3.8.2. Range of Magnitude

The magnitude of a pandemic or infectious disease in Lycoming County will range significantly depending on the aggressiveness of the virus in question and the ease of transmission. Pandemic influenza is easily transmitted from person-to-person, but advances in medical technologies have greatly reduced the number of deaths caused by influenza over time. The magnitude of a pandemic may be exacerbated by the fact than an influenza pandemic will cause outbreaks across the United States, limiting the ability to transfer assistance from one jurisdiction to another. Additionally, effective preventive and therapeutic measures, including vaccines and other medications, will likely be in short supply or will not be available.

In terms of lives lost, the impact various pandemic influenza outbreaks have had globally over the last century has declined, with the exception of COVID-19 (see Table 4.3.8-2). Medically high-risk populations are more vulnerable and include children, the elderly, pregnant women, and chronic disease patients with reduced immune system capacity. These populations are described in more detail in Section 4.3.8.5. Most people infected with H1N1 flu in 2009 recovered without needing medical treatment. Unlike a regular flu season, according to the Centers for Disease Control and Prevention (CDC) the majority of people who died, as many as 77%, were 18-64 years old with up to 11% of the deaths estimated in those 17 years old or younger (CDC, 2009).

The 1918 Spanish flu pandemic was the worst-case pandemic event in the 20th century for both Pennsylvania and worldwide. County data is unavailable, and mortality figures were probably under-reported. It is recorded that over 60,000 Pennsylvanians died from the flu or its complications in this pandemic (Shetty & Aher, 2018). Infection rates were much worse in denser cities, which should be a higher priority for response actions in future flu events.

Avian bird flu hit Pennsylvania in 1983 and 1984, resulting in the loss of 17 million birds, which equated to a loss of $65 million in economic activity (Smith, 2015). An event of a similar scale would be a worst-case scenario for Lycoming County.

It is believed that the coronavirus originated in an open-air market in the Wuhan province of China in November 2019. Shortly afterwards, the virus began to spread to nearby countries like Japan and South Korea. By March 2020, the virus had reached almost every country worldwide, with the most cases in the US. At first, people were mostly concerned with those who might be infected due to recent travel. However, community infections soon began to crop up in many cities and towns. This led to a statewide shutdown of schools and businesses and the cancellation of large events for spring and summer 2020. Only life sustaining services were permitted to remain open, including medical facilities, pharmacies, and grocery stores. People were advised remain home as much as possible in attempt to slow the transmission of COVID-

19. State health officials note that the virus has infected all age ranges at about the same rate, and that no age group can be considered more or less vulnerable to infection. (CDC, 2024b). Stay at home restrictions were lifted in June 2020. However, as the virus evolves the Pennsylvania Department of Health has changed restrictions as necessary to protect public health.

At the end of 2020, the first COVID-19 vaccine for emergency use was authorized by the EPA and by March 2021 more than 100 million COVID-19 vaccine doses had been administered. (CDC, 2024b) While the Federal Public Health Emergency for COVID-19 expired on May 11th, 2023, new variants have begun to pop up and case levels remain significant nationwide (US DHHS, 2024).

Viruses like COVID-19 constantly change through mutation, which sometimes result in a new variant of the virus. Some changes and mutations may allow the virus to spread more easily or make it resistant to treatments and vaccines. It is essential to track and monitor the incidence of variants during a pandemic to effectively respond to changing trends in transmission and patient care (CDC, 2023).

While COVID-19 or pandemic events do not cause environmental harm themselves, capacity in the environmental sector was similarly reduced. Several studies have found that the global socio-economic disruptions from the COVID-19 pandemic have directly and indirectly impacted community's abilities to implement projects that can improve environmental conditions such as air and water quality, reduction of noise, and restoration of ecology (Rume & Didar-Ul Islam, 2020).

Furthermore, there are significant economic and social costs beyond the possibility of deaths. Widespread illness may increase the likelihood of shortages of personnel to perform essential community services. In addition, high rates of illness and worker absenteeism would occur within the business community, and these contribute to social and economic disruption. Business closures or stay-at-home orders may result in job loss and increased unemployment claims. 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.

The potential impacts of pandemic and infectious diseases are as follows:

Table 4.3.8-1 Most Likely Lifelines Impacted by Pandemic and Infectious Diseases	
LIFELINES	NOTES
	Government services and administration will be significantly impacted by widespread disease. Response plans will need to be developed.
	Staffing issues may occur due to illness at various points in the food supply chain.
	Hospitals will be impacted through staffing issues, an increase in patients, and supply chain issues as the disease becomes more widespread.

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 and worldwide deaths are shown in Table 4.3.8-2 below.

Table 4.3.8-2 List of previous significant outbreaks of influenza over the past century (Global Security, 2009; WHO, 2009).		
DATE	**PANDEMIC**	**WORLDWIDE DEATHS (APPROXIMATE)**
1918-1920	Spanish Flu / H1N1	50 million
1957-1958	Asian Flu / H2N2	1.5-2 million
1968-1969	Hong Kong Flu / H3N2	1 million
2009 - 2010	Swine Flu / H1N1	12,000

Confirmed flu cases have been on the rise in Lycoming County over the past few years. Table 4.3.8-3 lists the number of confirmed flu cases in the county by flu season. According to the Pennsylvania Department of Health (DOH), there were 2,309 confirmed cases in the most recent influenza season from September 2024 to August 2025 (PA DOH, 2025a).

The CDC marked the 2014-2015 flu season as severe, with approximately 710,000 hospitalizations. The CDC does not track national deaths in adults, but the organization reported 148 pediatric deaths from influenza. The 2017-2018 flu season was another severe season. The CDC reported that the H3N2 flu, along with other strains including H1N1, led to more cases, doctors' visits, hospital visits, and deaths than previous flu seasons. The CDC also noted that the flu became widespread in all states and jurisdictions at the same time. In January

2018, approximately halfway through the flu season, 37 pediatric deaths were reported. The CDC estimated that 34 million Americans were affected by the flu (CDC, 2018).

According to the CDC, flu cases remained low during the seasons of 2020/21 and 2021/22 due to COVID-19 precautions. However, during the 2022-2023 flu season, influenza activity returned to levels that were seen prior to the emergence of COVID-19. Influenza activity in the United States during the 2022/23 season was classified as having moderate severity, but the season was classified as high severity among children. Among children and adolescents, the percentages of influenza symptomatic illness, medically attended illnesses, and hospitalizations were higher during the 2022-2023 season compared to pre-COVID-19 pandemic seasons. Children aged 5-17 years accounted for 27% of symptomatic illnesses, 30% of medically attended illnesses, and 6% of hospitalizations. In addition, 187 pediatric deaths were reported for the 2022/23 season as of October 26, 2024. However, flu-related pediatric deaths are likely under-reported, as not all children whose death was related to a flu virus infection may have been tested for the flu. Therefore, the CDC estimates that at least 400 additional deaths associated with flu occurred during the 2022-2023 season among children aged <18 years. Overall, the CDC estimated that 31 million Americans were affected by the flu (CDC, 2024c).

Table 4.3.8-3 Confirmed Flu Cases in Lycoming County by Flu Season (PA DOH, 2025a)

FLU SEASON	NUMBER OF CONFIRMED CASES
2014/15	632
2015/16	147
2016/17	899
2017/18	900
2018/19	1194
2019/20	1314
2020/21	2020/21 influenza season data is not available because influenza activity was abnormally low, likely due to COVID-19 mitigation measures.
2021/22	N/A
2022/23	1,247
2023/24	N/A
2024/25	2,309

The COVID-19 outbreak began in China in November 2019. The virus reached the United States in late February 2020, and most counties in Pennsylvania were affected by March 2020. By October 1, 2020, there were more than 162,140 confirmed cases in Pennsylvania, with almost 1,005 cases and 32 deaths reported in Lycoming County (PA DOH, 2020; PA Open Data, 2025). As shown in Table 4.3.8-4, the number of cases continued to rise at a steady rate until they eventually peaked in the spring of 2021.

Table 4.3.8-4 Cumulative COVID-19 Cases and Total Deaths in Lycoming County 2020-2023 (PA Open Data, 2024; PA Open Data. 2025)		
DATE	**CUMULATIVE CASES**	**CUMULATIVE DEATHS**
March 31, 2020	6	0
April 30, 2020	72	1
May 31, 2020	163	18
June 30, 2020	185	20
July 31, 2020	332	22
August 31, 2020	522	25
September 30, 2020	716	27
October 31, 2020	1,005	32
November 30, 2020	2,299	47
December 31, 2020	6,166	154
January 31, 2021	8,198	227
February 28, 2021	9,396	252
March 31, 2021	10,346	269
April 30, 2021	11,452	282
May 31, 2021	11,997	292
June 30, 2021	12,100	298
July 31, 2021	12,180	301
August 31, 2021	12,859	309
September 30, 2021	14,739	329
October 31, 2021	16,888	368
November 30, 2021	19,552	410
December 31, 2021	21,833	455
January 31, 2022	26,987	498
February 28, 2022	28,192	512
March 31, 2022	28,373	516
April 30, 2022	28,647	523
May 31, 2022	29,678	532
June 30, 2022	30,223	541
July 31, 2022	30,932	549
August 31, 2022	31,787	557
September 30, 2022	32,439	567
October 31, 2022	33,038	572
November 30, 2022	33,604	579
December 31, 2022	34,058	582
January 31, 2023	34,368	588
February 28, 2023	34,910	591
March 31, 2023	35,288	596
April 30, 2023	35,377	601
May 31, 2023	35,430	601
June 15, 2023	35,435	601

In the avian flu outbreak in Pennsylvania in 1983-1984, 17 million birds were lost. There has not been an outbreak since, although there have recently been outbreaks in the Midwest. In 1996-1997, a number of table-egg farms in Lancaster and Lebanon Counties tested positive for H7N2 avian influenza. As a result, nine flocks were lost, and PA Department of Agriculture imposed a quarantine on a 75-square-mile area restricting movement of poultry or poultry products into or out of the area (Jacob et al., 1998). A similar outbreak in Lycoming County could cause significant economic loss.

4.3.8.4. Future Occurrence

Future occurrences of pandemics and infectious diseases are unclear and impossible to predict. The precise timing of pandemic influenza is uncertain, but occurrences are most likely when the Influenza Type A virus makes a dramatic change, or antigenic shift, that results in a new or "novel" virus to which the population has no immunity. This emergence of a novel virus is the first step toward a pandemic. Future pandemics may also emerge from other diseases, especially invasive pathogens that Pennsylvanians do not have natural immunity to, like COVID-19 at its emergence. While it is unlikely that pandemics and infectious diseases will affect the county, this hazard occurred recently in Spring 2020. The best form of response is to expect that these events can occur at any time and to constantly evaluate resources and update emergency response plans. Climate change is increasing the likelihood of future pandemics due to shifts in the behaviors of hosts, vectors, and pathogens, along with changing weather patterns, migration shifts, and changes in livestock and agriculture practices which may allow new transmission pathways to develop.

Climate change will also force animals into different migration patterns and into new habitats, which can create new interactions and opportunities for pathogens to infect new hosts. This is a concern as most pandemics are driven by diseases that are passed from animals to humans (Baker & Metcalf, 2022).

It is important to note that even if these changes do not originate in Pennsylvania, the interconnectedness of global commerce and tourism increase the risks of diseases spreading across the world from their origin. Future pandemics and infectious disease outbreaks may emerge from a long list of diseases, and invasive pathogens for which Pennsylvanians lack natural immunity present a significant danger.

Looking at the number of historical incidences of pandemic-potential diseases, the probability of future pandemic events can be considered *unlikely* according to the Risk Factor Methodology (see Table 4.4-1).

4.3.8.5. Vulnerability Assessment

Certain population groups are at higher risk of pandemic flu infection. This includes people 65 years and older, children younger than 5 years old, pregnant women, and people of any age with certain chronic medical conditions. Such conditions include but are not limited to diabetes,

heart disease, asthma, and kidney disease (CDC, 2015). Schools, colleges, convalescent centers, and other institutions serving those younger than 5 years old and older than 65 years old, are locations conducive to faster transmission of pandemic influenza since population identified as being at high risk are concentrated at these facilities or because they have a large number of people living in close quarters. In general, jurisdictions that are more densely population are more vulnerable to disease threats when the disease is directly spread from human to human, but every jurisdiction in the Commonwealth has some vulnerability to pandemic and infectious disease threats.

There are some occupation-specific risks that may make some employees more vulnerable. For example, those working in direct patient care situations are more likely to be exposed to a pandemic disease.

There are no true environmental impacts of pandemics and infectious disease threats, but there will be significant economic and social costs beyond the possibility of disease-related deaths. Widespread illness may increase the likelihood of shortages of personnel 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. 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.

Jurisdictional losses in a pandemic or infectious disease outbreak stem from lost wages and productivity, not losses to buildings or land. Losses are difficult to estimate because the exact rates of absenteeism and cost of treating a widespread disease will depend on the virus or bacterium in question, the availability of vaccination or treatment, and the severity of symptoms. Pennsylvania's economy is integral to the national economy, so economic losses from a pandemic or infectious disease threat could be significant.

An avian flu outbreak could cause some economic loss for poultry farmers in Lycoming County. According to the 2022 Agricultural census, livestock, poultry, and products sales make up about 44% of Lycoming County's agricultural sales. Poultry and egg sales totaled around $6,162,000 in 2022 (USDA, 2024).

The COVID-19 pandemic had significant impacts on economic activity across the country. Thousands of individuals were laid off across the commonwealth as non-essential businesses were forced to close. In just one week, over three million Americans filed for unemployment; the greatest amount ever (Rushe & Holpuch, 2020). The service and hospitality industries were particularly impacted. Construction projects and other businesses were forced to pause operations while many others decided to permanently close. To combat these impacts, the

commonwealth and the federal government released relief packages for individuals and businesses. Lycoming County assisted 252 local entities and allocated $10.2 million in COVID relief funds from the Coronavirus Aid, Relief, and Economic Securities Act (CARES Act). This money went to school districts, nonprofits, local businesses, fire/EMS companies, alternative learning centers, and both county and municipal entities. The county also compiled a list with links on their website to medical information, relief packages, and other resources.

The COVID-19 pandemic has also spurred conversations around creating safe public spaces and work environments with respect to pandemic and infectious disease. The International Code Council (ICC) published an overview of code compliance that helps facilitate response to pandemic instances. For example, properly designed, installed, and maintained ventilation systems can help in mitigating the spread of pathogens (ICC, 2020). Many buildings have chosen to inspect and upgrade these systems during shelter in place orders. This is essential towards stopping the spread of pathogens in high density residential buildings and ensures workers will return to a safe environment when it is safe to work in offices again.

4.3.8.6. Equity in Vulnerable Communities

Equity considerations during pandemics and infectious disease outbreaks are crucial as there are a number of populations at an increased risk. Those living with chronic medical conditions, older adults, and young children may be particularly susceptible to the effects of pandemics and infectious disease outbreaks. Additionally, low-income populations are more likely to lack access to quality healthcare and have pre-existing health conditions. Furthermore, these populations may be unable to follow quarantine measures as they may be essential workers or live in group quarters. Williamsport, Jersey Shore Borough, and Porter Township are municipalities with the lowest number of medical practitioners per 1,000 people. Populations of people 65 and older are overall more susceptible to severe outcomes related to infectious disease, especially those currently residing within congregate care facilities. Households with inadequate broadband connection will have inequitable access to both remote work and remote learning. Having measures and protections in place for these groups is essential to mitigate and reduce the extensivity of this hazard.

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, PA, showed that readings on a construction worker frequently exceeded expected radiation levels, yet only natural, non-fission-product radioactivity was detected on him. Radon levels in his home were detected around 2,500 pCi/L (pico Curies per Liter), much higher than the 4 pCi/L guideline of the Environmental Protection Agency, or even the 67 pCi/L limit for uranium miners. As a result of this event, the Reading Prong section of Pennsylvania where the worker lived became the focus of the first large-scale radon scare in the world.

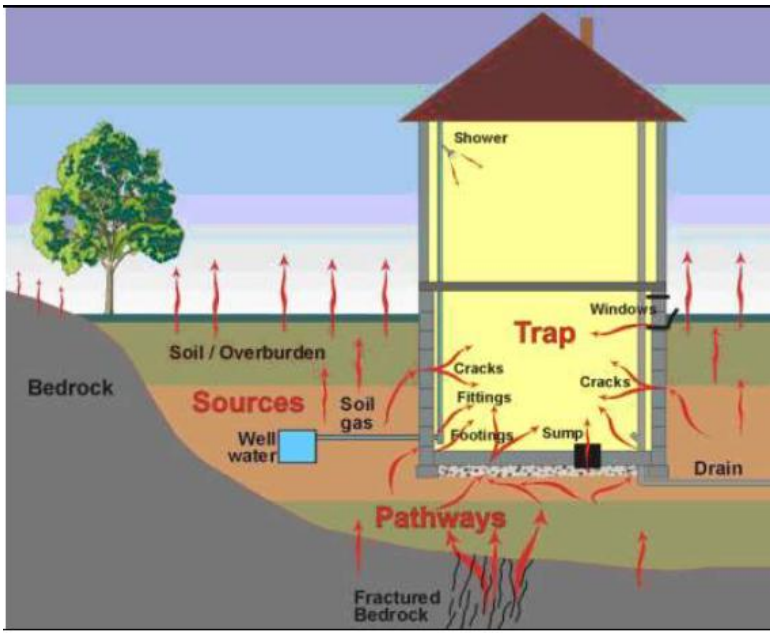
Radon is a gas that cannot be seen or smelled. It is a noble gas that originates from the natural radioactive decay of uranium and thorium. Like other noble gases (e.g., helium, neon, and argon), radon forms essentially no chemical compounds and tends to exist as a gas or as a dissolved atomic constituent in groundwater. 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 (i.e. 220Rn) has a half-life (time for decay of half of a given group of atoms) of 55 seconds, barely long enough for it to migrate from its source to the air inside a house and pose a health risk. However, radon (i.e. 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 (i.e. 226Ra), 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.

Three sources of radon in houses are now recognized (shown in Figure 4.3.9-1):

- 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 4.3.9-1 Sketch of radon entry points into a house (Arizona Geological Survey, 2006).



High radon levels were initially thought to be exacerbated in houses that are 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 4.3.9-1). Soil gas typically contains from a few hundred to a few thousand pCi/L of radon; therefore, even a small rate of soil gas inflow can lead to elevated radon concentrations in a house.

The radon concentration of soil gas depends upon a number of soil properties, the importance of which is still being evaluated. In general, ten to fifty percent of newly formed radon atoms escape the host mineral of their parent radium and gain access to the air-filled pore space. The radon content of soil gas clearly tends to be higher in soils containing higher levels of radium and uranium, especially if the radium occupies a site on or near the surface of a grain from which the radon can easily escape. The amount of pore space in the soil and its permeability for 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 similar to those in deep soil.

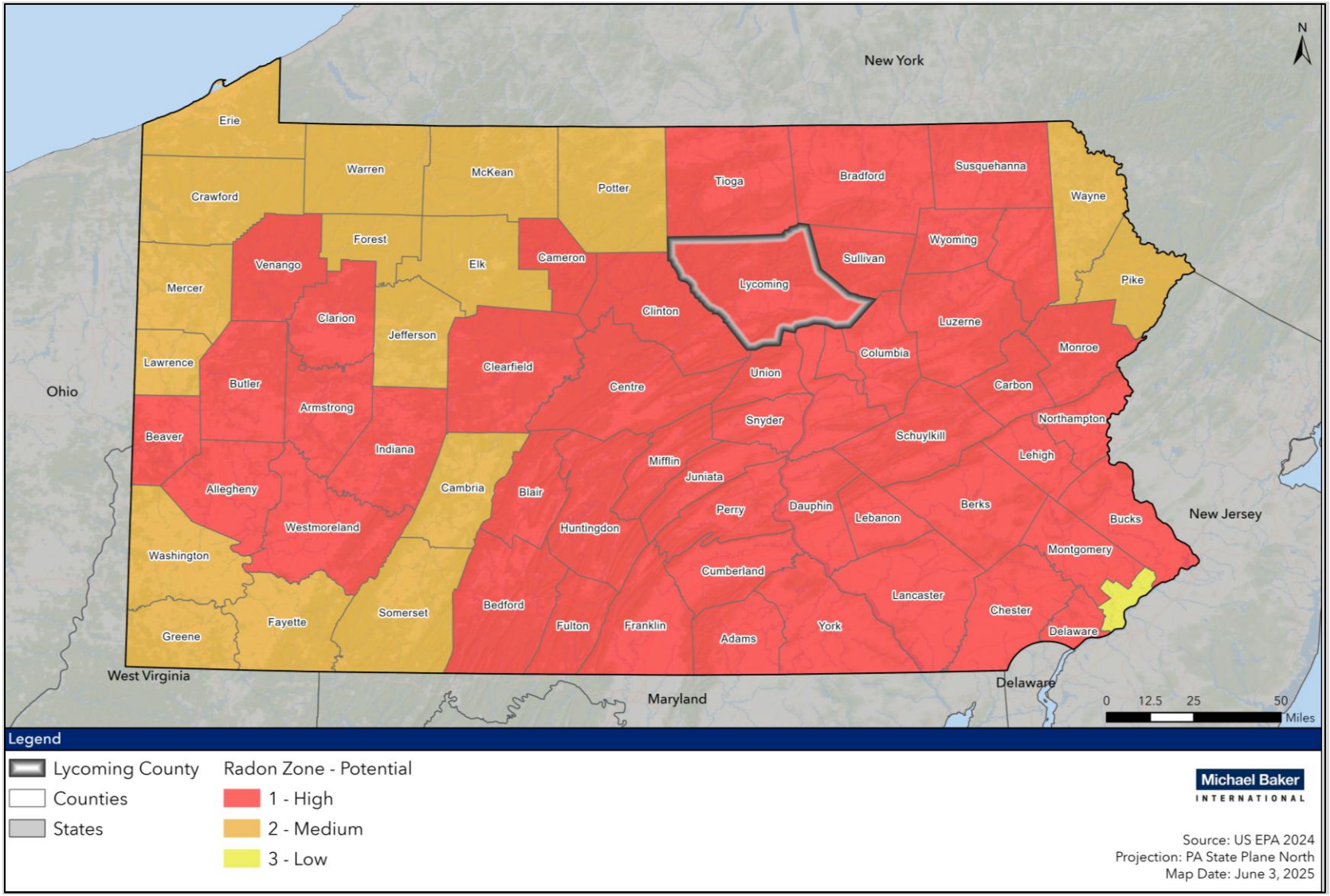
Each county in Pennsylvania is classified as having a *low*, *moderate*, or *high* radon hazard potential. Lycoming County is classified as having a high hazard, meaning there is a predicted indoor radon level greater than 4 pCi/L (see Figure 4.3.9-2).

Areas where houses have high levels of radon can be divided into three groups in terms of uranium content in rock and soil:

- Areas of very elevated uranium content (>50 parts per million (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 second factor listed above is most likely the cause of high radon levels in Lycoming County. There are eight areas of Lycoming County which have had high radon level test results, mostly in the central area of the county. The areas and test results are shown in more detail in Table 4.3.9-2.

Figure 4.3.9-2 Radon Hazard Zones in Pennsylvania (EPA, 2024)



4.3.9.2. Range of Magnitude

Exposure to radon is the second leading cause of lung cancer after smoking. It is the number one cause of lung cancer among non-smokers. Radon is responsible for about 21,000 lung cancer deaths every year; approximately 2,900 of which occur among people who have never smoked. Lung cancer is the only known effect on human health from exposure to radon in air and thus far, there is no evidence that children are at greater risk of lung cancer than adults (EPA, 2020a). The main hazard is actually from the radon daughter products (218Po, 214Pb, 214Bi), which may become attached to lung tissue and induce lung cancer by their radioactive decay.

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 the table, a smoker exposed to radon has a much higher risk of lung cancer.

Table 4.3.9-1 Radon risk for smokers and non-smokers (EPA, 2016).

RADON LEVEL (cCi/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)	
NON-SMOKERS			
20	About 36 people could get lung cancer	35 times the risk of drowning	Fix Structure
10	About 18 people could get lung cancer	20 times the risk of dying in a home fire	

Table 4.3.9-1 Radon risk for smokers and non-smokers (EPA, 2016).			
RADON LEVEL (cCi/L)	**IF 1,000 PEOPLE WERE EXPOSED TO THIS LEVEL OVER A LIFETIME…***	**RISK OF CANCER FROM RADON EXPOSURE COMPARES TO…****	**ACTION THRESHOLD**
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.*			

The worst-case scenario for radon exposure would be that a large area of tightly sealed homes provided residents high levels of exposure over a prolonged period without the residents being aware. This worst-case scenario exposure then could lead to many people with cancer attributed to the radon exposure.

The potential impacts of radon exposure community lifelines are as follows:

Table 4.3.9-2 Most Likely Lifelines Impacted by Radon Exposure	
LIFELINES	NOTES
	Direct exposure to radon can pose serious health risks and impact the safety of the community.
	Shelters may be at risk to radon exposure, so people would not be able to use them if another hazard event were to occur and shelters were needed.
	Exposure will increase the chances of lung cancer-causing potential increase in the amount of services and resources needed if communities develop more instances of cancer.

4.3.9.3. Past Occurrence

Current data on abundance and distribution of radon as it affects individual houses in Pennsylvania in general and Lycoming County specifically is considered incomplete and potentially biased. The EPA has estimated that the national average indoor radon concentration is 1.3 pCi/L and the level for action is 4.0 pCi/L. However, they have estimated that the average indoor concentration in Pennsylvania basements is about 7.1 pCi/L and 3.6 pCi/L on the first floor (EPA, 2016).

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 DEP over 4 pCi/L, then DEP works to help the homeowners make repairs to their houses to mitigate against high radon levels. The total number tests reported to DEP 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 the area.

In Lycoming County, 25 zip codes had sufficient tests reported to DEP to report their findings, which are shown in Table 4.3.9-2. This table does not include the zip codes for which insufficient data was collected in both basements and first floors. The spatial distribution of this data is illustrated in Figures 4.3.9-3 and 4.3.9-4.

Table 4.3.9-3 Radon level tests and results in Lycoming County zip codes (PA DEP, 2024b).

ZIP CODE	AREA OF LYCOMING COUNTY	BASEMENT			FIRST FLOOR		
		NUMBER OF TESTS	MAXIMUM RESULT (pCi/L)	AVERAGE RESULT (pCi/L)	NUMBER OF TESTS	MAXIMUM RESULT (pCi/L)	AVERAGE RESULT (pCi/L)
16921	Gaines	30	45.6	7.7	Insufficient Data	Insufficient Data	Insufficient Data
16938	Blackwell	56	49.8	6.3	Insufficient Data	Insufficient Data	Insufficient Data
16930	Liberty	74	89.9	8.3	Insufficient Data	Insufficient Data	Insufficient Data
17701	Williamsport	5283	1,003.0	10.1	896	115	3.8
17702	Williamsport	675	206.5	6.7	96	38.1	4.7
17724	Leroy	126	43.7	7.9	56	23.9	3.3
17728	Cogan Station	739	419.0	19.0	70	223.0	13.2
17737	Hughesville	592	322.0	12.5	100	52.3	4.2
17740	Salladasburgh	933	301.0	12.3	180	109.8	3.6
17744	Linden	206	180.6	17.7	45	53.4	6.0
17745	Lock Haven	2539	407.0	9.4	349	126.4	3.8
17747	Longanton	160	93.9	8.8	Insufficient Data	Insufficient Data	Insufficient Data
17752	Montgomery	348	100.0	7.2	49	6.6	1.7
17754	Montoursville	2526	448.0	10.8	237	91.7	6.4
17756	Muncy	1124	321.0	12.3	247	188.3	3.4
17758	Sonestown	61	119.2	6.5	Insufficient Data	Insufficient Data	Insufficient Data
17765	Roaring Branch	35	20.6	4.4	Insufficient Data	Insufficient Data	Insufficient Data
17771	Trout Run	217	402.2	20.1	49	111.4	5.8
17772	Turbotville	227	75.9	6.2	30	22.8	3.0
17774	Muncy	57	139.2	11.5	Insufficient Data	Insufficient Data	Insufficient Data
17777	Watsontown	696	219.3	8.4	103	37.5	2.9
17810	Montgomery	107	36.5	6.2	Insufficient Data	Insufficient Data	Insufficient Data
17814	Benton	387	370.0	16.9	98	55.5	5.1
17844	Mifflinburg	1108	349.0	12.0	270	42.8	2.4
17846	Millville	330	215.0	15.8	75	45.3	3.2

*Zip Codes with no data available or insufficient data for both basement and first floor readings are not included in this table. This includes the following zip codes: 17723, 17727, 17729, 17742, 17760, 17763, 17768, 17776, and 18619.

Figure 4.3.9-3 Average Basement Radon Test Results from 1987-2025

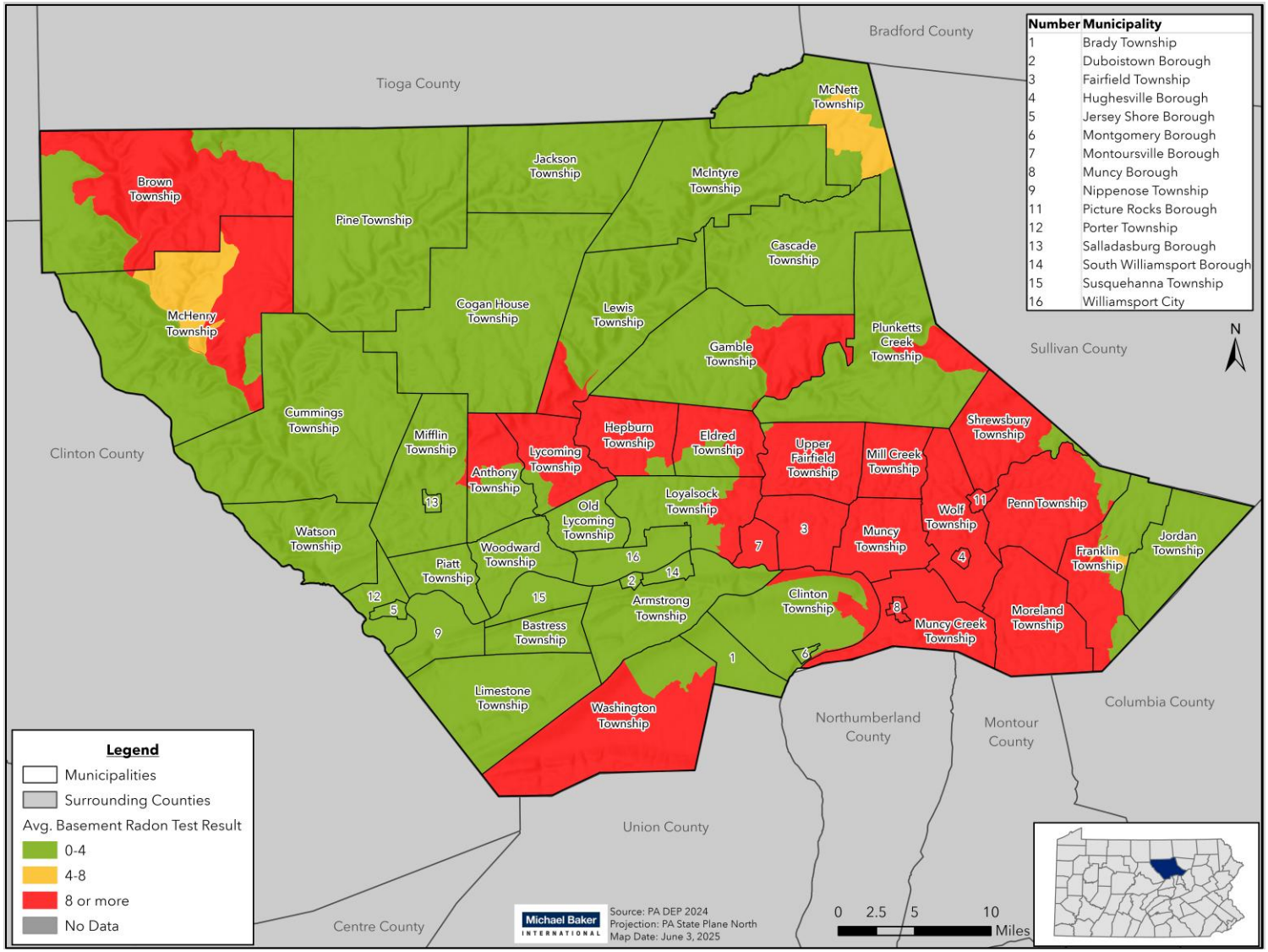
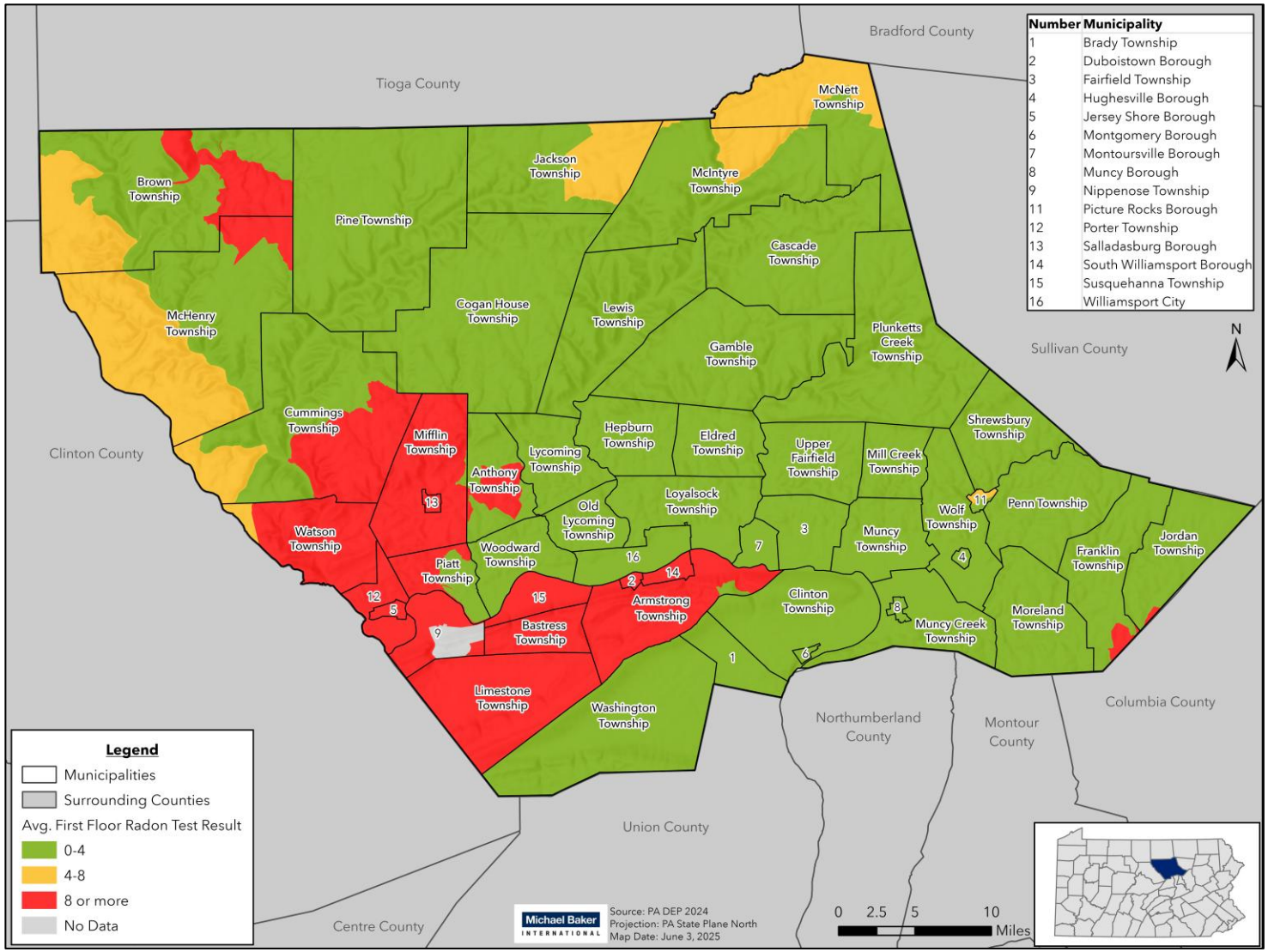


Figure 4.3.9-4 Average First Floor Radon Test Result from 1987-2025



4.3.9.4. Future Occurrence

Radon exposure is inevitable given present soil, geologic, and geomorphic factors in Lycoming County. Future occurrence of high radon level hazards can be considered *possible* as defined by the Risk Factor Methodology probability criteria (see Table 4.4-1). 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

Houses in Lycoming County, especially in the central areas of the county, could be susceptible to high levels of radon. Smokers can be up to ten times more vulnerable to lung cancer from high levels of radon depending on the level of radon they are exposed to (see Table 4.3.9-1). Older houses that have crawl spaces or unfinished basements are more vulnerable as well because of the increased exposure to soils which could be releasing higher levels of radon gas. Additionally, houses that rely on wells for their water may face an additional risk, although this type of exposure is low and rare in Pennsylvania. Proper testing for radon levels should be completed across Lycoming 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 in houses, businesses and schools.

The EPA determines that an average radon mitigation system costs $1,200. The EPA also states that current state surveys show that 1 home in 5 has elevated radon levels. Using this methodology, radon loss estimation is factored by assuming that 20% of buildings within the zip codes with elevated rest results have elevated radon values and each would require a radon mitigation system installed at the EPA estimated average of $1,200. According to the Pennsylvania State Hazard Mitigation Plan, Lycoming County has 49,444 buildings in areas with high radon test results, while approximately 20%, or 9,889, of these buildings will be impacted. The estimated cost for radon mitigation total $11,866,500.

Radon exposure has minimal environmental impacts. Due to the relatively short half-life of radon, it tends to only affect living or breathing organisms such as humans or pets which are routinely in contained areas (i.e. basement or house) where the gas is released

4.3.9.6. Equity in Vulnerable Communities

Communities with an aged housing stock are the most likely to be exposed to radon exposure as radon creeps in through poor foundations or ventilation systems. Low-income communities are more likely to have aged housing stock, so proper awareness is essential. This includes Williamsport City, South Williamsport Borough, Montoursville Borough, and Loyalsock Township as they have the largest numbers of structures over 55 years old. Williamsport also has the largest population below the poverty level. Low-income communities may also have less disposable income to afford testing kits, home repairs, and mitigation systems.

4.3.10. Subsidence, Sinkhole



4.3.10.1. Location and Extent

There are two common causes of subsidence in Pennsylvania: dissolution of carbonate rock such as limestone or dolomite, and mining activity. In the first case, water passing through naturally occurring fractures and bedding planes dissolves bedrock leaving voids below the surface (DCNR, 2020a). Eventually, overburden on top of the void collapses, leaving surface depressions resulting in karst topography. Characteristic structures associated with karst topography include sinkholes, linear depressions, and caves. Collapse sometimes occurs only after a large amount of activity, or when a heavy burden is placed on the overlying materials. This type of subsidence is fairly localized in extent. The second type occurs when an area has been sufficiently undermined, causing soil weakness and eventual collapse. Mining-related subsidence and sinkholes are possible but not the primary concern in Lycoming County.

In Pennsylvania, research has shown that subsidence may, but will not necessarily, occur in areas underlain by carbonate bedrock. Subsidence potential in Lycoming County is primarily associated with this type of carbonate rock subsidence event. Figure 4.3.9-1 shows that a small portion of Lycoming County lies in an area of Pennsylvania where limestone/dolomite bedrock is present near ground surface, thus making those areas more susceptible to natural sinkhole development. This area lies over parts of several communities in the South-West corner of Lycoming County. The map also illustrates DCNR's partial inventory of sinkholes and surface depressions.

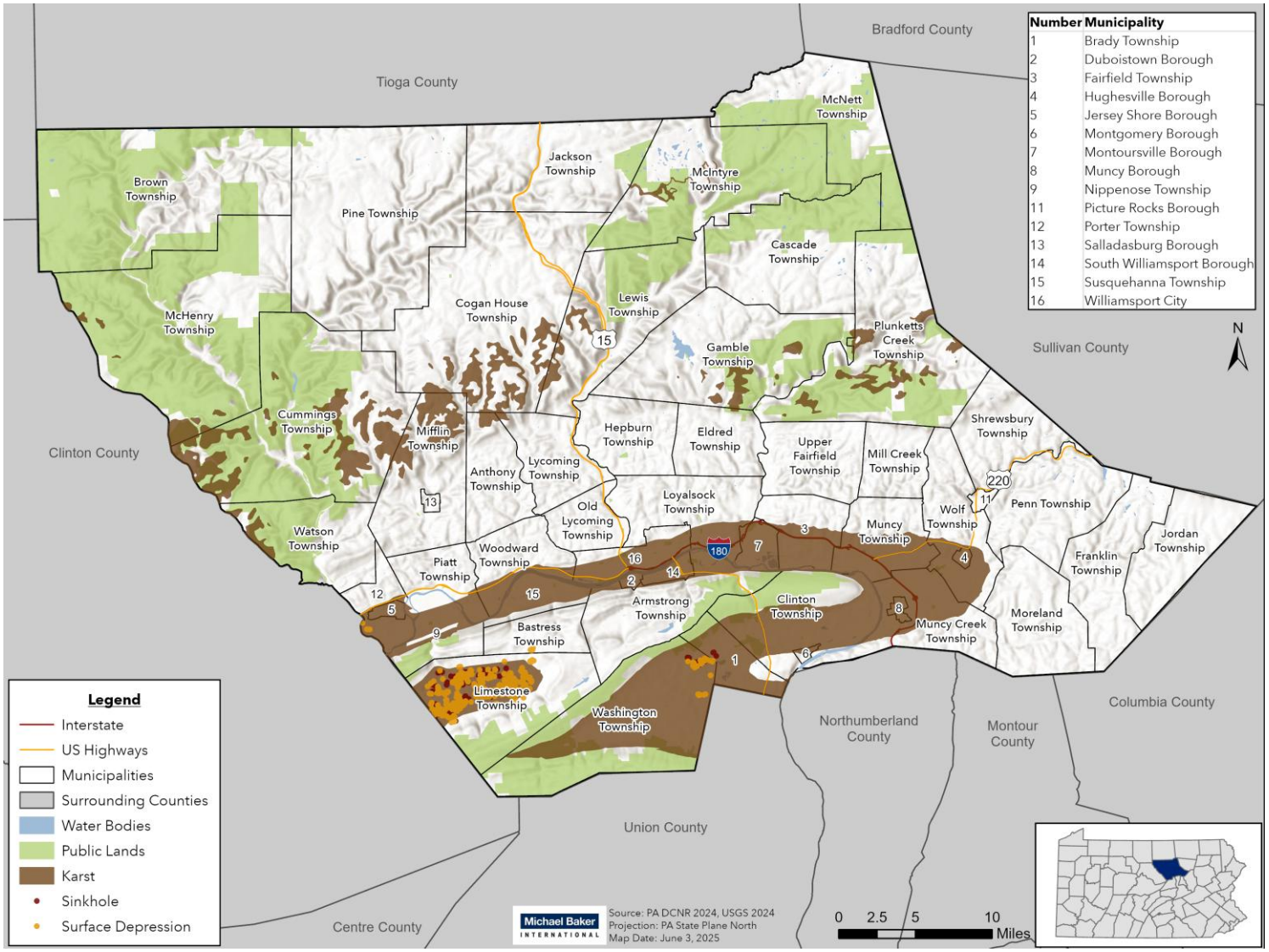
The following municipalities have identified near-surface carbonate rock and are therefore vulnerable to sinkholes:

- Anthony Township.
- Armstrong Township.
- Brady Township.
- Clinton Township.
- Cogan House Township.
- Cummings Township.
- Duboistown Borough.
- Fairfield Township.
- Gamble Township.
- Hughesville Borough.
- Jersey Shore Borough.
- Lewis Township.
- Limestone Township.
- Loyalsock Township.
- Lycoming Township.
- McHenry Township.
- Mifflin Township.
- Montgomery Borough.
- Montoursville Borough.
- Muncy Borough.
- Muncy Creek Township.
- Muncy Township.
- Nippenose Township.
- Piatt Township.
- Porter Township.
- South Williamsport Borough.
- Susquehanna Township.
- Washington Township.
- Watson Township.
- City of Williamsport.
- Wolf Township.
- Woodward Township

Lycoming County is located within two distinctive physiographic provinces. Most of the county is within the Allegheny High Plateaus section of the Appalachian Plateaus Province. This section is characterized by rolling hills dissected by steep stream valleys. Rock layers here are still horizontal, not deformed into ridges. However, creeks have cut down through rock layers in this section to form steep valleys, such as the Pine Creek Gorge. The southern third is within the Appalachian Mountain section of the Valley and Ridge Province. This section is characterized by a series of sharp-crested ridges separated by long narrow valleys. Ridges are composed of hard resistant sandstones and quartzite, while the valleys are underlain by softer rocks such as limestone and shale (LCPC, 1993). Valley areas in the southern part of Lycoming County are the most susceptible to sinkholes and subsidence due to these geologic characteristics.

Human activity can accelerate the creation of subsidence or sinkhole events. Leaking water pipes or structures that convey storm-water runoff may also result in areas of subsidence as the water dissolves substantial amounts of rock over time. Poorly managed stormwater may be an exacerbating factor in subsidence events. In some cases, construction, land grading or earthmoving activities that cause changes in stormwater flow can trigger sinkhole events. Transportation Incidents may be caused or exacerbated by sinkholes or subsident portions of road. Southern areas of the county which contain karst topography are of concern, as are the major roadways in this portion of the county. Interstate 180 traverses through the southern part of Lycoming County and intersects with limestone topography, which is known to be susceptible to sinkhole and subsidence incidents. US Highways 15 and 220 also intersect portions of geography where Limestone exists. Portions of these roadways are at greater risk of subsidence, sinkholes, and resulting or coincidental transportation incidents. Figure 4.3.10-1 shows areas of Lycoming County that are particularly susceptible to natural subsidence. For additional information related to transportation hazards, refer to Section 4.3.24.

Figure 4.3.10-1 Areas Subject to Natural Subsidence



4.3.10.2. Range of Magnitude

No two subsidence areas or sinkholes are exactly alike. Variations in size and shape, speed of onset (i.e. gradually or abruptly), and their proximity to development ultimately determines the magnitude of damage incurred. Based on the geologic formations underlying parts of Lycoming County, subsidence and sinkhole events may occur gradually or abruptly. Events could result in minor elevation changes or deep, gaping holes in the ground surface. 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 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 although sinkholes are limited in extent.

General recommendations have been published for site investigations prior to construction of buildings due to the potential for karst subsidence. They vary depending on the rock type immediately underlying soil cover. The recommendations include thorough geotechnical investigations to identify un-collapsed karst features and potential excavation to solid rock prior to construction.

In 2019, a break in the sewer line along Campbell Street in the City of Williamsport caused a large sinkhole. The City Municipal Water Authority estimated that it would need $550,000 in emergency repairs. Repairs on the original sewer before this incident were difficult due to its construction of brick and mortar, which had simply eroded away over time. Campbell Street was closed for several weeks after this incident (Danneker, June 14, 2019)

Figure 4.3.10-2 Large Sinkhole caused by sewer break in the City of Williamsport (Danneker, June 1, 2019).



Figure 4.3.10-3 Large Sinkhole caused by sewer break in the City of Williamsport (Danneker, June 14, 2019).



Groundwater in limestone and other similar carbonate rock formations can be easily polluted, because water moves readily from the earth's surface down through solution cavities and fractures, thus undergoing very little filtration. Contaminants such as sewage, fertilizers, herbicides, pesticides, or industrial products are of concern.

The magnitude of land subsidence and sinkholes in Lycoming County can be moderate as there have been past occurrences of land subsidence. Experience in Pennsylvania shows that subsidence may cause from a fraction of an inch to several feet of sagging of the surface of the earth and may occur within minutes or over several years.

According to the PA DEP, structural damages due to subsidence range from slight damage requiring cosmetic repairs to severe damage requiring foundation replacement or other high-cost repairs.

The worst-case scenario for sinkholes in Lycoming County would be a series of large sinkholes opening in Muncy Township. Though the geographic minority of the township is vulnerable to sinkholes, a series of sinkholes in this township could cut off access to I-180 and US-220, both major roads in the county. Sinkholes or other subsidence along these major roadways could cause crashes and pileups of cars, semi-trucks, and other vehicles transporting hazardous materials. Subsequent road closures and hazardous material spills could result. In addition, Muncy Township has the highest value of property within the vulnerable area: over $264 million. Further, a series of sinkholes could close secondary roads, cause power outages, prevent the delivery of emergency services, and cause injuries or death to the township's residents. Other worst-case scenarios would involve a sinkhole under a critical facility such as a hospital. This

could lead to structural damage and injuries to those in the building. During building repairs, part of the facility would need to be closed which would reduce capacity and ability to fill essential services.

The following impacts of subsidence and sinkholes on community lifelines are as follows:

Table 4.3.10-1 Most Likely Lifelines Impacted by Subsidence and Sinkholes

LIFELINES	NOTES
	Safety concerns related to sinkholes and subsidence as they have the potential to cause significant harm. Mitigation should be focused on increasing residents' knowledge of risks in their area.
	Disruption of water utility services, and potential groundwater contamination may occur.
	Direct damage to transportation infrastructure may occur depending on the location of the hazard.

4.3.10.3. Past Occurrence

The Pennsylvania DCNR maintains an online Sinkhole Inventory Database of sinkholes throughout the Commonwealth. According to the DCNR there have been a total of 70 sinkholes and 391 surface depressions in Lycoming County as of 2025. Table 4.3.10-2 shows the breakdown of sinkhole and surface depression by municipality.

Table 4.3.10-2 Sinkhole and surface depressions by municipality

MUNICIPALITY	SINKHOLE	SURFACE DEPRESSION
Brady Township	3	0
Bastress Township	0	4
Limestone Township	56	360
Porter Township	0	3
Washington Township	11	24
TOTAL	70	391

While mining-related subsidence is not the primary concern in Lycoming County, it has happened. On December 3rd, 2024 in Unity Township, a woman reportedly fell into a sinkhole above an old coal mine (Williamsport Sun-Gazette, 2024). The mine had been compromised and the sinkhole was suspected to have been formed while the woman was walking near the area (Deliso, 2024). The woman was found dead on December 13th, 2024 (Bartos, 2024).

4.3.10.4. Future Occurrence

Based on geological conditions, subsidence events may possibly occur in the future for the areas of Lycoming County underlain by carbonate rock such as limestone. Sinkholes and surface depressions are dependent on several variables, including land use and water management. Changes in these variables can affect the likelihood and frequency of future subsidence events. Overall, the probability of future subsidence and sinkhole events can be considered *unlikely* according to the Risk Factor Methodology (see Table 4.4-1).

4.3.10.5. Vulnerability Assessment

The most vulnerable municipalities are those that have identified near-surface limestone or past sinkhole occurrence. See Section 4.3.10-1 for a listing of these communities.

The secondary effects of sinkhole formation have the potential to cause significant impacts in communities underlain by surface-level carbonate rock, including structural damage, damage to transportation systems, and damage to subsurface utility systems. Structures and critical facilities located over limestone and dolomite bedrock are considered vulnerable to sinkholes and are inventoried in Table 4.3.10-3. Hughesville Borough, Jersey Shore Borough, Montoursville Borough, Muncy Borough, and South Williamsport Borough have 100% of their structures located in subsidence prone areas. About 60% of the critical facilities in Lycoming County are vulnerable to subsidence based on this analysis. Table 4.3.10-4 provides the property type of the vulnerable structures within subsidence areas in Lycoming County. The majority of structures in subsidence prone areas are residential structures, as seen in Table 4.3.10-4.

Table 4.3.10-3 Structures and critical facilities vulnerable to subsidence.

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN SUBSIDENCE PRONE AREAS	PERCENT STRUCTURES IN SUBSIDENCE PRONE AREAS	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN SUBSIDENCE PRONE AREAS	PERCENT CRITICAL FACILITIES IN SUBSIDENCE PRONE AREAS	TOTAL POPULATION	POPULATION IN SUBSIDENCE PRONE AREAS	PERCET POPULATION IN SUBSIDENCE PRONE AREAS
Anthony Township	387	2	1%	4	0	0%	867	0	0%
Armstrong Township	429	253	59%	1	0	0%	686	223	33%
Bastress Township	245	0	0%	3	0	0%	527	0	0%
Brady Township	234	222	95%	3	3	100%	501	501	100%
Brown Township	421	0	0%	5	0	0%	93	0	0%
Cascade Township	323	0	0%	0	0	#DIV/0!	422	0	0%
Clinton Township	1,161	1,004	86%	18	17	94%	3,720	3146	85%
Cogan House Township	636	9	1%	8	0	0%	935	9	1%
Cummings Township	604	106	18%	5	0	0%	265	58	22%
Duboistown Borough	560	557	99%	4	4	100%	1,200	1200	100%
Eldred Township	905	0	0%	4	0	0%	1,997	0	0%
Fairfield Township	1,482	1,071	72%	4	4	100%	2,834	1590	56%
Franklin Township	518	0	0%	5	0	0%	903	0	0%
Gamble Township	484	15	3%	3	0	0%	778	82	11%
Hepburn Township	1,267	0	0%	6	0	0%	2,578	0	0%
Hughesville Borough	973	973	100%	9	9	100%	2,154	2154	100%
Jackson Township	289	0	0%	1	0	0%	396	0	0%
Jersey Shore Borough	1,792	1,792	100%	17	17	100%	4,166	4166	100%
Jordan Township	533	0	0%	4	0	0%	850	0	0%
Lewis Township	648	17	3%	10	0	0%	862	6	1%
Limestone Township	844	610	72%	5	3	60%	1,966	1345	68%
Loyalsock Township	5,171	2,842	55%	35	20	57%	11,561	5983	52%

Table 4.3.10-3 Structures and critical facilities vulnerable to subsidence.

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN SUBSIDENCE PRONE AREAS	PERCENT STRUCTURES IN SUBSIDENCE PRONE AREAS	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN SUBSIDENCE PRONE AREAS	PERCENT CRITICAL FACILITIES IN SUBSIDENCE PRONE AREAS	TOTAL POPULATION	POPULATION IN SUBSIDENCE PRONE AREAS	PERCET POPULATION IN SUBSIDENCE PRONE AREAS
Lycoming Township	774	1	0%	1	0	0%	1,491	0	0%
McHenry Township	626	75	12%	4	0	0%	122	33	27%
McIntyre Township	383	0	0%	4	0	0%	461	0	0%
McNett Township	219	0	0%	2	0	0%	143	0	0%
Mifflin Township	552	2	0%	4	0	0%	1,089	38	3%
Mill Creek Township	301	0	0%	4	0	0%	582	0	0%
Montgomery Borough	661	328	50%	4	0	0%	1,568	798	51%
Montoursville Borough	2,301	2,299	100%	17	17	100%	4,750	4750	100%
Moreland Township	487	0	0%	5	0	0%	1,015	0	0%
Muncy Borough	1,172	1,172	100%	12	12	100%	2,440	2440	100%
Muncy Creek Township	1,835	1,569	86%	6	6	100%	3,573	2910	81%
Muncy Township	646	522	81%	12	12	100%	1,178	749	64%
Nippenose Township	358	277	77%	5	4	80%	661	356	54%
Old Lycoming Township	2,454	0	0%	8	0	0%	4,975	0	0%
Penn Township	559	0	0%	2	0	0%	895	0	0%
Piatt Township	536	146	27%	2	0	0%	1,047	156	15%
Picture Rocks Borough	285	0	0%	6	0	0%	643	0	0%
Pine Township	465	0	0%	2	0	0%	258	0	0%
Plunketts Creek Township	609	6	1%	5	0	0%	597	30	5%
Porter Township	698	522	75%	5	5	100%	1,528	1181	77%

Table 4.3.10-3 Structures and critical facilities vulnerable to subsidence.

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN SUBSIDENCE PRONE AREAS	PERCENT STRUCTURES IN SUBSIDENCE PRONE AREAS	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN SUBSIDENCE PRONE AREAS	PERCENT CRITICAL FACILITIES IN SUBSIDENCE PRONE AREAS	TOTAL POPULATION	POPULATION IN SUBSIDENCE PRONE AREAS	PERCET POPULATION IN SUBSIDENCE PRONE AREAS
Salladasburg Borough	134	0	0%	1	0	0%	250	0	0%
Shrewsbury Township	304	0	0%	0	0	0%	418	0	0%
South Williamsport Borough	2,842	2,842	100%	18	18	100%	6,261	6261	100%
Susquehanna Township	494	490	99%	4	4	100%	968	962	99%
Upper Fairfield Township	888	0	0%	5	0	0%	1,807	0	0%
Washington Township	775	741	96%	8	8	100%	1,768	1329	75%
Watson Township	364	7	2%	1	0	0%	534	0	0%
Williamsport, City of	10,860	8,236	76%	74	59	80%	27,754	21772	78%
Wolf Township	1,567	1,094	70%	8	7	88%	3,105	1839	59%
Woodward Township	1,142	535	47%	5	4	80%	2,046	861	42%
TOTAL	55,197	30,337	55%	388	233	60%	114,188	66,928	59%

Table 4.3.10-4 Structures by land use subsidence vulnerability in Lycoming County.

MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	OTHER	MIXED USE	RESIDENTIAL	UNKNOWN	TOTAL
Anthony Township	1	0	0	0	0	0	1	2
Armstrong Township	14	13	5	3	7	146	65	253

Table 4.3.10-4 Structures by land use subsidence vulnerability in Lycoming County.								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	OTHER	MIXED USE	RESIDENTIAL	UNKNOWN	TOTAL
Bastress Township	0	0	0	0	0	0	0	0
Brady Township	24	6	0	4	2	166	20	222
Brown Township	0	0	0	0	0	0	0	0
Cascade Township	0	0	0	0	0	0	0	0
Clinton Township	93	48	16	18	21	676	132	1,004
Cogan House Township	2	0	0	0	0	0	7	9
Cummings Township	19	4	1	0	0	38	44	106
Duboistown Borough	0	23	0	8	2	470	54	557
Eldred Township	0	0	0	0	0	0	0	0
Fairfield Township	17	70	4	18	22	795	145	1,071
Franklin Township	0	0	0	0	0	0	0	0
Gamble Township	8	0	0	0	0	3	4	15
Hepburn Township	0	0	0	0	0	0	0	0
Hughesville Borough	0	78	3	59	3	701	129	973
Jackson Township	0	0	0	0	0	0	0	0
Jersey Shore Borough	0	129	4	78	19	1,323	239	1,792
Jordan Township	0	0	0	0	0	0	0	0
Lewis Township	6	0	0	0	0	0	11	17
Limestone Township	105	12	1	12	6	423	51	610
Loyalsock Township	0	152	7	51	8	2,122	502	2,842
Lycoming Township	0	0	0	0	0	0	1	1
McHenry Township	4	1	0	1	0	63	6	75
McIntyre Township	0	0	0	0	0	0	0	0

Table 4.3.10-4 Structures by land use subsidence vulnerability in Lycoming County.								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	OTHER	MIXED USE	RESIDENTIAL	UNKNOWN	TOTAL
McNett Township	0	0	0	0	0	0	0	0
Mifflin Township	0	0	0	0	1	0	1	2
Mill Creek Township	0	0	0	0	0	0	0	0
Montgomery Borough	0	16	6	12	1	251	42	328
Montoursville Borough	0	126	17	61	13	1,768	314	2,299
Moreland Township	0	0	0	0	0	0	0	0
Muncy Borough	0	103	5	57	15	893	99	1,172
Muncy Creek Township	56	82	8	35	15	1,174	199	1,569
Muncy Township	46	74	6	15	6	277	98	522
Nippenose Township	17	11	0	3	5	189	52	277
Old Lycoming Township	0	0	0	0	0	0	0	0
Penn Township	0	0	0	0	0	0	0	0
Piatt Township	7	4	0	1	0	121	13	146
Picture Rocks Borough	0	0	0	0	0	0	0	0
Pine Township	0	0	0	0	0	0	0	0
Plunketts Creek Township	4	0	0	0	0	1	1	6
Porter Township	10	15	5	3	5	457	27	522
Salladasburg Borough	0	0	0	0	0	0	0	0
Shrewsbury Township	0	0	0	0	0	0	0	0
South Williamsport Borough	3	123	12	51	26	2,224	403	2,842
Susquehanna Township	22	11	0	5	5	376	71	490
Upper Fairfield Township	0	0	0	0	0	0	0	0
Washington Township	175	11	0	7	10	474	64	741

Table 4.3.10-4 Structures by land use subsidence vulnerability in Lycoming County.								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	OTHER	MIXED USE	RESIDENTIAL	UNKNOWN	TOTAL
Watson Township	0	0	0	0	0	1	6	7
Williamsport, City of	0	824	54	236	100	5,084	1,938	8,236
Wolf Township	42	28	3	12	11	847	151	1,094
Woodward Township	12	28	5	4	4	394	88	535
TOTAL	687	1,992	162	754	307	21,457	4,978	30,337

4.3.10.6. Equity in Vulnerable Communities

Communities that are at risk are often found in rural areas, and many areas of Lycoming County are rural. Land previously used for mining, or extraction of water can increase the risk of subsidence and sinkholes due to over-extraction. Simultaneously, rural communities may also lack the resources to prevent or respond to such events. Low-income communities may live in older, poorly constructed homes or areas where housing is cheaper but potentially more vulnerable to geological hazards like subsidence and sinkholes. This would make them overall slightly more at risk.

4.3.11. Tornado, Windstorm

4.3.11.1. Location and Extent



Tornadoes and potentially damaging high winds occur throughout Pennsylvania. Tornadoes and windstorms can affect any area of Lycoming County.

A tornado, a violently rotating funnel-like vortex, is an extraordinary feature of severe thunderstorms. A condensation funnel does not need to reach to the ground for a tornado to be present; a debris cloud beneath a thunderstorm is all that is needed to confirm the presence of a tornado, even in the total absence of a funnel. While the extent of tornado damage is usually localized, the extreme winds of this vortex can be among the most destructive on earth when they move through populated, developed areas.

Tornadoes can occur at any time during the day or night but are most frequent during late afternoon into early evening, the warmest hours of the day. May to August is the most likely time for tornadoes to occur in Pennsylvania. However, these events can occur any time of year.

Tornado movement is characterized in two ways: direction and speed of the spinning winds, and forward movement of the tornado/storm track. Rotational wind speeds of the vortex can range from 100 mph to more than 250 mph. In addition, the speed of forward motion can be zero to 45 or 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 forward motion of the tornado path can be a few hundred yards or several hundred miles in length. The width of tornadoes can vary greatly, but generally range in size from less than 100 feet to over a mile in width. Some tornadoes never touch the ground and are short-lived, while others may touch the ground several times.

Straight-line winds often accompany tornadoes and are caused by the movement of air from areas of higher pressure to areas of lower pressure – the greater the difference in pressure, the stronger the winds. Windstorms are generally defined as sustained wind speeds of 40 mph or greater lasting for one hour or longer, or winds of 58 mph or greater for any duration.

The enhanced Fujita Tornado Scale (or the EF-Scale) classifies U.S. tornadoes into six intensity categories, named EF0 to EF5, based upon the estimated maximum winds occurring within the funnel. The EF-Scale has subsequently become the definitive metric for estimating wind speeds within tornadoes based upon the damage done to buildings and structures (see Table 4.3.11-1).

4.3.11.2. Range of Magnitude

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. The damage caused by a tornado is a result of the high wind velocity and wind-blown debris, also accompanied by lightning or large hail. The most violent tornadoes have rotating winds of 250 miles per hour or

more and can cause extreme destruction and turning normally harmless objects into deadly missiles.

Since 2007, the EF Scale has been used in the United States to describe the magnitude of tornadoes. Prior to 2007, the Fujita Scale (F-Scale) was commonly used to describe magnitude. This scale is based on new information about the relationship between wind speed, given in miles per hour (mph), and corresponding damages. The EF-Scale categorizes tornadoes from EF0 to EF5 with EF0 being the most commonly occurring type of tornado. The strongest tornado recorded in Lycoming County has been a category 2 or EF2 tornado. The following table shows the relationship between the EF- and F- Scales.

Table 4.3.11-1 Enhanced Fujita Scale (EF-Scale) categories with associated wind speeds

FUJITA SCALE		ENHANCED FUJITA SCALE	
F NUMBER	3-SECOND GUST (MPH)	EF NUMBER	3-SECOND GUST (MPH)
0	45–78	0	65–85
1	79–117	1	86–110
2	118–161	2	111–135
3	162–209	3	136–165
4	210–261	4	166–200
5	262–317	5	Over 200

The types of damages that can be expected with each category of tornado are described in Table 4.3.11-2.

Table 4.3.11-2 Expected Tornado Damages.

F OR EF SCALE	EXAMPLES OF POSSIBLE DAMAGE
0	Light damage. Some damage to chimneys; broken tree branches; shallow-rooted trees pushed over; damage to sign boards.
1	Moderate damage. Surface peeled off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off roads.
2	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated.
3	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; cars lifted off ground and thrown.

Table 4.3.11-2 Expected Tornado Damages.	
F OR EF SCALE	**EXAMPLES OF POSSIBLE DAMAGE**
4	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown, and large missiles generated.
5	Catastrophic damage. Well-built houses swept completely away, leaving only the slab foundations.

The destruction caused by tornadoes ranges from light to inconceivable 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 impact of tornado hazards is ultimately dependent on the population or amount of property present in the area in which the tornado occurs. Tornado events are often so severe that property loss or human fatality is typically inevitable if evacuation or proper construction standards are not implemented. In Lycoming County, the impacts from tornado and wind-storm events have included torn roofs, destroyed mobile homes, downed power lines, uprooted trees, damaged street signs and billboards, damaged vehicles and homes, debris-filled streets, and malfunctioning traffic signals. These impacts have the potential to lead to other hazards including transportation incidents and utility interruption.

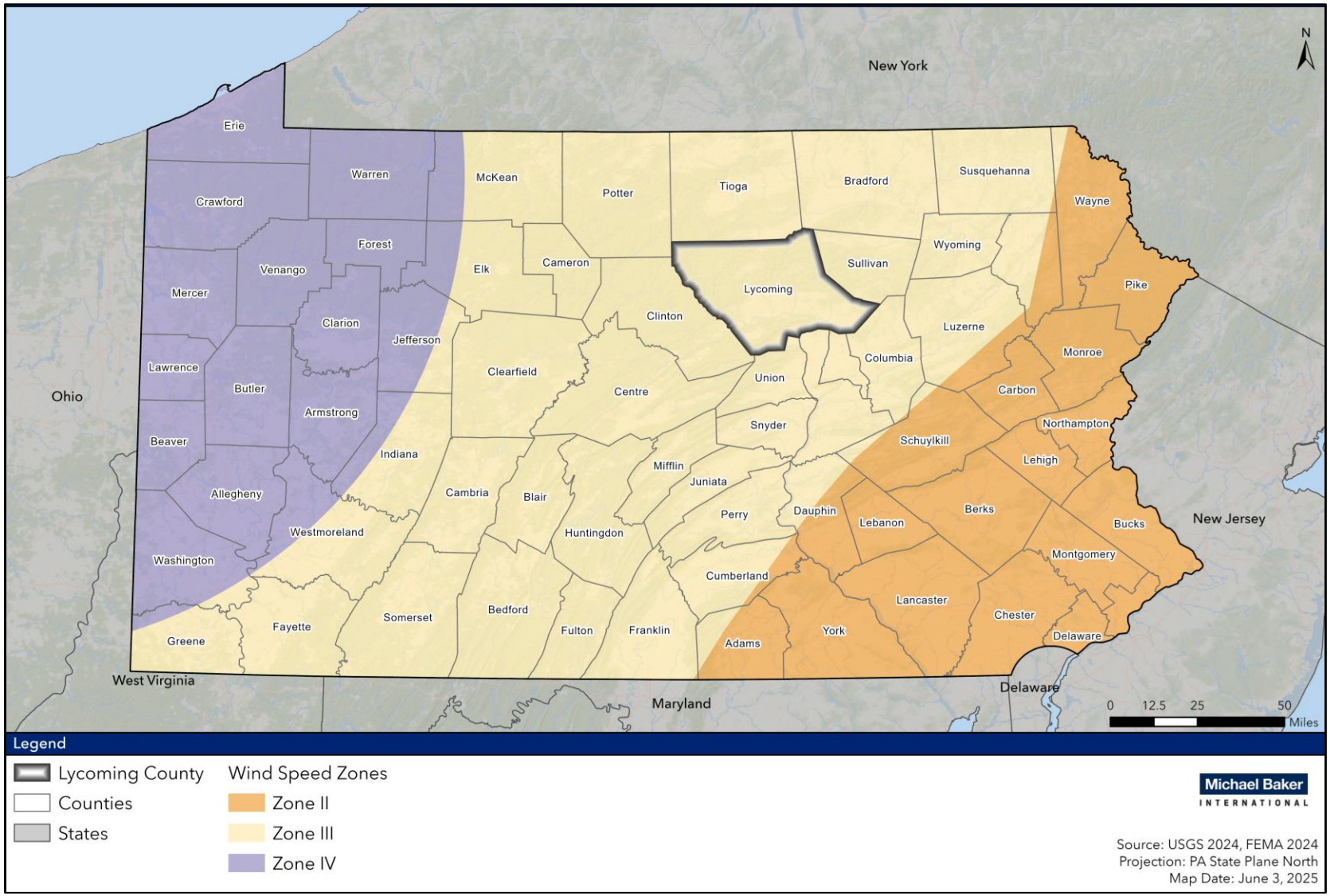
Figure 4.3.11-1 shows wind speed zones developed for the design of tornado shelters. It identifies worst-case wind speeds that could occur across the United States to be used as the basis for design and evaluation of structural integrity of shelters and critical facilities. Lycoming County falls in Zone III, meaning design wind speeds for shelters and critical facilities should be able to withstand a 3-second gust of up to 200 mph. The wind zones identified in this map represent the strongest wind speeds anticipated throughout Pennsylvania, not the normal or routine wind speeds expected statewide. In Lycoming County, all new residential and commercial structures are required to be constructed per the International Building Code (IBC), which requires structures to be designed to withstand a 90-mph wind speed.

The potential impacts of a tornado or windstorm on community lifelines are as follows:

Table 4.3.11-3 Most Likely Lifelines impacted by Tornadoes or Windstorms	
LIFELINES	NOTES
	Government officials, including police and fire, will be needed for community safety due to potential harm from tornadoes, high winds, and associated weather conditions.
	Tornadoes and windstorms cause significant damage to agricultural operations and structures. This can cause downstream impacts to food systems.

Table 4.3.11-3 Most Likely Lifelines impacted by Tornadoes or Windstorms	
LIFELINES	NOTES
	Energy supplies may be directly damaged by a tornado or windstorm. This could impact response and recovery.
	Material storage facilities and operations may be damaged due to significant damage from tornadoes and windstorms.

Figure 4.3.11-1 Map showing wind zones to guide design standards and shelter construction.



4.3.11.3. Past Occurence

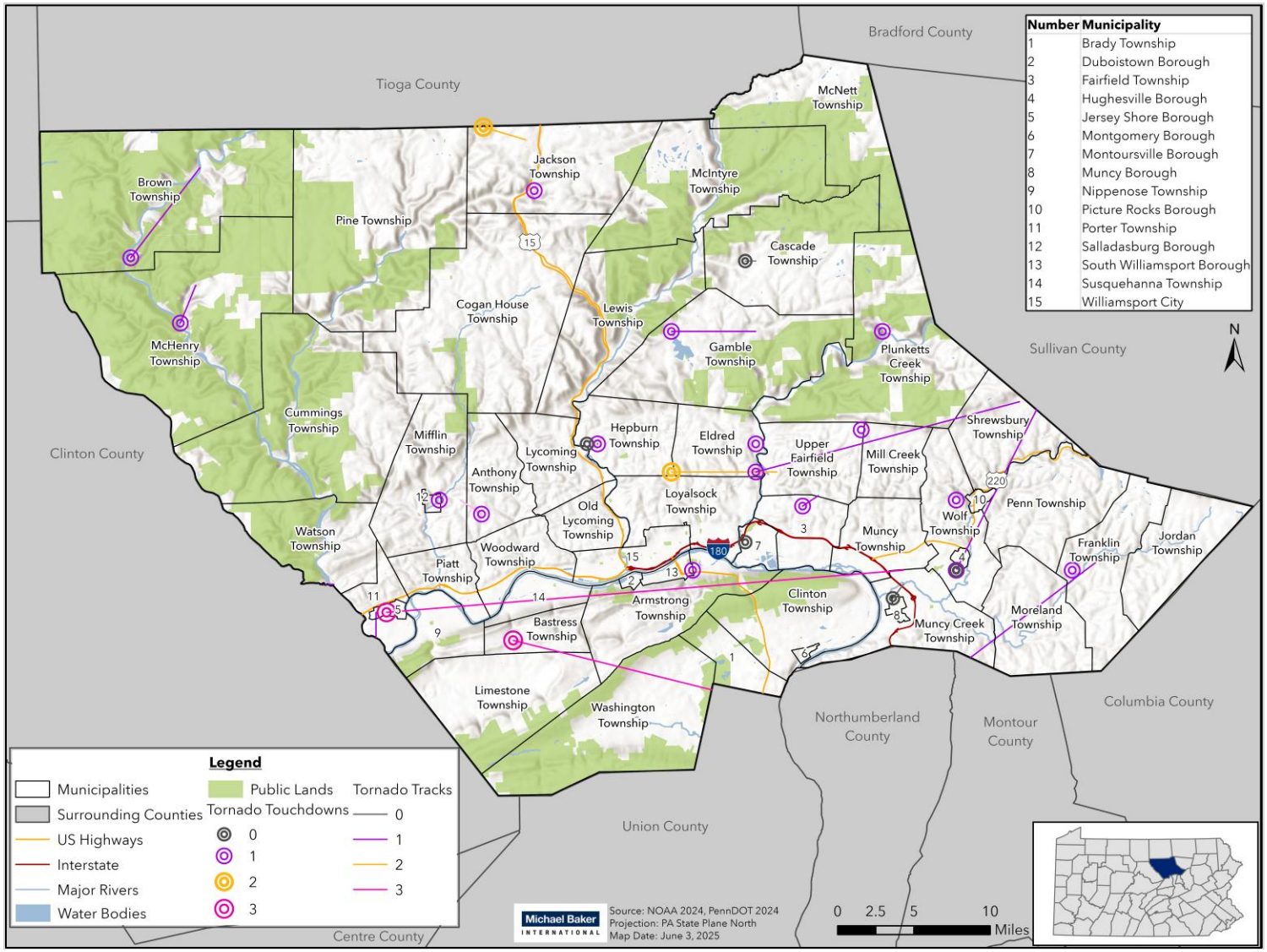
Historically, between 1950 and 2025, there were 29 tornadoes in Lycoming County. According to NOAA, there were two deaths and 20 injuries in Lycoming County resulting from a tornado on May 31, 1985. Associated winds have damaged power lines, uprooting trees, structures, motor vehicles, and crops. Figure 4.3.11-2 shows tornadoes that have affected (touch-downed or passed through) the county.

In May 1998, a tornado swept through Lycoming County, touching down in Mifflin Township, Wolf Township, the Williamsport Regional Airport, and Jackson Township, where it tore the roof off a lumberyard, downed power lines, and destroyed trees in the Village of Buttonwood. This event also caused over $1 million in damage at a nearby airport. The following June, there were two confirmed tornadoes in the forested area near the Borough of Picture Rocks. On July 1, 1999, a tornado touched down in Kellyburg, and on June 16, 2000, another tornado did some minor damage to homes and uprooted several trees in the Village of Farragut.

Recent tornado and windstorm events have mainly resulted in uprooting of trees and damage to some outbuildings and seasonal homes. Luckily, most of these recent events have occurred in rural areas and have not resulted in any injuries or fatalities.

The most recent tornado, at EF1 magnitude, occurred in Montour and Lycoming Counties on March 31st, 2022. Wind speeds reached 95 miles per hour. Extensive damage to trees along Laidecker Road was sustained, as well as property damage to multiple structures. One injury was sustained because of the tornado (NOAA NCEI, 2025b).

Figure 4.3.11-2 Map showing tornado events and tracks in Lycoming County.



As seen in Table 4.3.11-4, the magnitude of reported and confirmed tornadoes in the county over the last five years is in the EF0 to EF2 range. While this is the lowest range to be classified as a tornado, such events can nevertheless be devastating to human life and property in the affected areas.

Table 4.3.11-4 Previous tornado events between 1950 and 2025 in Lycoming County (NOAA NCEI, 2025b).

LOCATION	DATE	MAGNITUDE	DEATHS	INJURIES	ESTIMATED PROPERTY DAMAGE ($)
Countywide	8/16/1966	F2	0	1	25,000
Countywide	5/10/1973	F1	0	0	250,000
Countywide	7/29/1976	F3	0	0	2,500,000
Countywide	8/2/1979	F1	0	0	25,000
Countywide	5/31/1985	F3	2	20	25,000,000
Countywide	7/13/1986	F1	0	0	25,000
Countywide	8/13/1990	F1	0	0	2,500
Hughesville	6/12/1994	F0	0	0	50,000
Loyalsockville	7/8/1996	F1	0	0	0
Jersey Shore	11/8/1996	F1	0	0	100,000
Linden	11/8/1996	F1	0	0	100,000
Buttonwood	5/31/1998	F1	0	0	0
Salladasburg	5/31/1998	F1	0	0	0
Montoursville	5/31/1998	F0	0	0	0
Hughesville	5/31/1998	F0	0	0	0
Picture Rocks	6/16/1998	F1	0	0	0
Picture Rocks	6/16/1998	F1	0	0	0
Bodines	7/1/1999	F0	0	0	10,000
Farragut	6/16/2000	F1	0	0	0
Perryville	5/11/2003	F0	0	0	5,000
Lairdsville	7/21/2003	F1	0	0	10,000
Montoursville	6/6/2005	F1	0	0	0
Barbours	8/31/2005	F1	0	0	0
Muncy	6/19/2007	EF0	0	0	0
Slate Run	5/26/2011	EF1	0	0	8,000
Cammal	5/26/2011	EF1	0	0	6,000
Farragut	7/9/2015	EF1	0	0	100,000
Texas	10/2/2018	EF2	0	0	0
Clarkstown	3/31/2022	EF1	0	1	300,000
TOTAL			2	22	28,516,500

Windstorm events may be the result of thunderstorms, hurricanes, tropical storms, winter storms, or nor'easters. From 2000 to 2025, there have been 236 events with wind speeds of greater than 50 knots, as shown in Table 4.3.11-5. These events most frequently occurred in conjunction with thunderstorms. Windstorms events typically occur in areas including Farragut, Hughesville, Montgomery, Muncy, Newberry, and Williamsport.

Table 4.3.11-5 Previous wind events over 50 knots (NOAA NCEI, 2025b).

LOCATION	DATE	TYPE	WIND SPEED	DEATHS/ INJURIES	PROPERTY DAMAGE ($)
County-wide	2/18/2000	Winter Storm	NA	0	0
Montoursville	5/18/2000	Thunderstorm Wind	62 kts. M	0	0
Montoursville	6/2/2000	Thunderstorm Wind	51 kts. M	0	0
County-wide	12/13/2000	Winter Storm	NA	0	0
Calvert	4/9/2001	Thunderstorm Wind	50 kts. E	0	0
Moreland, Williamsport	6/20/2001	Thunderstorm Wind	50 kts. E	0	0
Glen Mawr, Williamsport	7/1/2001	Thunderstorm Wind	50 kts. E	0	0
Waterville	8/16/2001	Thunderstorm Wind	50 kts. E	0	0
Trout Run	8/19/2001	Thunderstorm Wind	50 kts. E	0	0
Montoursville, Williamsport	8/31/2001	Thunderstorm Wind	50 kts. E	0	0
Picture Rocks	9/13/2001	Thunderstorm Wind	50 kts. E	0	0
Jersey Shore	9/24/2001	Thunderstorm Wind	50 kts. E	0	0
Williamsport	10/16/2001	Thunderstorm Wind	50 kts. E	0	0
County-wide	12/14/2001	High Wind	60 kts. E	0	0
County-wide	2/1/2002	High Wind	63 kts. M	0	0
County-wide	3/9/2002	High Wind	50 kts. E	0	0
Hughesville	3/9/2002	Thunderstorm Wind	60 kts. M	0	0
Calvert, Williamsport	4/28/2002	Thunderstorm Wind	50 kts. E	0	0
Williamsport	5/31/2002	Thunderstorm Wind	50 kts. E	0	0
Tivoli, Williamsport	7/28/2002	Thunderstorm Wind	50 kts. E	0	0
Hughesville	5/11/2003	Thunderstorm Wind	50 kts. EG	0	$5,000
Jersey Shore	7/18/2003	Thunderstorm Wind	50 kts. EG	0	0
Hughesville, Muncy, Williamsport	7/21/2003	Thunderstorm Wind	50 kts. EG	0	0
Jersey Shore	7/27/2003	Thunderstorm Wind	50 kts. EG	0	0
Trout Run	8/16/2003	Thunderstorm Wind	50 kts. EG	0	0
Picture Rocks	8/29/2003	Thunderstorm Wind	50 kts. EG	0	0
Southern Lycoming (zone)	9/18/2003	Tropical Storm	NA	0	0

Table 4.3.11-5 Previous wind events over 50 knots (NOAA NCEI, 2025b).					
LOCATION	DATE	TYPE	WIND SPEED	DEATHS/ INJURIES	PROPERTY DAMAGE ($)
County-wide	11/13/2003	High Wind	60 kts. EG	0	0
Buttonwood	6/14/2004	Thunderstorm Wind	50 kts. EG	0	0
Williamsport	6/17/2004	Thunderstorm Wind	50 kts. EG	0	0
Jersey Shore, Trout Run	11/25/2004	Thunderstorm Wind	50 kts. EG	0	0
County-wide	1/5/2005	Winter Storm	NA	0	0
Northern Lycoming (zone)	1/22/2005	Winter Storm	NA	0	0
Northern Lycoming (zone)	2/21/2005	Winter Storm	NA	0	0
Picture Rocks	6/6/2005	Thunderstorm Wind	50 kts. EG	0	0
Lairdsville	7/13/2005	Thunderstorm Wind	50 kts. EG	0	0
Trout Run	7/26/2005	Thunderstorm Wind	50 kts. EG	0	0
Montgomery	8/2/2005	Thunderstorm Wind	50 kts. EG	0	0
Lairdsville, Loyalsockville	8/13/2005	Thunderstorm Wind	50 kts. EG	0	0
Williamsport	9/29/2005	Thunderstorm Wind	50 kts. EG	0	0
Hughesville, Waterville, Williamsport	11/6/2005	Thunderstorm Wind	50 kts. EG	0	0
County-wide	12/16/2005	Winter Storm	NA	0	0
County-wide	2/17/2006	High Wind	52 kts. EG	0	0
Montgomery, Williamsport	5/30/2006	Thunderstorm Wind	50 kts. EG	0	0
Jersey Shore	6/9/2006	Thunderstorm Wind	50 kts. EG	0	0
Loyalsockville, Montoursville, Williamsport	6/22/2006	Thunderstorm Wind	50 kts. EG	0	0
Hughesville	6/29/2006	Thunderstorm Wind	50 kts. EG	0	0
Williamsport	7/2/2006	Thunderstorm Wind	50 kts. EG	0	0
Williamsport	8/3/2006	Thunderstorm Wind	50 kts. EG	0	0
Lairdsville	8/25/2006	Thunderstorm Wind	50 kts. EG	0	0
Muncy	11/16/2006	Thunderstorm Wind	50 kts. EG	0	0
Southern Lycoming (zone)	12/1/2006	High Wind	71 kts. MG	1	$5,000
Southern Lycoming (zone)	2/13/2007	Winter Storm	NA	0	0
Newberry	6/8/2007	Thunderstorm Wind	50 kts. EG	0	0

Table 4.3.11-5 Previous wind events over 50 knots (NOAA NCEI, 2025b).

LOCATION	DATE	TYPE	WIND SPEED	DEATHS/ INJURIES	PROPERTY DAMAGE ($)
Farragut	6/19/2007	Thunderstorm Wind	50 kts. EG	0	0
Muncy	8/3/2007	Thunderstorm Wind	50 kts. EG	0	0
Jersey Shore	9/27/2007	Thunderstorm Wind	50 kts. EG	0	0
Northern Lycoming (zone)	12/13/2007	Winter Storm	NA	0	0
County-wide	2/1/2008	Winter Storm	NA	0	0
Jersey Shore	6/16/2008	Thunderstorm Wind	50 kts. EG	0	0
Lairdsville	7/18/2008	Thunderstorm Wind	50 kts. EG	0	0
Northern Lycoming (zone)	9/14/2008	High Wind	50 kts. EG	0	0
Northern Lycoming (zone)	12/11/2008	Winter Storm	NA	0	0
County-wide	12/19/2008	Winter Storm	NA	0	0
Northern Lycoming (zone)	1/10/2009	Winter Storm	NA	0	0
County-wide	1/27/2009	Winter Storm	NA	0	0
County-wide	2/12/2009	High Wind	50 kts. MG	0	$20,000
Duboistown Borough	7/11/2009	Thunderstorm Wind	50 kts. EG	0	$5,000
Perryville	7/26/2009	Thunderstorm Wind	50 kts. EG	0	$5,000
Jersey Shore	8/9/2009	Thunderstorm Wind	50 kts. EG	0	$10,000
Barbours, Jersey Shore	8/18/2009	Thunderstorm Wind	50 kts. EG	0	$10,000
Northern Lycoming (zone)	10/15/2009	Winter Storm	NA	0	0
(IPT) Williamsport Ar	12/3/2009	Thunderstorm Wind	55 kts. MG	0	0
Southern Lycoming (zone)	2/9/2010	Winter Storm	NA	0	0
Northern Lycoming (zone)	2/25/2010	Winter Storm	NA	0	0
Newberry, Picture Rocks, Ralston	4/8/2010	Thunderstorm Wind	50 kts. EG	0	$15,000
Cedar Run, East Faxon, Larrys Creek	7/24/2010	Thunderstorm Wind	50 kts. EG	0	$15,000
Garden View, Jersey Shore, Muncy, (IPT) Williamsport Ar	9/22/2010	Thunderstorm Wind	70 kts. EG	2	$25,000
Montoursville	10/11/2010	Thunderstorm Wind	50 kts. EG	0	$5,000

Table 4.3.11-5 Previous wind events over 50 knots (NOAA NCEI, 2025b).					
LOCATION	DATE	TYPE	WIND SPEED	DEATHS/ INJURIES	PROPERTY DAMAGE ($)
Northern Lycoming (zone)	2/1/2011	Winter Storm	NA	0	0
Northern Lycoming (zone)	3/23/2011	Winter Storm	NA	0	0
Hughesville, Oregon Hill	5/26/2011	Thunderstorm Wind	70 kts. EG	0	$10,000
Lairdsville	5/27/2011	Thunderstorm Wind	50 kts. EG	0	$5,000
County-wide	6/9/2011	Thunderstorm Wind	78 kts. EG	0	$5,000
White Pine	5/29/2012	Thunderstorm Wind	50 kts. EG	0	$5,000
Garden View	6/1/2012	Thunderstorm Wind	50 kts. EG	0	$5,000
Clarkstown, Loyalsockville, Picture Rocks, Williamsport, (IPT) Williamsport Ar	7/7/2012	Thunderstorm Wind	50 kts. EG	0	$20,000
South Williamsport	7/15/2012	Thunderstorm Wind	50 kts. EG	0	$5,000
Jersey Shore, Linden, Marsh Hill, Newberry, (IPT) Williamsport Ar	7/26/2012	Thunderstorm Wind	51 kts. EG	0	$22,500
Powys, Waterville	8/9/2012	Thunderstorm Wind	50 kts. EG	0	$10,000
Clarkstown, Newberry	9/8/2012	Thunderstorm Wind	50 kts. EG	0	$5,000
County-wide	10/29/2012	High Wind	50 kts. EG	0	0
County-wide	12/26/2012	Winter Storm	NA	0	0
Halls, Montoursville, (IPT) Williamsport Ar	4/10/2013	Thunderstorm Wind	50 kts. EG	0	$15,000
Muncy, Picture Rocks	4/19/2013	Thunderstorm Wind	61 kts. EG	0	$15,000
Calvert, Cammal, Picture Rocks, Trout Run, Waterville	5/22/2013	Thunderstorm Wind	50 kts. EG	0	$11,000
Hughesville	6/24/2013	Thunderstorm Wind	50 kts. EG	0	$5,000
Hughesville, Newberry, Williamsport	7/7/2013	Thunderstorm Wind	50 kts. EG	0	$15,000
Williamsport	7/28/2013	Thunderstorm Wind	50 kts. EG	0	$2,000
County-wide	9/11/2013	Thunderstorm Wind	50 kts. EG	0	$7,000
County-wide	9/12/2013	Thunderstorm Wind	50 kts. EG	0	$7,000
County-wide	2/4/2014	Winter Storm	NA	0	0
Brookside, English Center	5/21/2014	Thunderstorm Wind	50 kts. EG	0	$2,000

Table 4.3.11-5 Previous wind events over 50 knots (NOAA NCEI, 2025b).

LOCATION	DATE	TYPE	WIND SPEED	DEATHS/ INJURIES	PROPERTY DAMAGE ($)
Muncy, Unityville	5/27/2014	Thunderstorm Wind	50 kts. EG	0	$1,000
Hughesville, Muncy, South Williamsport	7/2/2014	Thunderstorm Wind	50 kts.	0	$4,500
Montoursville, Newberry, (IPT) Williamsport Ar	7/3/2014	Thunderstorm Wind	57 kts.	0	$3,000
Williamsport	7/8/2014	Thunderstorm Wind	50 kts.	0	$2,500
English Center	8/21/2014	Thunderstorm Wind	50 kts.	0	$500
Muncy	9/2/2014	Thunderstorm Wind	50 kts.	0	$500
Northern Lycoming (zone)	2/1/2015	Winter Storm	NA	0	$0
South Williamsport	6/8/2015	Thunderstorm Wind	50 kts.	0	$500
ELIMSPORT	6/23/2015	Thunderstorm Wind	50 kts.	0	$500
Clarkstown	6/30/2015	Thunderstorm Wind	50 kts.	0	$2,000
Clarkstown	9/4/2015	Thunderstorm Wind	50 kts.	0	$6,000
Southern Lycoming (zone)	2/15/2016	Winter Storm	NA	0	$0
Hughesville	2/24/2016	Thunderstorm Wind	50 kts.	0	$1,000
Montgomery, Moreland	6/28/2016	Thunderstorm Wind	87 kts.	0	$1,002,000
Montgomery	7/18/2016	Thunderstorm Wind	52 kts.	0	$2,000
Montgomery	8/1/2016	Thunderstorm Wind	50 kts.	0	$10,000
Barbours, Slate Run	8/13/2016	Thunderstorm Wind	50 kts.	0	$4,000
Elimsport, Montgomery, Muncy	9/18/2016	Thunderstorm Wind	78 kts.	0	$113,000
Northern Lycoming (zone)	1/23/2017	Winter Storm	NA	0	$0
Southern Lycoming (zone)	2/8/2017	Winter Storm	NA	0	$0
Northern Lycoming (zone)	2/9/2017	Winter Storm	NA	0	$0
County-wide	3/13/2017	Winter Storm	NA	0	$0
Cammal, Collomsville, Elimsport, Huntersville, Jersey Shore, Newberry, Nisbet	5/1/2017	Thunderstorm Wind	74 kts.	0	$34,000
Newberry	6/13/2017	Thunderstorm Wind	52 kts.	0	$3,000
Sylvan Dell	8/2/2017	Thunderstorm Wind	52 kts.	0	$4,000

Table 4.3.11-5 Previous wind events over 50 knots (NOAA NCEI, 2025b).					
LOCATION	DATE	TYPE	WIND SPEED	DEATHS/ INJURIES	PROPERTY DAMAGE ($)
Duboistown, Larryville, Pennsdale	8/4/2017	Thunderstorm Wind	61 kts.	0	$11,000
County-wide	4/4/2018	High Wind	52 kts.	0	$0
Hughesville, Steam Valley, OPP	5/15/2018	Thunderstorm Wind	52 kts.	0	$17,000
Moreland	7/25/2018	Thunderstorm Wind	61 kts.	0	$40,000
Clarkstown, Proctor	9/3/2018	Thunderstorm Wind	52 kts.	0	$0
County-wide	11/15/2018	Winter Storm	NA	0	$0
County-wide	1/19/2019	Winter Storm	NA	0	$0
Southern Lycoming (zone)	2/20/2019	Winter Storm	NA	0	$0
County-wide	2/24/2019	High Wind	52 kts.	0	$0
Muncy	4/14/2019	Thunderstorm Wind	52 kts.	0	$5,000
Balls Mills	5/19/2019	Thunderstorm Wind	52 kts.	0	$3,000
Barbours, Clarkstown, Jersey Shore	5/29/2019	Thunderstorm Wind	52 kts.	0	$4,000
Newberry	6/29/2019	Thunderstorm Wind	52 kts.	0	$4,000
Montoursville, (IPT) Williamsport Ar	7/2/2019	Thunderstorm Wind	54 kts.	0	$0
East Faxon, Williamsport	8/15/2019	Thunderstorm Wind	52 kts.	0	$1,000
Balls Mills, Jersey Shore	10/31/2019	Thunderstorm Wind	50 kts.	0	$0
Farragut	4/13/2020	Thunderstorm Wind	52 kts.	0	$4,000
Trout Run	6/10/2020	Thunderstorm Wind	52 kts.	0	$3,000
Balls Mills	7/8/2020	Thunderstorm Wind	52 kts.	0	$4,000
Waterville	7/8/2020	Thunderstorm Wind	61 kts.	0	$0
Northern Lycoming	12/16/2020	Winter Storm	NA	0	$0
Northern Lycoming	12/16/2020	Winter Storm	NA	0	$0
Northern Lycoming	1/31/2021	Winter Storm	NA	0	$0
Northern Lycoming	1/31/2021	Winter Storm	NA	0	$0
Northern Lycoming	2/1/2021	Winter Storm	NA	0	$0
Northern Lycoming	2/1/2021	Winter Storm	NA	0	$0
Northern Lycoming	2/15/2021	Winter Storm	NA	0	$0
Unityville	5/26/2021	Thunderstorm Wind	52 kts.	0	$0
Waterville	6/13/2021	Thunderstorm Wind	52 kts.	0	$3,000
Collomsville	6/14/2021	Thunderstorm Wind	52 kts.	0	$6,000

Table 4.3.11-5 Previous wind events over 50 knots (NOAA NCEI, 2025b).

LOCATION	DATE	TYPE	WIND SPEED	DEATHS/ INJURIES	PROPERTY DAMAGE ($)
Montoursville	6/30/2021	Thunderstorm Wind	52 kts.	0	$2,000
South Williamsport	7/07/2021	Thunderstorm Wind	52 kts.	0	$3,000
Williamsport Regional Airport	7/07/2021	Thunderstorm Wind	56 kts.	0	$0
Strawbridge	7/07/2021	Thunderstorm Wind	52 kts.	0	$4,000
Slate Run	7/13/2021	Thunderstorm Wind	52 kts.	0	$2,000
Richards Grove	7/17/2021	Thunderstorm Wind	52 kts.	0	$3,000
Brookside	8/12/2021	Thunderstorm Wind	52 kts.	0	$7,000
Bodines	8/12/2021	Thunderstorm Wind	52 kts.	0	$4,000
Slate Run	8/12/2021	Thunderstorm Wind	52 kts.	1	$0
Quenashaunke	8/12/2021	Thunderstorm Wind	52 kts.	1	$5,000
Garden View	8/12/2021	Thunderstorm Wind	52 kts.	0	$6,000
Duboistown	8/12/2021	Thunderstorm Wind	52 kts.	0	$12,000
Muncy	8/12/2021	Thunderstorm Wind	52 kts.	0	$4,000
Picture Rocks	8/13/2021	Thunderstorm Wind	52 kts.	0	$12,000
Hughesville	8/13/2021	Thunderstorm Wind	52 kts.	0	$6,000
Lairdsville	8/13/2021	Thunderstorm Wind	52 kts.	0	$4,000
Loyalsockville	9/13/2021	Thunderstorm Wind	52 kts.	0	$4,000
Fairfield Center	9/13/2021	Thunderstorm Wind	52 kts.	0	$3,000
Pennsdale	9/13/2021	Thunderstorm Wind	52 kts.	0	$4,000
Picture Rocks	9/13/2021	Thunderstorm Wind	52 kts.	0	$0
Hughesville	9/13/2021	Thunderstorm Wind	52 kts.	0	$3,000
Moreland	9/13/2021	Thunderstorm Wind	52 kts.	0	$0
Northern Lycoming	1/16/2022	Thunderstorm Wind	NA	0	$0
English Center	3/07/2022	Thunderstorm Wind	52 kts.	0	$10,000
Trout Run	3/07/2022	Thunderstorm Wind	52 kts.	0	$10,000
Lairdsville	3/07/2022	Thunderstorm Wind	52 kts.	0	$10,000
Northern Lycoming	3/12/2022	Winter Storm	NA	0	$0
Northern Lycoming	3/12/2022	Winter Storm	NA	0	$0
Williamsport	3/31/2022	Thunderstorm Wind	52 kts.	0	$0
Richards grove	7/1/2022	Thunderstorm Wind	52 kts.	0	$4,000
Duboistown	7/1/2022	Thunderstorm Wind	52 kts.	0	$4,000
Slate run	7/24/2022	Thunderstorm Wind	52 kts.	0	$9,000
Salladasburg	7/24/2022	Thunderstorm Wind	52 kts.	0	$9,000
Garden view	7/24/2022	Thunderstorm Wind	52 kts.	0	$4,000

Table 4.3.11-5 Previous wind events over 50 knots (NOAA NCEI, 2025b).					
LOCATION	DATE	TYPE	WIND SPEED	DEATHS/ INJURIES	PROPERTY DAMAGE ($)
Southern Lycoming	12/15/2022	Winter Storm	NA	0	$0
Southern Lycoming	12/15/2022	Winter Storm	NA	0	$0
Northern Lycoming	3/6/2023	Winter Storm	NA	0	$0
Pennsdale	6/26/2023	Thunderstorm Wind	52 kts.	0	$5,000
Collomsville	7/6/2023	Thunderstorm Wind	52 kts.	0	$10,000
Loyalsockville	7/6/2023	Thunderstorm Wind	52 kts.	0	$6,000
Williamsport	7/6/2023	Thunderstorm Wind	50 kts.	0	$0
Montgomery	7/14/2023	Thunderstorm Wind	52 kts.	0	$3,000
Montgomery	7/14/2023	Thunderstorm Wind	52 kts.	0	$4,000
Unityville	7/15/2023	Thunderstorm Wind	52 kts.	0	$1,000
Richards grove	7/15/2023	Thunderstorm Wind	52 kts.	0	$0
Steam Valley	7/20/2023	Thunderstorm Wind	52 kts.	0	$5,000
Newberry	7/20/2023	Thunderstorm Wind	52 kts.	0	$3,000
Ralston	7/20/2023	Thunderstorm Wind	52 kts.	0	$2,000
Hughesville	7/20/2023	Thunderstorm Wind	52 kts.	0	$4,000
Sylvan Dell	7/24/2023	Thunderstorm Wind	52 kts.	0	$6,000
Nisbet	8/4/2023	Thunderstorm Wind	52 kts.	0	$4,000
Nisbet	8/4/2023	Thunderstorm Wind	52 kts.	0	$4,000
Tivoli	8/12/2023	Thunderstorm Wind	52 kts.	0	$5,000
Ramsey	9/7/2023	Thunderstorm Wind	52 kts.	0	$4,000
Jersey Shore	9/7/2023	Thunderstorm Wind	52 kts.	0	$8,000
Newberry	9/7/2023	Thunderstorm Wind	52 kts.	0	$4,000
Balls Mills	9/9/2023	Thunderstorm Wind	52 kts.	0	$2,000
East Faxon	4/14/2024	Thunderstorm Wind	52 kts.	0	$5,000
Hughesville	4/14/2024	Thunderstorm Wind	52 kts.	0	$4,000
Trout Run	5/22/2024	Thunderstorm Wind	52 kts.	0	$10,000
Hughesville	6/22/2024	Thunderstorm Wind	61 kts.	0	$160,000
Warrensville	6/22/2024	Thunderstorm Wind	52 kts.	0	$3,000
Loyalsockville	6/22/2024	Thunderstorm Wind	52 kts.	0	$5,000
Moreland	6/22/2024	Thunderstorm Wind	52 kts.	0	$1,000
Unityville	6/22/2024	Thunderstorm Wind	52 kts.	0	$5,000
Montgomery	6/26/2024	Thunderstorm Wind	52 kts.	0	$10,000
Hughesville	6/26/2024	Thunderstorm Wind	52 kts.	0	$2,000
Brookside	7/10/2024	Thunderstorm Wind	52 kts.	0	$4,000
Oval	7/15/2024	Thunderstorm Wind	52 kts.	0	$1,000

Table 4.3.11-5 Previous wind events over 50 knots (NOAA NCEI, 2025b).					
LOCATION	DATE	TYPE	WIND SPEED	DEATHS/ INJURIES	PROPERTY DAMAGE ($)
Williamsport	7/15/2024	Thunderstorm Wind	56 kts.	0	$8,000
South Williamsport	7/15/2024	Thunderstorm Wind	56 kts.	0	$8,000
Sylvan Dell	7/15/2024	Thunderstorm Wind	70 kts.	0	$10,000
Montoursville	7/15/2024	Thunderstorm Wind	56 kts.	0	$8,000
Williamsport	7/15/2024	Thunderstorm Wind	55 kts.	0	$0
Warrensville	7/15/2024	Thunderstorm Wind	52 kts.	0	$3,000
Loyalsockville	7/15/2024	Thunderstorm Wind	52 kts.	0	$7,000
Jersey Shore	7/24/2024	Thunderstorm Wind	52 kts.	0	$2,000
Larrys Creek	9/21/2024	Thunderstorm Wind	52 kts.	0	$3,000
TOTAL				5	$2,080,500

4.3.11.4. Future Occurrence

The NCEI Storm Events database reports 29 tornadoes in Lycoming County for the entire 1950-2024 reporting period. This means that the annual probability of being in the path of a tornado in the county is relatively small. While the chance of being hit by a tornado is small, the damage that results when the tornado arrives can be devastating. Most of Pennsylvania is susceptible to tornadoes of a magnitude of, at most an, EF-3. It can be assumed that future tornadoes will be similar in nature to those that have affected the county in the past.

The county experiences strong winds on frequent basis, and when those winds strike, it can result in significant property damage, trees down, and utility outages. More windstorms have been seen in the central Pennsylvania region, so it is possible that an increasing number of these events will be seen in the county. The probability of tornadoes and windstorms in Lycoming County can be considered *likely* as defined by the Risk Methodology probability criteria (see Table 4.4-1).

Climate models project atmospheric conditions conducive to severe thunderstorms, tornadoes, and hail and wind will become more likely, but those events may not actually become more frequent themselves (Kossin et al. 2017). Projecting tornado activity based on more conducive conditions is difficult, as less than 10% of severe thunderstorms even produce tornadoes (Treisman, 2021). Therefore, the impact of climate change on this hazard's occurrence and intensity is unknown.

4.3.11.5. Vulnerability Assessment

For tornadoes or high winds, aged and dilapidated structures, or structures not built to applicable building codes are more susceptible to damage. Mobile homes and campgrounds are especially susceptible to tornado and high wind damage. Strong winds can rip roofs from

any dilapidated structure and overturn mobile homes. Past experiences with tornadoes in Lycoming County shows that death and injury are potential impacts.

Vulnerability to the effects of a tornado or windstorm is somewhat dependent upon the age of a structure. As building codes become more stringent, newer construction is more capable of enduring greater wind forces. All critical facilities in Lycoming County are at least somewhat vulnerable to tornadoes and windstorms. 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. Evaluation criteria include age of the building (and what building codes may have been in effect at the time), type of construction, and condition of the structure (i.e., how well the structure has been maintained). Individual structure data was not available for this study, so it was difficult to determine the exact number and types of structures within Lycoming County that have heightened vulnerability to wind hazards.

In Lycoming County, high winds occur annually. The most common detrimental effects are interruptions in power supply and communication services due to downed wires and blocked roadways due to downed trees. Most severe power failures or outages are regional events. With the loss of power, electrical-powered equipment and systems will not be operational. Examples include lighting, Heating, Ventilation, and Air Conditioning (HVAC) and ancillary support equipment, communication systems, ventilation system, refrigerators, sterilizers, and medical equipment. This can cause food spoilage, loss of heat or air conditions, basement flooding (sump pump failure), lack of light, loss of water (well pump failure), lack of phone service, or lack of internet.

All structures and infrastructure might be exposed to the effects of a tornado or other high winds. Depending on the severity of a tornado or high wind, any existing structures might be damaged to some extent. Any future structures might be exposed to tornados or high winds as this hazard does not occur in specific locations. However, future buildings will be somewhat protected from the effects of tornado or high wind as they will meet the most current state building code requirements for bracing and roof design.

Due to their lightweight and often unanchored design, manufactured housing is extremely vulnerable to high winds and will generally sustain the most damage. This is especially true for mobile homes built before 1976, when the Department of Housing and Urban Development enacted standards for durability and safety. Table 4.3.11-6 displays the number of mobile homes per municipality in Lycoming County. The highest proportions of structures on mobile home parcels are in Muncy Township (23%), Woodward Township (22%), Fairfield Township (18%), Wolf Township (17%), Mifflin Township (17%). All municipalities except Hughesville and South Williamsport have at least one mobile structure.

Table 4.3.11-6 Mobile homes per jurisdiction (Lycoming County, 2025)			
MUNICIPALITY	TOTAL STRUCTURES	NUMBER OF STRUCTURES ON MOBILE HOME PARCELS	PERCENT STRUCTURES ON MOBILE HOME PARCELS
Anthony Township	387	18	5%
Armstrong Township	429	26	6%
Bastress Township	245	5	2%
Brady Township	234	20	9%
Brown Township	421	9	2%
Cascade Township	323	22	7%
Clinton Township	1,161	75	6%
Cogan House Township	636	34	5%
Cummings Township	604	39	6%
Duboistown Borough	560	3	1%
Eldred Township	905	98	11%
Fairfield Township	1,482	265	18%
Franklin Township	518	31	6%
Gamble Township	484	16	3%
Hepburn Township	1,267	157	12%
Hughesville Borough	973	0	0%
Jackson Township	289	24	8%
Jersey Shore Borough	1,792	19	1%
Jordan Township	533	46	9%
Lewis Township	648	77	12%
Limestone Township	844	35	4%
Loyalsock Township	5,171	34	1%
Lycoming Township	774	109	14%
McHenry Township	626	36	6%
McIntyre Township	383	34	9%
McNett Township	219	13	6%
Mifflin Township	552	94	17%
Mill Creek Township	301	22	7%
Montgomery Borough	661	2	0%
Montoursville Borough	2,301	1	0%
Moreland Township	487	19	4%
Muncy Borough	1,172	1	0%
Muncy Township	1,835	418	23%
Muncy Creek Township	646	18	3%
Nippenose Township	358	39	11%
Old Lycoming Township	2,454	120	5%
Penn Township	559	19	3%

Table 4.3.11-6 Mobile homes per jurisdiction (Lycoming County, 2025)			
MUNICIPALITY	TOTAL STRUCTURES	NUMBER OF STRUCTURES ON MOBILE HOME PARCELS	PERCENT STRUCTURES ON MOBILE HOME PARCELS
Piatt Township	536	72	13%
Picture Rocks Borough	285	1	0%
Pine Township	465	39	8%
Plunketts Creek Township	609	43	7%
Porter Township	698	56	8%
Salladasburg Borough	134	16	12%
Shrewsbury Township	304	18	6%
South Williamsport Borough	2,842	0	0%
Susquehanna Township	494	20	4%
Upper Fairfield Township	888	84	9%
Washington Township	775	45	6%
Watson Township	364	19	5%
Williamsport City	10,860	4	0%
Wolf Township	1,567	260	17%
Woodward Township	1,142	250	22%
TOTAL	55,197	2,925	5%

The impacts of windstorms on the environment typically take place over a larger area. In either case, where these events occur, severe damage to plant species is likely. This includes uprooting or total destruction of trees and an increased threat of wildfire in areas where dead trees are not removed. Further, hazardous material facilities should meet design requirements for the wind zones identified in Figure 4.3.11-1 in order to prevent release of hazardous materials into the environment.

Table 4.3.11-7 below shows the Expected Annual Losses to Strong Winds for each census tract in the county according to FEMA's National Risk Index.

Table 4.3.11-7 Expected Annual Losses to Strong Winds by Census Tract (FEMA NRI, 2023)			
CENSUS TRACT	MUNICIPALITIES	ESTIMATED ANNUAL LOSSES	ESTIMATED ANNUAL LOSS RATING
1.00	Williamsport City	$28,231.53	Relatively Moderate
2.00	Williamsport City	$17,789.85	Relatively Moderate
3.00	Williamsport City	$40,281.29	Relatively High
4.00	Williamsport City	$32,424.24	Relatively Moderate
5.00	Williamsport City	$22,758.96	Relatively Moderate
6.00	Williamsport City	$24,438.99	Relatively Moderate

Table 4.3.11-7 Expected Annual Losses to Strong Winds by Census Tract (FEMA NRI, 2023)			
CENSUS TRACT	**MUNICIPALITIES**	**ESTIMATED ANNUAL LOSSES**	**ESTIMATED ANNUAL LOSS RATING**
8.00	Williamsport City	$18,745.53	Relatively Moderate
9.00	Williamsport City	$17,683.52	Relatively Moderate
10.00	Williamsport City	$22,283.67	Relatively Moderate
101.00	Cogan House Township, Pine Township, Jackson Township, McIntyre Township, McNett Township	$15,683.70	Relatively Moderate
102.00	Brown Township, McHenry Township, Cummings Township, Watson Township	$8,520.13	Relatively Low
103.00	Anthony Township, Mifflin Township, Piatt Township, Salladasburg Borough	$24,492.12	Relatively Moderate
104.00	Hepburn Township, Lycoming Township, Lewis Township	$36,246.78	Relatively Moderate
105.01	Cascade Township, Gamble Township, Plunketts Creek Township	$14,873.67	Relatively Moderate
105.02	Eldred Township, Upper Fairfield Township	$33,775.95	Relatively Moderate
106.00	Shrewsbury Township, Penn Township, Moreland Township, Franklin Township, Jordan Township	$41,749.68	Relatively High
107.00	Mill Creek Township, Wolf Township, Picture Rocks Borough, Hughesville Borough	$56,026.47	Relatively High
108.00	Muncy Creek Township, Muncy Borough, Muncy Township	$67,371.42	Relatively High
109.00	Fairfield Township	$26,314.00	Relatively Moderate
110.00	Montoursville Borough	$42,773.84	Relatively High
111.00	Loyalsock Township	$51,625.34	Relatively High
112.00	Loyalsock Township	$49,655.16	Relatively High
113.01	Woodward Township	$15,486.74	Relatively Moderate

Table 4.3.11-7 Expected Annual Losses to Strong Winds by Census Tract (FEMA NRI, 2023)			
CENSUS TRACT	**MUNICIPALITIES**	**ESTIMATED ANNUAL LOSSES**	**ESTIMATED ANNUAL LOSS RATING**
113.02	Old Lycoming Township	$35,768.71	Relatively Moderate
114.00	Armstrong Township, Susquehanna Township	$12,927.73	Relatively Moderate
116.01	Duboistown Borough	$8,492.72	Relatively Low
116.03	South Williamsport Borough	$18,904.25	Relatively Moderate
116.04	South Williamsport Borough	$35,015.39	Relatively Moderate
117.01	Clinton Township, Montgomery Borough	$36,686.86	Relatively Moderate
117.02	Brady Township, Washington Township, Clinton Township	$29,559.80	Relatively Moderate
118.00	Bastress Township, Nippenose Township, Limestone Township	$23,973.99	Relatively Moderate
119.00	Jersey Shore Borough, Porter Township	$41,324.07	Relatively High
TOTAL		$951,886.09	

Table 4.3.11-8 below shows the Expected Annual Losses to Tornado for each census tract in the county according to FEMA's National Risk Index.

Table 4.3.11-8 Expected Annual Losses to Tornado by Census Tract (FEMA NRI, 2023)			
CENSUS TRACT	**MUNICIPALITIES**	**ESTIMATED ANNUAL LOSSES**	**ESTIMATED ANNUAL LOSS RATING**
1.00	Williamsport City	$28,411.65	Relatively Low
2.00	Williamsport City	$18,977.72	Relatively Low
3.00	Williamsport City	$35,376.78	Relatively Low
4.00	Williamsport City	$33,260.31	Relatively Low
5.00	Williamsport City	$25,366.34	Relatively Low
6.00	Williamsport City	$37,307.55	Relatively Low
8.00	Williamsport City	$24,363.72	Relatively Low
9.00	Williamsport City	$22,463.65	Relatively Low
10.00	Williamsport City	$22,343.70	Relatively Low
101.00	Cogan House Township, Pine Township, Jackson Township, McIntyre	$23,430.83	Relatively Low

Table 4.3.11-8	Expected Annual Losses to Tornado by Census Tract (FEMA NRI, 2023)		
CENSUS TRACT	MUNICIPALITIES	ESTIMATED ANNUAL LOSSES	ESTIMATED ANNUAL LOSS RATING
	Township, McNett Township		
102.00	Brown Township, McHenry Township, Cummings Township, Watson Township	$13,991.25	Relatively Low
103.00	Anthony Township, Mifflin Township, Piatt Township, Salladasburg Borough	$28,780.94	Relatively Low
104.00	Hepburn Township, Lycoming Township, Lewis Township	$39,329.79	Relatively Low
105.01	Cascade Township, Gamble Township, Plunketts Creek Township	$20,591.96	Relatively Low
105.02	Eldred Township, Upper Fairfield Township	$37,585.64	Relatively Low
106.00	Shrewsbury Township, Penn Township, Moreland Township, Franklin Township, Jordan Township	$60,496.95	Relatively Low
107.00	Mill Creek Township, Wolf Township, Picture Rocks Borough, Hughesville Borough	$64,109.35	Relatively Moderate
108.00	Muncy Creek Township, Muncy Borough, Muncy Township	$89,114.51	Relatively Moderate
109.00	Fairfield Township	$34,150.01	Relatively Low
110.00	Montoursville Borough	$49,640.81	Relatively Low
111.00	Loyalsock Township	$61,239.53	Relatively Low
112.00	Loyalsock Township	$56,498.66	Relatively Low
113.01	Woodward Township	$18,473.98	Relatively Low
113.02	Old Lycoming Township	$35,454.97	Relatively Low
114.00	Armstrong Township, Susquehanna Township	$14,720.88	Relatively Low
116.01	Duboistown Borough	$7,894.50	Very Low
116.03	South Williamsport Borough	$19,375.37	Relatively Low

Table 4.3.11-8	Expected Annual Losses to Tornado by Census Tract (FEMA NRI, 2023)		
CENSUS TRACT	**MUNICIPALITIES**	**ESTIMATED ANNUAL LOSSES**	**ESTIMATED ANNUAL LOSS RATING**
116.04	South Williamsport Borough	$35,089.21	Relatively Low
117.01	Clinton Township, Montgomery Borough	$35,786.62	Relatively Low
117.02	Brady Township, Washington Township, Clinton Township	$36,281.10	Relatively Low
118.00	Bastress Township, Nippenose Township, Limestone Township	$28,832.94	Relatively Low
119.00	Jersey Shore Borough, Porter Township	$42,540.45	Relatively Low
TOTAL		$1,101,281.66	

4.3.11.6. Equity in Vulnerable Communities

With respect to equity, there are several communities of consideration when it comes to planning for tornadoes and windstorms. Manufactured home communities, primarily mobile homes, are extremely at risk in the face of tornadoes and high-speed winds. This means areas of Muncy Township, Woodward Township, Fairfield Township, Wolf Township, and Mifflin Township may be particularly vulnerable. Additionally, households without vehicles, smartphones, or people with disabilities are also at higher risk if evacuation becomes necessary as all these factors present significant barriers to active response times. Williamsport has the highest concentration of those population groups.

4.3.12. Wildfire



4.3.12.1. Location and Extent

A wildfire is an uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures. Wildfires often begin unnoticed and can spread quickly, creating dense smoke clouds. A wildland fire is a wildfire in an area in which development is essentially nonexistent, except for roads, railroads, power lines, and similar facilities. An urban-wildland interface fire is a wildfire in a geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels.

Wildland fires are most common in the spring (March to May) and fall (October to November) months. During spring months, the lack of leaves on the trees allows the sunlight to heat the existing leaves on the ground from the previous fall. The same theory applies for the fall; however, the dryer conditions are a more crucial factor.

Wildfire events can occur at any time of the year but are most likely to occur in Lycoming County during a drought. Wildland fires in Pennsylvania can occur in fields, grass, and brush as well as in the forest itself. Under dry conditions or drought, wildfires have the potential to burn forests as well as croplands. Any small fire in a wooded area, if not quickly detected and suppressed, can get out of control. Most wildland fires are caused by human carelessness, negligence, and ignorance. In 2017, debris burning accounted for the largest number of wildfires, while incendiary causes accounted for the largest number of acres burned in Pennsylvania (DCNR, 2017). However, some are precipitated by lightning strikes and in rare instances, spontaneous combustion.

Lycoming County is generally rural in nature, consisting of large tracts of agricultural, undeveloped, and forested lands. Therefore, a wildfire could develop in any portion of the county. The most high-risk areas of the county are in the wildland-urban interface. These areas are the transition zones where wildlands and human settlements meet and therefore where the potential for wildfire to spread to structures is greatest.

The Pennsylvania Wilds, or PA Wilds, is a popular hiking and camping destination in northern Pennsylvania. The vast forest network covers over 2 million acres and is partially located in Lycoming County. PA Wilds is known for the darkest skies in the country and attracts many visitors at night for stargazing.

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 many acres of land. Large events may require evacuation from one or more communities and necessitate regional or national firefighting support. The impact of a severe wildfire can be devastating. A wildfire has the potential to kill people, livestock, fish, and wildlife. They often destroy property, valuable timber, and forage, recreational, and scenic values.

Vegetation loss is often an environmental concern with wildfires, but it typically is not a serious impact in that they burn dead trees, leaves, and grasses to allow more open space for new and different types of vegetation to grow and receive sunlight. Another positive effect of a wildfire is that it stimulates the growth of new shoots on trees and shrubs and its heat can open pinecones and other seed pods. The most significant negative impact is the potential for severe erosion, silting of stream beds and reservoirs, and flooding due to ground-cover loss following a fire event.

Wildland fires in Lycoming County have generally been small and easily contained. There have been a few that have burned over 100 acres, but most are confined to 10 acres or less. The fact that Lycoming County's land use is mostly forest or agricultural has led to no property damage being done by these fires. The worst wildfire to occur within the county burned about 4,000 acres, though it caused no property damage, injuries, or deaths. However, the county recognizes that wildfires of this magnitude will continue to occur in Lycoming County and will have more devastating effects as development in or around wildlands increases.

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. More common firefighting injuries include falls, sprains, abrasions, or heat-related injuries such as dehydration. Response to wildfires also exposes emergency responders to the risk of motor vehicle incidents and can place them in remote acres away from the communities that they are chartered to protect.

The largest wildfire in Pennsylvania in recent years burned 10,000 acres in the north-central area of the Commonwealth. This fire was controlled within a week. It destroyed five cabins, but there was no loss of life. Another large wildfire burned 8,000 acres in the Poconos in 2016. About 100 people were evacuated and it took 130 firefighters to stop the blaze. Several other fires have burned over 2,000 acres each and again have been controlled within a week of the reported start. This is a potential worst-case scenario for wildfires in Lycoming County based on acreage, due to the large amounts of forested land in the county.

The potential impacts of wildfire on community lifelines are as follows:

Table 4.3.12-1 Most Likely Lifelines Impacted by Wildfire

LIFELINES	NOTES
	Fire departments will need to respond and possibly recover where community safety is threatened.
	Wildlife directly threatens homes and potentially agricultural operations.

Table 4.3.12-1 Most Likely Lifelines Impacted by Wildfire	
LIFELINES	NOTES
	Potential serious injuries and fatalities may occur, which can stress health and medical systems in large numbers.

4.3.12.3. Past Occurrence

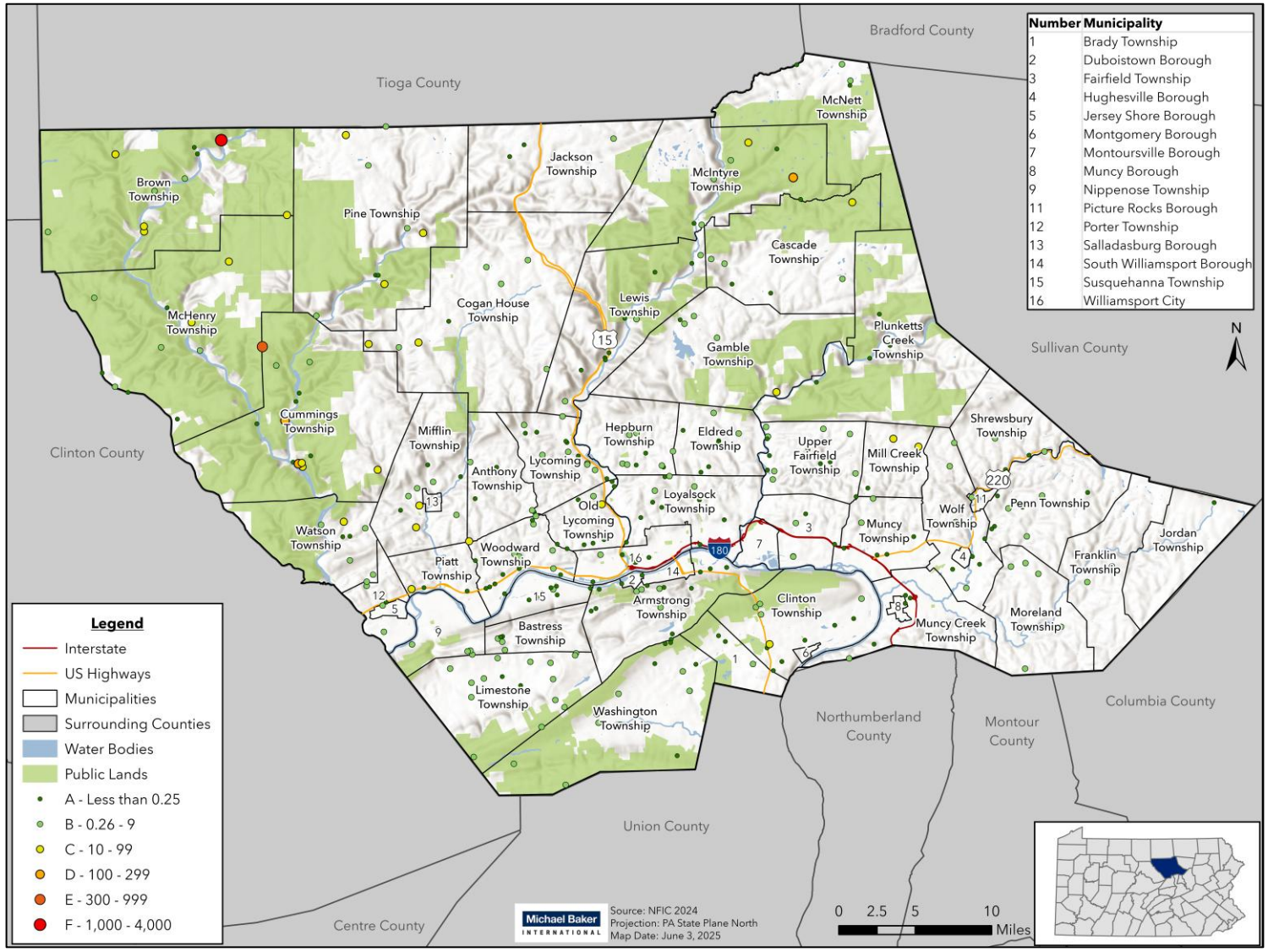
In the past, DCNR reported wildfire data at the State Forest District level. Lycoming County lies in State Forest District 20 (Loyalsock). District 20 also includes Bradford and Sullivan Counties. From 2012-2019, the most recent years data are available from DCNR, there were 213 wildfire events in Pennsylvania State Forest District 20 reported. This number does not include wildfires that were not reported to the DCNR or that were controlled solely by the volunteer fire departments in the county,

More recent data comes from the National Interagency Fire Center (NIFC). Table 4.3.12-2 lists the total number of wildfires per municipality and the total burned acres of those wildfires. Figure 4.3.12-3 maps the origins of wildfire events which were reported to the NIFC. It is important to note that this is not an inclusive map of all wildfires, just those with known locations. The map and table show that previous occurrences of wildfires have occurred throughout the entire County between 2002 and 2024.

Table 4.3.12-2 Wildfires by Municipality (NIFC, 2024)		
MUNICIPALITY	**TOTAL WILDFIRES**	**TOTAL ACRES BURNED**
Anthony Township	6	51
Armstrong Township	14	11
Bastress Township	11	3
Brady Township	3	0
Brown Township	10	4,153
Cascade Township	6	69
Clinton Township	11	37
Cogan House Township	8	52
Cummings Township	15	92
Duboistown Borough	2	0
Eldred Township	8	7
Fairfield Township	5	2
Franklin Township	2	3
Gamble Township	5	14
Hepburn Township	9	5

Table 4.3.12-2 Wildfires by Municipality (NIFC, 2024)		
MUNICIPALITY	TOTAL WILDFIRES	TOTAL ACRES BURNED
Jackson Township	3	1
Jersey Shore Borough	1	4
Jordan Township	1	0
Lewis Township	11	9
Limestone Township	18	35
Loyalsock Township	16	13
Lycoming Township	13	8
McHenry Township	10	43
McIntyre Township	8	258
McNett Township	5	8
Mifflin Township	9	36
Mill Creek Township	3	26
Moreland Township	5	8
Muncy Borough	1	0
Muncy Creek Township	4	1
Muncy Township	8	9
Nippenose Township	7	5
Old Lycoming Township	10	20
Penn Township	9	10
Piatt Township	3	33
Picture Rocks Borough	1	1
Pine Township	9	97
Plunketts Creek Township	4	1
Porter Township	3	1
Shrewsbury Township	3	5
Susquehanna Township	9	1
Upper Fairfield Township	14	15
Washington Township	18	14
Watson Township	9	25
Williamsport City	8	5
Wolf Township	9	13
Woodward Township	15	19
TOTAL	362	6,055

Figure 4.3.12-1 Wildfire origins in Lycoming County between 2002 and 2024



4.3.12.4. Future Occurrence

Previous events indicate that wildfires will continue to occur yearly in Lycoming County. The likelihood of a fire attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Therefore, the probability of a wildfire is estimated to be between 50 and 90 percent in any given year and can be considered *likely* as defined by the Risk Factor Methodology probability criteria (see Table 4.4-1).

The CMRA Tool provides a county-level assessment report for wildfire, shown in Figure 4.3.12-2 below. The future climate indicators for wildfire are precipitation and temperatures thresholds. According to CMRA, the days per year with no precipitation are projected to increase slightly while the days with maximum temperatures above 90 degrees Fahrenheit are expected to increase significantly. These projections show that the conditions in the future may make wildfires more likely. Beyond changes in temperature and precipitation, future land use patterns can alter future wildfire risk. If land in the wildland-urban interface is developed without adequate fire-resistant features and designs, the number of wildfires may increase.

Figure 4.3.12-2 Lycoming County Wildfire Hazard Assessment Report (CMRA, 2024)



Future Climate Indicators

Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Precipitation:							
Days per year with no precipitation (dry days)	**167 days** 163 - 172	**168 days** 157 - 179	**168 days** 160 - 183	**169 days** 158 - 180	**169 days** 159 - 187	**169 days** 161 - 182	**171 days** 148 - 194
Maximum number of consecutive dry days	**10 days** 10 - 12	**11 days** 9 - 13	**11 days** 10 - 13	**11 days** 10 - 13	**11 days** 10 - 14	**11 days** 10 - 13	**12 days** 10 - 14
Days per year with precipitation (wet days)	**198 days** 194 - 202	**197 days** 187 - 209	**197 days** 182 - 205	**197 days** 185 - 207	**196 days** 178 - 206	**196 days** 183 - 205	**195 days** 172 - 217
Temperature thresholds:							
Annual days with maximum temperature > 90°F	**3 days** 3 - 7	**14 days** 6 - 27	**15 days** 7 - 25	**20 days** 8 - 40	**26 days** 11 - 45	**27 days** 10 - 55	**56 days** 18 - 91
Annual days with maximum temperature > 100°F	**0 days** 0 - 0	**0 days** 0 - 2	**1 days** 0 - 4	**1 days** 0 - 8	**2 days** 0 - 11	**3 days** 0 - 8	**11 days** 0 - 42

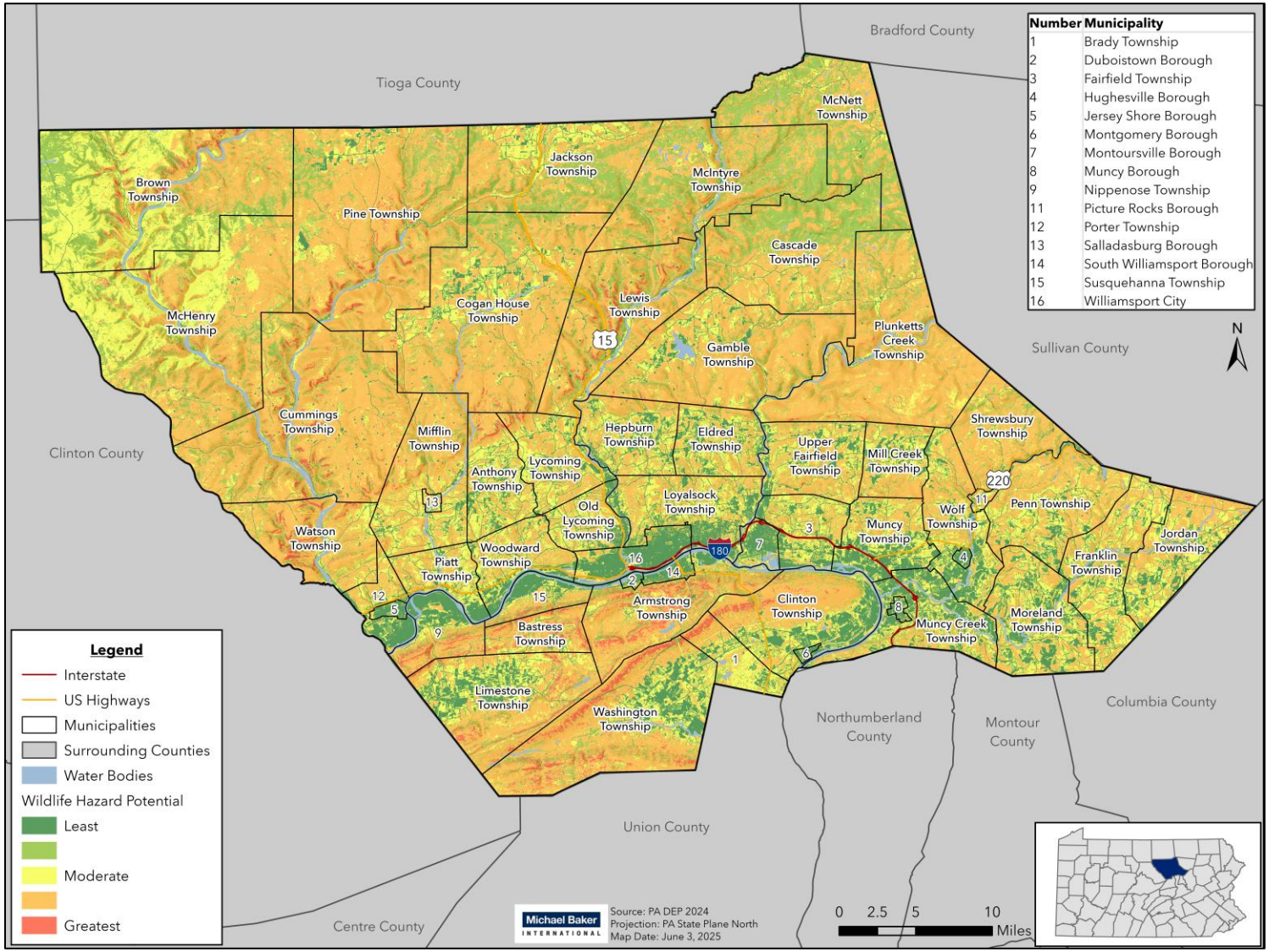
N/A = Data Not Available for the selected area

4.3.12.5. Vulnerability Assessment

The Pennsylvania Bureau of Forestry has conducted an independent wildfire hazard risk assessment for the various municipalities across Lycoming County. Results of that assessment are shown in Figure 4.3.12-2. *Wildfire hazard* is defined based on conditions that affect wildfire ignition and/or behavior such as fuel, topography and local weather. Based on this assessment, 31 jurisdictions in Lycoming County have a *high* wildfire hazard rating. Eleven municipalities have a *medium* wildfire hazard potential, and eight municipalities have a *low* wildfire hazard potential. A wildfire hazard assessment was not completed for the City of Williamsport, though it is assumed that with the density of development and limited open space, the chance of wildfire in Williamsport is also low. The individual vulnerability of communities will differ based on the design of the wildland-urban interface, the number of ingress and egress points into a community, and the availability of water to fight fires.

The Pennsylvania Department of Community and Economic Development's (DCED) Municipal Fire Service Report states that Lycoming County has a total of thirty-six fire companies across its fifty-two municipalities (DCED, 2025). Of the thirty-six fire companies in the county, one is a fully paid company, operating in Williamsport City. Two fire companies integrate paid and volunteer positions, engaging both types of firefighters. The remaining thirty-three are solely volunteer-run. Two of these operations, in Williamsport City and Loyalsock Township, employ a full-time Fire Marshall/Chief. Volunteer run fire departments can pose additional risks to communities informed by limited training and experience, resource constraints, response time delays, and community preparedness gaps. Volunteer firefighters may not have the same level of specialized wildfire training as full-time professionals, which can impact response effectiveness. Volunteer departments often operate with limited funding, meaning they may lack advanced equipment, protective gear, or sufficient personnel. Volunteers may have other jobs and responsibilities, leading to slower response times compared to full-time firefighters. Without a well-funded fire department, communities may struggle with fire prevention measures, evacuation planning, and public education.

Figure 4.3.12-3 Map showing wildfire hazard by jurisdiction across Lycoming County.



Wildfires have the potential to destroy huge areas of vegetation with no regard to the human-made structures within those areas. The rural areas in which these fires occur generally have little firefighting infrastructure such as hydrants, and the fire departments servicing those areas may take extended times to reach and ultimately extinguish the fire. Recognizing that these fires have the potential to spread relatively unopposed, the most vulnerable people and property are those within and near wooded areas.

For the purpose of this document, vulnerability to wildfire is defined as structures, critical facilities, and populations that are in or within 2 miles of state forests, state parks, and state game lands, as they are the largest continuous tracks of wooded land in Lycoming County. Table 4.3.12-3 shows the number of structures and critical facilities in wooded areas of Lycoming County, and Table 4.3.12-4 shows the number of structures vulnerable to wildfires by generalized property type. "Other" represents the greatest number of structures in or near state recreation areas by land use. This likely encompasses sheds, cabins, and other structures by forested areas, which is why there are less residential, commercial, and industrial structures at risk as shown in 4.3.12-5. There are 13 municipalities that have 100% structures and 21 municipalities with 100% of their critical facilities in or within 2 miles of state forests, parks, or game lands. About 50% of all structures in the county fall into this category, but 57% of critical facilities do.

Table 4.3.12-3 Structures and Critical Facilities Located in and near State Parks, State Forests, and State Game Lands in Lycoming County.

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN/NEAR STATE RECREATION AREAS	PERCENT STRUCTURES IN/NEAR STATE RECREATION AREAS	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN/NEAR STATE RECREATION AREAS	PERCENT CRITICAL FACILITIES IN/NEAR STATE RECREATION AREAS	TOTAL POPULATION	POPULATION IN/NEAR STATE RECREATION AREAS	PERCENT POPULATION IN/NEAR STATE RECREATION AREAS
Anthony Township	387	116	30%	4	0	0%	867	180	21%
Armstrong Township	429	429	100%	1	1	100%	686	686	100%
Bastress Township	245	39	16%	3	0	0%	527	46	9%
Brady Township	234	223	95%	3	3	100%	501	443	88%
Brown Township	421	421	100%	5	5	100%	93	93	100%
Cascade Township	323	322	100%	0	0	0%	422	422	100%
Clinton Township	1,161	1,033	89%	18	16	89%	3,720	3,436	92%
Cogan House Township	636	393	62%	8	6	75%	935	580	62%
Cummings Township	604	601	100%	5	5	100%	265	265	100%
Duboistown Borough	560	560	100%	4	4	100%	1,200	1,200	100%
Eldred Township	905	600	66%	4	4	100%	1,997	1,317	66%
Fairfield Township	1,482	983	66%	4	4	100%	2,834	1,532	54%
Franklin Township	518	79	15%	5	0	0%	903	115	13%
Gamble Township	484	478	99%	3	3	100%	778	778	100%
Hepburn Township	1,267	168	13%	6	0	0%	2,578	396	15%
Hughesville Borough	973	0	0%	9	0	0%	2,154	0	0%
Jackson Township	289	77	27%	1	0	0%	396	60	15%
Jersey Shore Borough	1,792	514	29%	17	5	29%	4,166	1,072	26%
Jordan Township	533	120	23%	4	0	0%	850	169	20%
Lewis Township	648	646	100%	10	10	100%	862	862	100%
Limestone Township	844	748	89%	5	4	80%	1,966	1,682	86%

Table 4.3.12-3 Structures and Critical Facilities Located in and near State Parks, State Forests, and State Game Lands in Lycoming County.

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN/NEAR STATE RECREATION AREAS	PERCENT STRUCTURES IN/NEAR STATE RECREATION AREAS	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN/NEAR STATE RECREATION AREAS	PERCENT CRITICAL FACILITIES IN/NEAR STATE RECREATION AREAS	TOTAL POPULATION	POPULATION IN/NEAR STATE RECREATION AREAS	PERCENT POPULATION IN/NEAR STATE RECREATION AREAS
Loyalsock Township	5,171	751	15%	35	11	31%	11,561	1,222	11%
Lycoming Township	774	21	3%	1	0	0%	1,491	112	8%
McHenry Township	626	626	100%	4	4	100%	122	122	100%
McIntyre Township	383	383	100%	4	4	100%	461	461	100%
McNett Township	219	219	100%	2	2	100%	143	132	92%
Mifflin Township	552	131	24%	4	0	0%	1,089	368	34%
Mill Creek Township	301	184	61%	4	2	50%	582	329	57%
Montgomery Borough	661	461	70%	4	2	50%	1,568	1,086	69%
Montoursville Borough	2,301	1,968	86%	17	17	100%	4,750	4,025	85%
Moreland Township	487	0	0%	5	0	0%	1,015	0	0%
Muncy Borough	1,172	560	48%	12	2	17%	2,440	1,186	49%
Muncy Creek Township	1,835	510	28%	6	0	0%	3,573	982	27%
Muncy Township	646	237	37%	12	6	50%	1,178	290	25%
Nippenose Township	358	357	100%	5	5	100%	661	661	100%
Old Lycoming Township	2,454	214	9%	8	0	0%	4,975	397	8%
Penn Township	559	0	0%	2	0	0%	895	0	0%
Piatt Township	536	122	23%	2	0	0%	1,047	212	20%
Picture Rocks Borough	285	0	0%	6	0	0%	643	0	0%
Pine Township	465	442	95%	2	2	100%	258	247	96%
Plunketts Creek Township	609	609	100%	5	5	100%	597	597	100%

Table 4.3.12-3 Structures and Critical Facilities Located in and near State Parks, State Forests, and State Game Lands in Lycoming County.

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN/NEAR STATE RECREATION AREAS	PERCENT STRUCTURES IN/NEAR STATE RECREATION AREAS	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN/NEAR STATE RECREATION AREAS	PERCENT CRITICAL FACILITIES IN/NEAR STATE RECREATION AREAS	TOTAL POPULATION	POPULATION IN/NEAR STATE RECREATION AREAS	PERCENT POPULATION IN/NEAR STATE RECREATION AREAS
Porter Township	698	218	31%	5	1	20%	1,528	676	44%
Salladasburg Borough	134	0	0%	1	0	0%	250	0	0%
Shrewsbury Township	304	82	27%	0	0	0%	418	41	10%
South Williamsport Borough	2,842	2,842	100%	18	18	100%	6,261	6,261	100%
Susquehanna Township	494	342	69%	4	4	100%	968	705	73%
Upper Fairfield Township	888	512	58%	5	5	100%	1,807	956	53%
Washington Township	775	775	100%	8	8	100%	1,768	1,768	100%
Watson Township	364	362	99%	1	1	100%	534	528	99%
Williamsport, City of	10,860	5,804	53%	74	52	70%	27,754	15,216	55%
Wolf Township	1,567	100	6%	8	0	0%	3,105	185	6%
Woodward Township	1,142	45	4%	5	1	20%	2,046	32	2%
TOTAL	55,197	27,427	50%	388	222	57%	114,188	54,131	47%

Table 4.3.12-4 Structures Located in and near State Parks, State Forests, and State Game Lands in Lycoming County by Generalized Property Type.

MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	OTHER	MIXED USE	RESIDENTIAL	UNKNOWN	TOTAL
Anthony Township	35	0	0	0	3	62	16	116
Armstrong Township	44	18	5	4	11	237	110	429
Bastress Township	15	0	0	1	1	18	4	39
Brady Township	23	7	0	4	3	164	22	223
Brown Township	39	10	1	2	6	304	59	421
Cascade Township	118	3	0	0	9	125	67	322
Clinton Township	93	50	13	18	18	711	130	1,033
Cogan House Township	131	10	0	0	6	151	95	393
Cummings Township	59	15	1	4	8	326	188	601
Duboistown Borough	0	23	0	8	2	473	54	560
Eldred Township	53	9	1	3	2	495	37	600
Fairfield Township	13	70	4	16	20	716	144	983
Franklin Township	30	1	0	1	5	37	5	79
Gamble Township	140	7	0	1	8	260	62	478
Hepburn Township	39	2	0	1	5	104	17	168
Hughesville Borough	0	0	0	0	0	0	0	0
Jackson Township	17	3	0	0	2	18	37	77
Jersey Shore Borough	0	45	1	32	5	351	80	514
Jordan Township	36	2	0	1	3	44	34	120
Lewis Township	65	18	2	8	14	393	146	646
Limestone Township	152	10	1	11	9	498	67	748
Loyalsock Township	0	106	7	32	3	439	164	751

Table 4.3.12-4 Structures Located in and near State Parks, State Forests, and State Game Lands in Lycoming County by Generalized Property Type.

MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	OTHER	MIXED USE	RESIDENTIAL	UNKNOWN	TOTAL
Lycoming Township	6	0	0	0	1	11	3	21
McHenry Township	66	11	0	1	18	429	101	626
McIntyre Township	25	9	0	6	20	229	94	383
McNett Township	69	7	0	0	6	79	58	219
Mifflin Township	45	4	0	1	5	56	20	131
Mill Creek Township	51	2	0	0	1	111	19	184
Montgomery Borough	0	30	6	23	2	350	50	461
Montoursville Borough	0	116	17	59	12	1,471	293	1,968
Moreland Township	0	0	0	0	0	0	0	0
Muncy Borough	0	27	0	10	5	503	15	560
Muncy Creek Township	55	19	3	10	7	332	84	510
Muncy Township	13	64	4	9	4	80	63	237
Nippenose Township	32	17	0	3	7	234	64	357
Old Lycoming Township	0	7	2	1	0	197	7	214
Penn Township	0	0	0	0	0	0	0	0
Piatt Township	5	2	0	1	0	101	13	122
Picture Rocks Borough	0	0	0	0	0	0	0	0
Pine Township	99	11	0	5	12	222	93	442
Plunketts Creek Township	101	8	1	3	27	387	82	609
Porter Township	20	7	3	0	3	173	12	218
Salladasburg Borough	0	0	0	0	0	0	0	0
Shrewsbury Township	30	2	0	0	1	20	29	82

Table 4.3.12-4 Structures Located in and near State Parks, State Forests, and State Game Lands in Lycoming County by Generalized Property Type.

MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	OTHER	MIXED USE	RESIDENTIAL	UNKNOWN	TOTAL
South Williamsport Borough	3	123	12	51	26	2,224	403	2,842
Susquehanna Township	3	10	0	4	3	290	32	342
Upper Fairfield Township	97	6	0	1	13	326	69	512
Washington Township	183	11	0	7	11	494	69	775
Watson Township	62	10	2	1	4	231	52	362
Williamsport, City of	4	680	52	195	83	3,309	1,481	5,804
Wolf Township	30	1	0	0	2	58	9	100
Woodward Township	3	5	3	2	1	25	6	45
TOTAL	2,104	1,598	141	540	417	17,868	4,759	27,427

Table 4.3.12-5 below shows the Expected Annual Losses to Wildfire for each census tract in the county according to FEMA's National Risk Index.

Table 4.3.12-5	Expected Annual Losses to Wildfire by Census Tract (FEMA NRI, 2023)		
CENSUS TRACT	**MUNICIPALITIES**	**ESTIMATED ANNUAL LOSSES**	**ESTIMATED ANNUAL LOSS RATING**
1.00	Williamsport City	$670.65	Relatively Low
2.00	Williamsport City	$380.74	Relatively Low
3.00	Williamsport City	$84.18	Very Low
4.00	Williamsport City	$0.00	No Expected Annual Losses
5.00	Williamsport City	$15.41	Very Low
6.00	Williamsport City	$69.68	Very Low
8.00	Williamsport City	$166.89	Very Low
9.00	Williamsport City	$243.01	Very Low
10.00	Williamsport City	$61.28	Very Low
101.00	Cogan House Township, Pine Township, Jackson Township, McIntyre Township, McNett Township	$387.11	Relatively Low
102.00	Brown Township, McHenry Township, Cummings Township, Watson Township	$486.00	Relatively Low
103.00	Anthony Township, Mifflin Township, Piatt Township, Salladasburg Borough	$1,585.67	Relatively Low
104.00	Hepburn Township, Lycoming Township, Lewis Township	$654.05	Relatively Low
105.01	Cascade Township, Gamble Township, Plunketts Creek Township	$312.12	Very Low
105.02	Eldred Township, Upper Fairfield Township	$389.10	Relatively Low
106.00	Shrewsbury Township, Penn Township, Moreland Township, Franklin Township, Jordan Township	$1,118.12	Relatively Low
107.00	Mill Creek Township, Wolf Township, Picture Rocks Borough, Hughesville Borough	$909.79	Relatively Low

Table 4.3.12-5	Expected Annual Losses to Wildfire by Census Tract (FEMA NRI, 2023)		
CENSUS TRACT	**MUNICIPALITIES**	**ESTIMATED ANNUAL LOSSES**	**ESTIMATED ANNUAL LOSS RATING**
108.00	Muncy Creek Township, Muncy Borough, Muncy Township	$1,841.15	Relatively Low
109.00	Fairfield Township	$659.36	Relatively Low
110.00	Montoursville Borough	$292.59	Very Low
111.00	Loyalsock Township	$754.16	Relatively Low
112.00	Loyalsock Township	$591.92	Relatively Low
113.01	Woodward Township	$234.03	Very Low
113.02	Old Lycoming Township	$346.76	Very Low
114.00	Armstrong Township, Susquehanna Township	$250.83	Very Low
116.01	Duboistown Borough	$114.11	Very Low
116.03	South Williamsport Borough	$382.95	Relatively Low
116.04	South Williamsport Borough	$466.52	Relatively Low
117.01	Clinton Township, Montgomery Borough	$505.38	Relatively Low
117.02	Brady Township, Washington Township, Clinton Township	$683.72	Relatively Low
118.00	Bastress Township, Nippenose Township, Limestone Township	$243.72	Very Low
119.00	Jersey Shore Borough, Porter Township	$613.10	Relatively Low
TOTAL		$15,514.09	

4.3.12.6. Equity in Vulnerable Communities

Communities in rural areas are more susceptible due to potential proximity to large fire-prone wooded areas. These areas may have limited evacuation routes, increasing the risk for residents in the path of wildfires. Additionally, households with people with disabilities, specifically related to lung or respiratory issues, are going to be at an increased risk of harm, and county hospitals should be prepared.

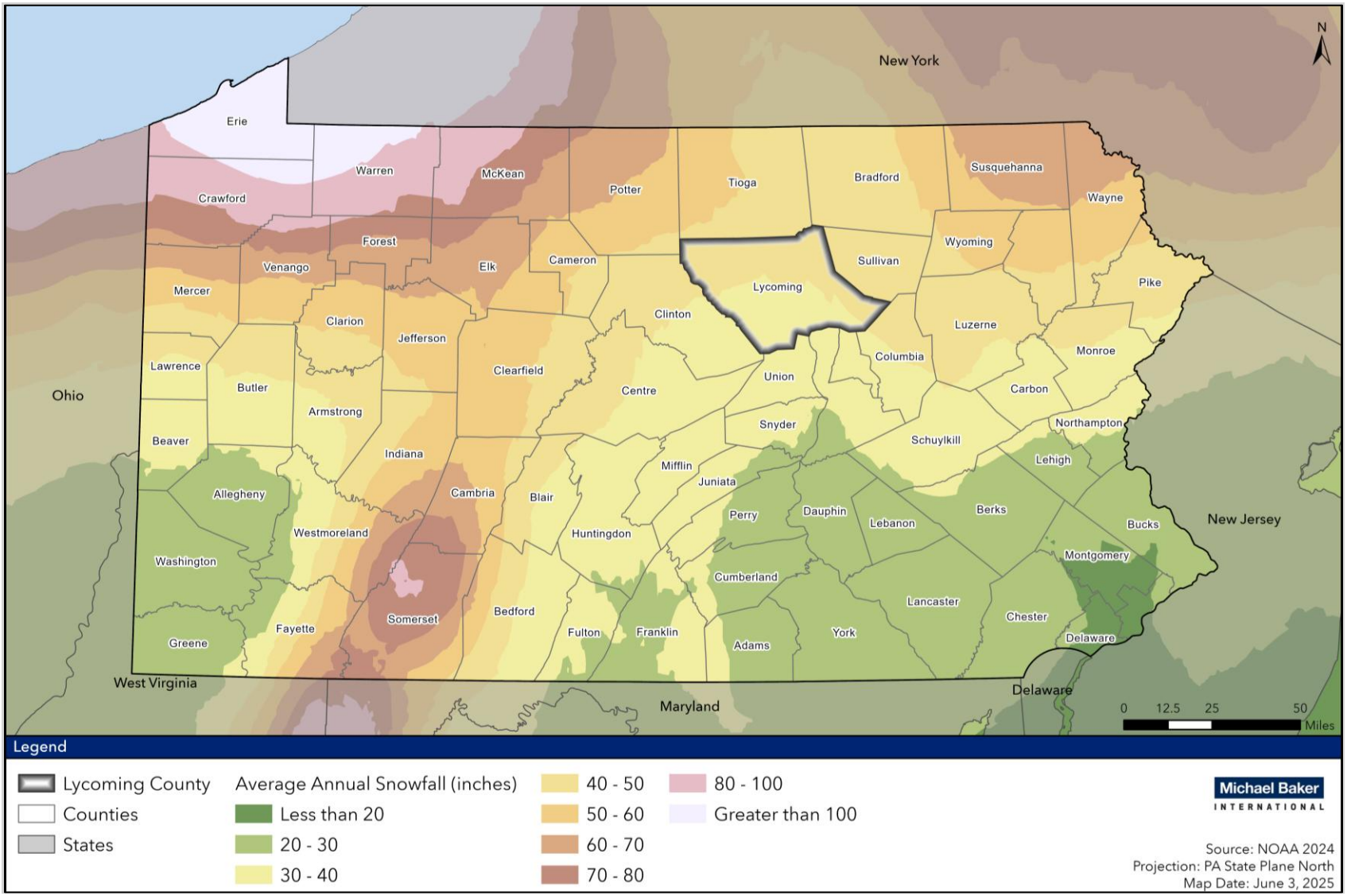
4.3.13. Winter Storm



4.3.13.1. Location and Extent

Heavy snow or ice occurs throughout the Commonwealth of Pennsylvania. Every municipality in Lycoming County is affected by these storms. Lycoming County experiences all levels of winter storms from ice storms and freezing rain to heavy snow and blizzards. Winter storms typically begin as low-pressure systems that move through Pennsylvania, following the jet stream. Average annual snowfall in Lycoming County ranges from 30 to 50 inches, with higher snowfalls occurring in the northwest portion of the county. See Figure 4.3.13-1 for the mean annual snowfall in Pennsylvania.

Figure 4.3.13-1 Pennsylvania mean annual snowfall



4.3.13.2. Range of Magnitude

Winter storms consist of cold temperatures, heavy snow or ice and sometimes strong winds. Because these events are regular annual occurrences in Lycoming County, they are considered hazards only when they result in damage to specific structures and/or overwhelm local capabilities to handle disruptions to traffic, communications, and electric power. The cost of removing snow, repairing damages, especially from ice storms, and the loss to businesses can have a negative economic impact for communities. Winter storms can generate other hazards such as infrastructure disruption (blocked roads and power outages), human-caused hazards (traffic incidents and trapped vehicles), and technological problems (communication system outages and overload). Winter storms can adversely affect roadways, utilities, business activities, and can cause loss of life, frostbite, or freezing.

Winter storms may include one or more of the following weather events:

1. Heavy Snowstorm: Accumulations of four inches or more in a six-hour period, or six inches or more in a twelve-hour period.

2. Sleet Storm: Sleet is formed when snow falling to the earth partially melts as it passes through a layer of warm air. The precipitation then passes through a cold layer of air and refreezes into solid pellets. Sleet causes surfaces to become slippery, posing hazards to pedestrians and motorists.

3. Ice Storm: An ice storm occurs when rain freezes upon impact with the ground or other objects such as trees and power lines. Heavy accumulations of ice can bring down trees and topple utility poles, disrupting power and communication for days while crews make the necessary repairs. The icy conditions are also dangerous for pedestrians and vehicular traffic.

4. Blizzard: According to the National Weather Service, a blizzard is a severe snowstorm that occurs when winds reach 35 mph or more. The blowing snow reduces visibility to less than one-quarter of a mile for at least three hours. Storms that meet these criteria are not frequent in Lycoming County; however, storms that produce blizzard-like conditions are a common occurrence.

5. Severe Blizzard: Wind velocity of 45 miles per hour, temperatures of 10 degrees Fahrenheit or lower, a high density of blowing snow with visibility frequently measured in feet prevailing over an extended period time.

Any of the above events can result in the closing of secondary roads, particularly in rural locations, 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 build-up and/or high winds, which can break limbs or even bring down large trees. An indirect effect of winter storms is the treatment of roadway surfaces with salt, chemicals, and other de-icing materials which can impair adjacent surfaces through corrosion and impair local water bodies and water supply (Hinsdale, 2018). Winter storms have a positive environmental impact as well, as gradual

melting of snow and ice provides excellent groundwater recharge. However, quickly rising temperatures following a heavy snowfall can cause rapid surface water runoff and severe flooding.

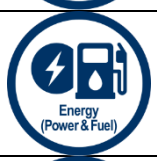
In Lycoming County, a devastating winter storm occurred in early January 1994. This storm caused record snowfall depths (in excess of 33 inches in some portions of the Commonwealth), strong winds, and sleet/freezing rains. Numerous storm-related power outages were reported, and as many as 600,000 residents were without electricity, in some cases for several days at a time. An intense ice storm followed that affected the Commonwealth and 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 PP&L stated that this was the worst winter storm in the history of the company, and related damage-repair costs exceeded $5,000,000.

Serious power supply shortages continued through mid-January because of record cold temperatures at 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 the facilities in which they resided. 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.

The record cold conditions resulted in numerous water-main breaks and interruptions of service to thousands of municipal and city water customers throughout the Commonwealth. Additionally, the extreme cold, in conjunction with accumulations of frozen precipitation, resulted in acute shortages of road salt. As a result, trucks were dispatched to haul salt from New York to expedite deliveries to PennDOT storage sites.

The potential impacts of winter storms on community lifelines are as follows:

Table 4.3.13-1 Most Likely Lifelines Impacted by Winter Storm

LIFELINES	NOTES
	Winter storms can cause damage to structures and water utility infrastructure, while the food supply chain may be disrupted due to impacts on transportation infrastructure.
	Potential direct damage to infrastructure and then potential increased fuel use for those who lost access to electrical heating may occur.
	Transportation lifeline will be involved in response and recovery. There may be direct damage to infrastructure and dangerous road conditions.

4.3.13.3. Past Occurrence

Lycoming County has experienced many major winter storms. In January 1978, February 1978, March 1989, February 1992, March 1993, January 1994, February 1994, and January 1996 all experienced winter storm events that resulted in emergency or disaster declarations.

Winter storm events in recent years have resulted in snow accumulations from 6-13 inches and significant ice coverage in parts of the county. The most common complications are bad travel conditions and road closures.

Since 2015, Lycoming County has witnessed 1 heavy snow event, 1 ice storm, and 22 winter storms. According to NOAA's NCEI, the most recent recorded winter storm event took place on March 6th, 2023, in the Northern Lycoming zone. The quick-hitting winter storm produced 7 to 10 inches of snow across northern Lycoming County in less than 12 hours. Multiple tractor trailers got stuck in the snow, resulting in US Route 15 being closed in both directions for nearly 3 hours between Route 184 and Route 284 (Buttonwood) in Cogan House Township. Similarly, the heavy snow event was a quick-hitting winter storm that produced up to 6 inches of snow across northern Lycoming County in less than 12 hours on March 12th, 2022. Furthermore, an ice storm occurred on January 9th, 2022, in Southern Lycoming zone. Overrunning precipitation fell into cold-air damming over central Pennsylvania ahead of an approaching arctic cold front. This produced a 0.25-inch ice accumulation across Southern Lycoming County and north of the Route 322 corridor. Table 4.3.13-2 presents a history of the winter storms that have affected Lycoming County. Table 4.3.13-2 summarizes these events to show the number of winter storm events each year from 1996 to 2024.

Table 4.3.13-2 Previous winter storms events in Lycoming County from 1996-2024 (NOAA NCEI, 2025b)

LOCATION	DATE	TYPE	PROPERTY DAMAGE ($)
Countywide	1/2/1996	Heavy Snow	0
Southern Lycoming (zone)	1/7/1996	Blizzard	0
Countywide	1/12/1996	Heavy Snow	0
Countywide	3/7/1996	Heavy Snow	0
Northern Lycoming (zone)	1/27/1997	Heavy Snow	0
Northern Lycoming (zone)	2/13/1997	Winter Storm	0
Countywide	3/14/1997	Ice Storm	0
Northern Lycoming (zone)	11/14/1997	Heavy Snow	0
Northern Lycoming (zone)	12/10/1997	Heavy Snow	0
Countywide	12/29/1997	Heavy Snow	0
Countywide	1/15/1998	Ice Storm	0
Countywide	1/22/1998	Ice Storm	0
Northern Lycoming (zone)	2/23/1998	Heavy Snow	0
Countywide	1/2/1999	Winter Storm	0
Countywide	1/8/1999	Winter Storm	0

Table 4.3.13-2 Previous winter storms events in Lycoming County from 1996-2024 (NOAA NCEI, 2025b)			
LOCATION	DATE	TYPE	PROPERTY DAMAGE ($)
Countywide	1/14/1999	Winter Storm	0
Countywide	2/7/1999	Heavy Snow	0
Northern Lycoming (zone)	3/6/1999	Heavy Snow	0
Northern Lycoming (zone)	3/21/1999	Heavy Snow	0
Countywide	1/25/2000	Heavy Snow	0
Countywide	1/30/2000	Heavy Snow	0
Countywide	2/13/2000	Ice Storm	0
Countywide	2/18/2000	Winter Storm	0
Countywide	12/13/2000	Winter Storm	0
Countywide	12/19/2000	Heavy Snow	0
Countywide	3/4/2001	Heavy Snow	$8,000
Countywide	1/6/2002	Heavy Snow	0
Countywide	12/5/2002	Heavy Snow	0
Countywide	12/10/2002	Ice Storm	0
Countywide	12/25/2002	Heavy Snow	0
Countywide	1/1/2003	Ice Storm	0
Countywide	1/2/2003	Heavy Snow	0
Countywide	2/16/2003	Heavy Snow	0
Countywide	12/14/2003	Heavy Snow	0
Southern Lycoming (zone)	1/27/2004	Heavy Snow	0
Countywide	2/3/2004	Heavy Snow	0
Countywide	3/16/2004	Heavy Snow	0
Countywide	1/5/2005	Winter Storm	0
Northern Lycoming (zone)	1/8/2005	Ice Storm	0
Northern Lycoming (zone)	1/22/2005	Winter Storm	0
Northern Lycoming (zone)	2/21/2005	Winter Storm	0
Countywide	3/1/2005	Heavy Snow	0
Northern Lycoming (zone)	10/25/2005	Heavy Snow	0
Countywide	12/9/2005	Heavy Snow	0
Countywide	12/16/2005	Winter Storm	0
Southern Lycoming (zone)	2/13/2007	Winter Storm	0
Northern Lycoming (zone)	2/13/2007	Heavy Snow	0
Countywide	3/16/2007	Heavy Snow	0
Northern Lycoming (zone)	4/15/2007	Heavy Snow	0
Northern Lycoming (zone)	12/2/2007	Ice Storm	0
Northern Lycoming (zone)	12/9/2007	Ice Storm	0
Northern Lycoming (zone)	12/13/2007	Winter Storm	0
Countywide	2/1/2008	Winter Storm	0

Table 4.3.13-2 Previous winter storms events in Lycoming County from 1996-2024 (NOAA NCEI, 2025b)			
LOCATION	**DATE**	**TYPE**	**PROPERTY DAMAGE ($)**
Southern Lycoming (zone)	2/12/2008	Ice Storm	0
Northern Lycoming (zone)	12/11/2008	Winter Storm	0
Countywide	12/19/2008	Winter Storm	0
Countywide	12/23/2008	Ice Storm	0
Countywide	1/6/2009	Ice Storm	0
Northern Lycoming (zone)	1/10/2009	Winter Storm	0
Countywide	1/27/2009	Winter Storm	0
Northern Lycoming (zone)	10/15/2009	Winter Storm	0
Southern Lycoming (zone)	2/9/2010	Winter Storm	0
Northern Lycoming (zone)	2/25/2010	Winter Storm	0
Northern Lycoming (zone)	2/1/2011	Winter Storm	0
Countywide	2/20/2011	Heavy Snow	0
Countywide	3/6/2011	Heavy Snow	0
Northern Lycoming (zone)	3/23/2011	Winter Storm	0
Southern Lycoming (zone)	10/29/2011	Heavy Snow	0
Countywide	12/26/2012	Winter Storm	0
Countywide	12/14/2013	Heavy Snow	0
Countywide	2/4/2014	Winter Storm	0
Countywide	2/13/2014	Heavy Snow	0
Southern Lycoming (zone)	11/25/2014	Heavy Snow	0
Northern Lycoming (zone)	2/1/2015	Winter Storm	0
Southern Lycoming (zone)	2/15/2016	Winter Storm	0
Northern Lycoming (zone)	1/23/2017	Winter Storm	0
Southern Lycoming (zone)	2/8/2017	Winter Storm	0
Northern Lycoming (zone)	2/9/2017	Winter Storm	0
Countywide	3/13/2017	Winter Storm	0
Countywide	11/15/2018	Winter Storm	0
Countywide	1/19/2019	Winter Storm	0
Southern Lycoming (zone)	2/20/2019	Winter Storm	0
Northern Lycoming (zone)	12/16/2020	Winter Storm	0
Southern Lycoming (zone)	12/16/2020	Winter Storm	0
Southern Lycoming (zone)	01/31/2021	Winter Storm	0
Northern Lycoming (zone)	01/31/2021	Winter Storm	0
Northern Lycoming (zone)	02/01/2021	Winter Storm	0
Southern Lycoming (zone)	02/01/2021	Winter Storm	0
Northern Lycoming (zone)	02/15/2021	Winter Storm	0
Southern Lycoming (zone)	1/09/2022	Ice Storm	0
Northern Lycoming (zone)	01/16/2022	Winter Storm	0

Table 4.3.13-2 Previous winter storms events in Lycoming County from 1996-2024 (NOAA NCEI, 2025b)			
LOCATION	**DATE**	**TYPE**	**PROPERTY DAMAGE ($)**
Northern Lycoming (zone)	3/09/2022	Heavy Snow	0
Northern Lycoming (zone)	03/12/2022	Winter Storm	0
Southern Lycoming (zone)	03/12/2022	Winter Storm	0
Southern Lycoming (zone)	12/15/2022	Winter Storm	0
Northern Lycoming (zone)	12/15/2022	Winter Storm	0
Northern Lycoming (zone)	03/06/2023	Winter Storm	0
TOTAL			**$8,000**

Table 4.3.13-3 Number of Winter Storm Events per year in Lycoming County (NOAA NCEI, 2025b).			
YEAR	**NUMBER OF STORMS**	**YEAR**	**NUMBER OF STORMS**
1996	4	2011	5
1997	6	2012	1
1998	3	2013	1
1999	6	2014	3
2000	6	2015	1
2001	1	2016	1
2002	4	2017	4
2003	4	2018	1
2004	3	2019	2
2005	8	2020	2
2006	0	2021	5
2007	7	2022	5
2008	5	2023	1
2009	4	2024	0
2010	2	TOTAL	95

4.3.13.4. Future Occurrence

Data from the NOAA NCEI Storm Events Database shows that winter storms are a regular occurrence in Lycoming County. As noted in the table above, the county has been affected by one to five winter storm events each year from 2010 to 2024.

Climate projections show that while precipitation totals are expected to increase, the number of days below 32 degrees Fahrenheit may decrease. This may lead to a decrease in the number of winter storms. That said, the polar jet stream and arctic warming may play a part in large-scale storms still being a potential hazard. Cohen, Pfeiffer, and Francis (2018) posited that warming Arctic temperatures have led to a weakening of the polar jet stream, which has allowed warmer, yet still very cold, arctic air to travel southward and provide the other half of the equation for the intense winter storms seen in the Northeast United States. There is a possibility these storms

continue to occur and may even occur more frequently, with the warming Atlantic Ocean generating more fuel and the potential for more intense hot air-cold air clashes that strengthen storms (Feuerstein, 2022). However, this study has been criticized due to the small size of the 35-year sample and the potential for compounding factors impacting the data, as various climate modeling techniques have so-far been unable to reproduce the effect and confirm the linkage (Blackport and Screen, 2020). More studies are ongoing.

The future occurrence of winter storms hazard can be considered *likely* as defined by the Risk Factor Methodology probability criteria (see Table 4.4-1).

4.3.13.5. Vulnerability Assessment

In Lycoming County, accumulations of snow and/or ice during winter months are expected and normal. The most common detrimental effects of snow and/or ice are not collapsed structures but traffic accidents and interruptions in power supply and communications services.

Some rural areas of the county are susceptible to isolation due to the loss of telephone communication and road closures. Power failures and interruption of water supplies are not uncommon from ice storms as well as heavy snow or blizzard conditions. Emergency medical supplies, food, and fuel are sometimes required during these storms. Particular areas of vulnerability include low-income and elderly populations, mobile homes, and infrastructure such as roadways and utilities that can be damaged by such storms.

Vulnerability to the effects of winter storms on buildings is somewhat dependent on the age of a building. As building codes become more stringent, buildings can support heavier loads and as buildings age, various factors may deteriorate their structural integrity. Vulnerability also depends upon the type of construction and the degree to which a structure has been maintained.

The most vulnerable structures are those that were poorly built or are dilapidated. The weight of heavy snow or ice may lead to structural collapse or to minor property damage. Some shed roofs that protect township and borough road maintenance or firefighting equipment have large span roofs that may collapse under the weight of especially heavy snow or ice although none have collapsed due to recent heavy snow or ice storms.

All structures and infrastructure in Lycoming County are exposed to heavy snow and ice. For this analysis, structures built prior to 1940 are identified as being potentially at risk of being somewhat weakened and more susceptible to damage due to heavy snow or ice.

Table 4.3.13-4 below shows the number of housing units in Lycoming County built prior to 1940 according to the US Census Bureau's estimates. The following municipalities have the highest proportion of housing units built prior to 1940: Jersey Shore Borough (66.1%), Montgomery Borough (57.5%), Hughesville Borough (53.8%), Muncy Borough (52.7%), and the City of Williamsport (51.6%). The City of Williamsport and Jersey Shore Borough both have over 1,000 residential structures built before 1940 (6,780 and 1,102 respectively). South Williamsport Borough is close with 954 structures. These communities all have higher vulnerabilities to winter

storm events from this analysis. While the U.S. Census provide estimates for residential structures, the age of non-residential structures is not available.

Table 4.3.13-4 Age of Housing Units in Lycoming County (U.S. Census Bureau, ACS, 2023)		
MUNICIPALITY	NUMBER OF HOUSING UNITS BUILT PRIOR TO 1940	PERCENT OF TOTAL HOUSING UNITS
Anthony Township	53	15%
Armstrong Township	43	18%
Bastress Township	61	24%
Brady Township	12	6%
Brown Township	146	39%
Cascade Township	33	15%
Clinton Township	154	16%
Cogan House Township	106	23%
Cummings Township	69	23%
Duboistown Borough	199	35%
Eldred Township	30	4%
Fairfield Township	114	9%
Franklin Township	115	30%
Gamble Township	91	24%
Hepburn Township	155	13%
Hughesville Borough	603	54%
Jackson Township	60	30%
Jersey Shore Borough	1,102	66%
Jordan Township	105	25%
Lewis Township	101	19%
Limestone Township	166	19%
Loyalsock Township	406	8%
Lycoming Township	134	20%
McHenry Township	128	31%
McIntyre Township	95	30%
McNett Township	50	31%
Mifflin Township	99	23%
Mill Creek Township	25	12%
Montgomery Borough	365	58%
Montoursville Borough	520	23%
Moreland Township	85	20%
Muncy Borough	595	53%
Muncy Township	98	21%
Muncy Creek Township	191	14%
Nippenose Township	34	11%

Table 4.3.13-4 Age of Housing Units in Lycoming County (U.S. Census Bureau, ACS, 2023)		
MUNICIPALITY	**NUMBER OF HOUSING UNITS BUILT PRIOR TO 1940**	**PERCENT OF TOTAL HOUSING UNITS**
Old Lycoming Township	326	13%
Penn Township	82	20%
Piatt Township	75	18%
Picture Rocks Borough	158	42%
Pine Township	82	24%
Plunketts Creek Township	155	34%
Porter Township	84	13%
Salladasburg Borough	40	36%
Shrewsbury Township	63	28%
South Williamsport Borough	954	36%
Susquehanna Township	66	13%
Upper Fairfield Township	135	18%
Washington Township	101	16%
Watson Township	73	23%
Williamsport, City of	6,780	52%
Wolf Township	215	16%
Woodward Township	157	18%
TOTAL	15,889	30%

Table 4.3.13-5 below shows the Expected Annual Losses to Winter Storm for each census tract in the county according to FEMA's National Risk Index.

Table 4.3.13-5 Expected Annual Losses to Winter Storm by Census Tract (FEMA NRI, 2023)			
CENSUS TRACT	**MUNICIPALITIES**	**ESTIMATED ANNUAL LOSSES**	**ESTIMATED ANNUAL LOSS RATING**
1.00	Williamsport City	$2,597.43	Relatively Moderate
2.00	Williamsport City	$1,812.44	Relatively Low
3.00	Williamsport City	$4,412.89	Relatively Moderate
4.00	Williamsport City	$3,168.31	Relatively Moderate
5.00	Williamsport City	$2,180.63	Relatively Moderate
6.00	Williamsport City	$2,706.64	Relatively Moderate
8.00	Williamsport City	$2,288.58	Relatively Moderate
9.00	Williamsport City	$2,276.04	Relatively Moderate
10.00	Williamsport City	$2,576.79	Relatively Moderate
101.00	Cogan House Township, Pine Township, Jackson	$3,016.51	Relatively Moderate

Table 4.3.13-5 Expected Annual Losses to Winter Storm by Census Tract (FEMA NRI, 2023)			
CENSUS TRACT	**MUNICIPALITIES**	**ESTIMATED ANNUAL LOSSES**	**ESTIMATED ANNUAL LOSS RATING**
	Township, McIntyre Township, McNett Township		
102.00	Brown Township, McHenry Township, Cummings Township, Watson Township	$1,582.26	Relatively Low
103.00	Anthony Township, Mifflin Township, Piatt Township, Salladasburg Borough	$3,376.47	Relatively Moderate
104.00	Hepburn Township, Lycoming Township, Lewis Township	$4,711.64	Relatively Moderate
105.01	Cascade Township, Gamble Township, Plunketts Creek Township	$2,250.68	Relatively Moderate
105.02	Eldred Township, Upper Fairfield Township	$3,237.33	Relatively Moderate
106.00	Shrewsbury Township, Penn Township, Moreland Township, Franklin Township, Jordan Township	$4,542.41	Relatively Moderate
107.00	Mill Creek Township, Wolf Township, Picture Rocks Borough, Hughesville Borough	$5,426.45	Relatively Moderate
108.00	Muncy Creek Township, Muncy Borough, Muncy Township	$6,948.66	Relatively Moderate
109.00	Fairfield Township	$2,695.45	Relatively Moderate
110.00	Montoursville Borough	$4,168.93	Relatively Moderate
111.00	Loyalsock Township	$5,080.50	Relatively Moderate
112.00	Loyalsock Township	$5,159.06	Relatively Moderate
113.01	Woodward Township	$1,934.29	Relatively Low
113.02	Old Lycoming Township	$4,115.71	Relatively Moderate
114.00	Armstrong Township, Susquehanna Township	$1,462.20	Relatively Low
116.01	Duboistown Borough	$951.70	Relatively Low
116.03	South Williamsport Borough	$1,801.78	Relatively Low

Table 4.3.13-5 Expected Annual Losses to Winter Storm by Census Tract (FEMA NRI, 2023)			
CENSUS TRACT	**MUNICIPALITIES**	**ESTIMATED ANNUAL LOSSES**	**ESTIMATED ANNUAL LOSS RATING**
116.04	South Williamsport Borough	$3,212.20	Relatively Moderate
117.01	Clinton Township, Montgomery Borough	$3,328.54	Relatively Moderate
117.02	Brady Township, Washington Township, Clinton Township	$3,018.37	Relatively Moderate
118.00	Bastress Township, Nippenose Township, Limestone Township	$3,004.12	Relatively Moderate
119.00	Jersey Shore Borough, Porter Township	$4,831.97	Relatively Moderate
TOTAL		$103,876.97	

4.3.13.6. Equity in Vulnerable Communities

During winter storms there will be a disproportionate impact on low-income and marginalized communities. Low-income households are more likely to live in poorly insulated or older homes that are less able to withstand extreme cold. These homes may lack sufficient heating, insulation, and weatherproofing, making them more vulnerable to damage from ice, snow, and cold temperatures. Many low-income households also experience energy insecurity and may struggle to afford heating during winter months. Energy shutoffs due to unpaid bills can leave them dangerously exposed to cold weather. Elderly households or households with people with disabilities may also face additional challenges due to mobility issues. Icy conditions, snow buildup, and impassable roads or sidewalks can prevent them from leaving their homes. Williamsport, Loyalsock Township, South Williamsport Borough, Old Lycoming Township, and Montoursville Borough may be particularly vulnerable due to their elderly and disabled populations and older homes.

HUMAN-MADE HAZARDS

4.3.14. Dam Failure



Due to data sensitivity, the Dam Failure profile can be found in Appendix H.

4.3.15. Disorientation

4.3.15.1. Location and Extent

Pennsylvania Wilds (PA Wilds) is a popular recreational destination in northern Pennsylvania for activities such as hiking, camping, hunting, and fishing. The vast forest network covers over 2 million acres and is partially located in Lycoming County. PA Wilds is known for the darkest skies in the country and attracts many visitors at night for stargazing. As a result, people can become lost or trapped in remote and rugged wilderness areas. People are much more likely to become lost at night, and this attraction increases the risk of disorientation occurring in Lycoming County. Visitation to the PA Wilds in Lycoming County increased during the 2020 COVID Pandemic, when people were looking for safe recreational activities. Search and rescue may be required for people who suffer from medical problems or injuries and those who become accidentally or intentionally disoriented. Search and rescue efforts are focused in and around state forest and state park lands (DCNR, 2020b).

Lycoming County is largely rural and heavily wooded with steep mountains and numerous rivers and streams. Popular outdoor recreational activities include biking, rock-climbing, hiking, hunting, fishing, and boating. Almost a third (32% or 392 square miles) of Lycoming County is comprised of state park, state forest, and state game lands. As of 2022, 77 percent of the county was forest and only 3 percent is considered urban, with agriculture and rural covering the rest of the area (Lycoming County Emergency Management Agency (LCEMA), 2022). Figure 4.3.15-1 shows hiking trails across the county as well as State Forests, Parks, and Game Lands. These large swaths of state forests and rolling terrain make coordination across the county and cellular communication between individuals quite challenging. Disorientation is most likely to occur in areas of vast, open wilderness. With numerous trails and side, back roads in a region that is largely underserved by cellular coverage, it becomes quite easy to become lost and disoriented.

Another factor leading to people becoming lost or trapped in wilderness areas is their access to communication or wayfinding measures with devices over data or cellular networks. Figure 4.3.15-2 shows the range of cell towers throughout Lycoming County. As the map shows, many of the forested areas in the county are more than 8 miles from the closest cell tower. Due to the varying elevations throughout the county, many of these areas that are out of the 8-mile range and most likely do not have great access to cell service, making them areas prone to disorientation.

Figure 4.3.15-1 Lycoming County areas potentially vulnerable to disorientation

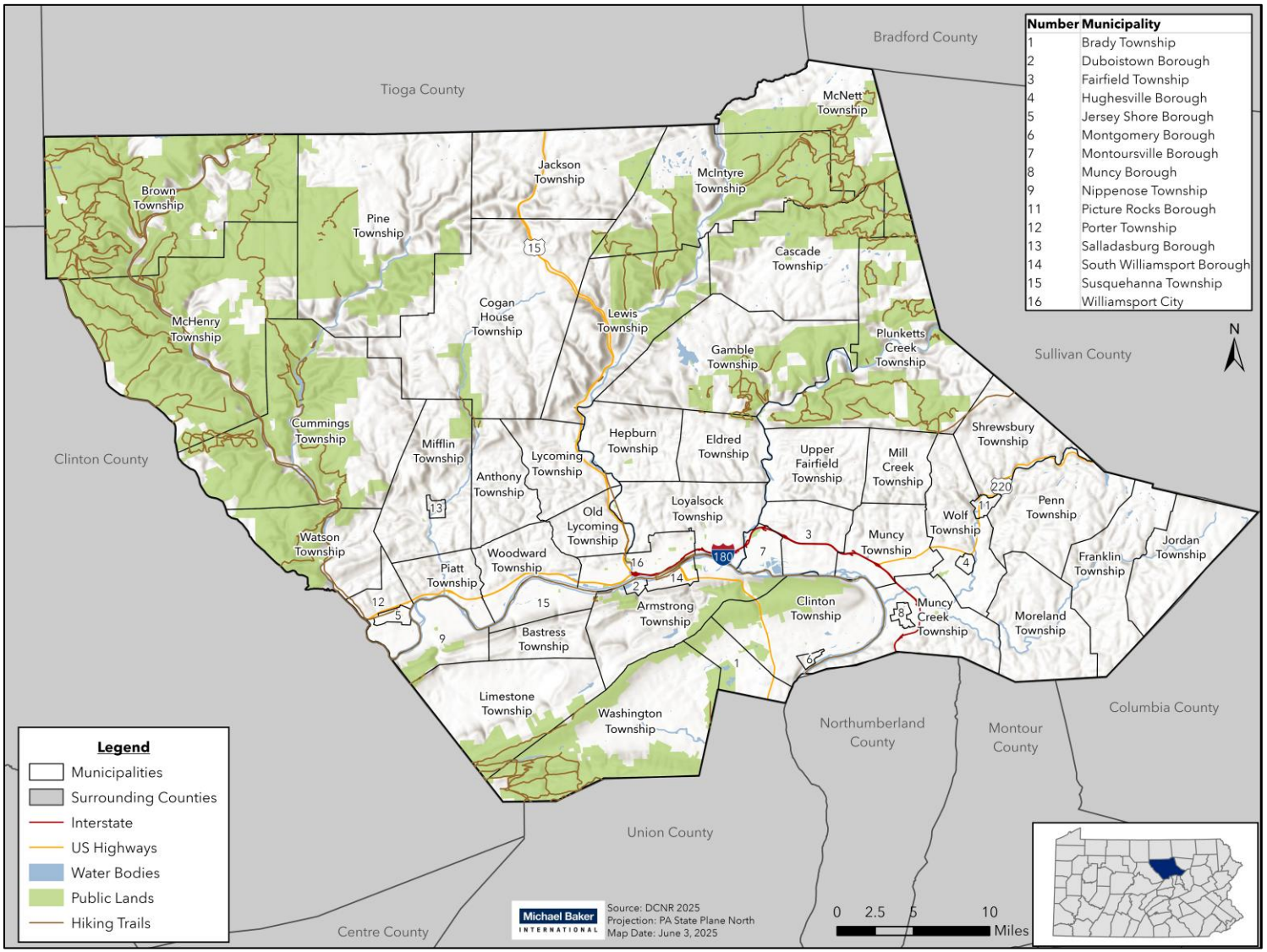
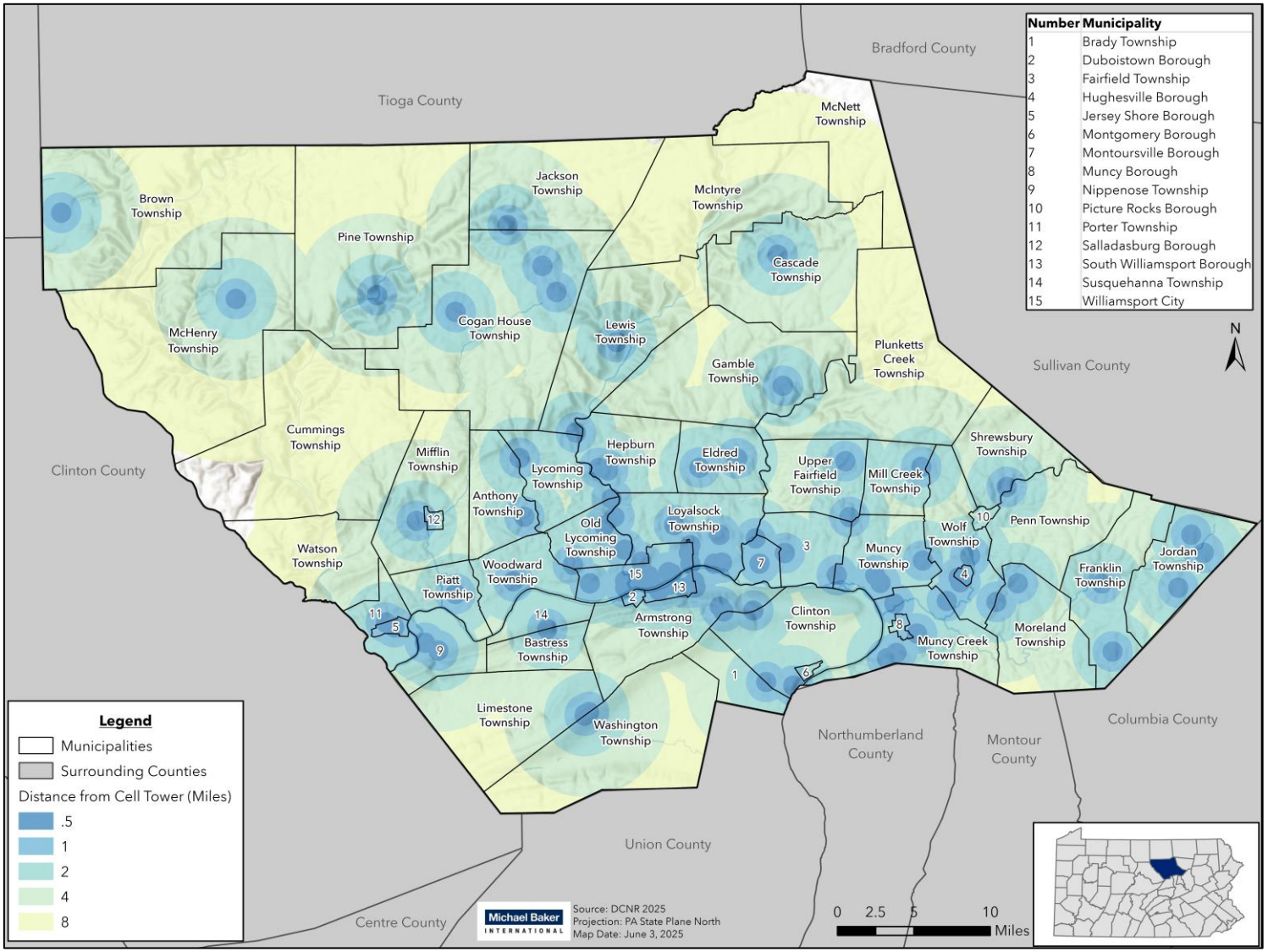


Figure 4.3.15-2 Cell Tower Range in Lycoming County



4.3.15.2. Range and Magnitude

A wide variety of factors can contribute to the outcome of a search and rescue mission, but the most common dangers associated with disorientation are lack of food, water, shelter, and medical care. Lycoming County generally has an abundance of water and during the warmer summer months shelter is less of a necessity than during winter months when extreme temperatures can pose a more serious threat. Age, physical fitness, and familiarity with the area can also have a bearing on the outcome. The worst-case scenario associated with disorientation involves serious injury or death.

The potential impacts of disorientation on community lifelines are as follows:

Table 4.3.15-1 Most Likely Lifelines Impacted by Disorientation

LIFELINES	NOTES
	Government operations and facilities, such as search and rescue, are needed for response and recovery.
	Access to food, water, and shelter are seasonally-dependent.
	Search and rescues activities into remote areas require increased fuel expenditures.
	Personnel will likely be overutilized in response and recovery, leading to potential gaps in capability.
	Equipment and vehicles will likely be overutilized in response and recovery, leading to potential gaps in capability.

4.3.15.3. Past Occurrence

While search-and-rescue (SAR) efforts are tracked by the DCNR, a detailed, comprehensive list of incidents involving disorientation and SAR is not available. However, given the numerous park lands, frequently used for recreational purposes, and sporadic cellular reception, it is expected that there have been and will continue to be lost hikers and people over the years.

In October 2019, an experienced outdoorsman and hunter got lost in the Moshannon State Forest in Clearfield County, PA. The man was lost for over 24 hours while more than 30 searchers worked overnight to find him. The hunter was found around 2 PM the next day in a deep ravine and remote portion of the area being searched. After becoming lost, the hunter traveled down a drainage he found thinking it would lead him to civilization. However, this assumption was

incorrect in the Quehanna Wild Area where road and civilization are mostly in the flat mountain tops. The hunter fell numerous times on the rugged and steep terrain and got wet and cold from stream crossings (PA Environment News, 2019). This scenario points out that disorientation can occur to even experienced and prepared hikers.

4.3.15.4. Future Occurrence

It is impossible to predict when and where disorientation may occur. During times when activities such as hunting, hiking, biking, and camping increase, so does the likelihood of individuals becoming disoriented. Lycoming County continues to gain popularity as a tourist and recreational destination. Cherry Springs State Park in Potter and Lycoming Counties is famous for stargazing in the darkest skies in PA. Search and rescue operations throughout the county are predicted to continue but can be mitigated with appropriate actions, including improved cellular coverage and/or the installation of booster units at critical locations with weak signals. Based on available past occurrence data the probability of the county seeing a disorientation incident is considered *possible* as defined by the Risk Factor Methodology probability criteria (see Table 4.4-1).

4.3.15.5. Vulnerability Assessment

Individuals are most likely to become disorientated in areas of vast, open wilderness. This is especially relevant as Lycoming County's limited cellular coverage inhibits residents and visitors' ability to make calls, access maps, and look up pertinent weather information, if they are anywhere outside of Williamsport and primary road corridors. Children and the elderly are more vulnerable to the exposure of elements. Bikers, hunters, hikers, and All-terrain vehicle (ATV) riders are the most common victims of disorientation. Many outdoor, recreational activities commonly associated with disorientation take place during the warmer months of spring and summer and pose a somewhat reduced risk because of the average temperature range during these seasons. The most dangerous period to become lost outdoors is during the winter months when heat and shelter are vital. Lycoming County often experiences winter storms and temperatures below freezing.

Cherry Springs State Park presents unique complications by drawing in hikers for the state's darkest skies. The park was created from some of the most remote portions of the Susquehannock State Forest. There is no lighting or infrastructure for miles around to prevent light pollution and preserve the dark skies. This also means there is likely little to no cell service. It is easy to get lost in the dark, and visitors should know their route well before entering the park. Signs, maps, and blaze/trail markings are used to help hikers; however, these may be difficult to see at night. Hikers entering Cherry Spring State Park and other remote forests at night are the most vulnerable to disorientation in Lycoming County.

While prevention is the best solution to disorientation, lessening the impacts of this hazard by identifying and quickly locating individuals that have become lost or injured is equally important. There are several resources available on a state and local level for responding to SAR

events. The DCNR is the primary coordinator for SAR operation efforts on state lands within Pennsylvania. The agency is responsible for over two million acres of forest land (DCNR, 2020b).

The LCEMA supports emergency operations planning for all 52 municipalities. This includes programs such as Fire Training Courses for all County Emergency Responders and the Flash Flood Warning volunteer program (LCEMA, 2022). Search and rescue training and best practices are enhanced through these programs and increase the county's ability to respond to instances of lost persons or disorientation.

The PA DCNR also has resources available for search and rescue operations. For example, the agency has produced a guide for local officials to create a search-and-rescue team. The DCNR also provides rescue training and certificates for rescue team leaders and members.

4.3.15.6. Equity in Vulnerable Communities

Disorientation is more likely to occur to bikers, hunters, hikers, or ATV riders that explore more remote areas of the county. These populations tend to be more physically fit and/or knowledgeable about the terrain, but this is not always the case. Children and the elderly are more vulnerable to the exposure of elements and would be more at-risk in situations of disorientation.

4.3.16. Environmental Hazards: Conventional Oil and Gas Wells



4.3.16.1. Location and Extent

PA DEP differentiates between conventional and unconventional oil and gas wells. Conventional wells are traditional vertical wells, while unconventional wells are typically horizontally drilled wells commonly associated with the Marcellus Shale. This hazard profile looks at conventional oil and gas wells. Unconventional gas wells are profiled in Section 4.3.19.

Regulatory standards for the industry have evolved significantly as a function of both advances in technology and a more intense focus on environmental protection. More than 350,000 oil and gas wells have been drilled in Pennsylvania since the first commercial oil well was developed in 1859 (PA DEP-OOGM, 2010).

Additionally, oil and gas development had been taking place for nearly a century prior to permitting requirements enacted in 1955, an estimated 100,000 to 560,000 abandoned wells are yet to be accounted for in the state (PA DEP, 2025b). As of March 2024, 200 orphaned wells have been plugged with the help of grant funding as part of the Bipartisan Infrastructure Law passed in 2021 (ECOS, 2024). Efforts to plug abandoned wells are expected to continue with ongoing grant support.

Private water supplies such as domestic drinking water wells in the vicinity of oil and gas wells are at risk of contamination from brine and other pollutants including methane.

Lycoming County has only one active conventional well, and approximately 91 permits for wells that either have not yet been drilled or never materialized. The release and combustion of a large quantity of natural gas is of particular concern, especially as this industry continues to grow. Table 4.3.16-1 provides a breakdown of permits issued per year from 2020 to 2025

Table 4.3.16-1 New conventional gas and combined oil & gas well permits issued in Lycoming County (PA DEP, 2025c).

YEAR	PERMITS	YEAR	PERMITS
2006	0	2016	10
2007	3	2017	8
2008	17	2018	0
2009	3	2019	0
2010	0	2020	0
2011	0	2021	1
2012	0	2022	0
2013	31	2023	0
2014	7	2024	0
2015	19	2025*	0
TOTAL			99

Table 4.3.16-2 provides a breakdown of permits issued per municipality from 2006 to 2025.

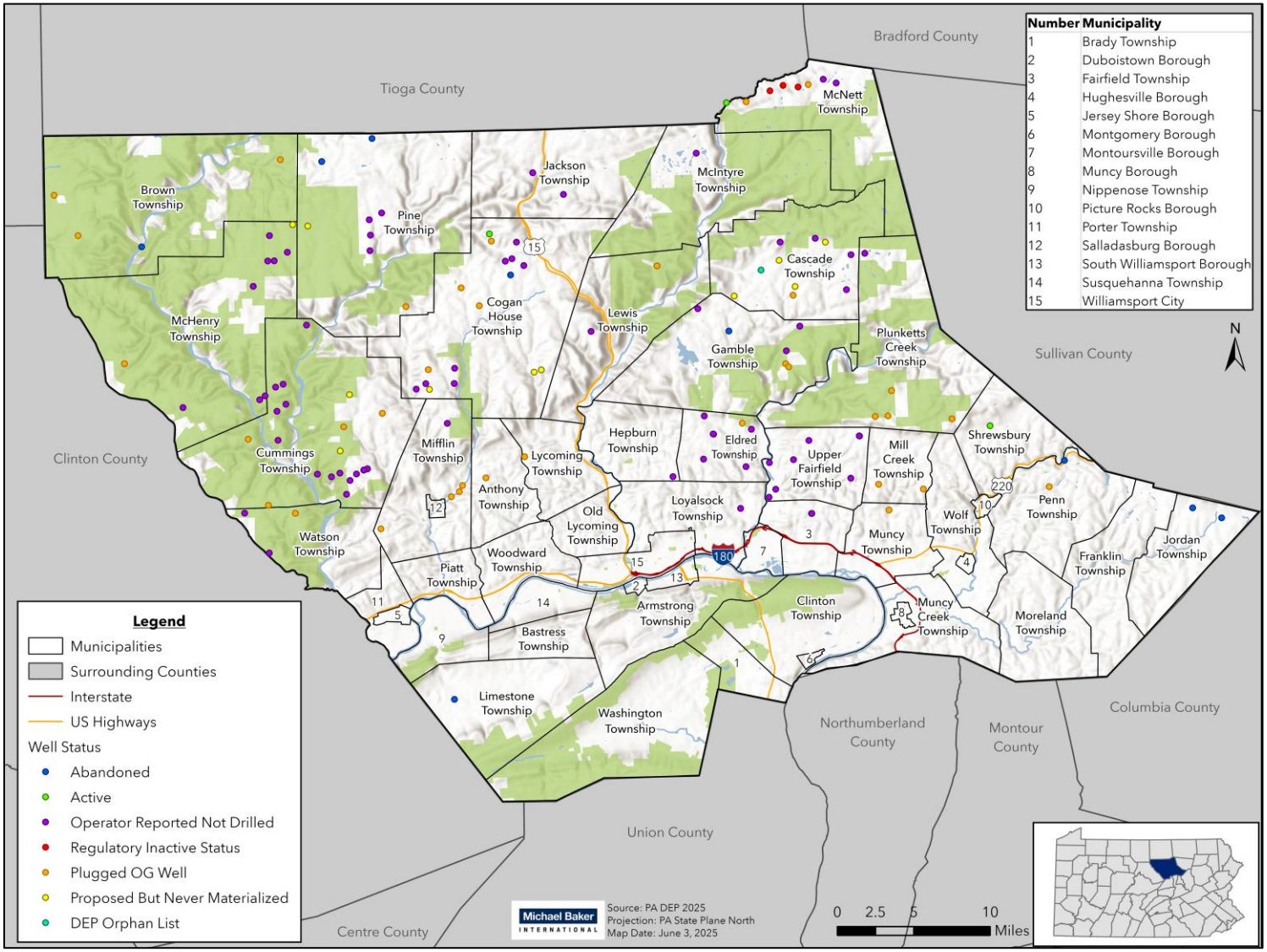
Table 4.3.16-2 Distribution of new conventional gas and combined oil & gas well permits issued from 2006 - 2025 (PA DEP, 2025c).			
MUNICIPALITY	**NO. OF PERMITS ISSUED**	**MUNICIPALITY**	**NO. OF PERMITS ISSUED**
Cascade Township	11	Loyalsock Township	1
Cogan House Township	12	McHenry Township	14
Cummings Township	17	McIntyre Township	1
Fairfield Township	2	McNett Township	6
Gamble Township	2	Mifflin Township	1
Hepburn Township	1	Pine Township	8
Jackson Township	2	Plunketts Creek Township	2
Lewis Township	1	Upper Fairfield Township	12

Table 4.3.16-3 provides current well status. The industry is highly regulated by the PA DEP, and local response agencies have been trained to deal with accidents at the sites, but the threat of releases, fire, and explosions remains.

Table 4.3.16-3 Status of conventional gas and combined oil & gas wells as of April 2025 (PA DEP, 2025c).	
PERMIT STATUS	**NUMBER**
Active	1
Plugged OG Well	4
Operator Reported Not Drilled	79
Regulatory Inactive Status	3
Proposed But Never Materialized	12

Figure 4.3.16-1 shows the location of the conventional gas wells and permits in Lycoming County.

Figure 4.3.16-1 Conventional Oil and Gas Well Locations in Lycoming County.



4.3.16.2. Range of Magnitude

As is the case with all-natural resource extraction, a variety of potential hazards exist with oil and gas extraction. Abandoned oil and gas wells that are not properly plugged can contaminate groundwater and consequently domestic drinking water wells. Surface waters and soil are sometimes polluted by brine, a salty wastewater product of oil and gas well drilling, and from oil spills occurring at the drilling site or from a pipeline breach. This can spoil public drinking water supplies and be particularly detrimental to vegetation and aquatic animals.

Though injury and death have resulted from oil and gas well drilling and extraction, the majority of impacts from this human-made hazard are environmental in nature. Wells that are improperly drilled or plugged can contaminate groundwater resulting in water well contamination or eventually surface water contamination. Drilling additives stored on site can leak and contaminate soil, surface water, and groundwater. Oil leaks at the well site from oil pipelines contaminate soil and surface water and damage aquatic life and ecosystems.

The impacts of oil and natural gas wells range in magnitude and extent. There are several potential impacts, including those on water, land, and air. Common accidents involving gas well sites include "blowouts," which are an explosion or failure of the rig, as well as the potential for chemical contamination. Beyond the purely environmental impacts of drilling, Lycoming County is likely to see significant indirect effects on its transportation infrastructure and land cover.

The potential impacts of conventional oil and gas wells on community lifelines are as follows:

Table 4.3.16-4 Most Likely Lifelines Impacted by Conventional Oil and Gas Wells

LIFELINE	NOTES
	Community safety may be endangered, and fire departments may be called into response and recovery if leaks or other issues result in explosions and fires.
	Impacts from conventional wells include environmental contaminations, which can impact agricultural operations and water supplies.
	Potential environmental contamination can have adverse health impacts on communities, leading to more strain on the local healthcare system.
	Issues with drilling operations may lead to additional challenges with energy production.

4.3.16.3. Past Occurrence

Pennsylvania has a long history of oil and gas well drilling and, though relatively infrequent, many accidents and incidents have occurred related to the extraction of these natural resources. While no comprehensive list of oil and gas related incidents exists, PA DEP releases reports on violations of active wells. Between January 2007 and April 2025, 2,458 total violations committed by wells were reported in Lycoming County with 2,005 specifically concerning Environmental Health and Safety.

There have been few reported accidents or incidents involving natural gas drilling. One incident was on July 28, 2009, when a gas well in McNett Township leaked natural gas into the water table, where it spread into the Lycoming Creek, some smaller streams, and into the water supplies of four residents. No injuries or damage were reported. In addition, four incidents related to gas transmission and gathering were documented for Lycoming County in or January 2010 to the present. On May 5, 2013, a well in Cummings Township relieved approximately 26.53 million cubic feet (mmcf) of natural gas when the relief valve activated before reaching its set point. The gas quickly dissipated into the atmosphere, and no immediate effects were reported. On June 9, 2015, a gas line in Benton Borough ruptured and about 113mmcf of natural gas was released before local personnel isolated the affected segment. About 150 people were evacuated, but no injuries or damage were reported.

4.3.16.4. Future Occurrence

The likelihood of an emergency at a natural gas drilling site in Lycoming County cannot be determined at this time, as there is little historical data to analyze. However, the likelihood of an incident within the county is expected to increase as the number of well sites continues to climb.

Future emergencies will occur at well sites as well as along the natural gas transportation network. As drilling activities have increased, I-180 and US-220 have experienced increased truck traffic due to the natural gas industry. As more permits are issued, this traffic will increase further. Also, the county will face an increased risk of pipeline emergencies as the related infrastructure is put in place.

Numerous studies have examined the ramifications (primarily the significant impact fracking has on water quality) of drilling for natural gas in a region (the entirety of the Marcellus Shale) that acts as the water supply for over 22 million (Evans and Kiesecker, 2014). The increase of natural gas drilling in Lycoming County not only implies the increased risk of an incident (that can include a chemical release, a fire, and/or an explosion), but also increased development and deforestation, both which result in more stress on the existing (transportation) infrastructure and impervious surface. The implications of the increased use of the transportation infrastructure are rather straightforward. The natural gas drilling process requires 2,300 to 4,000 truck trips per well (Cassidy, 2014), so that not only are there more trucks on the roads, but they are using roads often designed for heavy use. Increased use of the roads by heavy trucks can increase the wear-and-tear on the roads (which were, in most cases, not designed for that type of traffic) and subsequently increase the likelihood of traffic incidents.

Consideration of which roads are actually suitable for heavy, industrial use and improved safety measures (including more traffic signals and officers, or a planned trucking schedule) could help reduce traffic incidents and infrastructure degradation (Cassidy, 2014). Additionally, the industry could take responsibility for improving maintenance of the infrastructure and scheduling of their traffic to keep heavy truck flow to certain hours and minimize incidents.

Impervious surfaces can increase the risk of flooding (as rain or run-off can no longer readily seep into the ground) and can prove exceedingly detrimental to maintaining a balanced ecosystem. Estimates vary slightly (based on location, technology, etc.), but the average footprint of a well pad is 1.3 hectares and the associated infrastructure is 10.3 hectares (Evans and Kiesecker, 2014; Ridlington and Rumpler, 2013). If the indirect impacts are considered as well, then the total land disturbance, and impact on the permeability of the ground, is 20.2 hectares (or about 50 acres) (Evans and Kiesecker, 2014). If this unit is applied to the number of new wells in the past five years in Lycoming County, then about 20 additional hectares (0.08 square miles), roughly 0.006% of the total area of the county, may have been disturbed by or converted to a conventional extractive use since the previous plan.

The land that is affected by the natural gas industry is predominantly forested, so not only is there significant deforestation, but this deforestation means that 0.006% of the county has become impervious within 5 years due to the natural gas industry. If this trend continues, and the natural gas industry continues to expand, then not only will the likelihood of a natural gas incident increase, but transportation infrastructure incidents and flooding will become greater hazards as well. When planning for future development, there are several measures the county could take to help mitigate the impacts of natural gas drilling on transportation infrastructure and impervious surfaces.

On the whole, the probability of future natural gas drilling incident events can be considered *possible* according to the Risk Factor Methodology (see Table 4.4-1).

4.3.16.5. Vulnerability Assessment

Vulnerability to oil and gas well incidents is defined as being located within 1,000 yards of an conventional oil or gas well. This buffer is what PA DEP uses as its "zone of culpability" for oil and gas well incidents. While explosions or other catastrophic incidents at an oil or gas well could cause property damage, of primary concern is the population living near these wells. Table 4.3.16-5 enumerates the populations living within 1,000 yards of a conventional oil and gas well. This was calculated by intersecting the 2020 Census Block centroids with the zone of culpability as defined by PA DEP. This analysis indicates that Cogan House Township has nearly 100 residents in the hazard area for conventional oil or gas wells. There is 1 critical facility within Lycoming County susceptible to conventional wells. Table 4.3.16-6 demonstrates which land uses are most affected by natural gas drilling. Limestone Township, Jordan Township, and Brown Township have the highest number of residential land uses prone to natural gas drilling hazards. Jordan Township and Pine Township have the highest number of agricultural land uses affected.

Table 4.3.16-5 Structures, Critical Facilities, and Populations Vulnerable to Conventional Oil and Gas Wells.									
MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES WITHIN 1,000 YARDS OF CONVENTIONAL OIL/GAS WELL*	PERCENT STRUCTURES WITHIN 1,000 YARDS OF CONVENTIONAL OIL/GAS WELL	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN 1,000 YARDS OF CONVENTIONAL OIL/GAS WELL	PERCENT CRITICAL FACILITIES WITHIN 1,000 YARDS OF CONVENTIONAL OIL/GAS WELL	TOTAL POPULATION	POPULATION WITHIN 1,000 YARDS OF CONVENTIONAL OIL/GAS WELL*	PERCENT POPULATION WITHIN 1,000 YARDS OF CONVENTIONAL OIL/GAS WELL
Anthony Township	387	0	0%	4	0	0%	867	0	0%
Armstrong Township	429	0	0%	1	0	0%	686	0	0%
Bastress Township	245	0	0%	3	0	0%	527	0	0%
Brady Township	234	0	0%	3	0	0%	501	0	0%
Brown Township	421	68	16%	5	1	20%	93	1	1%
Cascade Township	323	0	0%	0	0	0%	422	0	0%
Clinton Township	1,161	0	0%	18	0	0%	3,720	0	0%
Cogan House Township	636	37	6%	8	0	0%	935	94	10%
Cummings Township	604	0	0%	5	0	0%	265	0	0%
Duboistown Borough	560	0	0%	4	0	0%	1,200	0	0%
Eldred Township	905	0	0%	4	0	0%	1,997	0	0%
Fairfield Township	1,482	0	0%	4	0	0%	2,834	0	0%
Franklin Township	518	0	0%	5	0	0%	903	0	0%
Gamble Township	484	11	2%	3	0	0%	778	37	5%
Hepburn Township	1,267	0	0%	6	0	0%	2,578	0	0%
Hughesville Borough	973	0	0%	9	0	0%	2,154	0	0%
Jackson Township	289	0	0%	1	0	0%	396	0	0%
Jersey Shore Borough	1,792	0	0%	17	0	0%	4,166	0	0%
Jordan Township	533	61	11%	4	0	0%	850	78	9%
Lewis Township	648	0	0%	10	0	0%	862	0	0%
Limestone Township	844	61	7%	5	0	0%	1,966	45	2%
Loyalsock Township	5,171	0	0%	35	0	0%	11,561	0	0%
Lycoming Township	774	0	0%	1	0	0%	1,491	0	0%

Table 4.3.16-5 Structures, Critical Facilities, and Populations Vulnerable to Conventional Oil and Gas Wells.

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES WITHIN 1,000 YARDS OF CONVENTIONAL OIL/GAS WELL*	PERCENT STRUCTURES WITHIN 1,000 YARDS OF CONVENTIONAL OIL/GAS WELL	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN 1,000 YARDS OF CONVENTIONAL OIL/GAS WELL	PERCENT CRITICAL FACILITIES WITHIN 1,000 YARDS OF CONVENTIONAL OIL/GAS WELL	TOTAL POPULATION	POPULATION WITHIN 1,000 YARDS OF CONVENTIONAL OIL/GAS WELL*	PERCENT POPULATION WITHIN 1,000 YARDS OF CONVENTIONAL OIL/GAS WELL
McHenry Township	626	0	0%	4	0	0%	122	0	0%
McIntyre Township	383	2	1%	4	0	0%	461	0	0%
McNett Township	219	0	0%	2	0	0%	143	0	0%
Mifflin Township	552	0	0%	4	0	0%	1,089	0	0%
Mill Creek Township	301	0	0%	4	0	0%	582	0	0%
Montgomery Borough	661	0	0%	4	0	0%	1,568	0	0%
Montoursville Borough	2,301	0	0%	17	0	0%	4,750	0	0%
Moreland Township	487	0	0%	5	0	0%	1,015	0	0%
Muncy Borough	1,172	0	0%	12	0	0%	2,440	0	0%
Muncy Creek Township	1,835	0	0%	6	0	0%	3,573	0	0%
Muncy Township	646	0	0%	12	0	0%	1,178	0	0%
Nippenose Township	358	0	0%	5	0	0%	661	0	0%
Old Lycoming Township	2,454	0	0%	8	0	0%	4,975	0	0%
Penn Township	559	18	3%	2	0	0%	895	15	2%
Piatt Township	536	0	0%	2	0	0%	1,047	0	0%
Picture Rocks Borough	285	0	0%	6	0	0%	643	0	0%
Pine Township	465	44	9%	2	0	0%	258	36	14%
Plunketts Creek Township	609	0	0%	5	0	0%	597	0	0%
Porter Township	698	0	0%	5	0	0%	1,528	0	0%
Salladasburg Borough	134	0	0%	1	0	0%	250	0	0%
Shrewsbury Township	304	26	9%	0	0	0%	418	0	0%
South Williamsport Borough	2,842	0	0%	18	0	0%	6,261	0	0%
Susquehanna Township	494	0	0%	4	0	0%	968	0	0%

Table 4.3.16-5 Structures, Critical Facilities, and Populations Vulnerable to Conventional Oil and Gas Wells.

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES WITHIN 1,000 YARDS OF CONVENTIONAL OIL/GAS WELL*	PERCENT STRUCTURES WITHIN 1,000 YARDS OF CONVENTIONAL OIL/GAS WELL	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN 1,000 YARDS OF CONVENTIONAL OIL/GAS WELL	PERCENT CRITICAL FACILITIES WITHIN 1,000 YARDS OF CONVENTIONAL OIL/GAS WELL	TOTAL POPULATION	POPULATION WITHIN 1,000 YARDS OF CONVENTIONAL OIL/GAS WELL*	PERCENT POPULATION WITHIN 1,000 YARDS OF CONVENTIONAL OIL/GAS WELL
Upper Fairfield Township	888	0	0%	5	0	0%	1,807	0	0%
Washington Township	775	0	0%	8	0	0%	1,768	0	0%
Watson Township	364	0	0%	1	0	0%	534	0	0%
Williamsport, City of	10,860	0	0%	74	0	0%	27,754	0	0%
Wolf Township	1,567	0	0%	8	0	0%	3,105	0	0%
Woodward Township	1,142	0	0%	5	0	0%	2,046	0	0%
TOTAL	55,197	328	1%	388	1	0%	114,188	306	0%

Table 4.3.16-6 Structures Vulnerable to Conventional Oil and Gas Wells by Land Use								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER	RESIDENTIAL	UNKNOWN	TOTAL
Anthony Township	0	0	0	0	0	0	0	0
Armstrong Township	0	0	0	0	0	0	0	0
Bastress Township	0	0	0	0	0	0	0	0
Brady Township	0	0	0	0	0	0	0	0
Brown Township	2	0	0	0	2	57	7	68
Cascade Township	0	0	0	0	0	0	0	0
Clinton Township	0	0	0	0	0	0	0	0
Cogan House Township	8	1	0	0	0	20	8	37
Cummings Township	0	0	0	0	0	0	0	0
Duboistown Borough	0	0	0	0	0	0	0	0
Eldred Township	0	0	0	0	0	0	0	0
Fairfield Township	0	0	0	0	0	0	0	0
Franklin Township	0	0	0	0	0	0	0	0
Gamble Township	6	0	0	0	0	2	3	11
Hepburn Township	0	0	0	0	0	0	0	0
Hughesville Borough	0	0	0	0	0	0	0	0
Jackson Township	0	0	0	0	0	0	0	0
Jersey Shore Borough	0	0	0	0	0	0	0	0
Jordan Township	18	1	0	1	3	29	9	61
Lewis Township	0	0	0	0	0	0	0	0
Limestone Township	8	1	0	1	0	44	7	61
Loyalsock Township	0	0	0	0	0	0	0	0
Lycoming Township	0	0	0	0	0	0	0	0
McHenry Township	0	0	0	0	0	0	0	0
McIntyre Township	0	0	0	0	0	0	2	2
McNett Township	0	0	0	0	0	0	0	0
Mifflin Township	0	0	0	0	0	0	0	0

Table 4.3.16-6 Structures Vulnerable to Conventional Oil and Gas Wells by Land Use								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER	RESIDENTIAL	UNKNOWN	TOTAL
Mill Creek Township	0	0	0	0	0	0	0	0
Montgomery Borough	0	0	0	0	0	0	0	0
Montoursville Borough	0	0	0	0	0	0	0	0
Moreland Township	0	0	0	0	0	0	0	0
Muncy Borough	0	0	0	0	0	0	0	0
Muncy Creek Township	0	0	0	0	0	0	0	0
Muncy Township	0	0	0	0	0	0	0	0
Nippenose Township	0	0	0	0	0	0	0	0
Old Lycoming Township	0	0	0	0	0	0	0	0
Penn Township	5	1	0	0	1	9	2	18
Piatt Township	0	0	0	0	0	0	0	0
Picture Rocks Borough	0	0	0	0	0	0	0	0
Pine Township	13	1	0	0	2	24	4	44
Plunketts Creek Township	0	0	0	0	0	0	0	0
Porter Township	0	0	0	0	0	0	0	0
Salladasburg Borough	0	0	0	0	0	0	0	0
Shrewsbury Township	9	2	0	0	2	10	3	26
South Williamsport Borough	0	0	0	0	0	0	0	0
Susquehanna Township	0	0	0	0	0	0	0	0
Upper Fairfield Township	0	0	0	0	0	0	0	0
Washington Township	0	0	0	0	0	0	0	0
Watson Township	0	0	0	0	0	0	0	0
Williamsport, City of	0	0	0	0	0	0	0	0
Wolf Township	0	0	0	0	0	0	0	0
Woodward Township	0	0	0	0	0	0	0	0
TOTAL	69	7	0	2	10	195	45	328

4.3.16.6. Equity in Vulnerable Communities

Equity considerations for conventional oil and gas wells focus on the disproportionate impacts these operations have on marginalized communities. Low-income, rural, and minority populations are often located closer to conventional oil and gas wells, exposing them to air and water contaminations, noise pollution, and the risk of accidents or spills. In addition, Brady, Washington, and Clinton Townships have the highest concentration of people without health insurance.

4.3.17. Environmental Hazards: Gas and Liquid Pipelines

4.3.17.1. Location and Extent



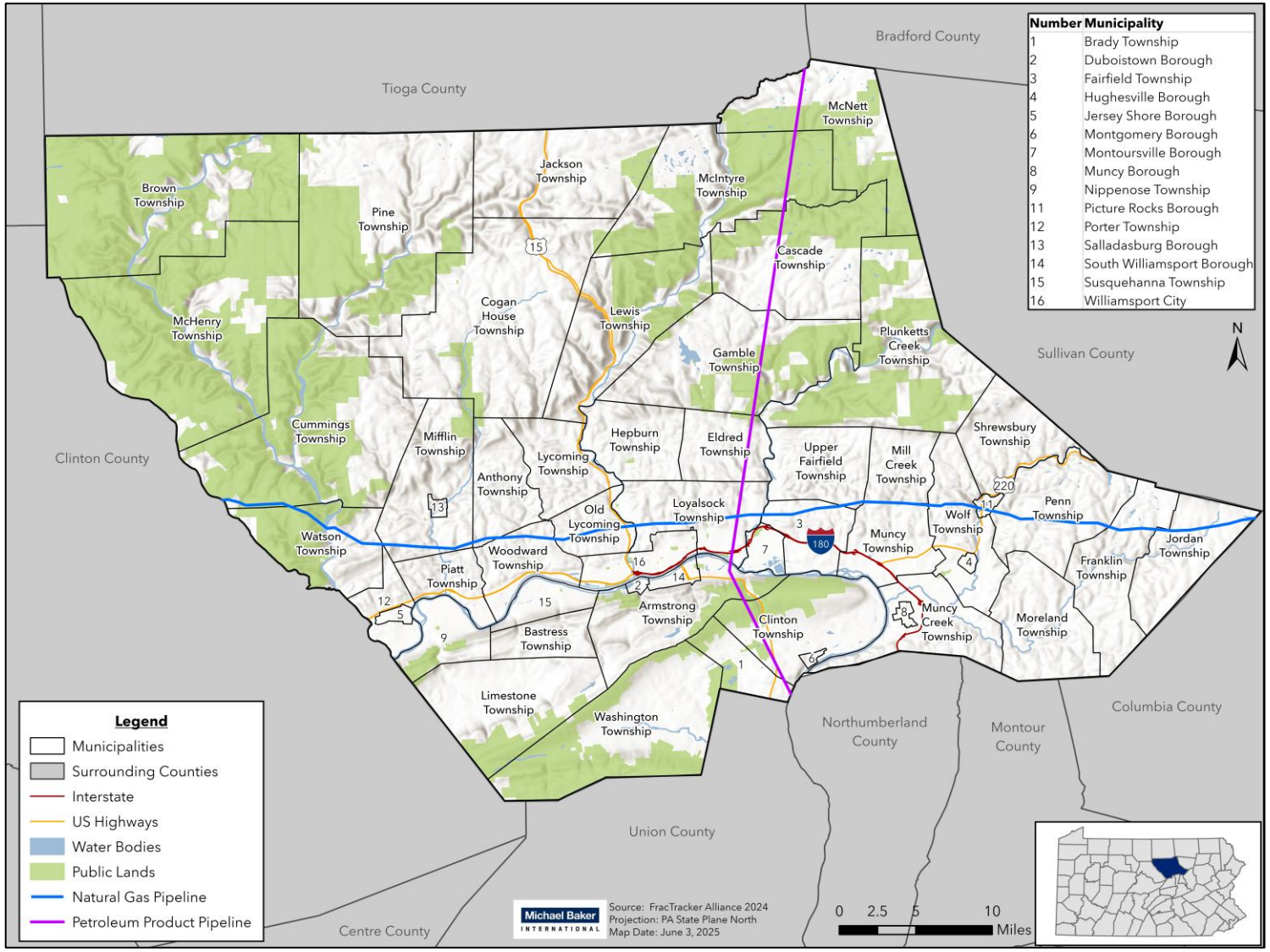
Pipelines are a vital component of the nation's infrastructure that transport two of the materials most essential to daily life – water and energy products. This profile addresses the risks posed by the gas and liquid pipeline systems that move energy products in Pennsylvania and across Lycoming County. These pipeline systems cross both rural and densely populated areas, and range in length from a few thousand feet to hundreds of miles. Pipeline systems are defined by federal regulations as all parts of a pipeline facility through which a hazardous liquid or gas moves, including piping, valves, pumps or compressors, metering and delivery stations, and storage and breakout tanks. Although pipelines are typically located underground, they may also be located aboveground when dictated by operational considerations (such as connections to pump and compressor stations) or environmental conditions (such as geological characteristics) (FEMA, 2015).

Natural gas pipelines are the most common type of pipeline in the United States and serve to transport natural gas from the point of production to the point of use. Three major types of pipelines move natural gas: gathering lines, transmission lines, and distribution lines. Gathering lines are the pipelines that move natural gas from the production well to a processing facility. Gas transmission lines are the large pipelines (6 to 48 inches in diameter) that move natural gas from the processing facility to local distribution networks. Gas transmission lines are designed to transport natural gas long distances at high pressures (often 200 – 1,500 psi). There are approximately 300,000 miles of gas transmission pipelines in the United States. Gas distribution lines are the smaller gas mains and service lines (1/2 to 2 inches in diameter) that move natural gas from the transmission network directly to homes and businesses. Gas distribution pipelines are designed to transport natural gas shorter distances at relatively low pressures (PHMSA, n.d.; Pipeline Safety Trust, 2015). There are approximately 2.35 million miles of gas distribution lines in the United States (PHMSA, 2023).

Liquid petroleum pipelines are the second most common type of pipeline in the United States, and serve to transport crude oil, refined product, and highly volatile liquids (HVLs) to local distribution networks. The system for doing so has the same three categories of pipelines. Gathering lines are typically 2 to 8 inches in diameter, transmission lines are larger, cross-country pipelines (8 to 48 inches in diameter), and refined product lines are similar but typically smaller than transmission ones at 8 to 42 inches in diameter. There are approximately 85,000 miles of crude oil transmission pipelines and 64,000 miles of refined product lines in the United States (PHMSA, 2022). Tanker trucks take the refined petroleum products the last few miles from the storage terminals to gas stations and homes.

Figure 4.3.17-1 shows the pipelines that are located within Lycoming County. The natural gas pipeline runs horizontally across the middle of the county, while the refined product pipeline runs vertically (FracTracker Alliance,2024). There are 281 miles of natural gas transmission and 39 miles of liquid petroleum pipelines in Lycoming County (PEMA, 2023).

Figure 4.3.17-1 Gas and Liquid Pipelines within Lycoming County



4.3.17.2. Range of Magnitude

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

- Serious injuries or fatalities.
- Damage to buildings and infrastructure.
- Environmental impacts, including pollution of air, waterways and drinking water sources, and contamination of environmentally sensitive areas.
- Disruptions and closures to critical infrastructure and services, including transportation routes and emergency medical services.
- Residential, commercial, and industrial energy supply losses.
- Disruption of local businesses and regional economies.
- Displacement of residential communities or businesses.

Understanding pipeline threats and hazards begins with understanding the physical and chemical properties of the products in the pipeline. Natural gas is a clean-burning fuel that consists mostly of methane (94 percent) and ethane (4 percent). Some relevant characteristics of natural gas are summarized below (FEMA, 2015):

- Although natural gas is nontoxic, it can cause asphyxiation if released in an enclosed area.
- Natural gas is combustible and natural gas fires produce large amounts of radiant heat.
- If an ignition source exists, natural gas releases can result in a sudden fire or explosion near the point of release. Once the release ends, however, the hazard declines very quickly as the gas disperses.
- If natural gas migrates into a building and accumulates inside, the hazard can persist for longer.

Liquid petroleum pipelines can carry many different crude oil and refined petroleum products with widely varying physical and chemical properties. Many of these products can spread over land and water, flowing into valleys, ravines, and waterways. Relevant characteristics of some liquid petroleum products are summarized below (FEMA, 2015):

- Most crude oils are heavier and less toxic than refined petroleum products, and do not penetrate porous surfaces such as soil and sand. Because these products do not evaporate and tend to adhere to surfaces, however, they remain in the environment longer than refined products. Oil spills may take weeks, months, or even years to clean up.
- Most refined petroleum products are highly fluid, spready quickly over land or water surfaces, and penetrate porous surfaces. These products are usually flammable, and

their volatile components can burn the eyes and skin and irritate the nose, eyes, and mouth. Because these products have a high evaporation rate and generally do not adhere to surfaces, they are easier to clean up. Refined petroleum products also produce vapors that are heavier than air. These vapors will collect in low areas.

Highly volatile liquids (HVLs) belong to a category of their own. While they are liquid, they can contain gasses like ethane, propane, and butane which can form vapor clouds in low-lying areas. Anhydrous ammonia is a highly volatile liquid that is particularly toxic and corrosive. It is typically transported under pressure as liquefied gas and rapidly expands when released. Its vapors are extremely irritating and may be fatal if inhaled, ingested, or absorbed through the skin.

The environmental impacts of hazardous material releases from pipelines could include (EPA, 1999):

- Surface and groundwater contamination.
- Other effects on water quality such as changes in water temperature.
- Damage to streams, lakes, ponds, estuaries, and wetland ecosystems.
- Air quality effects – pollutants, smoke, and dust.
- Loss of quality in landscape.
- Reduced soil quality.
- Damage to plant communities – loss of biodiversity; damage to vegetation.
- Damage to animal species – animal fatalities; degradation of wildlife and aquatic habitat; pollution of drinking water for wildlife; loss of biodiversity; disease.

These impacts are a particular concern for liquid petroleum pipelines, since liquid petroleum products can flow into valleys, ravines, and waterways. To minimize the environmental impacts of liquid petroleum pipelines, federal regulations require pipeline operators to include drinking water sources and unusually sensitive ecological resources in the "high consequence areas" that they prioritize for integrity management (PHMSA, 2021).

In some cases, natural hazard events can cause pipeline failures and/or complicate emergency response activities. The most common cause of pipeline failures from natural hazards are geological events like landslides or earthquakes (Girgin and Krausmann, 2014). While not the leading cause of failures, hazard events like severe storms are accompanied by winds, thunderstorms, or floods that can spread contamination more quickly and exacerbate the threat to local water supplies, air quality, soil, and agriculture. When a pipeline failure occurs during a natural disaster, access to the pipeline may be restricted, waterlines for fire suppression may be compromised, and response personnel and resources may be limited. Other natural hazard events that can lead to pipeline failure include earthquakes, land subsidence, avalanches, lightning, fires, and severe winter storms (FEMA, 1997).

Several exacerbating or mitigating circumstances can affect the severity of a pipeline failure. Mitigating circumstances include precautionary measures taken in advance to reduce the impact of a release on the surrounding environment. After a release, primary and secondary containment or shielding by sheltering-in-place can help protect people and property.

Exacerbating circumstances can include weather conditions, the micro-meteorological effects of buildings and terrain, and lack of code compliance or maintenance. Non-compliance 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 pipelines and surrounding buildings.

The potential impacts of gas and liquid pipelines on community lifelines are as follows:

Table 4.3.17-1 Most Likely Lifelines Impacted by Gas and Liquid Pipelines

LIFELINES	NOTES
	Fire departments may be called into response and recovery if leaks or other issues result in explosions and fires.
	Environmental contamination from pipelines can impact agricultural operations and water supplies. Supply chains may also be impacted if there are disruptions to transportation infrastructure.
	Environmental impacts from pipelines could adversely impact communities, leading to more strain on the local healthcare system.
	Pipelines play an important role in energy production and distribution. Issues with pipelines may lead to additional challenges with energy production and availability.

4.3.17.3. Past Occurrence

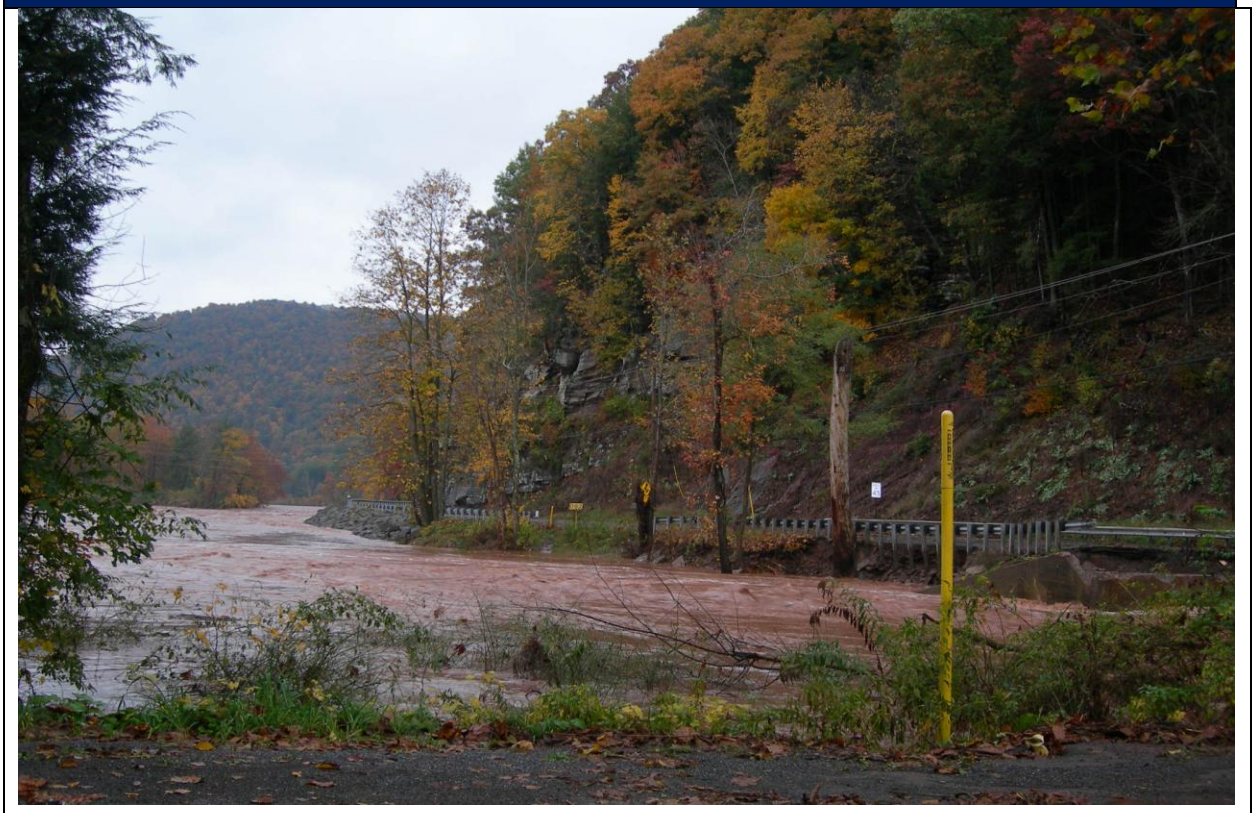
Pennsylvania has a long history of oil and gas well drilling and transportation and, though relatively infrequent, many accidents and incidents have occurred related to the extraction and transportation of these natural resources. The hazards associated with each incident vary widely and encompass damages including serious injury, explosion, fire, and water contamination.

According to PEMA's 2023 State Hazard Mitigation Plan, Lycoming County experienced 5 significant pipelines incidents, however, the county only has two major pipelines, one for natural gas and another for refined products.

One of these pipeline incidents occurred on October 21st, 2016, as a result of mudslides from high winds and heavy floods. The eight-inch Sunoco pipeline was broken by debris from a washed-out bridge ten feet upstream. The pipeline was buried five feet below the creek near the intersection of Wallis Run Rd and Butternut Grove Rd, but heavy rains exposed it. When ruptured on October 21st, the pipeline spilled 55,000 gallons of gasoline into Wallis Run, a tributary of Loyalsock Creek. Water suppliers and government agencies advised locals to

conserve water. The PA DEP and American Water shut down intake valves until they had measured contamination levels in three water supplies serving thousands of people downstream. As a result, the highest levels of pollution in the Loyalsock Creek were recorded, although heavy rains had flushed out much of the pollution. It should be noted that the same pipeline had been exposed, (although not breached), just five years earlier (FracTracker Alliance, 2025). Figure 4.3.17-2 displays the location of where the rupture occurred.

Figure 4.3.17-2 The yellow pipeline marker shows the location of the Sunoco pipeline rupture (Photograph courtesy of Carol Kafer / Loyalsock Watershed Association & Susan Phillips / StateImpact Pennsylvania).



Another incident occurred on June 9th, 2015, in the Unityville area by the Columbia County border. The pipeline had been installed in 1963 and was a 24-inch line. A 34-foot rupture in the pipeline was caused by corrosion with localized coating failure and pressure variations during bi-directional flow listed as contributing factors. As a result of the rupture, about 150 people were evacuated and parts of routes 118 and 42 in the area were closed because of natural gas leaking under pressure (Beauge, 2016). Figure 4.3.17-3 below portrays browned vegetation caused by methane release from the rupture.

Figure 4.3.17-3 Vegetation of the rupture area turned brown due to escaping methane (Photograph courtesy of Crable, Ad / LancasterOnline).



Other prior year incident information for Pennsylvania can be found on the Pennsylvania Emergency Management Association website. The Pennsylvania Hazardous Material Emergency Planning and Response Act 1990-165 2021 Annual Report, the most recent version available, identified the following hazmat incidents:

Table 4.3.17-2 Previous Hazmat Incidents in Lycoming County (PEMA, 2021)

INCIDENT TYPE	NUMBER OF INCIDENTS
Chemical Release / Spill	8
Flammable Liquid / Solid	2
Natural Gas Release	1
TOTAL	**11**

4.3.17.4. Future Occurrence

The future probability of high-impact pipeline failures will be shaped by the maintenance of existing pipeline systems, the construction of new pipeline systems, and the amount of new development that occurs near pipelines. While many pipeline break incidents have occurred in Pennsylvania and Lycoming County in the past, they are generally considered difficult to predict,

especially within the boundaries of a county. An occurrence is largely dependent upon the accidental or intentional actions of a person or group. It is difficult to predict when and where environmental hazards related to gas pipelines 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. Overall, the probability of future environmental hazards events is *possible* as defined by the Risk Factor Methodology (See Section 4.4-1).

Pipeline failures are low-probability, potentially high-consequence events. Although gas and liquid pipeline failures are infrequent within Pennsylvania, generally across the US they are frequent with almost 2 incidents happening daily (PHMSA, 2022). The hazardous and inflammable materials released by these events can pose a significant threat to public safety and the built and natural environment. Explosions associated with pipeline failures, for example, can cause severe injury to nearby residents and destroy homes and other property. Corrosion is a major cause of pipeline failure and is often associated with pipeline age. Besides corrosion, pipeline failures can be caused by excavation damage, incorrect operation, material/weld/equipment failure, natural force damage, and other outside forces. Land development tends to increase the likelihood of external impacts and pipeline failure. Land development without appropriate planning can also impede access to pipelines for operation and maintenance or emergency response (FEMA, 2015).

4.3.17.5. Vulnerability Assessment

Table 4.3.17-3 lists the total structures and critical facilities vulnerable to a liquid or gas pipeline incident (excluding oil and gas wells). The table only includes municipalities within .25 miles of a pipeline. The jurisdictions with the most structures located within 0.25 miles of a liquid or gas are Loyalsock Township (870 structures) and Old Lycoming Township (517 structures). The municipality with the highest percentage of total structures within 0.25 miles of a liquid or gas pipeline is Picture Rocks Borough (55% of total structures). The jurisdictions that have the most critical facilities within 0.25 miles of a liquid or gas pipeline are Loyalsock Township (8) and Picture Rocks Borough (6). The jurisdictions with the highest percentage of total critical facilities within 0.25 miles of a liquid or gas pipeline are Picture Rocks Borough (100% of critical facilities) and Penn Township (50% of total critical facilities).

Table 4.3.17-4 lists the vulnerability of each municipality to liquid and gas pipelines generalized by land use. There are in total 2,441 total structures located within 0.25 miles of a liquid or gas pipeline; the most vulnerable structure to the hazard is residential with 1,832 structures located near a pipeline.

Table 4.3.17-3 Structures and Critical Facilities Vulnerable Liquid and Gas Pipelines									
MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES WITHIN .25 MILES OF A LIQUID OR GAS PIPELINE	PERCENT STRUCTURES WITHIN .25 MILES OF A LIQUID OR GAS PIPELINE	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN .25 MILES OF A LIQUID OR GAS PIPELINE	PERCENT CRITICAL FACILITIES WITHIN .25 MILES OF A LIQUID OR GAS	TOTAL POPULATION	POPULATION WITHIN .25 MILE OF A LIQUID OR GAS PIPELINE	PERCENT POPULATION WITH .25 MILES OF A LIQUID OR GAS PIPELINE
Anthony Township	387	11	3%	4	1	25%	867	32	4%
Armstrong Township	429	48	11%	1	0	0%	686	107	16%
Bastress Township	245	0	0%	3	0	0%	527	0	0%
Brady Township	234	9	4%	3	0	0%	501	0	0%
Brown Township	421	0	0%	5	0	0%	93	0	0%
Cascade Township	323	29	9%	0	0	0%	422	24	6%
Clinton Township	1,161	103	9%	18	1	6%	3,720	84	2%
Cogan House Township	636	0	0%	8	0	0%	935	0	0%
Cummings Township	604	11	2%	5	0	0%	265	0	0%
Duboistown Borough	560	0	0%	4	0	0%	1,200	0	0%
Eldred Township	905	93	10%	4	0	0%	1,997	304	15%
Fairfield Township	1,482	168	11%	4	0	0%	2,834	436	15%
Franklin Township	518	21	4%	5	0	0%	903	82	9%
Gamble Township	484	9	2%	3	0	0%	778	1	0%
Hepburn Township	1,267	0	0%	6	0	0%	2,578	0	0%
Hughesville Borough	973	0	0%	9	0	0%	2,154	0	0%
Jackson Township	289	0	0%	1	0	0%	396	0	0%

Table 4.3.17-3 Structures and Critical Facilities Vulnerable Liquid and Gas Pipelines									
MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES WITHIN .25 MILES OF A LIQUID OR GAS PIPELINE	PERCENT STRUCTURES WITHIN .25 MILES OF A LIQUID OR GAS PIPELINE	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN .25 MILES OF A LIQUID OR GAS PIPELINE	PERCENT CRITICAL FACILITIES WITHIN .25 MILES OF A LIQUID OR GAS	TOTAL POPULATION	POPULATION WITHIN .25 MILE OF A LIQUID OR GAS PIPELINE	PERCENT POPULATION WITH .25 MILES OF A LIQUID OR GAS PIPELINE
Jersey Shore Borough	1,792	0	0%	17	0	0%	4,166	0	0%
Jordan Township	533	50	9%	4	0	0%	850	170	20%
Lewis Township	648	0	0%	10	0	0%	862	0	0%
Limestone Township	844	0	0%	5	0	0%	1,966	0	0%
Loyalsock Township	5,171	870	17%	35	8	23%	11,561	2,349	20%
Lycoming Township	774	0	0%	1	0	0%	1,491	0	0%
McHenry Township	626	0	0%	4	0	0%	122	0	0%
McIntyre Township	383	8	2%	4	0	0%	461	0	0%
McNett Township	219	11	5%	2	0	0%	143	0	0%
Mifflin Township	552	82	15%	4	0	0%	1,089	109	10%
Mill Creek Township	301	6	2%	4	0	0%	582	21	4%
Montgomery Borough	661	0	0%	4	0	0%	1,568	0	0%
Montoursville Borough	2,301	0	0%	17	0	0%	4,750	0	0%
Moreland Township	487	0	0%	5	0	0%	1,015	0	0%
Muncy Borough	1,172	0	0%	12	0	0%	2,440	0	0%
Muncy Creek Township	1,835	0	0%	6	0	0%	3,573	0	0%
Muncy Township	646	4	1%	12	0	0%	1,178	0	0%

Table 4.3.17-3 Structures and Critical Facilities Vulnerable Liquid and Gas Pipelines									
MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES WITHIN .25 MILES OF A LIQUID OR GAS PIPELINE	PERCENT STRUCTURES WITHIN .25 MILES OF A LIQUID OR GAS PIPELINE	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN .25 MILES OF A LIQUID OR GAS PIPELINE	PERCENT CRITICAL FACILITIES WITHIN .25 MILES OF A LIQUID OR GAS	TOTAL POPULATION	POPULATION WITHIN .25 MILE OF A LIQUID OR GAS PIPELINE	PERCENT POPULATION WITH .25 MILES OF A LIQUID OR GAS PIPELINE
Nippenose Township	358	0	0%	5	0	0%	661	0	0%
Old Lycoming Township	2,454	517	21%	8	0	0%	4,975	890	18%
Penn Township	559	62	11%	2	1	50%	895	156	17%
Piatt Township	536	2	0%	2	0	0%	1,047	0	0%
Picture Rocks Borough	285	157	55%	6	6	100%	643	316	49%
Pine Township	465	0	0%	2	0	0%	258	0	0%
Plunketts Creek Township	609	0	0%	5	0	0%	597	0	0%
Porter Township	698	0	0%	5	0	0%	1,528	0	0%
Salladasburg Borough	134	0	0%	1	0	0%	250	0	0%
Shrewsbury Township	304	0	0%	0	0	0%	418	0	0%
South Williamsport Borough	2,842	0	0%	18	0	0%	6,261	0	0%
Susquehanna Township	494	0	0%	4	0	0%	968	0	0%
Upper Fairfield Township	888	21	2%	5	0	0%	1,807	35	2%
Washington Township	775	0	0%	8	0	0%	1,768	0	0%
Watson Township	364	53	15%	1	0	0%	534	0	0%
Williamsport City	10,860	0	0%	74	0	0%	27,754	0	0%
Wolf Township	1,567	15	1%	8	0	0%	3,105	43	1%

Table 4.3.17-3 Structures and Critical Facilities Vulnerable Liquid and Gas Pipelines

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES WITHIN .25 MILES OF A LIQUID OR GAS PIPELINE	PERCENT STRUCTURES WITHIN .25 MILES OF A LIQUID OR GAS PIPELINE	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN .25 MILES OF A LIQUID OR GAS PIPELINE	PERCENT CRITICAL FACILITIES WITHIN .25 MILES OF A LIQUID OR GAS	TOTAL POPULATION	POPULATION WITHIN .25 MILE OF A LIQUID OR GAS PIPELINE	PERCENT POPULATION WITH .25 MILES OF A LIQUID OR GAS PIPELINE
Woodward Township	1,142	81	7%	5	0	0%	2,046	261	13%
TOTAL	55,197	2,441	4%	388	17	4%	114,188	5,420	5%

Table 4.3.17-4 Structures Vulnerable to Gas and Liquid Pipelines by Land Use

MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	OTHER	MIXED USE	RESIDENTIAL	UNKOWN	TOTAL
Anthony Township	4	1	0	0	1	4	1	11
Armstrong Township	4	2	1	1	0	25	15	48
Brady Township	2	0	0	0	1	5	1	9
Cascade Township	13	1	0	0	1	6	8	29
Clinton Township	7	8	2	4	1	70	11	103
Cummings Township	5	1	0	0	0	0	5	11
Eldred Township	11	3	0	0	1	73	5	93

Table 4.3.17-4 Structures Vulnerable to Gas and Liquid Pipelines by Land Use								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	OTHER	MIXED USE	RESIDENTIAL	UNKOWN	TOTAL
Fairfield Township	23	3	0	2	4	128	8	168
Franklin Township	9	1	0	0	1	5	5	21
Gamble Township	5	0	0	0	0	2	2	9
Jordan Township	14	0	0	1	0	29	6	50
Loyalsock Township	24	17	2	4	9	754	60	870
McIntyre Township	0	0	0	0	0	6	2	8
McNett Township	4	0	0	0	1	4	2	11
Mifflin Township	19	0	0	1	2	49	11	82
Mill Creek Township	3	0	0	0	0	3	0	6
Muncy Township	2	0	0	0	0	2	0	4
Old Lycoming Township	25	18	0	10	6	404	54	517
Penn Township	27	3	0	0	1	25	6	62
Piatt Township	0	0	0	0	0	1	1	2
Picture Rocks Borough	2	10	2	5	1	132	5	157
Upper Fairfield Township	8	1	0	0	0	8	4	21
Watson Township	15	1	0	1	0	30	6	53
Wolf Township	8	0	0	0	0	5	2	15
Woodward Township	14	0	0	0	1	62	4	81
TOTAL	248	70	7	29	31	1,832	224	2,441

4.3.17.6. Equity in Vulnerable Communities

Equity considerations in gas and liquid pipelines emphasize ensuring that mitigation and preparedness actions address the unique needs of vulnerable populations. Communities near pipelines are at higher risk of leaks, spills, or explosions, yet they may lack the resources or infrastructure needed for effective emergency response. Pipelines are often in or near low-income and minority communities, indigenous lands, and rural areas. Pipelines also are oftentimes located in existing industrial areas, compounding potential impacts. Health impacts associated with pipelines include respiratory illnesses, cancers, and neurological areas. Those with pre-existing health conditions or older homes may be more at risk due to associated contaminated air or water. In addition, Brady, Washington, and Clinton Townships have the highest concentration of people without health insurance. Preparedness efforts must include accessible emergency response plans, clear communication in multiple languages, and training programs tailored to local communities. Additionally, prioritizing regular maintenance, with a focus on areas where vulnerable populations live, is essential to mitigate harmful effects.

4.3.18. Environmental Hazards: Hazardous Materials Release

4.3.18.1. Location and Extent



Hazardous material releases pose threats to the natural environment, the built environment, and public safety through the diffusion of harmful substances, materials, or products. Hazardous materials can include toxic chemicals, infectious substances, bio-hazardous waste, and any materials that are explosive, corrosive, flammable, or radioactive. Hazardous material releases can occur wherever hazardous materials are manufactured, used, stored, or transported. Such releases can occur along transportation routes or at fixed-site facilities. Hazardous material releases can result in human and wildlife injury, property damage, and contamination of air, water, and soils.

Fixed-site facilities that use, manufacture, or store hazardous materials in Lycoming County pose significant risk and must comply with both Title III of the federal Superfund Amendments and Reauthorization Act (SARA), also known as the Emergency Planning and Community Right-to-Know Act, and the Commonwealth's reporting requirements under the Hazardous Materials Emergency Planning and Response Act (1990-165), as amended. These statutes require that all owners or operators of facilities that manufacture, produce, use, import, export, store, supply, or distribute any extremely hazardous substance, as defined by the EPA, at or above the threshold planning quantity, shall report to the county where the facility is located and the Commonwealth. These facilities are subject to the requirement of assisting the Local Emergency Planning Committee (LEPC) in the development of an Off-site Emergency Response Plan (EPA, 2020b). The right-to-know reporting requirements keep communities abreast of the presence and release of chemicals at individual facilities.

The EPA also tracks key information about chemicals handled by industrial facilities through its TRI database. Facilities which employ ten or more full-time employees, and which manufacture or process 25,000 pounds or more, or otherwise use 10,000 pounds or more, of any SARA Section 313-listed toxic chemical in the course of a calendar year are required to report TRI information to the EPA and PEMA. In 2023, there were 1,047 tracked facilities on EPA's TRI in Pennsylvania, 18 of which are located in Lycoming County as shown in Figure 4.3.18-1 (EPA, 2025).

Figure 4.3.18-1 Locations of TRI Facilities in Lycoming County (EPA, 2025)

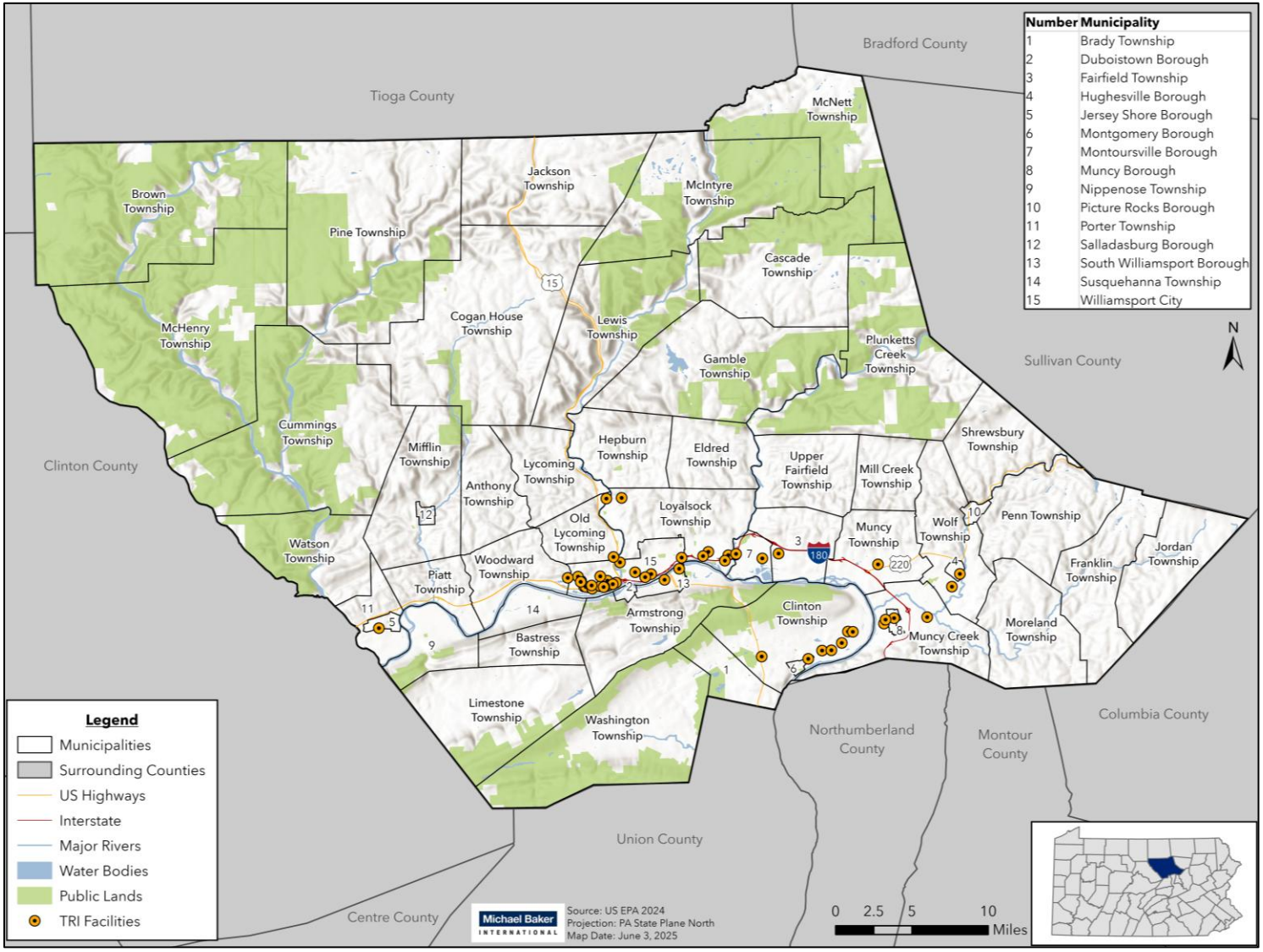


Table 4.3.18-1 shows the number of TRI facilities in Lycoming County by municipality. Of the 52 municipalities in Lycoming County, 7 contain a TRI facility. Williamsport is home to the most TRI sites in the county, with 7 of the 18 TRI facilities within its boundaries. Next would be Muncy Borough with 3 and then Loyalsock and Clinton Township tied for third with 2 TRI facilities each.

Table 4.3.18-1 TRI Facilities in Lycoming County (EPA, 2025)

TRI FACILITY	ADDRESS	MUNICIPALITY
Andritz Inc.	35 Sherman St	Muncy Borough
Arxada LLC	3500 Trenton Ave	Williamsport City
Championx-Hughesville	356 Boak Ave	Wolf Township
Chemcoat Inc	2790 Canfields Ln	Loyalsock Township
High Steel Structures - Williamsport Facility	3501 West Fourth Street	Williamsport City
Koppers Inc (Susquehanna)	50 Koppers Ln	Clinton Township
Lycoming Engines A Div Of Avco Corp	652 Oliver St	Williamsport City
Ohd Thermacore Inc.	3200 Reach Rd	Williamsport City
Plastic Development Co	75 Palmer Industrial Rd	Woodward Township
Pmf Industries Inc	2601 Reach Rd	Williamsport City
Prysmian Cables & Systems Usa LLC	409 Reighard Ave	Williamsport City
Reladyne Northeast LLC	98 Carpenter St	Muncy Borough
Spartronics Williamsport Inc.	2333 Reach Rd	Williamsport City
St Engineering Hackney Inc	914 Saegers Station Rd	Clinton Township
Stellant Systems LLC	1035 Westminster Dr	Loyalsock Township
Superior Plus Energy Services Inc. - Mill Street Station	10 Mill St	Montoursville Borough
Wenger Feeds LLC-Muncy (F/K/A Wenger Feed Mill Inc)	6829 Rt 405 Hwy	Clinton Township
Young Industries Inc	16 Painter St	Muncy Borough

A notable facility that reports through the EPA TRI process includes Superior Plus Energy Services Inc. - Mill Street Station in Montoursville Borough. The facility provides propane, compressed natural gas, renewable energy and related products and services. In 2023, this company was responsible for 20 percent of Lycoming County releases (EPA, 2025).

In addition to fixed-site hazardous materials release, there are increasingly large numbers of chemicals, oils, radioactive materials, and other hazardous substances spilled as a result of highway, rail, and waterway accidents, storage tank leakage, pipeline break, and/or other accidents. On occasion, these events become a major disaster and force people to evacuate and/or lose their homes and businesses. According to the U.S. DOT's Office of Operations and

the U.S. Census Bureau, it is estimated that 11 percent of all freight transported by trucks is hazardous material.

A number of major highways can be used in Lycoming County for the transport of hazardous materials including US-15, US-220, I-180, and I-80. Lycoming County has 708.57 linear miles of roadway according to PennDOT's 2023 Pennsylvania Highway Statistics Report (PennDOT, 2024). Additionally, many of these roads cross rivers and streams and travel through downtown and residential areas, increasing the potential to pollute surface water and groundwater and cause harm to life and property.

PA-14, 42, 44, 87, 184, 284, 287, 405, 442, 554, 654, 864, 880, and 973 are also vulnerable to accidents involving hazardous materials. As hazardous materials shipments on these roadways continue to increase, it is not only likely transportation incidents involving hazardous materials will continue to occur in Lycoming County; they could increase in number and magnitude.

Potential also exists for hazardous material releases to occur along rail lines as collisions and derailments of train cars can result in large spills. Several railroad accidents have occurred in Pennsylvania involving hazardous materials (NTSB, 2020). More information on the impacts of highway and rail incidents can be found in Section 4.3.23.

Potential also exists for hazardous material release incidents to occur along pipelines. Pipelines that transport hazardous liquids and flammable substances can corrode, be damaged during excavation, incorrectly operated, or damaged by other natural or human-made forces leading to a hazardous materials release incident. For more information reference Section 4.3.17. Additional hazardous materials are contained at the military installations within Pennsylvania. Nuclear facilities are another type of fixed-facility that poses risk of hazard material release. For more information about nuclear incidents, reference Section 4.3.21.

4.3.18.2. Range of Magnitude

Hazardous material releases can contaminate air, water, and soils, possibly resulting in death and/or injuries. 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. Hazardous materials can 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 incident

, 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, characteristics that can enhance or magnify the effects of a hazardous material release include:

- Weather conditions: Affects how the hazard occurs and develops.
- Micro-meteorological effects of buildings and terrain: Alters dispersion of hazardous materials.
- Non-compliance 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.

The severity of the incident is dependent not only on the circumstances described above, but also with 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.

Generally, the ways hazardous materials are harmful to humans and other animals can be broken into several categories referred to as the TRACEM model (FEMA, 2019):

- Thermal Harm: exposure to extreme temperatures either through contacting a heated surface or inhaling fumes.
- Radiological Harm: exposure to ionizing radiation removes electrons from atoms and causes damage to living cells and DNA.
- Asphyxiation: exposure to materials that reduce oxygen levels, typically in confined spaces or with very concentrated forms of hazardous material, that tissues cannot be oxygenated enough.
- Chemical Harm: exposure to chemicals that include poisons, corrosive agents, certain metals, opioids, pesticides, and more. The injuries and illnesses that result will depend entirely on the material.
- Etiological (Biological) Harm: exposure to organic materials such as bacteria, viruses, and biological toxins which can produce delayed responses as pathogens take time to multiply.
- Mechanical Harm: either contact with fragmentation or debris created in pressure releases or explosions, injuries caused solely by pressure increases (eardrum and blood vessel rupture), or secondary blast injuries when victims are thrown by blasts.

A worst-case scenario event of a hazardous material release would be if a release occurred in the most populous jurisdiction, the City of Williamsport. A hazardous material release would likely cause the evacuation of residents.

The environmental impacts of hazardous material releases include:

- Hydrologic effects – surface and groundwater contamination.

- Other effects on water quality such as changes in water temperature.
- Damage to streams, lakes, ponds, estuaries, and wetland ecosystems.
- Air quality effects – pollutants, smoke, and dust.
- Loss of quality in landscape.
- Reduced soil quality.
- Damage to plant communities – loss of biodiversity; damage to vegetation.
- Damage to animal species – animal fatalities; degradation of wildlife and aquatic habitat; pollution of drinking water for wildlife; loss of biodiversity; disease.

The potential impacts of hazardous materials release on community lifelines are as follows:

Table 4.3.18-2 Most Likely Lifelines Impacted by Hazardous Materials Release

LIFELINES	NOTES
	Fire departments may be called into response and recovery if leaks or other issues result in explosions and fires.
	Impacts from hazardous materials releases include environmental contamination, which can impact agricultural operations and water supplies.
	Releases can have adverse impacts on communities, leading to more strain on the local healthcare system.
	Transportation lifeline as release itself or resulting explosions and fires.

4.3.18.3. Past Occurrence

Between January 2021 and March 2025, there were 23 highway and railway related hazardous material incidents in Lycoming County (PHMSA, 2024). Other prior year incident information for Pennsylvania can be found on the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration website.

Since the passage of SARA, Title III facilities which produce, use, or store hazardous chemicals must notify the public through the county emergency dispatch center and PEMA if an accidental release of a hazardous substance meets or exceeds a designated reportable quantity, and affects or has the potential to affect persons and/or the environment outside the plant. SARA Title III and Pennsylvania Act 165 also require a written follow-up report to PEMA and the county. These written follow-up reports include any known or anticipated health risks associated with the release and actions to be taken to mitigate potential future incidents. In addition, Section

204(a) (10) of Act 165 requires PEMA to staff and operate a 24-hour State Emergency Operations Center (SEOC) to provide effective emergency response coordination. Pennsylvania's Hazardous Material Emergency Planning and Response Act 990-165 - 2021 Annual Report is the latest report available. It states there were 1,643 hazardous materials/petroleum incidents in Pennsylvania and 11 of these events occurred in Lycoming County (PEMA, 2021). Additional incident information for years prior to 2021 may be obtained from annual reports submitted to PEMA.

Table 4.3.18-3 shows the number of hazardous materials release events in Lycoming County as reported by PEMA-KC, the agency's incident management system, as reported in the 2023 Pennsylvania State Hazard Mitigation Plan.

Table 4.3.18-3 Hazardous Materials Release Events in Lycoming County (PEMA, 2023)

YEAR	EVENTS
2018	5
2019	3
2020	19
2021	11
2022	7
2023	1
TOTAL	46

4.3.18.4. Future Occurrence

While many hazardous material release incidents have occurred in Lycoming County 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. Intentional acts are addressed under Section 4.3.22, Terrorism.

Shifting traffic patterns and the presence of a multitude of hazardous materials in transit through the county warrants the need for development of increased response capability. 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 to the environment.

The probability of future hazardous materials release events can be considered *likely* according to the Risk Factor Methodology (see Table 4.4-1).

4.3.18.5. Vulnerability Assessment

Jurisdictions that are home to one or more hazardous materials facilities should be considered vulnerable to hazardous materials releases from fixed facilities. Structures, critical facilities, and populations located near hazardous material areas are also at risk. Table 4.3.18-4 shows the total number of structures in hazardous materials hazard areas defined as a 1.5-mile radius from

any TRI facility. Fifteen of Lycoming County's municipalities have structures within hazardous materials hazard areas. A number of municipalities are more at risk than others with higher percentages of structures within hazardous materials hazard areas. Every structure in Hughesville Borough, Duboistown Borough, and Muncy Borough are within hazardous materials areas. Williamsport has the most structures in these areas with 6,417.

Table 4.3.18-4 also shows the total number of critical facilities in hazardous materials areas by municipality. Note that the critical facility analysis for hazardous material hazard areas does not include TRI facilities classified as a critical facility as these sites are those that define the hazard area in this analysis. Fifteen of Lycoming County's municipalities have critical facilities within hazardous materials hazard area. A number of municipalities are more at risk than others with higher percentages of critical facilities within hazardous materials areas. Every critical facility in Duboistown Borough, Hughesville Borough, Muncy Borough, Old Lycoming Township, and Wolf Township are within hazardous materials areas. Williamsport has the most critical facilities in these areas with 49. In the event of hazardous materials release, these facilities may be susceptible to water contamination. Loyalsock Township and Williamsport have the highest number of residential land uses vulnerable to hazardous materials release as shown in Table 4.3.18-5. Additionally, residential land uses are the most prone overall.

Table 4.3.18-4 Structures and Critical Facilities Vulnerable to Hazardous Materials Release

MUNICIAPLITY	TOTAL STRUCTURES	STRUCTURES IN HAZARDOUS MATERIAL HAZARD AREA	PERCENT STRUCTURES IN HAZARDOUS MATERIAL HAZARD AREA	TOTAL CFS	CFS IN HAZARDOUS MATERIAL HAZARD AREA	PERCENT CFS IN HAZARDOUS MATERIAL HAZARD AREA	TOTAL POPULATION	POPULATION IN HAZARDOUS MATERIAL AREA	PERCENT POPULATION IN HAZARDOUS MATERIAL AREA
Anthony Township	387	0	0%	4	0	0%	867	0	0%
Armstrong Township	429	178	41%	1	0	0%	686	280	41%
Bastress Township	245	0	0%	3	0	0%	527	0	0%
Brady Township	234	0	0%	3	0	0%	501	0	0%
Brown Township	421	0	0%	5	0	0%	93	0	0%
Cascade Township	323	0	0%	0	0	0%	422	0	0%
Clinton Township	1,161	417	36%	18	8	44%	3,720	2,255	61%
Cogan House Township	636	0	0%	8	0	0%	935	0	0%
Cummings Township	604	0	0%	5	0	0%	265	0	0%
Duboistown Borough	560	560	100%	4	4	100%	1,200	1,200	100%
Eldred Township	905	0	0%	4	0	0%	1,997	0	0%
Fairfield Township	1,482	0	0%	4	0	0%	2,834	0	0%
Franklin Township	518	0	0%	5	0	0%	903	0	0%
Gamble Township	484	0	0%	3	0	0%	778	0	0%
Hepburn Township	1,267	0	0%	6	0	0%	2,578	0	0%
Hughesville Borough	973	973	100%	9	9	100%	2,154	2,154	100%
Jackson Township	289	0	0%	1	0	0%	396	0	0%
Jersey Shore Borough	1,792	0	0%	17	0	0%	4,166	0	0%
Jordan Township	533	0	0%	4	0	0%	850	0	0%
Lewis Township	648	0	0%	10	0	0%	862	0	0%
Limestone Township	844	0	0%	5	0	0%	1,966	0	0%

Table 4.3.18-4 Structures and Critical Facilities Vulnerable to Hazardous Materials Release									
MUNICIAPLITY	TOTAL STRUCTURES	STRUCTURES IN HAZARDOUS MATERIAL HAZARD AREA	PERCENT STRUCTURES IN HAZARDOUS MATERIAL HAZARD AREA	TOTAL CFS	CFS IN HAZARDOUS MATERIAL HAZARD AREA	PERCENT CFS IN HAZARDOUS MATERIAL HAZARD AREA	TOTAL POPULATION	POPULATION IN HAZARDOUS MATERIAL AREA	PERCENT POPULATION IN HAZARDOUS MATERIAL AREA
Loyalsock Township	5,171	3,571	69%	35	25	71%	11,561	7,310	63%
Lycoming Township	774	0	0%	1	0	0%	1,491	0	0%
McHenry Township	626	0	0%	4	0	0%	122	0	0%
McIntyre Township	383	0	0%	4	0	0%	461	0	0%
McNett Township	219	0	0%	2	0	0%	143	0	0%
Mifflin Township	552	0	0%	4	0	0%	1,089	0	0%
Mill Creek Township	301	0	0%	4	0	0%	582	0	0%
Montgomery Borough	661	89	13%	4	0	0%	1,568	146	9%
Montoursville Borough	2,301	2,110	92%	17	15	88%	4,750	4,295	90%
Moreland Township	487	0	0%	5	0	0%	1,015	0	0%
Muncy Borough	1,172	1,172	100%	12	12	100%	2,440	2,440	100%
Muncy Creek Township	1,835	1,267	69%	6	4	67%	3,573	2,323	65%
Muncy Township	646	4	1%	12	0	0%	1,178	2	0%
Nippenose Township	358	0	0%	5	0	0%	661	0	0%
Old Lycoming Township	2,454	1,821	74%	8	8	100%	4,975	3,594	72%
Penn Township	559	0	0%	2	0	0%	895	0	0%
Piatt Township	536	0	0%	2	0	0%	1,047	0	0%
Picture Rocks Borough	285	0	0%	6	0	0%	643	0	0%
Pine Township	465	0	0%	2	0	0%	258	0	0%
Plunketts Creek Township	609	0	0%	5	0	0%	597	0	0%

Table 4.3.18-4 Structures and Critical Facilities Vulnerable to Hazardous Materials Release

MUNICIAPLITY	TOTAL STRUCTURES	STRUCTURES IN HAZARDOUS MATERIAL HAZARD AREA	PERCENT STRUCTURES IN HAZARDOUS MATERIAL HAZARD AREA	TOTAL CFS	CFS IN HAZARDOUS MATERIAL HAZARD AREA	PERCENT CFS IN HAZARDOUS MATERIAL HAZARD AREA	TOTAL POPULATION	POPULATION IN HAZARDOUS MATERIAL AREA	PERCENT POPULATION IN HAZARDOUS MATERIAL AREA
Porter Township	698	0	0%	5	0	0%	1,528	0	0%
Salladasburg Borough	134	0	0%	1	0	0%	250	0	0%
Shrewsbury Township	304	0	0%	0	0	0%	418	0	0%
South Williamsport Borough	2,842	28	1%	18	0	0%	6,261	37	1%
Susquehanna Township	494	141	29%	4	2	50%	968	439	45%
Upper Fairfield Township	888	0	0%	5	0	0%	1,807	0	0%
Washington Township	775	0	0%	8	0	0%	1,768	0	0%
Watson Township	364	0	0%	1	0	0%	534	0	0%
Williamsport City	10,860	6,417	59%	74	49	66%	27,754	16,679	60%
Wolf Township	1,567	994	63%	8	8	100%	3,105	1,782	57%
Woodward Township	1,142	135	12%	5	3	60%	2,046	329	16%
TOTAL	**55,197**	**19,877**	**36%**	**388**	**147**	**38%**	**114,188**	**45,265**	**40%**

Table 4.3.18-5 Structures Vulnerable to Hazardous Materials Release by Land Use								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER	RESIDENTIAL	UNKNOWN	TOTAL
Anthony Township	0	0	0	0	0	0	0	0
Armstrong Township	15	6	5	1	4	106	41	178
Bastress Township	0	0	0	0	0	0	0	0
Brady Township	0	0	0	0	0	0	0	0
Brown Township	0	0	0	0	0	0	0	0
Cascade Township	0	0	0	0	0	0	0	0
Clinton Township	39	13	11	6	10	273	65	417
Cogan House Township	0	0	0	0	0	0	0	0
Cummings Township	0	0	0	0	0	0	0	0
Duboistown Borough	0	23	0	8	2	473	54	560
Eldred Township	0	0	0	0	0	0	0	0
Fairfield Township	0	0	0	0	0	0	0	0
Franklin Township	0	0	0	0	0	0	0	0
Gamble Township	0	0	0	0	0	0	0	0
Hepburn Township	0	0	0	0	0	0	0	0
Hughesville Borough	0	78	3	59	3	701	129	973
Jackson Township	0	0	0	0	0	0	0	0
Jersey Shore Borough	0	0	0	0	0	0	0	0
Jordan Township	0	0	0	0	0	0	0	0
Lewis Township	0	0	0	0	0	0	0	0
Limestone Township	0	0	0	0	0	0	0	0
Loyalsock Township	8	173	7	56	12	2,565	750	3,571

Table 4.3.18-5 Structures Vulnerable to Hazardous Materials Release by Land Use								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER	RESIDENTIAL	UNKNOWN	TOTAL
Lycoming Township	0	0	0	0	0	0	0	0
McHenry Township	0	0	0	0	0	0	0	0
McIntyre Township	0	0	0	0	0	0	0	0
McNett Township	0	0	0	0	0	0	0	0
Mifflin Township	0	0	0	0	0	0	0	0
Mill Creek Township	0	0	0	0	0	0	0	0
Montgomery Borough	0	7	5	3	1	59	14	89
Montoursville Borough	0	114	10	57	11	1,624	294	2,110
Moreland Township	0	0	0	0	0	0	0	0
Muncy Borough	0	103	5	57	15	893	99	1,172
Muncy Creek Township	53	71	6	28	13	917	179	1,267
Muncy Township	1	0	0	0	0	1	2	4
Nippenose Township	0	0	0	0	0	0	0	0
Old Lycoming Township	25	81	11	27	17	1,415	245	1,821
Penn Township	0	0	0	0	0	0	0	0
Piatt Township	0	0	0	0	0	0	0	0
Picture Rocks Borough	0	0	0	0	0	0	0	0
Pine Township	0	0	0	0	0	0	0	0
Plunketts Creek Township	0	0	0	0	0	0	0	0
Porter Township	0	0	0	0	0	0	0	0
Salladasburg Borough	0	0	0	0	0	0	0	0
Shrewsbury Township	0	0	0	0	0	0	0	0

Table 4.3.18-5 Structures Vulnerable to Hazardous Materials Release by Land Use								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER	RESIDENTIAL	UNKNOWN	TOTAL
South Williamsport Borough	0	0	0	0	0	27	1	28
Susquehanna Township	1	7	0	3	0	112	18	141
Upper Fairfield Township	0	0	0	0	0	0	0	0
Washington Township	0	0	0	0	0	0	0	0
Watson Township	0	0	0	0	0	0	0	0
Williamsport, City of	5	505	47	131	85	4,173	1,471	6,417
Wolf Township	40	26	2	10	4	792	120	994
Woodward Township	9	7	3	2	1	101	12	135
TOTAL	196	1,214	115	448	178	14,232	3,494	19,877

4.3.18.6. Equity in Vulnerable Communities

Marginalized communities, particularly low-income and minority populations, are often located near industrial facilities, waste sites, and transport routes for hazardous materials. These areas are more likely to experience spills, leaks, or accidents involving toxic substances making them more susceptible. Children, the elderly, and people with preexisting health conditions are particularly vulnerable to the effects of hazardous materials. Municipalities with high concentrations of these groups should plan accordingly. Brady, Washington, and Clinton Townships may be more at risk because they have the highest concentration of people without health insurance.

4.3.19. Environmental Hazards: Unconventional Oil and Gas Wells

4.3.19.1. Location and Extent



PA DEP defines unconventional wells as wells drilled deep into shale rock formations found thousands of feet underground. These formations, mainly Marcellus Shale and Utica Shale, contain and produce natural gas. These wells use horizontal drilling techniques that use large quantities of high-pressured water, approximately one to eight million gallons, mixed with sand and other additives including hydrochloric and muriatic acid, to hydraulically fracture the rock. This practice is more commonly known as fracking. This type of extraction presents unique challenges for the county.

Private water supplies such as domestic drinking water wells in the vicinity of oil and gas wells are at risk of contamination from brine and other pollutants including methane, which can pose a fire hazard. For more information on public and private water supplies, see Section 4.3.16.5.

The release and combustion of a large quantity of natural gas is of particular concern, especially as this industry continues to grow. There are 1,424 active unconventional wells, and approximately 787 permits for wells that either have not yet been drilled or never materialized in Lycoming County. Between 2020 and 2025, 255 permits for a new well were issued. The industry is highly regulated by the PA DEP, and local response agencies have been trained to deal with accidents at the sites, but the threat of releases, fire, and explosions remains.

Table 4.3.19-1 includes a breakdown of permits issued per year.

Table 4.3.19-1 New Unconventional gas and combined oil & gas well permits issued in Lycoming County (PA DEP, 2025c).

YEAR	PERMITS	YEAR	PERMITS
2006	3	2016	67
2007	14	2017	92
2008	51	2018	115
2009	107	2019	108
2010	254	2020	48
2011	377	2021	46
2012	355	2022	69
2013	324	2023	42
2014	210	2024	43
2015	91	2025*	37
TOTAL			2,453

Table 4.3.19-2 includes a breakdown of permits issued for each municipality from 2006 to 2025.

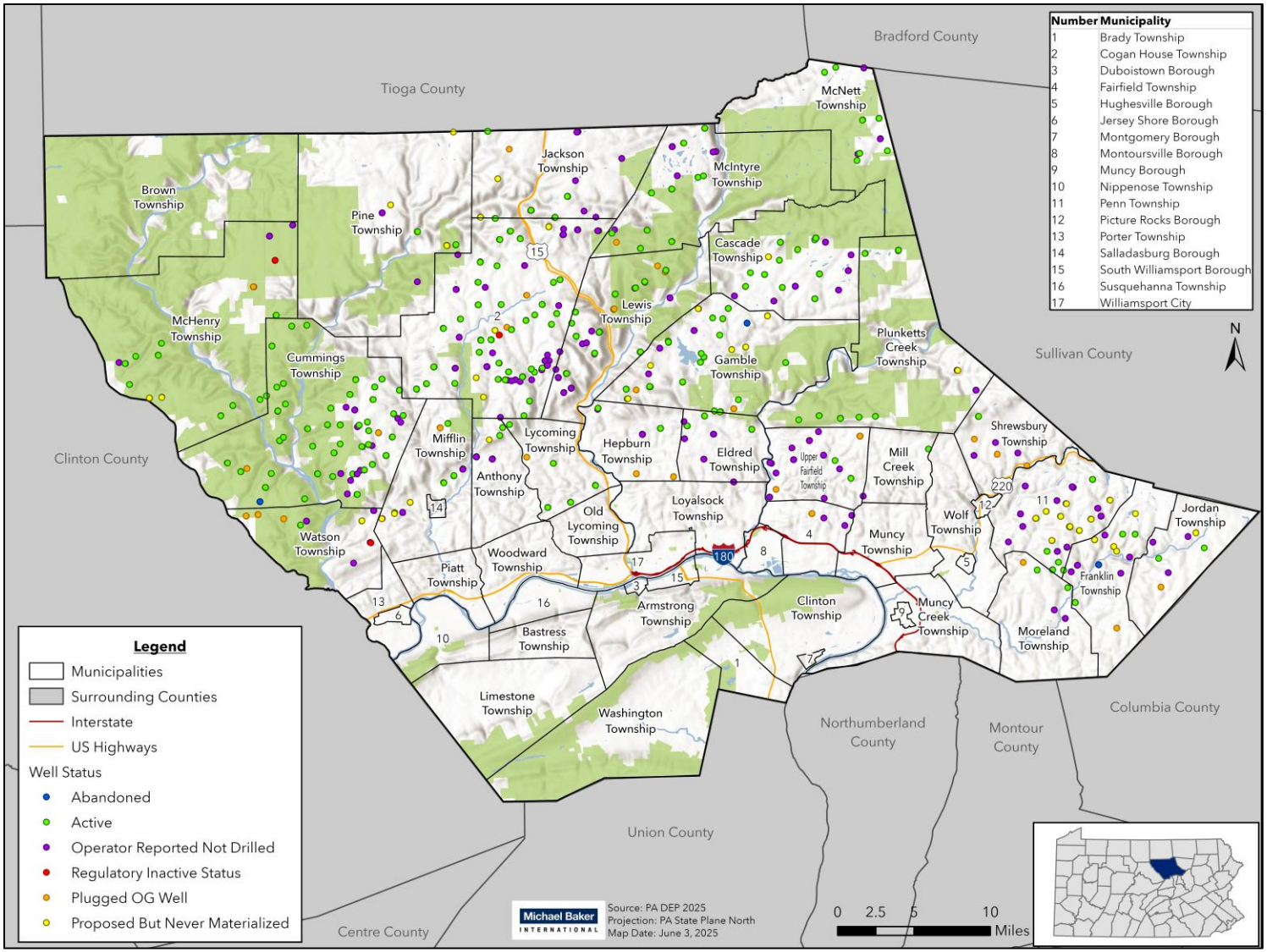
Table 4.3.19-2 Distribution of new unconventional gas and combined oil & gas well permits issued from 2006 - 2025 (PA DEP, 2025c).			
MUNICIPALITY	**NO. OF PERMITS ISSUED**	**MUNICIPALITY**	No. of PERMITS issued
Anthony Township	28	McIntyre Township	116
Cascade Township	122	McNett Township	44
Cogan House Township	410	Mifflin Township	45
Cummings Township	381	Mill Creek Township	8
Fairfield Township	7	Moreland Township	15
Franklin Township	65	Penn Township	155
Gamble Township	246	Pine Township	34
Hepburn Township	53	Plunketts Creek Township	71
Jackson Township	79	Shrewsbury Township	22
Lewis Township	166	Upper Fairfield Township	12
Lycoming Township	29	Watson Township	43
McHenry Township	146	Wolf Township	1

Table 4.3.19-3 provides a breakdown of current well status.

Table 4.3.19-3 Status of Unconventional gas and combined oil & gas wells as of April 2025 (PA DEP, 2025c).	
PERMIT STATUS	**NUMBER**
Abandoned	7
Active	1,424
Plugged OG Well	162
Operator Reported Not Drilled	607
Regulatory Inactive Status	43
Proposed But Never Materialized	180

As shown in Figures 4.3.19-1 unconventional wells are concentrated in the central part of the county, primarily in Cogan House, Cummings, and Gamble Townships. This is similar to conventional wells.

Figure 4.3.19-1 Unconventional Oil and Gas Wells in Lycoming County



4.3.19.2. Range of Magnitude

The Marcellus Shale formation exists at a depth normally between 5,000 and 8,000 feet and holds trillions of cubic feet of natural gas. Extraction from this depth was previously not feasible but as drilling technology has improved over the years, recovering natural gas from Marcellus Shale is now possible (PA DEP-OOGM, 2010). This extraction process is different from traditional natural gas extraction in that it often requires horizontal drilling. Horizontal drilling is accomplished by hydraulic fracturing, which involves pumping one to eight million gallons of water, mixed with sand and other additives including hydrochloric or muriatic acid, into the shale formation. The fluid or "frac fluid" that is recovered from this process must be properly treated as the water quality is very poor.

This extraction process is different from traditional natural gas extraction in that it often requires horizontal drilling. Horizontal drilling is accomplished by hydraulic fracturing which involves pumping one to eight million gallons of water, mixed with sand and other additives including hydrochloric or muriatic acid, into the shale formation. The fluid or "frac fluid" that is recovered from this process must be properly treated as the water quality is very poor.

Frac fluid is extremely saline and can be three to six times as salty as sea water. Other contaminants can include barium, bromine, lithium strontium, sulfate, ammonium, and very high concentrations of total dissolved solids (TDS). There is also some concern about normally occurring radioactive materials (NORMS) present in shale and potentially present in recovered drilling fluid, but there is very little data available on the radioactivity of frac fluid in Pennsylvania (Kirby, 2010).

Methods to desalinize liquid, including frac fluid, are being studied, with forward osmosis and ion concentration polarization among the most recently explored methods (Shahidul et al, 2019 and Choi et al, 2019). High levels of total dissolved solids (TDSs), though not harmful to humans, can be extremely harmful to aquatic life and can damage industrial equipment. Often, recovered frac fluid is stored in earthen impoundments and after treatment is taken to a sewage treatment facility. There is concern surrounding the toxic solid waste that remains after frac fluid is treated.

In addition to the traditional hazards associated with oil and gas well drilling, potential impacts from Marcellus Shale gas well drilling include:

- Surface water depletion from high consumptive use with low return rates affecting drinking water supplies, and aquatic ecosystems and organisms.
- Contaminated surface and groundwater resulting from hydraulic fracturing and the recovery of contaminated hydraulic fracturing fluid.
- Mishandling of solid toxic waste.
- Public health concerns.

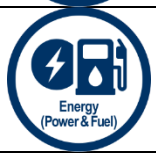
The water used for hydraulic fracturing is composed of 87 chemicals, some of which have the potential to cause a danger to health of life (PA DEP-OOGM, 2010).

The worst-case scenario for an oil or gas well incident would be if there was a discharge of pollutant material like frac fluid into the waterways of Lycoming County. This is particularly an issue in the southern and central portions of the county, where there are a higher number of reported domestic water wells and potentially, a greater amount of reliance on these wells for potable water supply.

DOH has indicated some level of concern regarding unconventional drilling. Both unconventional and conventional wells are often located near residential areas, and there are growing concerns among the public, media and researchers about environmental contamination of water, air and soil from drilling and associated operations (e.g., pipelines, compressor stations, wastewater storage). These concerns have raised numerous questions about adverse health impacts associated with unconventional drilling. In March 2017, PA DOH developed a confidential health registry to better track and respond to public health complaints related to these types of wells. 221 total health complaints have been logged by PA DOH across the Commonwealth as of June 2025 (PA DOH, 2025b).

The potential impacts of unconventional oil and gas wells on community lifelines are as follows:

Table 4.3.19-4 Most Likely Lifelines Impacted by Unconventional Oil and Gas Wells

LIFELINES	NOTES
	Fire departments may be called into response and recovery if leaks or other issues result in explosions and fires.
	Impacts from unconventional wells include environmental contamination, which can impact agricultural operations and water supplies.
	Potential environmental contamination can have adverse health impacts on communities, leading to more strain on the local healthcare system.
	Issues with drilling operations may lead to additional challenges with energy production.

4.3.19.3. Past Occurrence

Pennsylvania has a long history of oil and gas well drilling and, though relatively infrequent, accidents and incidents have occurred related to the extraction of these natural resources. No comprehensive list of oil and gas related incidents exist for the Commonwealth; however, major gas and oil well incidents in Pennsylvania are captured in PEMA's incident management system, PEMA-KC. While access to this data is restricted, the 2023 Pennsylvania State Hazard Mitigation Plan reported that there were zero incidents in Lycoming County between 2018 and April 2023.

Beyond the PEMA-KC system, information can be found via local reporting. In November 2017, more than 63,000 gallons of natural gas drilling waste brine spilled into an unnamed tributary of the Loyalsock Creek from a well site in Lycoming County. Because residents who live nearby receive their water from wells, the threat of contamination was possible. PA DEP sampled water from homes at the residents' request and did not find evidence of groundwater contamination (Allegheny Front, 2017).

4.3.19.4. Future Occurrence

As is the case with conventional wells, it remains difficult to predict the number or frequency of unconventional well site incidents. 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 to the environment.

If continued investment and development in the natural gas industry is inevitable, then the county could regulate new well pads siting locations. The design and process of an unconventional, horizontal well, is such that the placement of the well pad is much more flexible (as there are multiple lateral wells that extend to a greater area), and the siting has the ability to take impacts to natural habitats into account. In determining more ecologically appropriate locations that reduce potential runoff, the county could require a setback from streams and wetlands, as well as avoidance of development on areas with a steep slope. Additionally, greater care and oversight could be taken to balance future well development with watershed needs and conservation goals.

Overall, the probability of a future unconventional oil and gas well event is *possible* as defined by the Risk Factor Methodology (see Section 4.4-1).

4.3.19.5. Vulnerability Assessment

Structures and critical facilities located near unconventional well hazard areas are also at risk, which are defined as areas within 1,000 yards of any unconventional oil or gas well. Table 4.3.19-5 shows total number of structures in unconventional well hazard areas by municipality. Twenty-four municipalities have structures located near unconventional wells. Cascade Township, Cogan House Township, Upper Fairfield Township, and Gamble Township all have at least 40% of structures in hazard areas. Cogan House Township and Gamble Township have the highest amount of critical facilities in hazard areas. Table 4.3.19-6 shows the structures vulnerable to unconventional oil and gas wells by land use. The most hazard-prone land use category is residential with Upper Fairfield Township, Eldred Township, and Gamble Township having the largest shares of vulnerable residential structures.

Table 4.3.19-5 Structures and Critical Facilities Vulnerable to Unconventional Oil and Gas Wells

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN UNCONVENTIONAL HAZARD AREA	PERCENT STRUCTURES IN UNCONVENTIONAL WELL HAZARD AREA	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN UNCONVENTIONAL HAZARD AREA	PERCENT CRITICAL FACILITIES IN UNCONVENTIONAL WELL HAZARD	TOTAL POPULATION	POPULATION IN UNCONVENTIONAL HAZARD AREA	PERCENT POPULATION IN UNCONVENTIONAL HAZARD AREA
Anthony Township	387	71	18%	4	0	0%	867	159	18%
Armstrong Township	429	0	0%	1	0	0%	686	0	0%
Bastress Township	245	0	0%	3	0	0%	527	0	0%
Brady Township	234	0	0%	3	0	0%	501	0	0%
Brown Township	421	0	0%	5	0	0%	93	0	0%
Cascade Township	323	144	45%	0	0	0%	422	187	44%
Clinton Township	1,161	0	0%	18	0	0%	3,720	0	0%
Cogan House Township	636	268	42%	8	4	50%	935	360	39%
Cummings Township	604	138	23%	5	0	0%	265	72	27%
Duboistown Borough	560	0	0%	4	0	0%	1,200	0	0%
Eldred Township	905	232	26%	4	0	0%	1,997	597	30%
Fairfield Township	1,482	12	1%	4	0	0%	2,834	3	0%
Franklin Township	518	148	29%	5	0	0%	903	249	28%
Gamble Township	484	255	53%	3	3	100%	778	411	53%
Hepburn Township	1,267	126	10%	6	0	0%	2,578	308	12%
Hughesville Borough	973	0	0%	9	0	0%	2,154	0	0%
Jackson Township	289	17	6%	1	0	0%	396	75	19%
Jersey Shore Borough	1,792	0	0%	17	0	0%	4,166	0	0%
Jordan Township	533	44	8%	4	0	0%	850	90	11%
Lewis Township	648	60	9%	10	0	0%	862	93	11%
Limestone Township	844	0	0%	5	0	0%	1,966	0	0%

Table 4.3.19-5 Structures and Critical Facilities Vulnerable to Unconventional Oil and Gas Wells

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN UNCONVENTIONAL HAZARD AREA	PERCENT STRUCTURES IN UNCONVENTIONAL WELL HAZARD AREA	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN UNCONVENTIONAL HAZARD AREA	PERCENT CRITICAL FACILITIES IN UNCONVENTIONAL WELL HAZARD	TOTAL POPULATION	POPULATION IN UNCONVENTIONAL HAZARD AREA	PERCENT POPULATION IN UNCONVENTIONAL HAZARD AREA
Loyalsock Township	5,171	6	0%	35	0	0%	11,561	483	4%
Lycoming Township	774	98	13%	1	0	0%	1,491	182	12%
McHenry Township	626	40	6%	4	0	0%	122	12	10%
McIntyre Township	383	26	7%	4	0	0%	461	62	13%
McNett Township	219	73	33%	2	0	0%	143	25	17%
Mifflin Township	552	95	17%	4	0	0%	1,089	129	12%
Mill Creek Township	301	27	9%	4	0	0%	582	21	4%
Montgomery Borough	661	0	0%	4	0	0%	1,568	0	0%
Montoursville Borough	2,301	0	0%	17	0	0%	4,750	0	0%
Moreland Township	487	86	18%	5	1	20%	1,015	158	16%
Muncy Borough	1,172	0	0%	12	0	0%	2,440	0	0%
Muncy Creek Township	1,835	0	0%	6	0	0%	3,573	0	0%
Muncy Township	646	0	0%	12	0	0%	1,178	0	0%
Nippenose Township	358	0	0%	5	0	0%	661	0	0%
Old Lycoming Township	2,454	16	1%	8	0	0%	4,975	7	0%
Penn Township	559	198	35%	2	2	100%	895	317	35%
Piatt Township	536	0	0%	2	0	0%	1,047	0	0%
Picture Rocks Borough	285	0	0%	6	0	0%	643	0	0%
Pine Township	465	12	3%	2	0	0%	258	1	0%
Plunketts Creek Township	609	24	4%	5	0	0%	597	70	12%
Porter Township	698	0	0%	5	0	0%	1,528	0	0%

Table 4.3.19-5 Structures and Critical Facilities Vulnerable to Unconventional Oil and Gas Wells

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN UNCONVENTIONAL HAZARD AREA	PERCENT STRUCTURES IN UNCONVENTIONAL WELL HAZARD AREA	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES IN UNCONVENTIONAL HAZARD AREA	PERCENT CRITICAL FACILITIES IN UNCONVENTIONAL WELL HAZARD	TOTAL POPULATION	POPULATION IN UNCONVENTIONAL HAZARD AREA	PERCENT POPULATION IN UNCONVENTIONAL HAZARD AREA
Salladasburg Borough	134	0	0%	1	0	0%	250	0	0%
Shrewsbury Township	304	3	1%	0	0	0%	418	14	3%
South Williamsport Borough	2,842	0	0%	18	0	0%	6,261	0	0%
Susquehanna Township	494	0	0%	4	0	0%	968	0	0%
Upper Fairfield Township	888	352	40%	5	2	40%	1,807	902	50%
Washington Township	775	0	0%	8	0	0%	1,768	0	0%
Watson Township	364	34	9%	1	0	0%	534	26	5%
Williamsport, City of	10,860	0	0%	74	0	0%	27,754	0	0%
Wolf Township	1,567	31	2%	8	0	0%	3,105	56	2%
Woodward Township	1,142	0	0%	5	0	0%	2,046	0	0%
TOTAL	55,197	2,636	5%	388	12	3%	114,188	5,069	4%

Table 4.3.19-6 Structures Vulnerable to Unconventional Oil and Gas Wells by Land Use

MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER	RESIDENTIAL	UNKNOWN	TOTAL
Anthony Township	21	0	0	0	1	38	11	71
Armstrong Township	0	0	0	0	0	0	0	0
Bastress Township	0	0	0	0	0	0	0	0
Brady Township	0	0	0	0	0	0	0	0
Brown Township	0	0	0	0	0	0	0	0
Cascade Township	53	1	0	0	4	51	35	144
Clinton Township	0	0	0	0	0	0	0	0
Cogan House Township	82	8	0	0	3	90	85	268
Cummings Township	17	5	1	0	0	24	91	138
Duboistown Borough	0	0	0	0	0	0	0	0
Eldred Township	25	0	1	1	1	191	13	232
Fairfield Township	0	2	0	0	3	6	1	12
Franklin Township	48	1	0	1	2	70	26	148
Gamble Township	66	5	0	0	2	144	38	255
Hepburn Township	41	1	0	1	1	66	16	126
Hughesville Borough	0	0	0	0	0	0	0	0
Jackson Township	4	1	0	0	1	5	6	17
Jersey Shore Borough	0	0	0	0	0	0	0	0
Jordan Township	15	2	0	0	1	18	8	44
Lewis Township	7	0	0	0	4	18	31	60
Limestone Township	0	0	0	0	0	0	0	0
Loyalsock Township	1	0	0	0	0	3	2	6
Lycoming Township	26	2	1	1	2	54	12	98
McHenry Township	4	1	0	0	2	13	20	40
McIntyre Township	0	0	0	0	0	1	25	26

Table 4.3.19-6 Structures Vulnerable to Unconventional Oil and Gas Wells by Land Use								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER	RESIDENTIAL	UNKNOWN	TOTAL
McNett Township	19	4	0	0	3	27	20	73
Mifflin Township	30	4	0	0	1	35	25	95
Mill Creek Township	5	0	0	0	0	17	5	27
Montgomery Borough	0	0	0	0	0	0	0	0
Montoursville Borough	0	0	0	0	0	0	0	0
Moreland Township	22	0	0	0	0	53	11	86
Muncy Borough	0	0	0	0	0	0	0	0
Muncy Creek Township	0	0	0	0	0	0	0	0
Muncy Township	0	0	0	0	0	0	0	0
Nippenose Township	0	0	0	0	0	0	0	0
Old Lycoming Township	4	0	0	0	2	9	1	16
Penn Township	73	4	0	0	6	80	35	198
Piatt Township	2	0	0	0	0	0	10	12
Picture Rocks Borough	0	0	0	0	0	0	0	0
Pine Township	0	0	0	0	0	0	0	0
Plunketts Creek Township	7	0	0	0	0	2	15	24
Porter Township	0	0	0	0	0	0	0	0
Salladasburg Borough	0	0	0	0	0	0	0	0
Shrewsbury Township	2	0	0	0	0	0	1	3
South Williamsport Borough	0	0	0	0	0	0	0	0
Susquehanna Township	0	0	0	0	0	0	0	0
Upper Fairfield Township	66	5	0	1	15	231	34	352
Washington Township	0	0	0	0	0	0	0	0
Watson Township	7	0	0	0	0	18	9	34
Williamsport, City of	0	0	0	0	0	0	0	0

Table 4.3.19-6 Structures Vulnerable to Unconventional Oil and Gas Wells by Land Use

MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER	RESIDENTIAL	UNKNOWN	TOTAL
Wolf Township	5	0	0	0	0	26	0	31
Woodward Township	0	0	0	0	0	0	0	0
TOTAL	652	46	3	5	54	1,290	586	2,636

4.3.19.6. Equity in Vulnerable Communities

Equity considerations for unconventional oil and gas wells focus on the disproportionate impacts these operations have on marginalized communities. Low-income, rural, and minority populations are often located closer to unconventional oil and gas wells, exposing them to air and water contaminations, noise pollution, and the risk of accidents or spills. In addition, Brady, Washington, and Clinton Townships have the highest concentration of people without health insurance.

4.3.20. Levee Failure

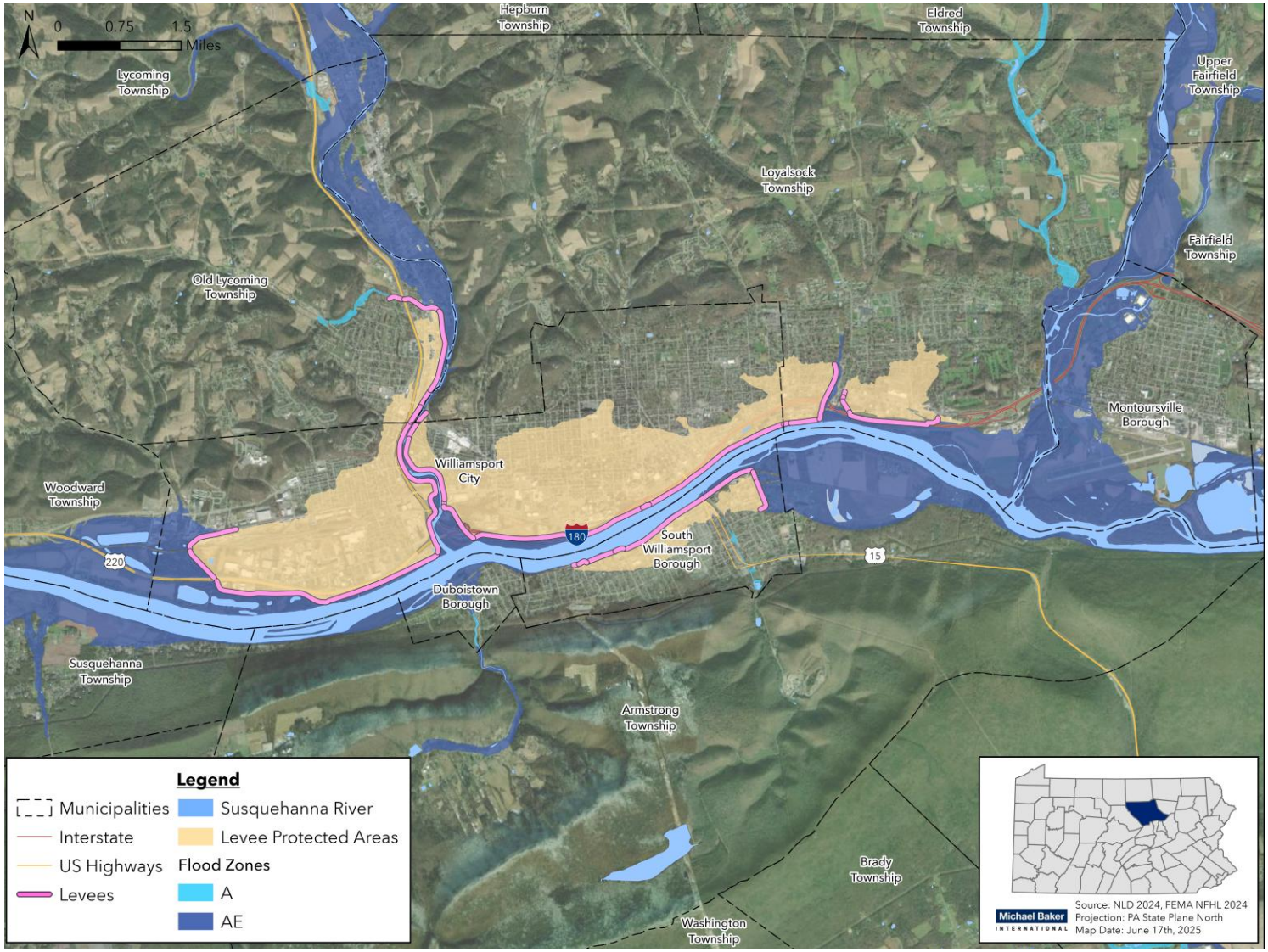


4.3.20.1. Location and Extent

A levee is a human-made structure, often an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water to reduce the risk from temporary flooding (FEMA, 2016). Breaches of these structures occur when they are overtopped or physically incapable of containing the pressure exerted by the floodwaters. If a levee breaks, many properties may be quickly submerged by floodwater and residents may become trapped by this rapidly rising water. The failure of levees has the potential to result in loss of life, property damage, and substantial economic impacts (for example from damage to infrastructure or agriculture).

According to the USACE National Levee Database (NLD), there are five major levee systems in Lycoming County, excluding spoil levees and systems less than 0.1 miles in length (Table 4.3.20-1). Four of these systems are located in the greater Williamsport area along the West Branch Susquehanna and its tributaries, and one is located in the community of Ralston along Lycoming Creek. Figure 4.3.20-1 shows the location of the Williamsport levees and levee-impacted areas.

Figure 4.3.20-1 Levee Locations and Impact Areas in Lycoming County



Levee systems can be Federal or Non-Federal projects. Federal projects are congressionally authorized projects that are generally planned, designed and constructed by USACE and a cost-sharing levee sponsor. Levees require maintenance to continue to provide the level of protection for which they were designed and built. Maintenance and operational responsibilities, referred to as sponsorship, belong to a variety of entities including levee districts, water management districts, local governments, state governments, and tribal governments.

Table 4.3.20-1 shows the entity responsible for constructing, operating, and maintaining the major levee systems in Lycoming County. Of the county's 14 miles of levee systems, 13.7 miles are located in the greater Williamsport area, and 12.6 miles are part of the Williamsport-South Williamsport flood risk project. The Williamsport-South Williamsport project consists of the Northeast Williamsport, Northwest Williamsport, and South Williamsport levee systems and was designed as a comprehensive project for the Borough of South Williamsport, City of Williamsport, and contiguous communities. Today this project also supports the Susquehanna River Walk, a four-mile paved trail that opened in 2009 and was built on top of the Northeast Williamsport and South Williamsport levee systems.

Table 4.3.20-1 Levee and Floodwall Information for Lycoming County (USACE NLD, 2025)

LEVEE SYSTEM NAME	SPONSOR	LENGTH (MI)	USACE REHABILITATION STATUS*	AUTHORIZATION CATEGORY
Bull Run	Township of Loyalsock	1.1	Active	PA DEP constructed, turned over to public sponsor operations and maintenance.
Northeast Williamsport**	City of Williamsport	4.0	Active	USACE Federally constructed, turned over to public sponsor operations and maintenance
Northwest Williamsport**	City of Williamsport	6.3	Active	USACE Federally constructed, turned over to public sponsor operations and maintenance.
South Williamsport**	Borough of South Williamsport	2.3	Active	USACE Federally constructed, turned over to public sponsor operations and maintenance.
Ralston	McIntyre Township	0.3	Not Enrolled	Non-Federal Levee, Locally Operated and Maintained

Table 4.3.20-1 Levee and Floodwall Information for Lycoming County (USACE NLD, 2025)				
LEVEE SYSTEM NAME	SPONSOR	LENGTH (MI)	USACE REHABILITATION STATUS*	AUTHORIZATION CATEGORY

**The USACE Rehabilitation Program (authorized under Public Law 84-99) is a voluntary program that provides for the repair of eligible levees damaged by floods and coastal storms. Participation in the Rehabilitation Program can happen in two ways. Federal levees are eligible after their construction, once the levee sponsor takes responsibility for operation and maintenance. Non-federal levees that are owned, operated, and maintained by public entities (not private levees) may participate in the program if they meet eligibility requirements.*

***Part of the Williamsport-South Williamsport Flood Risk Project*

FEMA plays an important role in helping local officials and community members understand the risk of flooding in levee-impacted areas. While levees can reduce the risk of flooding, they do not eliminate it. Levees do not "protect" lives or property from flooding. Rather, they reduce risk. The primary way that FEMA communicates flood risk in levee-impacted areas is through its Flood Insurance Rate Maps (FIRMs). These maps show the areas with low, moderate, and high risk of flooding during a 1-percent-annual-chance flood, or a flood that has a one-percent chance of happening in any given year. The FEMA flood maps for Lycoming County became effective in June 2016 and show flood hazards in levee-impacted areas based on the best available data at that time

4.3.20.2. Range of Magnitude

Flood-related hazards due to levee failures range in magnitude including: overtopping, when the water-level rises over the top of the levee; back-ending, when water flows around the back of the levee, outside of the edge of the levee system; and total failure as seen during Hurricane Katrina. Levees are typically designed with three feet of freeboard to prevent overtopping, but older levees were not built to that standard (FEMA, 2021).

A levee failure of breach causes flooding in landward areas adjacent to the structure. The failure of a levee or other flood protection structure could be devastating depending on the level of flooding for which the structure is designed and the amount of landward development present. In some instances, the magnitude of flooding could be more severe under a levee failure event compared to a normal flooding event. If an abrupt failure occurs, the rushing waters of a flood wave could result in catastrophic losses. The City of Williamsport and Lycoming County are pursuing extensive repairs to the Williamsport-South Williamsport levee systems through the Williamsport Levee Flood Control Project to reduce the risk of levee failure to Williamsport's economic core (see more information in *Section 4.3.20.4 Future Occurrence*).

Properties located in the area of reduced risk landward of a levee system are not subject to the mandatory flood insurance purchase requirement of the National Flood Insurance Program. Thus, regardless of whether a levee is accredited, there is concern that properties in these areas lack flood insurance. In the event of a failure, it is likely that inundated properties will not be insured.

The environmental impacts of a levee failure result in significant water quality and debris disposal issues. Flood waters will back up sanitary sewer systems and inundate wastewater treatment plants, causing raw sewage to contaminate residential and commercial buildings and the flooding waterways. The contents of unsecured containers of oil, fertilizers, pesticides, and other chemicals get added to flood waters. Water supplies and water treatment could be off-line for weeks. After the flood waters subside, contaminated and flood damaged building materials and contents must be properly disposed. Contaminated sediment must be removed from buildings, yards, and properties.

The worst-case levee failure is one which occurs abruptly with little warning and results in deep, fast-moving flood waters through a developed or populated area. The potential for significant impact from a levee failure to occur in Lycoming County is possible because all levees in Lycoming County are located within densely populated areas, especially the three levee systems throughout Williamsport.

The potential impacts of levee failure on community lifelines are as follows:

Table 4.3.20-2 Most Likely Lifelines Impacted by Levee Failure

LIFELINE	NOTES
	Anticipating both causal, compounding, and cascading impacts where community safety is threatened and government operations and facilities, including police, fire, and search and rescue are involved with response and recovery. Actions to protect communities are focused on proper local planning that manages development near levee systems and educating people on the potential risks.
	Anticipating a causal, compounding, and cascading relationship for the Food, Water, Shelter lifeline in response and recovery. Levee failure events present significant risk to buildings, and the potential compounding and cascading impacts from additional hazards and damage to infrastructure may create issues for food and water access. Ways to mitigate damage to this lifeline are similar to those above and include insurance programs for homes.
	Anticipating a causal, compounding, and cascading relationship for the Hazardous Materials lifeline in response and recovery due to potential contamination because of flood damage to facilities. Mitigation for this should be focused on increasing the resiliency of sites through specific building codes and development regulations that either provide protection or result in hazardous sites being located outside hazard areas.

4.3.20.3. Past Occurrence

The Williamsport-South Williamsport Flood Risk Project was built after severe damage caused by the great flood of 1936; this led to the 1936 National Flood Control Act, which appropriated $27 million for flood-control projects in Pennsylvania and New York. In 1955, the US Army Corps of Engineers estimated that Williamsport sustained $10.5 million in property damage from the 1936 flood, which is equivalent to nearly $100 million in 2019 dollars (Danneker, 2019).

Furthermore, the Bull Run Levee was built following flooding associated with Tropical Storm Agnes in 1972. While the Ralston Levee is the newest, as it was constructed in 2002 due to historic flooding from Lycoming Creek (USACE, 2025).

4.3.20.4. Future Occurrence

Given certain circumstances, a levee failure can occur at any time. However, the probability of future occurrence can be reduced through proper design, construction, and maintenance measures. The age of the levee can increase the potential for failures if not maintained. In Pennsylvania, the average age of the levees is 58 years old; the typical life-span of a levee is 50 years (ASCE, 2022).

A press release issued by Pennsylvania congressman Dan Meuser on April 9, 2024, revealed that he had secured $3,500,000 in federal funding for the Williamsport Levee Flood Control Project (Press Release, 2024). The funding is complementary to already $8 million set aside for the critical project, that was highlighted at a press conference in January 2024. The Williamsport Levee Flood Control Project includes the Northeast Williamsport, Northwest Williamsport, and South Williamsport Levee systems. Williamsport Mayor, Derek Slaughter, reported that the levee system has been maintained for 70 years but has not undergone redesign or asset upgrades for over 50 years (NCPA Staff, 2024).

The project seeks to enhance pump stations, upgrade electrical systems, fortify relief wells, and improve cross pipes and related infrastructure. The goal of this project is to bring the levee system up to certification standards, as it currently falls short of compliance. Failure to achieve certification could result in heightened flood insurance premiums, negatively impacting local businesses and residents (Press Release, 2024). According to the USACE, more than $4.3 billion in economic assets are protected by the levee, which holds back the waters of the West Branch of the Susquehanna River (Press Release, 2024) and protects the City of Williamsport, the Borough of South Williamsport, Loyalsock, and Old Lycoming Township (NCPA Staff, 2024). The flood zone behind the levee is responsible for about 87% of Lycoming County's economic activity that generates over 80% of its tax revenue and employs 45% of its workforce (Press Release, 2024).

Most levees are designed to operate safely at specified levels of flooding. While FEMA focuses on mapping levees that will reduce the risk of a 1% annual chance flood, other levees may be designed to protect against smaller or larger floods. Design specifications provide information on the percent-annual-chance flood a structure is expected to withstand, given that it has been adequately constructed and maintained. Levee failure is also influenced by the frequency and

severity of flood events. Therefore, potential future changes in climate and weather conditions, such as predicted increases in heavy precipitation events, may impact the future occurrences of levee failure. For more information on the future occurrence of flood events, please see Section 4.3.4. Overall, the probability of future levee failures can be considered *unlikely* according to the Risk Factor Methodology (See Table 4.4-1).

4.3.20.5. Vulnerability Assessment

The 2018 Lycoming County Comprehensive Plan highlighted levee failure as "the single greatest threat to maintaining and pursuing economic resilience" for the municipalities in the greater Williamsport area. According to the plan, the Williamsport-South Williamsport flood risk project protects 40 percent of the $2.7 billion in real estate in the City of Williamsport, Old Lycoming Township, South Williamsport, and Loyalsock Township. The Plan notes that this includes not only residential properties, but commercial, industrial, and government properties as well. The area landward of the Bull Run levee system is also an economic driver for the greater Williamsport area and is known as the Golden Strip. The area landward of the 0.3-mile Ralston levee system in McIntyre Township is a residential area.

Table 4.3.20-3 shows the structures and critical facilities landward of Lycoming County levee systems that would be vulnerable to levee failure in the event of a 1-percent-annual-chance flood, and Table 4.3.20-4 shows the property types within these levee-impacted areas. While it is unlikely that a levee failure event would flood every structure located in the levee-impacted areas at once, these tables show that a fairly large share of structures are at risk in the municipalities within the greater Williamsport area, including thousands of commercial and residential structures and nearly 200 industrial structures. Note that even more structures could be affected by a flood event larger than the 1-percent-annual-chance flood.

Table 4.3.20-3 Structures and Critical Facilities Vulnerable to Levee Failure.							Table 4.3.2	Table 4.3.2	Table 4.3.2
MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES VULNERABLE TO LEVEE FAILURE	PERCENT STRUCTURES VULNERABLE TO LEVEE FAILURE	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES VULNERABLE TO LEVEE FAILURE	PERCENT CRITICAL FACILITIES VULNERABLE TO	TOTAL POPULATION	POPULATION VULNERABLE TO LEVEE FAILURE	PERCENT POPULATION VULNERABLE TO LEVEE FAILURE
Loyalsock Township	5,171	642	12%	35	4	11%	11561	1,026	9%
Old Lycoming Township	2,454	228	9%	8	2	25%	4975	261	5%
South Williamsport Borough	2,842	716	25%	18	7	39%	6261	1,269	20%
Williamsport, City of	10860	5,104	47%	74	52	70%	27754	13,565	49%
TOTAL	21,327	6,690	31%	135	65	48%	50,551	16,121	32%

Table 4.3.20-7 Structures Vulnerable to Levee Failure by Land Use								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	OTHER	MIXED USE	RESIDENTIAL	UNKNOWN	TOTAL VULNERABLE STRUCTURES
Loyalsock Township	0	86	15	1	18	388	134	642
McIntyre Township	0	0	0	0	0	0	0	0
Old Lycoming Township	0	21	8	2	6	99	92	228
South Williamsport Borough	1	31	26	4	23	470	161	716
Williamsport, City of	0	303	103	76	189	3078	1355	5104
TOTAL	1	441	152	83	236	4035	1742	6,690

4.3.20.6. Equity in Vulnerable Communities

In terms of equity, residents living within mobile homes or other manufactured homes within levee impact areas may be more likely to experience risks associated with levee failure at a disproportionate rate due to the manufacturing of these homes. People currently experiencing homelessness are highly susceptible to flooding as they lack secure shelter. Communities with an aged housing stock may also be more susceptible due to aged infrastructure and dated building practices. Williamsport, South Williamsport Borough, and Loyalsock Township may be particularly vulnerable. Equitable policies must ensure access to emergency shelters, temporary housing, and long-term housing solutions for people displaced by dam failure. In terms of evacuation, households without vehicles or with people who have disabilities will need assistance.

4.3.21. Nuclear Incident



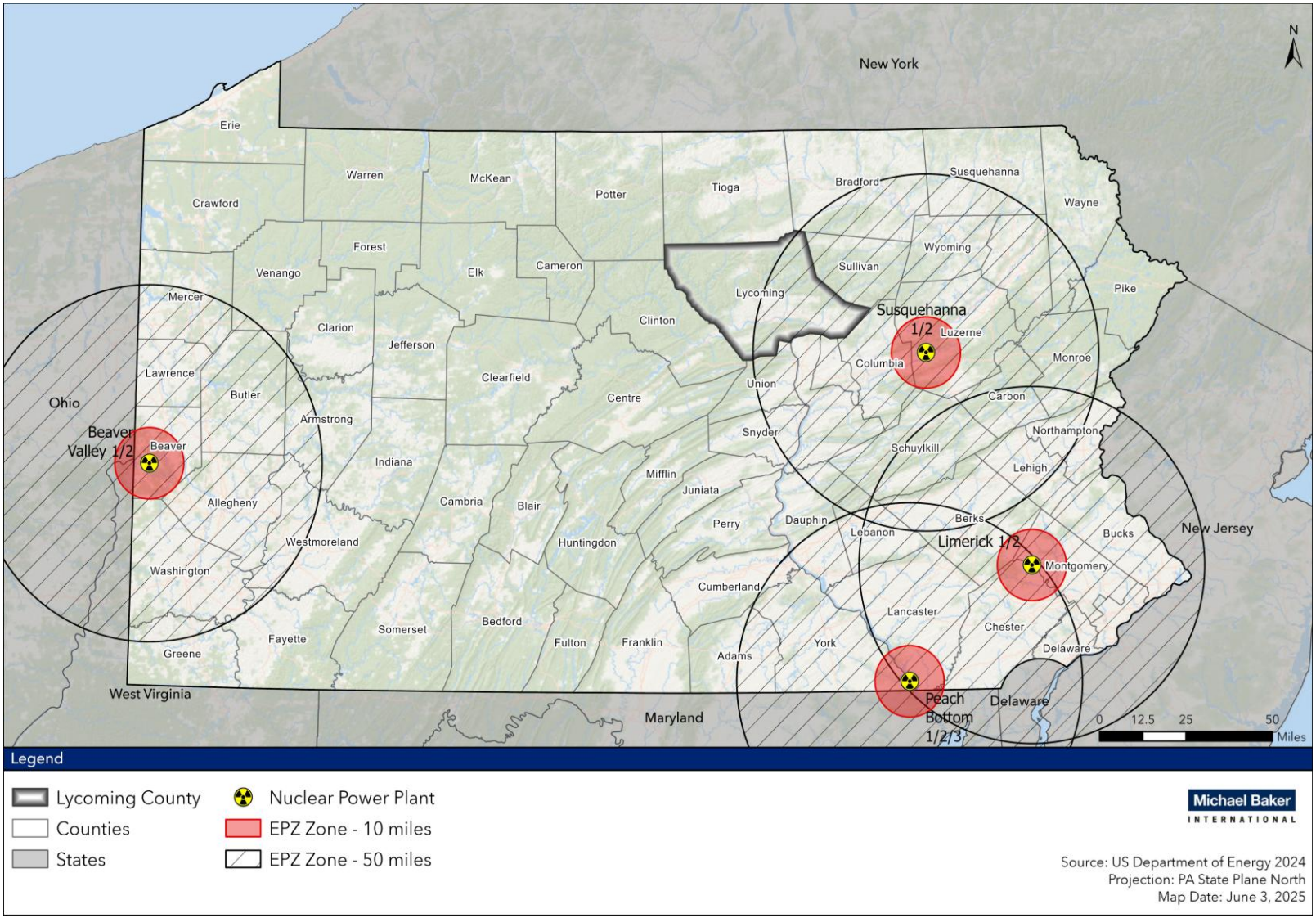
4.3.21.1. Location and Extent

Nuclear incidents generally refer to events involving the release of significant levels of radioactivity or exposure of workers or the general public to radiation. The primary concern following such an incident or accident is the extent of radiation, inhalation, and ingestion of radioactivity isotopes which can cause acute health effects (e.g. death, burns, severe impairment), chronic health effects (e.g. cancer), and psychological effect (US EPA, 2024).

The NRC encourages the use of Probabilistic Risk Assessments to quantitatively estimate the potential risk to public health and safety considering the design, operations, and maintenance practices at nuclear power plants. Probabilistic Risk Assessments typically focus on accidents that can severely damage the core and that may challenge containment. FEMA, PEMA, and county governments have formulated Radiological Emergency Response Plans to prepare for radiological emergencies at the five nuclear power generating facilities in the Commonwealth of Pennsylvania. These plans include a *Plume Exposure Pathway Emergency Planning Zone (EPZ)* with a radius of ten miles from each nuclear power facility and *an Ingestion Exposure Pathway EPZ* with a radius of fifty miles from each facility. The exact size and configuration of the EPZ may vary in relation to local emergency response capabilities, topography, road networks, and political boundaries.

Portions of Lycoming County, including the City of Williamsport, fall within the Ingestion Exposure Pathway EPZ (within 50 miles) of the Susquehanna Steam Electric Station (SSES) in Luzerne County. This EPZ covers a radius around the plant that may receive some contamination in very small amounts in the event of a radioactive release. Thousands of County residents reside within this zone. The other four nuclear plants in Pennsylvania are more than 50 miles away from Lycoming County; this distance exceeds the Plume Exposure and Ingestion Exposure Pathway EPZs for radiological emergencies, so these other facilities are considered a minimal threat to the county. However, in the event of an emergency, evacuees from distant EPZs may seek shelter in Lycoming County. Figure 4.3.21-1 illustrates the location of the nuclear facilities in the Commonwealth and their associated plume and ingestion areas.

Figure 4.3.21-1 Location of Lycoming County in relation to Pennsylvania nuclear power stations, their Emergency Planning Zones (EPZs), and the population density of affected municipalities



4.3.21.2. Range of Magnitude

Nuclear accidents themselves are classified into three categories:

- Criticality accidents: Involves loss of control of nuclear assemblies or power reactors.
- Loss-of-coolant accidents: Occurs whenever a reactor coolant system experiences a break or opening large enough so that the coolant inventory in the system cannot be maintained by the normally operating make-up system (USNRC, 2021a).
- Loss-of-containment accidents: Involves the release of radioactivity from materials such as tritium, fission products, plutonium, and natural, depleted, or enriched uranium. Points of release have been containment vessels at fixed facilities or damaged packages during transportation accidents.

The magnitude of a nuclear incident differs for those within the Plume Exposure Pathway EPZ and those within the Ingestion Exposure Pathway EPZ. The Plume Exposure Pathway refers to whole-body external exposure to gamma radiation from a radioactive plume and from deposited materials and inhalation exposure from the passing radioactive plume. The duration of primary exposures could range in length from hours to months depending on the proximity to the point of radioactive release.

The Ingestion Exposure Pathway refers to exposure primarily from ingestion of water or foods such as milk and fresh vegetables that have been contaminated with radiation. This kind of exposure can stem from any of the three categories of nuclear accident. Potential environmental impacts specific to the 50-mile Ingestion Exposure Pathway EPZ include the long-term effects of radioactive contamination in the environment and in agricultural products (US EPA, 2024). Lycoming County can expect some radioactive contamination in very small amounts in the case of a nuclear incident at the SSES. This is not a significant concern in terms of external exposure and immediate health risks, but even a small amount of radiation will require the protection of the food chain, particularly milk supplies. Small amounts of radiation ingested over time could lead to future health issues in humans. There is an increased cancer risk over decades for people who have ingested radiation. The damage to cells and internal organs may be mild to severe, depending on the amount of radiation ingested and the number of years over which the ingestion occurred. As a result, in the case of a nuclear incident, foodstuffs, crops, milk, livestock feed and forage, and farm water supplies will need to be protected from and tested for contamination. Additionally, spills and releases of radiologically active materials from accidents can result in the contamination of soil and public water supplies. Areas underlain by limestone and some types of glacial sediments are particularly susceptible to contamination.

Nuclear facilities must notify the appropriate authorities in the event of an accident. The Nuclear Regulatory Commission uses four classification levels for nuclear incidents (USNRC, 2021b):

- Unusual Event: Under this category, events are in process or have occurred which indicate *potential degradation in the level of safety of the plant*. No release of radioactive material requiring offsite response or monitoring is expected unless further degradation occurs.

- Alert: If an alert is declared, events are in process or have occurred which involve an actual or potential substantial degradation in the level of safety of the plant. Any releases of radioactive material from the plant are expected to be limited to a small fraction of the EPA Protective Action Guides (PAGs).

- Site Area Emergency: A site area emergency involves events in process, or which have occurred that result in actual or likely major failures of plant functions needed for protection of the public. Any releases of radioactive material are not expected to exceed the EPA PAGs, except near the site boundary.

- General Emergency: A general emergency involves actual or imminent substantial core damage or melting of reactor fuel with the potential for loss of containment integrity. Radioactive releases during a general emergency can reasonably be expected to exceed the EPA PAGs for more than the immediate site area.

A worst-case scenario for Lycoming County would be if a General Emergency occurred at the SSES that leaked enough radiation to create a longer-term and widespread damage in the form of contaminated water, soil, and food supplies in the region.

The accident at the Three Mile Island Generating Station in March 1979 remains the nation's only nuclear incident at the General Emergency level and remains the worst nuclear incident on record in Pennsylvania, and in the nation. During the incident, equipment malfunctions, design-related problems, and worker errors led to a partial meltdown of the TMI Unit 2 reactor core at TMI (USNRC, 2021).

The nuclear industry has adopted pre-determined, site-specific Emergency Action Levels (EALs). The EALs provide the framework and guidance to observe, address, and classify the severity of site-specific events and conditions that are communicated to off-site emergency response organizations (USNRC, 2022). There are additional EALs that specifically deal with issues of security, such as threats of airborne attack, hostile action within the facility, or facility attack. These EALs ensure that appropriate notifications for the security threat are made in a timely manner. Each facility is also equipped with a public alerting system, which includes a number of sirens to alert the public located in the Plume Ingestion Pathway EPZ. This alerting system is activated by the counties of each specific EPZ. Emergency notifications and instructions are communicated to the public via the Emergency Alert System as activated by the Commonwealth of Pennsylvania Emergency Operations Center. State officials also have the capability to send emergency messages as text messages to mobile devices.

The potential impacts of nuclear incidents on community lifelines are as follows:

Table 4.3.21-1 Most Likely Lifelines Impacted by Nuclear Incidents

LIFELINE	NOTES
Safety and Security	Community safety due to potential harm from radioactivity.

Table 4.3.21-1 Most Likely Lifelines Impacted by Nuclear Incidents	
LIFELINE	NOTES
	Potential long-term effects of radioactive contamination for water and food resources.
	The immediate impacts on public health and the potential long-term health impacts including cancers and psychological impacts will increase the amount of resources needed at local healthcare facilities.

4.3.21.3. Past Occurrence

Lycoming County is at risk to the impacts of a nuclear incident at the Susquehanna Steam Electric Station (SSES), which is located in Luzerne County. There have been no failures at the SSES, that have resulted in damages, injuries, or fatalities. The 2025 Luzerne County Hazard Mitigation Plan states that the nuclear power generating plant had one 'Alert' declared on March 2, 2006. Alerts are the second lowest of four emergency classifications for nuclear power plants. Alerts are declared when an event has occurred that could reduce the plant's level of safety, but backup plant systems still work.

Nuclear incidents rarely occur, but the incident at Three Mile Island is the worst fixed-nuclear facility accident in US history. The resulting contamination and state of the reactor core led to the development of a fourteen-year cleanup and scientific effort. Additionally, the Presidents' Commission on the Accident at Three Mile Island examined the costs of the accident, concluding, "The accident at Three Mile Island on March 28, 1979, generated considerable economic disturbance. Some of the impacts were short term, occurring during the first days of the accident. Many of the impacts were experienced by the local community; others will be felt at the regional and national levels." The report concluded: "It appears clear that the major costs of the TMI Unit 2 accident are associated with the emergency management replacement power and the plant refurbishment or replacement. The minimum cost estimate of nearly $1 billion supports the argument that considerable additional resources can be cost effective if spent to guard against future accidents" (US DHS, 1979).

Despite the severity of the damage, no injuries due to radiation exposure occurred. However, numerous studies were conducted to determine the measurable health effects related to radiation and/or stress. More than a dozen epidemiological and stress related studies conducted to date have found no discernible direct health effects to the population in the vicinity of the plant, but there was evidence of psychological stress in those closest to the site that persisted over time (USNRC, 2024a; Cleary and Houts, 1984). One study conducted by the DOH's Three Mile Island Health Research Program did find evidence of psychological stress, "lasting in some cases for five to six years." According to the program chief, "the people suffering from stress perceived their health as being poorer than it actually was when the Health Department checked the medical records."

The accident at Three Mile Island had a profound effect on the residents, emergency management community government officials, and nuclear industry, not only in Pennsylvania, but nationwide. There were minimal requirements for off-site emergency planning for nuclear power stations prior to this accident. Afterwards, comprehensive, coordinated, and exercised plans were developed for the state, counties, school districts, special facilities (hospitals, nursing homes, and detention facilities) and municipalities to assure the safety of the population. Costs associated with an event at a nuclear facility, be it real or perceived, are significant. The mitigation efforts put in place immediately following 1979 continue today. The Commonwealth Nuclear/Radiological plan which is a successor of the original "Annex E" is a result of the Commonwealth's efforts to address the many components of mitigation planning. The comprehensive planning involved with the five nuclear facilities is an ongoing effort. Plans are reviewed and amended on an annual basis. Recent amendments to various planning documents and station procedures include the efforts to enhance station security measures and the means to bolster communications and response in the event of terrorist activities.

The most recent nuclear incident to occur worldwide was at the Marcoule nuclear site in the Languedoc-Roussillon region of France. This incident occurred on September 12, 2011. Officials reported an explosion near a furnace in the Centraco radioactive waste storage site, which resulted in a fire. While no leakage or radiation contamination was reported, the fire injured four people and killed one person (BBC, 2011).

Another recent worldwide nuclear incident was that which involved the Fukushima Daiichi nuclear reactor in Okuma, Fukushima, Japan. This incident occurred on March 11, 2011. An earthquake in the area resulted in a series of equipment failures, nuclear meltdowns, and releases of radioactive materials. These failures and releases were largely attributed to the water that penetrated the structures following a tsunami that was generated by the earthquake. The flooding caused the failure of multiple generators meant to keep the systems operating safety after the automatic shutdown. No deaths have been directly attributed to the incidents at the reactor. The World Health Organization completed a report that indicated there were only small proportional increases in occurrence of certain cancers following the radiation exposure from the plans (WNA, 2020).

Following this incident, the United States NRC developed a set of recommendations based on the lessons learned from the Fukushima incident. These recommendations are meant to enhance reactor safety for US-based nuclear reactors against a variety of factors. Recommendations included the categories of regulatory framework, ensuring protection (of the facilities and equipment), enhancing mitigation, strengthening emergency preparedness, and improving the efficiency of NRC programs. One of the specific recommendations involved the re-evaluation and upgrade of seismic and flooding protection of structures, systems and components for each reactor. As more information comes out, and more lessons learned are developed, it should only serve to reinforce the protections in place against any type of incident involving nuclear power stations.

4.3.21.4. Future Occurrence

Pennsylvania is home to the only nuclear power plant *General Emergency* in the nation. Since the Three Mile Island incident, nuclear power has become significantly safer and is one of the most heavily regulated industries in the nation. Despite the knowledge gained since then, there is still the potential for a similar accident to occur again at one of the five nuclear generating facilities in the Commonwealth. The Nuclear Energy Agency of the Organization for Economic Co-Operation and Development notes that studies estimate the chance of protective barriers in a modern nuclear facility at less than one in 100,000 per year (NEA, 2005). Nuclear incident occurrences may also occur as a result of intentional actions; these acts are addressed under Section 4.3.22 Terrorism.

Across the United States, several *Unusual Event* and *Alert* classification level events occur each year at the 100+ nuclear facilities that warrant notification of local emergency managers. *Alert* emergencies occur less frequently. For example, in 1997, there were 40 notifications of *Unusual Events* and three *Alert* events nationwide. Based on historical events, *Site Area Emergency* and *General Emergency* incidents are very rare. Therefore, the future occurrence of nuclear incidents that affect Lycoming County can be considered *unlikely* as defined by the Risk Factor methodology probability criteria (see Table 4.4-1).

4.3.21.5. Vulnerability Assessment

About half of the county is vulnerable to the contamination effects possible in a nuclear incident. Specifically, thirty-seven municipalities in Lycoming County are located within the 50-mile Ingestion Exposure Pathway EPZ of the Susquehanna Steam Electric Station. These are shown in Figure 4.3.21-1 and are listed in 4.3.21-2.

Table 4.3.21-2 Municipalities located within the 50-mile Ingestion Exposure Pathway EPZ of the Susquehanna Steam Electric Station

Armstrong Township	Lewis Township	Old Lycoming Township
Bastress Township	Limestone Township	Penn Township
Brady Township	Loyalsock Township	Picture Rock Borough
Cascade Township	Lycoming Township	Plunketts Creek Township
Clinton Township	McIntyre Township	Shrewsbury Township
Duboistown Borough	McNett Township	South Williamsport Borough
Eldred Township	Mill Creek Township	Susquehanna Township
Fairfield Township	Montgomery Borough	Upper Fairfield Township
Franklin Township	Montoursville Borough	Washington Township
Gamble Township	Moreland Township	Williamsport, City of
Hepburn Township	Muncy Creek Township	Wolf Township
Hughesville Borough	Muncy Borough	
Jordan Township	Muncy Township	

The health effects reported from the psychological stress of individuals living in the immediate area will strain stress management and disaster psychology resources to the limit. Radionuclide

ingestion by domesticated farm animals could force agricultural product embargos, placing severe strain on the economy. Radiological particulate contamination of the environment could impact natural resources; disrupt service delivery; and cause work cessation and evacuations. Other response measures that result from the event could damage the local economy. In the event of a release, national-level repercussions may produce anti-nuclear activism, widespread concern over public health, and a moratorium on new or renewed nuclear facilities around the nation.

As stated above, the county's primary vulnerability to nuclear incidents comes in the form of food, soil, and water contamination. According to the 2022 USDA Census of Agriculture, Lycoming County has 181,550 acres in 918 farms. The market value of all agricultural products sold exceeded $66 million in 2022; some or this entire product is at risk during a nuclear event (USDA, 2024).

Water contamination is also a concern in nuclear incidents. There are several public water suppliers that operate in Lycoming County or provide water to municipalities. Suppliers include the Lycoming County Water and Sewer Authority, Montgomery Water Authority, Muncy Borough Municipal Authority, Muncy State Correctional Institution, Williamsport Municipal Water Authority, Pennsylvania American, Jersey Shore Area Joint Water Authority, Hughesville Borough Water Authority, Limestone Township Water Authority, Montoursville Water Authority, Ralston Area Joint Authority, Roaring Branch Waterworks, and Waterville Water Association.

The loss experienced by each jurisdiction in the case of a nuclear incident will depend on the magnitude of the event. The example of the Three Mile Island incident gives an indication of local and regional economic loss, however. The President's Commission on the Three Mile Island Incident calculated the economic impact of the accident, looking at direct and indirect losses and other potential growth impacts. Direct impacts to the manufacturing sector were estimated at $6.3 million. These losses occurred within a few days after the accident and quickly subsided thereafter with no evidence of permanent layoffs resulting. Food processors also incurred expenses with some farms purchasing equipment to detect radiation levels and converting dairy production to powdered milk.

The utility itself incurred significant costs in the areas of emergency management and plant refurbishment and replacement power. Emergency management costs ran in the hundreds of millions of dollars and replacement power for both units at a cost of $24 million a month. The unaffected TMI Unit 1 was shut down for 6.5 years. During this time, more than $100 million in plant upgrades and refurbishment took place. Replacement power costs today are estimated at nearly twice the 1979 dollars. Cost of the accident cleanup and placing the facility in monitored storage cost approximately $1 billion.

The impact on tourism was estimated at approximately $6.5 million, and wages lost in this sector estimated from $2.8 million to $3.8 million. Losses in the agricultural sector appeared to be minimal due to off-growing season. The Pennsylvania Department of Agriculture indicated that losses were significantly less than $1 million.

4.3.21.6. Equity Considerations for Vulnerable Communities

Regarding equity and nuclear incidents, marginalized communities often face disproportionate risks due to their proximity to nuclear facilities, limited access to emergency services, and reduced capacity for evacuation and recovery. Williamsport has the highest concentration of households without a vehicle. These communities may experience higher exposure to radiation, face barriers to timely medical care, and struggle with long-term recovery issues. Equity considerations involve education, awareness, and evacuation.

4.3.22. Terrorism



4.3.22.1. Location and Extent

Following several serious international and domestic terrorist incidents during the 1990s and early 2000s, citizens across the United States paid increased attention to the potential for deliberate, harmful actions of individuals or groups. The term "terrorism" refers to intentional, criminal, malicious acts, but the functional definition of terrorism can be interpreted in many ways. Officially, terrorism is defined in the Code of Federal Regulations as "the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives" (28 CFR §0.85). Terrorist actions can occur as a result of a group, or due to a lone wolf or lone-actor terrorist. A lone-actor terrorist is someone who prepares and commits violent acts alone, outside of any command structure or without material assistance from any group. They may be influenced or motivated by the ideology and beliefs of an external group and may act in support of such group (US DHS, 2013).

The Federal Bureau of Investigation (FBI) characterizes terrorism as either domestic or international, depending on the origin, base, and objectives of the terrorist organization. However, the origin of the terrorist or person causing the hazard is far less relevant to mitigation planning than the hazard itself and its consequences.

Terrorism can refer to the use of weapons of mass destruction (WMD), including, biological, chemical, nuclear, and radiological weapons; arson, incendiary, explosive, and armed attacks; industrial sabotage and intentional hazardous materials releases; and "cyber-terrorism." Within these general categories, however, there are many variations. Particularly in the area of biological and chemical weapons, there is a wide variety of agents and ways for them to be disseminated.

Terrorism can take many forms:

- Agriterrorism.
- Arson/incendiary attack.
- Armed attack.
- Biological agent,
- Chemical agent.
- Cyberterrorism.
- Conventional bomb.
- Intentional hazardous materials or radiological releases.
- Nuclear bombs.

The severity of terrorist incidents depends upon the type of method used, the proximity of the device to people, animals, or other assets, and the duration of exposure to the incident or device. For example, chemical agents are poisonous gases, liquids, or solids that have toxic effects on people, animals, or plants. Many chemical agents can cause serious injuries or death. Severity of injuries depends on the type and amount of the chemical agent used and the

duration of exposure. Biological agents are organisms or toxins that have illness-producing effects on people, livestock, and crops. Because some biological agents cannot be easily detected and may take time to develop, it is difficult to know that a biological attack has occurred until victims display symptoms. In other cases, the effects are immediate. Those affected by a biological agent require the immediate attention of professional medical personnel. Some agents are contagious, and victims may need to be quarantined.

4.3.22.2. Range and Magnitude

The types of terrorist activity with the most relevance to Lycoming County include agriterrorism, intentional hazardous materials releases, and bomb threats. Agriterrorism is direct, intentional, generally covert contamination of food supplies or introduction of pests and/or disease agents to crops, livestock, or forestland. Lycoming County is semi-rural with the majority of its land area dedicated to forests. The County also has a number of TRI facilities and major transportation routes that traverse the county, making intentional hazardous materials release a potential threat to citizens and the environment. Bomb threats represent a simple way to disrupt activities at critical infrastructure facilities, major events, financial institutions, and schools.

Lycoming County has a long, storied history with the Little League World Series (LLWS) making it an inviting terrorist target. Despite no reported incidents of terrorism in this County, these events can occur in any location. The LLWS is a well-attended and publicized event with a single game attendance record of 45,000 spectators. A terrorist attack, such as the detonation of a vehicle-borne improvised explosive device, may cause hundreds and/or thousands of injuries and/or deaths. First responder services (such as EMS, fire, and police) may be delayed for an indefinite period of time due to ingress and egress challenges, resource availability and capabilities, emergency response coordination, and communication challenges. The willingness of terrorists to attack a family-oriented event will cause worldwide psychosocial and political ramifications. Lycoming County could suffer long-term economic consequences due to decreased attendance. Annually, the LLWS injects nearly $20 million in revenue into the local economy. The hospitality industry – lodging, restaurants, transportation, and fuel services – will experience negative economic effects resulting from a terror event.

The potential impacts of terrorism on community lifelines are as follows:

Table 4.3.22-1 Most Likely Lifelines Impacted by Terrorism

LIFELINES	NOTES
	Community safety is often threatened, and police, fire, and other government services are either targeted or needed to respond to terroristic threats or actions.
	Water resources and the food supply chain may be targeted by biological terrorism.

Table 4.3.22-1 Most Likely Lifelines Impacted by Terrorism	
LIFELINES	NOTES
	Energy infrastructure may be a potential target for terrorism.
	Hazardous materials facilities may be a potential target for terrorism.

4.3.22.3. Past Occurrence

The majority of terrorist events experienced by Lycoming County are bomb threats. Since 2018, there have been several bomb threats and other potentially dangerous events reported to PEMA and recorded in the PEMA Knowledge Center database (PEMA-KC). Table 4.3.22-2 below provides additional details.

Table 4.3.22-2 Incidents in PEMA-KC System (2018-2023)	
DATE	TYPE
October 31, 2018	School Bomb Threat
November 5, 2018	Bomb Threat
December 16, 2018	Email Bomb Threat
December 13, 2018	Suspicious Package
April 16, 2019	Bomb Threat
November 6, 2019	Bomb Threat
November 24, 2019	Bomb Threat
June 9, 2020	Suspicious Package
March 29, 2021	Bomb Threat; Hand Grenade
September 16, 2021	Bomb Threat
December 17, 2021	Bomb Threat
December 21, 2021	Bomb Threat
October 5, 2022	Bomb Threat
February 24, 2023	Bomb Threat
March 30, 2023	Suspicious Activity; School Shooting Report

4.3.22.4. Future Occurrence

The probability of terrorism occurring cannot be quantified with as great a level of accuracy as that of many natural hazards. Furthermore, these incidents generally occur at a specific location, such as a government building, rather than encompassing an area such as a floodplain. Thus, planning should be asset-specific, identifying potentially at-risk critical facilities and systems in the community. Once a comprehensive list of critical assets has been developed, it should be prioritized so that efforts can be directed to protect the most important assets first. Then,

beginning with the highest-priority assets, the vulnerabilities of each facility or system to each type of hazard should be assessed.

For the purpose of developing a realistic prioritization of terrorism hazard mitigation projects, three elements should be considered in concert:

- Relative importance of the various facilities and systems in the asset inventory.
- Vulnerabilities of those facilities.
- Threats that are known to exist.

Critical assets and infrastructures are systems whose incapacity or destruction would have a debilitating effect on the county:

- Government services.
- Emergency services.
- Water supply systems.
- Transportation networks.
- Telecommunications infrastructure.
- Electrical power systems.
- Gas and oil facilities.

Lycoming County has many notable local landmarks and one major landmark of national significance: the site of the Little League World Series. The site has international significance, notably to children involved in Little League. Lycoming County's Chamber of Commerce approximates 75,000 visitors for the annual event (Bottorf, 2024). In 2003, over 330,000 people visited the site during the 10-day Little League World Series. The symbolism of the site and the vulnerability of its users make it a possible target for future terrorist activity. Each year, federal, state, and local law enforcement and intelligence agencies collaborate to ensure that the site remains safe from terrorist attacks.

Additionally, the Marcellus Shale natural gas drilling industry includes many gas well sites within Lycoming County. Any of these sites could be a potential target for terrorism, especially by groups opposing the petroleum industry or natural conservation groups (e.g., the Earth Liberation Front, or ELF). On the whole, though, the probability of future terrorism events can be considered *unlikely* according to the Risk Factor Methodology.

4.3.22.5. Vulnerability

With the exception of the Little League World Series site and Marcellus Shale gas drilling sites described above, Lycoming County does not have facilities, buildings, or landmarks of national importance that are more likely to be terrorism targets than other areas in the United States. Notable County landmarks are of a local historical interest. Of greater concern to the community may be agriterrorism and intentional hazardous material releases. Intentional hazardous material releases are possible at the TRI facilities found throughout the county and along the major transportation routes that traverse the county. These releases would affect population centers as well as water supply areas.

All critical infrastructure is vulnerable to acts of terrorism, especially those acts committed by local groups that know the communities' dependence on that infrastructure. Each critical facility must be individually assessed for its vulnerability to a terrorist or criminal event. The following checklist provides guidance on areas for examination in determining a facility's vulnerability to attack

Inherent vulnerability:

- **Visibility** – How aware is the public of the existence of the facility?
- **Utility** – How valuable might the place be in meeting the objectives of a potential terrorist?
- **Accessibility** – How accessible is the place to the public?
- **Asset mobility** – is the asset's location fixed or mobile?
- **Presence of hazardous materials** – Are flammable, explosive, biological, chemical and/or radiological materials present on site? If so, are they well secured?
- **Potential for collateral damage** – What are the potential consequences for the surrounding area if the asset is attacked or damaged?
- **Occupancy** – What is the potential for mass casualties based on the maximum number of individuals on site at a given time?

Tactical vulnerability:

Site Perimeter

- Site planning and Landscape Design – Is the facility designed with security in mind – both site-specific and with regard to adjacent land uses?
- Parking Security – Are vehicle access and parking managed in a way that separates vehicles and structures?

Building Envelope

- Structural Engineering – Is the building's envelope designed to be blast-resistant? Does it provide collective protection against chemical, biological and radiological contaminants?

Facility Interior

- Architectural and Interior Space Planning – Does security screening cover all public and private areas?
- Mechanical Engineering – Are utilities and HVAC systems protected and/or backed up with redundant systems?
- Electrical Engineering – Are emergency power and telecommunications available? Are alarm systems operational? Is lightning sufficient?
- Fire Protection Engineering – Are the building's water supply and fire suppression systems adequate, code-compliant and protected? Are on-site personnel trained appropriately? Are local first responders aware of the nature of the operations at the facility?

- Electronic and Organized Security – Are systems and personnel in place to monitor and protect the facility?

4.3.22.6. Equity in Vulnerable Communities

Regarding equity in the face of an act of terrorism, there are several communities to consider. Emergency response plans should be included and take into account the needs of diverse populations, including non-English speakers, individuals with disabilities, and those with limited access to technological resources like smartphones or internet connections. Williamsport has the highest concentration of these households.

4.3.23. Transportation Incidents



4.3.23.1. Location and Extent

In this plan, a transportation incident or crash is defined as an incident involving highway, air, and rail travel. Table 4.3.23-1 lists the different types of identified traffic and rail incidents.

Table 4.3.23-1 Identified Types of Traffic and Rail Incidents (PennDOT, 2018; Federal Railroad Administration, 2020)

MODE	TYPE OF INCIDENT	DESCRIPTION
Traffic	Non-collision	A harmful event that does not involve a collision, such as a fire, explosion, or overturn.
	Angle	A crash in which two vehicles on opposite roadways collide at an intersection, driveway, or ramp.
	Rear-end	A crash in which vehicles traveling in the same direction on the same road collide.
	Head-on	A crash in which vehicles traveling in opposite directions on the same road collide.
	Sideswipe	A crash between two vehicles in which the sides of the vehicles engage.
	Hit fixed object	A collision in which a vehicle hits a stationary object on or adjacent to the roadway.
	Hit pedestrian	A collision between a motor vehicle and any person not in or upon the vehicle.
Rail	Derailment	An incident on a railway in which a train leaves the rails.
	Collision	An incident in which a train strikes something such as another train or highway motor vehicle.
	Other	Incidents caused by other circumstances like obstructions on rails, fire, or explosion.

U.S. Route 15 runs north/south, bisecting the county in the middle. Duboistown, South Williamsport, and Williamsport make up the area where three major roadways intersect: Interstate 180, U.S. Route 15, and U.S. Route 220. U.S. Route 15 runs north/south from South Carolina into New York, and is a major transportation corridor. Because of this, many commercial vehicles pass through the county on a daily basis. Figure 4.3.23-1 shows the major highways, rail lines, and airports located throughout Lycoming County.

Traffic and rail incidents can occur anywhere along their respective corridors in Lycoming County. Aviation incidents typically occur within 5 miles of take-off or landing but can occur countywide. Lycoming County is at high risk for all three types of traffic incidents. There is an annual influx of traffic due to many reasons, such as the county being an educational epicenter, and due to Williamsport being home to the Little League World Series and Hall of Fame. Figure 4.3.23-2 shows traffic volume on state roads and Figure 4.3.23-3 shows incident density. The

highest concentration of incidents has occurred along state roads and highways, specifically Interstate 180, U.S. Route 15, and U.S. Route 220.

As identified in section 4.3.18 Environmental Hazards: Hazardous Materials Release, Lycoming County is at risk to hazardous material incidents due to the transportation of hazardous materials. Transportation of hazardous materials on highways involves tanker trucks or trailers which are responsible for the greatest number of hazard material release incidents. There are over 120,000 miles of highway across Pennsylvania and many of those are used to transport hazardous materials (PennDOT, 2018). These roads also cross rivers and streams at many points and have the potential to pollute watersheds that serve as domestic water supplies for parts of the state.

Potential also exists for hazardous material releases to occur along rail lines as collisions and derailments of train cars can results in large spills. A number of severe rail events have reportedly occurred in Pennsylvania. The major rail line in Lycoming County runs along the Susquehanna River. Its lines lie in valleys next to stream beds, compounding the impact of rail-related releases and increasing the possibility of water contamination during a release.

Pipelines can also transport hazardous liquids and flammable substances such as natural gas. Incidents can occur when pipes corrode, when they are damaged during excavation, incorrectly operated, or damaged by other forces. There are approximately 39 miles of liquid petroleum pipeline and 281 miles of natural gas transmission pipeline in Lycoming County (PEMA, 2023). In addition, hazardous materials can be transported by aircraft or by watercraft. Crashes, spills of materials, and fires on these vessels can pose a hazard. More details on the risk of gas and liquid pipelines can be found in section 4.3.17

Figure 4.3.23-1 Lycoming County's transportation network, including highways, rail, and aviation.

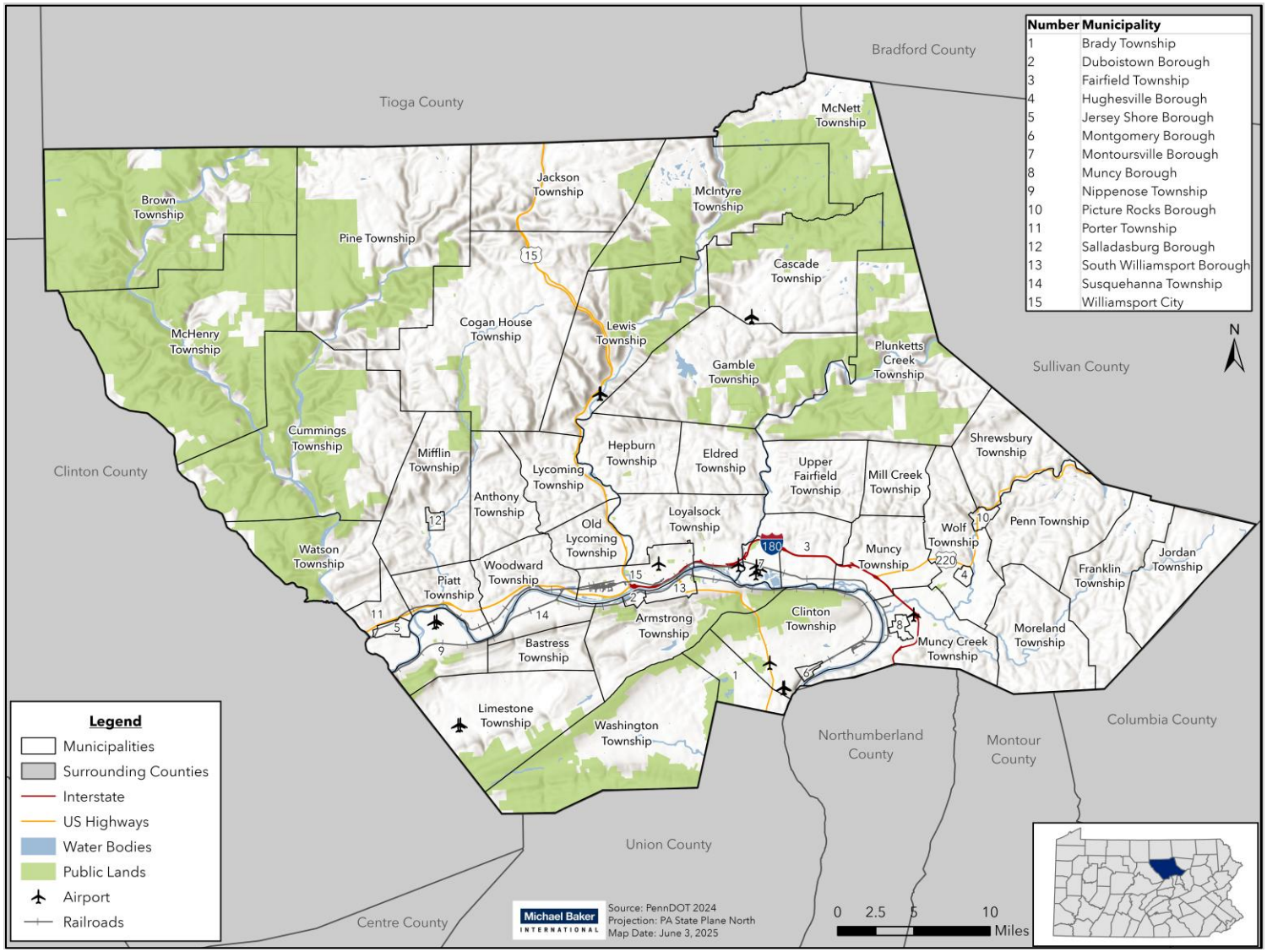


Figure 4.3.23-2 Traffic volume on state roads in Lycoming County.

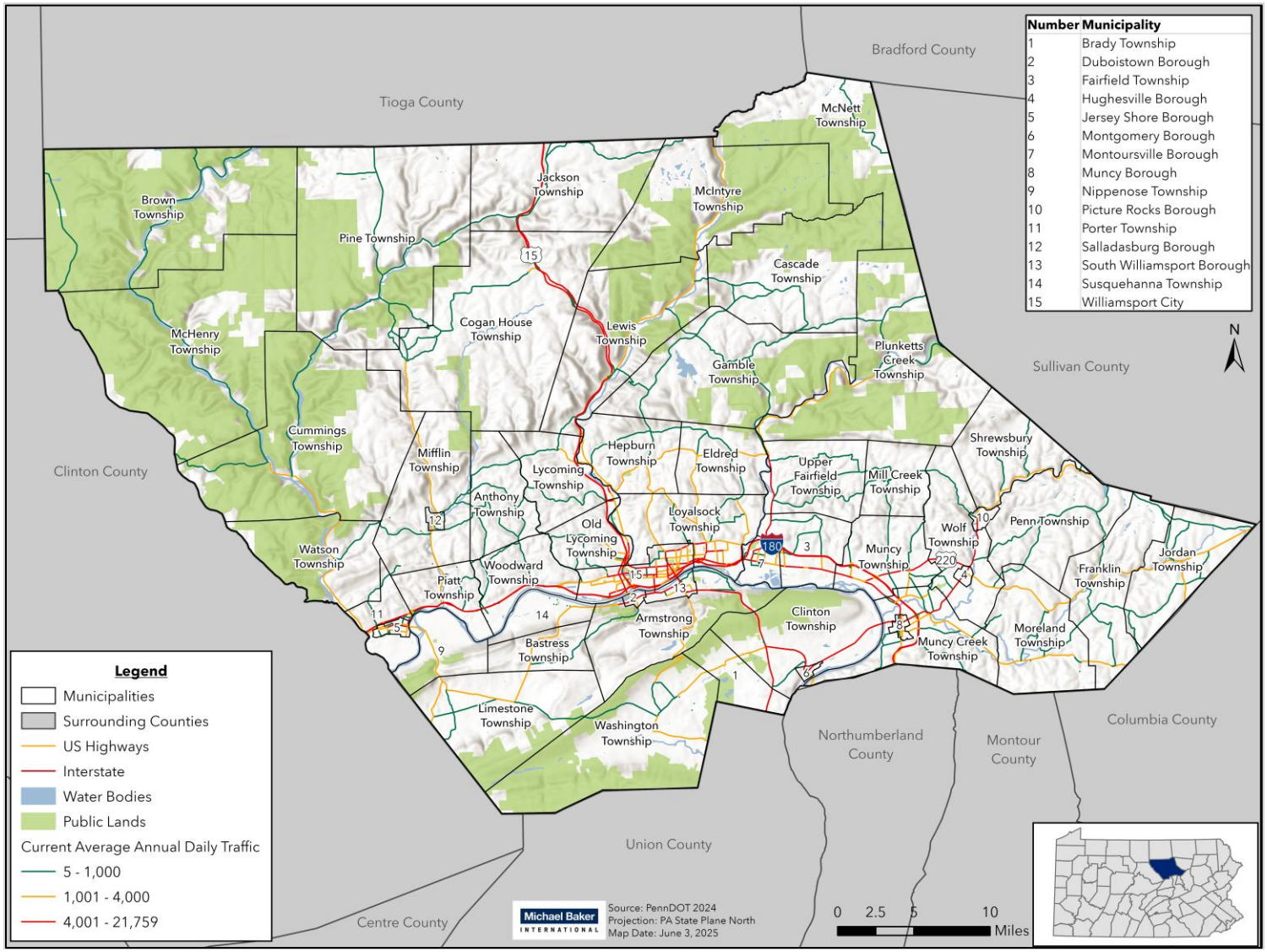
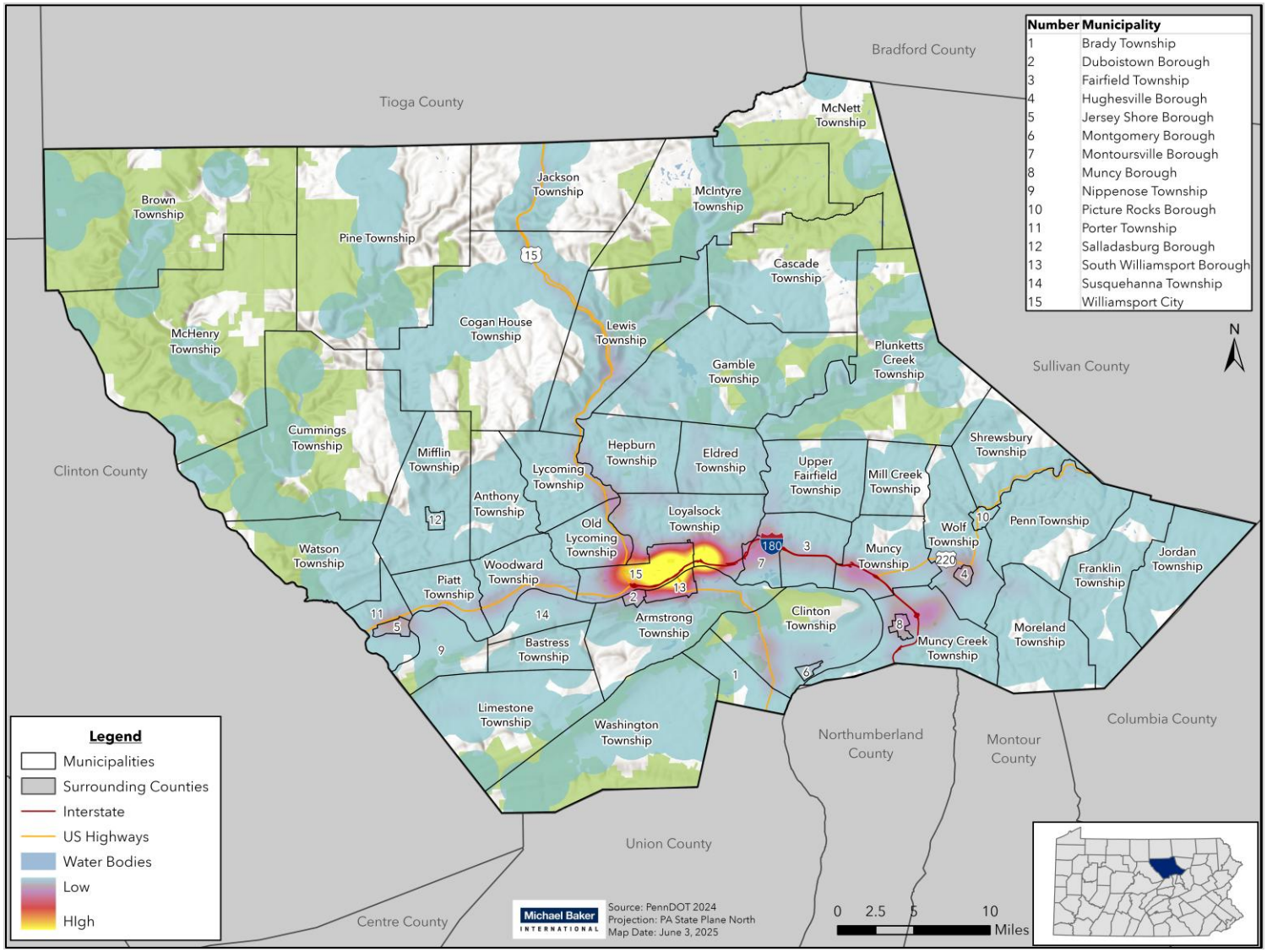


Figure 4.3.23-3 Lycoming County Transportation Incident Density



4.3.23.2. Range of Magnitude

Traffic incidents are measured two ways. First, insurance companies look at the level of damage sustained to the vehicle. They identify them as undamaged, damage has occurred that is cost effective to repair, or the vehicle is considered a complete loss, as it would cost more to fix than it is currently worth. Secondly, deaths or injuries that have occurred as a result of the event must be considered. For the purpose of this community-oriented analysis, consideration of what damage has occurred to the motor vehicle is not included.

Significant passenger vehicle, air, and rail transportation incidents can result in a wide range of outcomes from damage solely to property to serious injury or death. The most serious transportation incidents include a release of hazardous material. As described in Section. 4.3.18, weather conditions, micro-meteorological effect of buildings and terrain, and non-compliance with applicable codes can exacerbate these releases. Response time and quantity and type of material release also impact the severity of an incident.

Lycoming County is a hub of many major transportation routes and the City of Williamsport has become a base of intermodal transportation in the region. In the city, over 27,000 vehicles traverse the Market Street Bridge on a daily basis. An incident involving multiple vehicles would impact the local transportation infrastructure, as well as the freight and manufacturing industry, and will force road closures for an undetermined period of time. A large number of casualties should be anticipated by emergency responders. Upon notification of a multi-vehicle incident, particularly when entrapment is reported, county hospitals should enact their medical surge capacity plans. During the road closure, vehicular traffic will be rerouted through secondary streets, increasing local traffic in the area.

The majority of motor vehicle crashes are non-fatal in Pennsylvania, but PennDOT estimates that every hour eight people are injured in a car crash, and every seven hours someone dies as a result of a car crash (PennDOT, 2023). Most fatal crashes occur in the months of July, August, and October.

Railway and roadway incidents in particular have the potential to result in hazardous materials release. Transportation incidents can also result in broader infrastructure damage. Like the range of magnitude, the environmental impacts of transportation incidents can vary greatly. In the case of a simple motor vehicle crash, train derailment, or aviation incident, the environmental impact is minimal. However, if the incident involves any type of vehicle moving chemicals or other hazardous materials, the impact will be considerably larger and may include an explosion or the release of potentially hazardous material. For a complete discussion of the environmental impacts of hazardous materials releases, see Section 4.3.18.

A worst-case scenario for transportation incidents in Lycoming County would be if a Bakken crude oil train was to derail and explode near Williamsport in the middle of the workday, when an increased number of people would be downtown. This kind of event, like the Lac-Megantic train derailment in Quebec in July 2013, would have no warning time (NASA, 2013). There would be the potential for serious loss of life and loss of property in the event of an explosion.

The rail infrastructure would be damaged, and mass evacuations would be needed to reduce exposure to chemicals. An incident of this nature would not only cause environmental harm and endanger human health, but it would also cause a disruption of the economy in Lycoming County during recovery.

The potential impacts of transportation incidents on community lifelines are as follows:

Table 4.3.23-2 Most Likely Lifelines Impacted by Transportation Incidents

LIFELINE	NOTES
	Direct harm to the community, including drivers, bicyclists, and pedestrians.
	Medical personnel might be needed due to the significant risk of injury and death that transportation incidents represent.
	Potential negative consequences of incidents occurring while transporting these materials.

4.3.23.3. Past Occurrence

The most common transportation incidents in Lycoming County involve highway incidents involving motor vehicles. Vehicular transportation incidents like this are a daily occurrence throughout Pennsylvania. Table 4.3.23-3 shows PennDOT data on traffic incidents from 2003 to 2023, including the number of vehicle incidents, fatal crashes, crashes that cause injuries, and the incidents that result only in property damage. The annual number of total incidents peaked in 2011. Annual counts declined overall until about 2019, where they have stagnated to the present day.

Table 4.3.23-3 Total number of crashes, fatal crashes, and property damage-only crashes in Lycoming County (PennDOT, 2023)

YEAR	TOTAL CRASHES	TOTAL FATAL CRASHES	TOTAL INJURY CRASHES	TOTAL PROPERTY DAMAGE-ONLY CRASHES
2003	1,271	13	580	678
2004	1,255	24	576	655
2005	1,148	17	561	570
2006	1,085	16	555	514
2007	1,313	20	627	666
2008	1,244	12	570	662
2009	1,162	15	554	593
2010	1,226	20	574	632

Table 4.3.23-3 Total number of crashes, fatal crashes, and property damage-only crashes in Lycoming County (PennDOT, 2023)				
YEAR	TOTAL CRASHES	TOTAL FATAL CRASHES	TOTAL INJURY CRASHES	TOTAL PROPERTY DAMAGE-ONLY CRASHES
2011	1,324	19	619	686
2012	1,248	15	592	641
2013	1,187	9	496	682
2014	1,091	16	438	637
2015	1,161	21	481	659
2016	1,101	14	489	598
2017	1,089	9	458	622
2018	1,115	9	475	631
2019	1,000	9	431	560
2020	869	10	365	494
2021	923	17	369	537
2022	892	11	367	514
2023	922	13	364	545
TOTAL	23,626	309	10,541	12,776

A comprehensive list of rail incidents is not available for Lycoming County. However, these incidents have led to fatalities and injuries in addition to environmental contamination. In July 2014, around a dozen train cars derailed in Nisbet spilling coal in from four from a 129-car train (NBC, 2014). In August 2014, two men died on impact when their pickup truck collided with a moving Norfolk Southern freight train in Clinton Township (Papa, 2014). In February 2020, a Lycoming Valley Railroad employee sustained severe injuries when a rail car ran over him (Beauge, 2020).

Crashes involving aircrafts have also occurred in Lycoming County. The Bureau of Aircraft Accidents Archives lists four incidents that resulted in injuries and fatalities in the City of Williamsport; in 1959, 1965, 1974, and 1991. Two of these incidents occurred during takeoff and two during landing (BAAA, 2020). In 2019, a small plane crashed near the Jersey Shore Airport in Nippenose Township resulting in two fatalities (Bohman, 2019).

4.3.23.4. Future Occurrence

Transportation incidents have little to no warning time and are nearly impossible to predict. While some roads or intersections may gain a reputation as being dangerous, and others are quantitatively shown to be so, this does not necessarily mean an incident will occur with any frequency or guarantee. It represents an elevation in the probability that an incident may occur. As such, it can be said with certainty that if no changes occur in the county then motor vehicle incidents are as likely to occur in the future as they were in the past.

It must also be taken into account that with the increase in development, associated mainly with the growth of the natural gas industry in Lycoming County, there will be more motor vehicles using its road network. This increase in traffic will also cause an increase in motor vehicle incidents. The areas with the greatest level of development, and those along major transportation routes, are likely to see an increase in both traffic and motor vehicle incidents as a secondary effect of that development.

As Table 4.3.23-3 shows, the amount of traffic incidents has remained relatively constant in recent years. Additionally, the trucking industry is expected to continue to grow increasing the number of long-haul trucks operating in the county on a daily basis. The increase in Bakken crude oil transportation by rail represents an increase in risk to future transportation incidents by rail. Based on all of these factors, the probability of transportation incidents and crashes in Lycoming County are characterized as *likely* according to the Risk Factor Methodology (see Table 4.4.1).

4.3.23.5. Vulnerability Assessment

A transportation related incident can occur on any stretch of road or railway in Lycoming County. However, severe incidents are more likely along highways such as Interstate 180, U.S. Route 15, and U.S. Route 220, which experience heavier traffic volumes including heavy freight vehicles. The combination of high traffic volume, severe winter weather in the county, and large numbers of hazardous materials haulers increase the chances of traffic incidents occurring.

Lycoming County's future population growth and land use will be significantly impacted by the safety and capacity of the transportation systems traversing the county. Most residents, visitors, and tourists will use automobiles as their primary transportation throughout the community. Immigration and commercial development are also largely dependent on motor vehicle transportation systems.

Because of the widespread transportation network in Lycoming County, a large number of structures are exposed to the threat of transportation incidents. Tables 4.3.23-4, 4.3.23-5, and 4.3.23-6 show the structures, critical facilities, and populations vulnerable to transportation incidents on roads, railroads, and near airports in Lycoming County. Woodward Township, Lewis Township, and South Williamsport Borough have the highest percentage of populations vulnerable to highway traffic incidents. The County's airports pose the greatest risk to critical facilities. 77% of critical facilities within the county are susceptible to airports. The City of Williamsport overall is the most vulnerable to transportation incidents of all kind due to its density and proximity to major infrastructure and junctions. Table 4.3.24-5 shows the structures vulnerable to transportation incidents by land use. The most vulnerable land use is residential with Williamsport City, Loyalsock Township, Montoursville Borough having the highest number of vulnerable residential structures.

Table 4.3.23-4 Structures Vulnerable to Transportation Incidents

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES WITHIN 0.25 MILES OF MAJOR HIGHWAY	PERCENT STRUCTURES WITHIN 0.25 MILES OF MAJOR HIGHWAY	STRUCTURES WITHIN 0.25 MILES OF ACTIVE RAIL LINE	PERCENT STRUCTURES WITHIN 0.25 MILES OF ACTIVE RAIL LINE	TOTAL STRUCTURES WITHIN 5 MILES OF AIRPORT	PERCENT STRUCTURES WITHIN 5 MILES OF AIRPORT
Anthony Township	387	0	0%	0	0%	31	8%
Armstrong Township	429	152	35%	87	20%	428	100%
Bastress Township	245	0	0%	0	0%	137	56%
Brady Township	234	23	10%	0	0%	234	100%
Brown Township	421	0	0%	0	0%	0	0%
Cascade Township	323	0	0%	0	0%	315	98%
Clinton Township	1,161	121	10%	275	24%	1,161	100%
Cogan House Township	636	28	4%	0	0%	36	6%
Cummings Township	604	0	0%	0	0%	0	0%
Duboistown Borough	560	1	0%	421	75%	560	100%
Eldred Township	905	0	0%	0	0%	325	36%
Fairfield Township	1,482	229	15%	117	8%	1,480	100%
Franklin Township	518	0	0%	0	0%	0	0%
Gamble Township	484	0	0%	0	0%	460	95%
Hepburn Township	1,267	67	5%	0	0%	1,267	100%
Hughesville Borough	973	241	25%	0	0%	973	100%
Jackson Township	289	72	25%	0	0%	0	0%
Jersey Shore Borough	1,792	370	21%	872	49%	1,792	100%
Jordan Township	533	0	0%	0	0%	0	0%
Lewis Township	648	238	37%	0	0%	613	95%

Table 4.3.23-4 Structures Vulnerable to Transportation Incidents

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES WITHIN 0.25 MILES OF MAJOR HIGHWAY	PERCENT STRUCTURES WITHIN 0.25 MILES OF MAJOR HIGHWAY	STRUCTURES WITHIN 0.25 MILES OF ACTIVE RAIL LINE	PERCENT STRUCTURES WITHIN 0.25 MILES OF ACTIVE RAIL LINE	TOTAL STRUCTURES WITHIN 5 MILES OF AIRPORT	PERCENT STRUCTURES WITHIN 5 MILES OF AIRPORT
Limestone Township	844	0	0%	0	0%	775	92%
Loyalsock Township	5,171	522	10%	286	6%	5,171	100%
Lycoming Township	774	193	25%	0	0%	631	82%
McHenry Township	626	0	0%	0	0%	0	0%
McIntyre Township	383	0	0%	0	0%	143	37%
McNett Township	219	0	0%	0	0%	0	0%
Mifflin Township	552	0	0%	0	0%	349	63%
Mill Creek Township	301	0	0%	0	0%	1	0%
Montgomery Borough	661	0	0%	593	90%	661	100%
Montoursville Borough	2,301	337	15%	605	26%	2,301	100%
Moreland Township	487	0	0%	0	0%	67	14%
Muncy Borough	1,172	0	0%	45	4%	1,172	100%
Muncy Township	1,835	198	11%	168	9%	1,832	100%
Muncy Creek Township	646	247	38%	50	8%	643	100%
Nippenose Township	358	0	0%	225	63%	358	100%
Old Lycoming Township	2,454	695	28%	0	0%	2,406	98%
Penn Township	559	57	10%	0	0%	19	3%
Piatt Township	536	183	34%	180	34%	536	100%
Picture Rocks Borough	285	64	22%	0	0%	0	0%
Pine Township	465	0	0%	0	0%	0	0%

Table 4.3.23-4 Structures Vulnerable to Transportation Incidents

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES WITHIN 0.25 MILES OF MAJOR HIGHWAY	PERCENT STRUCTURES WITHIN 0.25 MILES OF MAJOR HIGHWAY	STRUCTURES WITHIN 0.25 MILES OF ACTIVE RAIL LINE	PERCENT STRUCTURES WITHIN 0.25 MILES OF ACTIVE RAIL LINE	TOTAL STRUCTURES WITHIN 5 MILES OF AIRPORT	PERCENT STRUCTURES WITHIN 5 MILES OF AIRPORT
Plunketts Creek Township	609	0	0%	0	0%	108	18%
Porter Township	698	237	34%	197	28%	698	100%
Salladasburg Borough	134	0	0%	0	0%	89	66%
Shrewsbury Township	304	106	35%	0	0%	0	0%
South Williamsport Borough	2,842	1,203	42%	1394	49%	2,842	100%
Susquehanna Township	494	0	0%	249	50%	149	30%
Upper Fairfield Township	888	0	0%	0	0%	317	36%
Washington Township	775	0	0%	0	0%	221	29%
Watson Township	364	0	0%	0	0%	67	18%
Williamsport, City of	10,860	1,639	15%	2303	21%	10,860	100%
Wolf Township	1,567	266	17%	0	0%	1,362	87%
Woodward Township	1,142	622	54%	333	29%	801	70%
TOTAL	55,197	8,111	15%	8,400	15%	44,391	80%

Table 4.3.23-5 Critical Facilities Vulnerable to Transportation Incidents

MUNICIPALITY	TOTAL CRITICAL FACILITIES	FACILITIES WITHIN 0.25 MILES OF MAJOR HIGHWAY	PERCENT FACILITIES WITHIN 0.25 MILES OF MAJOR HIGHWAY	FACILITIES WITHIN 0.25 MILES OF ACTIVE RAIL LINE	PERCENT FACILITIES WITHIN 0.25 MILES OF ACTIVE RAIL LINE	FACILITIES WITHIN 5 MILES OF AIRPORT	PERCENT FACILITIES WITHIN 5 MILES OF AIRPORT
Anthony Township	4	0	0%	0	0%	1	25%
Armstrong Township	1	0	0%	0	0%	1	100%
Bastress Township	3	0	0%	0	0%	2	67%
Brady Township	3	0	0%	0	0%	3	100%
Brown Township	5	0	0%	0	0%	0	0%
Cascade Township	0	0	0%	0	0%	0	0%
Clinton Township	18	1	6%	9	50%	18	100%
Cogan House Township	8	2	25%	0	0%	0	0%
Cummings Township	5	0	0%	0	0%	0	0%
Duboistown Borough	4	0	0%	4	100%	4	100%
Eldred Township	4	0	0%	0	0%	0	0%
Fairfield Township	4	2	50%	1	25%	4	100%
Franklin Township	5	0	0%	0	0%	0	0%
Gamble Township	3	0	0%	0	0%	3	100%
Hepburn Township	6	0	0%	0	0%	6	100%
Hughesville Borough	9	0	0%	0	0%	9	100%
Jackson Township	1	1	100%	0	0%	0	0%
Jersey Shore Borough	17	1	6%	9	53%	17	100%
Jordan Township	4	0	0%	0	0%	0	0%
Lewis Township	10	8	80%	0	0%	10	100%
Limestone Township	5	0	0%	0	0%	5	100%
Loyalsock Township	35	8	23%	8	23%	35	100%
Lycoming Township	1	1	100%	0	0%	1	100%
McHenry Township	4	0	0%	0	0%	0	0%
McIntyre Township	4	0	0%	0	0%	0	0%

Table 4.3.23-5 Critical Facilities Vulnerable to Transportation Incidents

MUNICIPALITY	TOTAL CRITICAL FACILITIES	FACILITIES WITHIN 0.25 MILES OF MAJOR HIGHWAY	PERCENT FACILITIES WITHIN 0.25 MILES OF MAJOR HIGHWAY	FACILITIES WITHIN 0.25 MILES OF ACTIVE RAIL LINE	PERCENT FACILITIES WITHIN 0.25 MILES OF ACTIVE RAIL LINE	FACILITIES WITHIN 5 MILES OF AIRPORT	PERCENT FACILITIES WITHIN 5 MILES OF AIRPORT
McNett Township	2	0	0%	0	0%	0	0%
Mifflin Township	4	0	0%	0	0%	4	100%
Mill Creek Township	4	0	0%	0	0%	0	0%
Montgomery Borough	4	0	0%	4	100%	4	100%
Montoursville Borough	17	1	6%	5	29%	17	100%
Moreland Township	5	0	0%	0	0%	0	0%
Muncy Borough	12	0	0%	1	8%	12	100%
Muncy Township	6	4	67%	0	0%	6	100%
Muncy Creek Township	12	10	83%	0	0%	12	100%
Nippenose Township	5	0	0%	4	80%	5	100%
Old Lycoming Township	8	7	88%	0	0%	8	100%
Penn Township	2	0	0%	0	0%	0	0%
Piatt Township	2	1	50%	1	50%	2	100%
Picture Rocks Borough	6	0	0%	0	0%	0	0%
Pine Township	2	0	0%	0	0%	0	0%
Plunketts Creek Township	5	0	0%	0	0%	0	0%
Porter Township	5	0	0%	0	0%	5	100%
Salladasburg Borough	1	0	0%	0	0%	1	100%
Shrewsbury Township	0	0	0%	0	0%	0	0%
South Williamsport Borough	18	5	28%	9	50%	18	100%
Susquehanna Township	4	0	0%	4	100%	0	0%
Upper Fairfield Township	5	0	0%	0	0%	2	40%
Washington Township	8	0	0%	0	0%	0	0%
Watson Township	1	0	0%	0	0%	1	100%
Williamsport, City of	74	29	39%	36	49%	74	100%

Table 4.3.23-5 Critical Facilities Vulnerable to Transportation Incidents

MUNICIPALITY	TOTAL CRITICAL FACILITIES	FACILITIES WITHIN 0.25 MILES OF MAJOR HIGHWAY	PERCENT FACILITIES WITHIN 0.25 MILES OF MAJOR HIGHWAY	FACILITIES WITHIN 0.25 MILES OF ACTIVE RAIL LINE	PERCENT FACILITIES WITHIN 0.25 MILES OF ACTIVE RAIL LINE	FACILITIES WITHIN 5 MILES OF AIRPORT	PERCENT FACILITIES WITHIN 5 MILES OF AIRPORT
Wolf Township	8	0	0%	0	0%	8	100%
Woodward Township	5	4	80%	5	100%	1	20%
TOTAL	388	85	22%	100	26%	299	77%

Table 4.3.23-6 Population Vulnerable to Transportation Incidents

MUNICIPALITY	ESTIMATED POPULATION	POPULATION WITHIN 0.25 MILES OF MAJOR HIGHWAY	PERCENT POPULATION WITHIN 0.25 MILES OF MAJOR HIGHWAY	POPULATION WITHIN 0.25 MILES OF ACTIVE RAIL LINE	PERCENT POPULATION WITHIN 0.25 MILES OF ACTIVE RAIL LINE	TOTAL POPULATION WITHIN 5 MILES OF AIRPORT	PERCENT POPULATION WITHIN 5 MILES OF AIRPORT
Anthony Township	867	0	0%	0	0%	87	10%
Armstrong Township	686	95	14%	46	7%	686	100%
Bastress Township	527	0	0%	0	0%	247	47%
Brady Township	501	10	2%	0	0%	501	100%
Brown Township	93	0	0%	0	0%	0	0%
Cascade Township	422	0	0%	0	0%	418	99%
Clinton Township	3,720	45	1%	410	11%	3,720	100%
Cogan House Township	935	0	0%	0	0%	43	5%
Cummings Township	265	0	0%	0	0%	0	0%
Duboistown Borough	1,200	0	0%	906	76%	1,200	100%
Eldred Township	1,997	0	0%	0	0%	763	38%

Table 4.3.23-6 Population Vulnerable to Transportation Incidents

MUNICIPALITY	ESTIMATED POPULATION	POPULATION WITHIN 0.25 MILES OF MAJOR HIGHWAY	PERCENT POPULATION WITHIN 0.25 MILES OF MAJOR HIGHWAY	POPULATION WITHIN 0.25 MILES OF ACTIVE RAIL LINE	PERCENT POPULATION WITHIN 0.25 MILES OF ACTIVE RAIL LINE	TOTAL POPULATION WITHIN 5 MILES OF AIRPORT	PERCENT POPULATION WITHIN 5 MILES OF AIRPORT
Fairfield Township	2,834	268	9%	505	18%	2,825	100%
Franklin Township	903	0	0%	0	0%	0	0%
Gamble Township	778	0	0%	0	0%	756	97%
Hepburn Township	2,578	267	10%	0	0%	2,578	100%
Hughesville Borough	2,154	414	19%	0	0%	2,154	100%
Jackson Township	396	91	23%	0	0%	0	0%
Jersey Shore Borough	4,166	912	22%	2,192	53%	4,166	100%
Jordan Township	850	0	0%	0	0%	0	0%
Lewis Township	862	361	42%	0	0%	832	97%
Limestone Township	1,966	0	0%	0	0%	1,805	92%
Loyalsock Township	11,561	780	7%	251	2%	11,561	100%
Lycoming Township	1,491	378	25%	0	0%	1,192	80%
McHenry Township	122	0	0%	0	0%	0	0%
McIntyre Township	461	0	0%	0	0%	115	25%
McNett Township	143	0	0%	0	0%	0	0%
Mifflin Township	1,089	0	0%	0	0%	695	64%
Mill Creek Township	582	0	0%	0	0%	0	0%
Montgomery Borough	1,568	0	0%	1,347	86%	1,568	100%
Montoursville Borough	4,750	833	18%	961	20%	4,750	100%
Moreland Township	1,015	0	0%	0	0%	117	12%
Muncy Borough	2,440	0	0%	64	3%	2,440	100%
Muncy Township	3,573	633	18%	187	5%	3,573	100%
Muncy Creek Township	1,178	371	31%	60	5%	1,178	100%

Table 4.3.23-6 Population Vulnerable to Transportation Incidents

MUNICIPALITY	ESTIMATED POPULATION	POPULATION WITHIN 0.25 MILES OF MAJOR HIGHWAY	PERCENT POPULATION WITHIN 0.25 MILES OF MAJOR HIGHWAY	POPULATION WITHIN 0.25 MILES OF ACTIVE RAIL LINE	PERCENT POPULATION WITHIN 0.25 MILES OF ACTIVE RAIL LINE	TOTAL POPULATION WITHIN 5 MILES OF AIRPORT	PERCENT POPULATION WITHIN 5 MILES OF AIRPORT
Nippenose Township	661	0	0%	205	31%	661	100%
Old Lycoming Township	4,975	1,301	26%	0	0%	4,961	100%
Penn Township	895	38	4%	0	0%	2	0%
Piatt Township	1,047	240	23%	276	26%	1,047	100%
Picture Rocks Borough	643	164	26%	0	0%	141	22%
Pine Township	258	0	0%	0	0%	0	0%
Plunketts Creek Township	597	0	0%	0	0%	0	0%
Porter Township	1,528	352	23%	412	27%	1,528	100%
Salladasburg Borough	250	0	0%	0	0%	173	69%
Shrewsbury Township	418	126	30%	0	0%	0	0%
South Williamsport Borough	6,261	2,638	42%	2,921	47%	6,261	100%
Susquehanna Township	968	0	0%	177	18%	491	51%
Upper Fairfield Township	1,807	0	0%	0	0%	567	31%
Washington Township	1,768	0	0%	0	0%	563	32%
Watson Township	534	0	0%	0	0%	147	28%
Williamsport, City of	27,754	3,038	11%	6,209	22%	27,754	100%
Wolf Township	3,105	275	9%	0	0%	2,712	87%
Woodward Township	2,046	848	41%	444	22%	1,424	70%
TOTAL	114,188	14,478	13%	17,573	15%	98,402	86%

Table 4.3.23-7 Structures Vulnerable to Transportation Incidents Involving Highways								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER	RESIDENTIAL	UNKNOWN	TOTAL
Anthony Township	0	0	0	0	0	0	0	0
Armstrong Township	6	12	0	3	3	80	48	152
Bastress Township	0	0	0	0	0	0	0	0
Brady Township	2	2	0	1	0	11	7	23
Brown Township	0	0	0	0	0	0	0	0
Cascade Township	0	0	0	0	0	0	0	0
Clinton Township	7	18	4	6	1	65	20	121
Cogan House Township	8	4	0	1	0	11	4	28
Cummings Township	0	0	0	0	0	0	0	0
Duboistown Borough	0	1	0	0	0	0	0	1
Eldred Township	0	0	0	0	0	0	0	0
Fairfield Township	8	10	1	3	2	170	35	229
Franklin Township	0	0	0	0	0	0	0	0
Gamble Township	0	0	0	0	0	0	0	0
Hepburn Township	1	6	0	1	4	45	10	67
Hughesville Borough	0	13	1	18	0	184	25	241
Jackson Township	14	5	0	1	1	42	9	72
Jersey Shore Borough	0	31	1	18	4	263	53	370
Jordan Township	0	0	0	0	0	0	0	0
Lewis Township	9	11	0	7	2	168	41	238
Limestone Township	0	0	0	0	0	0	0	0
Loyalsock Township	2	114	7	34	7	189	169	522
Lycoming Township	7	4	1	1	3	144	33	193
McHenry Township	0	0	0	0	0	0	0	0
McIntyre Township	0	0	0	0	0	0	0	0
McNett Township	0	0	0	0	0	0	0	0

Table 4.3.23-7 Structures Vulnerable to Transportation Incidents Involving Highways								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER	RESIDENTIAL	UNKNOWN	TOTAL
Mifflin Township	0	0	0	0	0	0	0	0
Mill Creek Township	0	0	0	0	0	0	0	0
Montgomery Borough	0	0	0	0	0	0	0	0
Montoursville Borough	0	18	0	9	3	276	31	337
Moreland Township	0	0	0	0	0	0	0	0
Muncy Borough	0	0	0	0	0	0	0	0
Muncy Township	20	21	0	6	5	115	31	198
Muncy Creek Township	13	46	2	7	2	133	44	247
Nippenose Township	0	0	0	0	0	0	0	0
Old Lycoming Township	3	70	8	27	8	425	154	695
Penn Township	9	2	1	1	3	37	4	57
Piatt Township	16	11	4	5	4	111	32	183
Picture Rocks Borough	3	0	0	2	0	54	5	64
Pine Township	0	0	0	0	0	0	0	0
Plunketts Creek Township	0	0	0	0	0	0	0	0
Porter Township	5	13	0	2	3	197	17	237
Salladasburg Borough	0	0	0	0	0	0	0	0
Shrewsbury Township	10	6	1	5	5	68	11	106
South Williamsport Borough	0	63	5	27	14	872	222	1,203
Susquehanna Township	0	0	0	0	0	0	0	0
Upper Fairfield Township	0	0	0	0	0	0	0	0
Washington Township	0	0	0	0	0	0	0	0
Watson Township	0	0	0	0	0	0	0	0
Williamsport, City of	0	309	31	96	19	784	400	1,639
Wolf Township	23	15	0	9	11	145	63	266
Woodward Township	16	34	2	6	4	436	124	622

Table 4.3.23-7 Structures Vulnerable to Transportation Incidents Involving Highways								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER	RESIDENTIAL	UNKNOWN	TOTAL
TOTAL	182	839	69	296	108	5,025	1,592	8,111

Table 4.3.23-8 Structures Vulnerable to Transportation Incidents Involving Rail								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER	RESIDENTIAL	UNKNOWN	TOTAL
Anthony Township	0	0	0	0	0	0	0	0
Armstrong Township	4	1	4	1	4	63	10	87
Bastress Township	0	0	0	0	0	0	0	0
Brady Township	0	0	0	0	0	0	0	0
Brown Township	0	0	0	0	0	0	0	0
Cascade Township	0	0	0	0	0	0	0	0
Clinton Township	16	15	9	6	7	176	46	275
Cogan House Township	0	0	0	0	0	0	0	0
Cummings Township	0	0	0	0	0	0	0	0
Duboistown Borough	0	22	0	8	1	360	30	421
Eldred Township	0	0	0	0	0	0	0	0
Fairfield Township	5	1	1	0	14	90	6	117
Franklin Township	0	0	0	0	0	0	0	0
Gamble Township	0	0	0	0	0	0	0	0
Hepburn Township	0	0	0	0	0	0	0	0
Hughesville Borough	0	0	0	0	0	0	0	0

Table 4.3.23-8 Structures Vulnerable to Transportation Incidents Involving Rail								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER	RESIDENTIAL	UNKNOWN	TOTAL
Jackson Township	0	0	0	0	0	0	0	0
Jersey Shore Borough	0	59	1	32	7	667	107	873
Jordan Township	0	0	0	0	0	0	0	0
Lewis Township	0	0	0	0	0	0	0	0
Limestone Township	0	0	0	0	0	0	0	0
Loyalsock Township	0	88	6	25	3	41	123	286
Lycoming Township	0	0	0	0	0	0	0	0
McHenry Township	0	0	0	0	0	0	0	0
McIntyre Township	0	0	0	0	0	0	0	0
McNett Township	0	0	0	0	0	0	0	0
Mifflin Township	0	0	0	0	0	0	0	0
Mill Creek Township	0	0	0	0	0	0	0	0
Montgomery Borough	1	47	6	29	4	417	89	593
Montoursville Borough	0	80	16	49	7	267	186	605
Moreland Township	0	0	0	0	0	0	0	0
Muncy Borough	0	1	2	0	0	38	4	45
Muncy Township	5	12	5	9	4	95	38	168
Muncy Creek Township	3	15	2	5	3	11	11	50
Nippenose Township	6	10	0	1	3	158	47	225
Old Lycoming Township	0	0	0	0	0	0	0	0
Penn Township	0	0	0	0	0	0	0	0
Piatt Township	12	10	4	5	2	108	39	180
Picture Rocks Borough	0	0	0	0	0	0	0	0
Pine Township	0	0	0	0	0	0	0	0
Plunketts Creek Township	0	0	0	0	0	0	0	0
Porter Township	3	6	0	2	2	172	11	196

Table 4.3.23-8 Structures Vulnerable to Transportation Incidents Involving Rail

MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER	RESIDENTIAL	UNKNOWN	TOTAL
Salladasburg Borough	0	0	0	0	0	0	0	0
Shrewsbury Township	0	0	0	0	0	0	0	0
South Williamsport Borough	2	83	10	40	11	1,008	240	1,394
Susquehanna Township	10	9	0	3	3	173	51	249
Upper Fairfield Township	0	0	0	0	0	0	0	0
Washington Township	0	0	0	0	0	0	0	0
Watson Township	0	0	0	0	0	0	0	0
Williamsport, City of	0	323	45	86	24	1,238	587	2,303
Wolf Township	0	0	0	0	0	0	0	0
Woodward Township	9	19	4	3	3	223	72	333
TOTAL	76	801	115	304	102	5,305	1,697	8,400

Table 4.3.23-9 Structures Vulnerable to Transportation Incidents Involving Airports

MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER	RESIDENTIAL	UNKNOWN	TOTAL
Anthony Township	16	1	0	0	1	9	4	31
Armstrong Township	44	18	5	4	11	237	109	428
Bastress Township	32	1	0	2	2	92	8	137
Brady Township	25	8	0	4	4	170	23	234
Brown Township	0	0	0	0	0	0	0	0
Cascade Township	116	3	0	0	9	125	62	315
Clinton Township	104	53	16	20	21	792	155	1,161

Table 4.3.23-9 Structures Vulnerable to Transportation Incidents Involving Airports								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER	RESIDENTIAL	UNKNOWN	TOTAL
Cogan House Township	7	1	0	0	0	4	24	36
Cummings Township	0	23	0	8	2	473	54	560
Duboistown Borough	0	0	0	0	0	0	0	0
Eldred Township	56	1	0	2	3	241	22	325
Fairfield Township	72	78	4	24	31	1,102	169	1,480
Franklin Township	0	0	0	0	0	0	0	0
Gamble Township	133	7	0	1	8	251	60	460
Hepburn Township	152	32	2	8	17	927	129	1,267
Hughesville Borough	0	78	3	59	3	701	129	973
Jackson Township	0	0	0	0	0	0	0	0
Jersey Shore Borough	0	129	4	78	19	1,323	239	1,792
Jordan Township	0	0	0	0	0	0	0	0
Lewis Township	65	18	2	8	12	371	137	613
Limestone Township	158	12	1	12	9	517	66	775
Loyalsock Township	133	241	10	80	95	3,724	888	5,171
Lycoming Township	61	16	1	9	15	450	79	631
McHenry Township	0	0	0	0	0	0	0	0
McIntyre Township	11	1	0	1	16	89	25	143
McNett Township	0	0	0	0	0	0	0	0
Mifflin Township	76	7	1	5	7	218	35	349
Mill Creek Township	1	0	0	0	0	0	0	1
Montgomery Borough	1	47	6	31	4	479	93	661
Montoursville Borough	0	126	17	61	13	1,770	314	2,301
Moreland Township	26	2	0	1	0	32	6	67
Muncy Borough	0	103	5	57	15	893	99	1,172
Muncy Township	118	88	8	36	19	1,341	222	1,832

Table 4.3.23-9 Structures Vulnerable to Transportation Incidents Involving Airports								
MUNICIPALITY	AGRICULTURE	COMMERCIAL	INDUSTRIAL	MIXED USE	OTHER	RESIDENTIAL	UNKNOWN	TOTAL
Muncy Creek Township	83	75	6	15	11	345	108	643
Nippenose Township	32	17	0	3	7	235	64	358
Old Lycoming Township	86	98	14	33	29	1,845	301	2,406
Penn Township	3	0	0	1	0	15	0	19
Piatt Township	75	17	4	11	5	347	77	536
Picture Rocks Borough	0	0	0	0	0	0	0	0
Pine Township	0	0	0	0	0	0	0	0
Plunketts Creek Township	5	1	0	0	3	89	10	108
Porter Township	44	23	5	3	8	569	46	698
Salladasburg Borough	3	3	0	9	0	59	15	89
Shrewsbury Township	0	0	0	0	0	0	0	0
South Williamsport Borough	3	123	12	51	26	2,224	403	2,842
Susquehanna Township	11	5	0	3	2	89	39	149
Upper Fairfield Township	61	9	0	2	14	207	24	317
Washington Township	36	0	0	3	0	169	13	221
Watson Township	30	2	0	0	0	24	11	67
Williamsport, City of	6	917	56	255	134	7,179	2,313	10,860
Wolf Township	100	39	3	14	18	1,009	179	1,362
Woodward Township	77	40	4	8	5	521	146	801
TOTAL	2,062	2,463	189	922	598	31,257	6,900	44,391

4.3.23.6. Equity in Vulnerable Communities

Lower-income communities may be at a higher risk of transportation incidents as infrastructure may be outdated or poorly maintained, increasing the risk of severe outcomes from transportation incidents. This includes Williamsport and Loyalsock Township as they have areas with the highest populations below the poverty level. Rural areas may also have disproportionate effects due to their secluded locations which could affect access to timely and effective emergency response services.

4.3.24. Utility Interruption



4.3.24.1. Location and Extent

Utility interruptions include any impairment of the functioning of telecommunication, gas, electric, water, or waste networks. Interruptions or outages occur because of geomagnetic storms, fuel or resources shortage, electromagnetic pulses, information technology failures, transmission facility or linear utility accident, and major energy, power, or utility failure. The focus of utility interruptions as a hazard lies in fuel, energy, or utility failure.

These kinds of interruptions rarely spontaneously occur on their own; this hazard is often secondary to other natural hazard events, particularly transportation incidents, lightning strikes, extreme heat or cold events, and coastal and winter storms. For example, severe thunderstorms or winter storms could bring down power lines and cause widespread disruptions in electricity service. Strong heat waves may result in rolling blackouts where power may not be available for an extended period. Local outages may be caused by traffic accidents or wind damage.

Utility interruptions in Lycoming County occur regularly but are usually small-scale, localized incidents. Utility interruptions are possible anywhere there is utility service. Table 4.3.24-1 lists the major utility companies in Lycoming County. Water authorities are listed and discussed in Section 4.3.1.

Table 4.3.24-1 Major Utility Companies in Lycoming County (Williamsport/Lycoming Chamber of Commerce, 2019)

COMPANY NAME	TYPE OF UTILITY
Pennsylvania Power & Light (PPL)	Electric
Comcast Cable	Telecom
Cricket Wireless at One-Stop	
Hans CedarDale Satellite	
Russell Cellular	
TCC Verizon Wireless	
Weaver Wireless Consultants	
UGI Utilities, Inc.	Gas
Superior Plus Energy Services	Oil

According to the 2023 5-year American Community Survey, in Lycoming County, 34.2% of housing units use gas as their heat source, followed by 22.3% of homes using fuel oil for heat, and 26.5% of homes using electric heat (U.S. Census Bureau, 2025). As a result, an interruption in any of those utilities could affect a significant number of residents. In addition, an increasing reliance on internet access and telecommunications could also impact a large number of residents at any given time.

4.3.24.2. Range and Magnitude

The most severe utility interruptions will be regional or widespread power and telecommunications outages. With the loss of power, electrically powered equipment and systems will not be operational. Examples may include lighting; HVAC and ancillary support equipment; communication (i.e. public address systems, telephone, computer servers, and peripherals); ventilation systems; fire and security systems; refrigerators, sterilizers, trash compactors, office equipment; and medical equipment. This can cause food spoilage, loss of heat or air conditions, basement flooding (sump pump failure), lack of light, loss of water (well pump failure), lack of phone service, or lack of internet service. These issues are often more of a nuisance than a hazard but can cause damage or harm depending on the population affected and the severity of the outage.

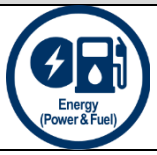
The severity of a utility interruption can be compounded with extreme weather events, especially winter weather events. Interruptions can also be more severe for special needs populations that are dependent on electronic medical equipment. Utility interruptions can significantly hamper first responders in their efforts to provide aid in a compound disaster situation, especially with losses of telecommunications and wireless capabilities. Telecommunications interruptions will also hinder first responders' efforts. Additionally, an internet outage could be crippling to the economy, as many companies and government entities process payments and invoices electronically rather than with physical checks.

In a possible worst-case scenario, a winter storm event causes widespread power outages, leaving citizens without heat in the midst of subzero temperatures. The power outage also means that elderly populations or others at risk of health problems due to the lack of heat are unable to call for assistance or leave their homes. Power lines are unable to be repaired because of the magnitude of the storm, and the power outage lasts for several days.

The potential impacts of utility interruption on the community lifelines are as follows:

Table 4.3.24-2 Most Likely Lifelines Impacted by Utility Interruption

LIFELINES	NOTES
	Government facilities may be impacted directly and the capability to administer services diminished.
	Water and electrical utilities in homes and potentially different aspects of the food supply chain will be impacted.
	Healthcare facilities may be impacted directly and therefore the capacity to deal with patients is diminished.

Table 4.3.24-2 Most Likely Lifelines Impacted by Utility Interruption	
LIFELINES	NOTES
	Fuel usage may increase as a result of electricity no longer being available for an extended period of time.

4.3.24.3. Past Occurrence

Power outages in Lycoming County have been caused by winter storms, wind, vehicle incidents, and other factors. Utility interruptions are largely minor, routine events, but there have been Presidential and Gubernatorial Disaster Declarations in which a utility interruption was a major component of a disaster. For example, the nation's gas shortage coupled with severe winter weather in January 1977 led to a President's Declaration of Emergency. Additionally, Hurricane Sandy caused widespread power outages and infrastructural damage in October 2012, leading to a Presidential Disaster Declaration.

In March 2014, there was an outage (caused by a tractor trailer knocking down several power lines) that affected 2,000 people in Lycoming County (Krize, 2014). A more recent example would be in March 2023 when wind gusts caused downed electrical wires in the Greater Williamsport area. There were 1,400 active outages reported to PPL as a result (Williamsport Sun-Gazette, 2023). Furthermore, severe storms swept through Northeastern Pennsylvania on July 15th, 2024, causing damage and power outages. Lycoming County was one of the regions hit by this storm, resulting in 4,678 homes and businesses without power (WNEP Web Staff, 2024). Power outages are not an unusual occurrence, and can often be exacerbated in rural areas, because several "downed" lines can affect a large number of people.

4.3.24.4. Future Occurrence

Utility interruptions will continue to occur annually with minimal impact. Widespread utility interruption events usually occur approximately once every five years, usually as a secondary effect of an extreme weather event. These interruptions should be anticipated, and first responders should be prepared during severe weather events. Research by the National Oceanic and Atmospheric Administration (NOAA) suggests that climate change may cause more extreme storms in Pennsylvania (Frankson et. al., 2017).

Power outages can be expected at any time of year, on a nearly monthly basis. Iced power lines; falling tree limbs due to ice, wind, or lightning strikes; and vehicle incidents damaging power lines, or their support poles can all be reasons for power outages.

The region around Lycoming County is expected to see large increases in precipitation and numbers of very hot and very cold days (Climate Central, 2019). These factors can increase the occurrence of hazards such as flooding, hurricanes and tropical storms, landslides, tornados and windstorms, wildfires, and winter storms. Impacts from any of these hazards can lead to

utility interruption on a range of scales. Overall, the future probability of utility interruptions can be considered *highly likely* according to the Risk Factor Methodology (See Table 4.4-1).

Aging infrastructure also brings risk in the form of potential utility interruptions, particularly for places like Lycoming County with aging infrastructure. In many utility systems, significant portions of the equipment and facilities date from the growth periods of the 1950s and 1960s that followed World War II. As this equipment ages, it deteriorates from the constant wear and tear of service. Eventually the equipment reaches a point at which it will either fail on its own or as a result of outside forces (storms, loads it was designed to handle but no longer can, etc.). These failures cause service interruptions and can require expensive emergency repairs. In addition, as repairs have taken place along transmission routes, there is often a mix of new and old equipment along the line, as repair and is generally the choice made to resolve an issue, over a replacement. For example, from 2013 to 2016, PP&L invested nearly $3 million on upgrades to local utility equipment and facilities to modernize its system and enhance reliability. These included rebuilding an underground electric vault in downtown Williamsport and replacing automated equipment at its South Williamsport substation (PPL, 2013). Municipalities still expressed increased concerns for utility interruptions throughout the planning process. Continual upgrades are needed to reduce power outages, especially in more rural areas of the county.

The wholesale replacement of a system is not a feasible solution for utility companies. This would require the interruption of services while the replacement occurs, as well as accessing the existing system (which may lay under roads, private property, or other inconvenient places). Utility companies face the challenge of managing the issue of the aging infrastructure. They are tasked with reducing the effects of aging equipment while also controlling the deterioration of the existing system as much as possible. This balance will be tenuous as transmission equipment continues to age and break down. These breakdowns will likely lead to more frequent utility disruptions as time goes by.

4.3.24.5. Vulnerability Assessment

All jurisdictions are vulnerable on some level to utility interruptions, but because this hazard often occurs in conjunction with other hazards, jurisdictions that have been identified as more vulnerable to winter storms, windstorms, tornado, flooding, and other natural hazard events may be more vulnerable to a utility interruption.

Emergency medical facilities, including retirement homes and senior centers are particularly vulnerable to power outages. While back-up power generators are often used at these facilities, loss of electricity may result in hot or cold temperatures for which elderly populations are particularly vulnerable. Appendix D provides a list of where those facilities are located in Lycoming County. The County checks on its special need's populations during times of extended power outage. Conservation and improved technology have resulted in more efficient use of energy sources. The increasing use of alternative fuel supplies, such as kerosene heaters, wood burning stoves, coal burners, etc., has also decreased our vulnerability to future

shortages. However, severe weather extremes, accidents, labor strikes, terrorism, or nationwide shortages could cause significant energy shortage problems.

4.3.24.6. Equity in Vulnerable Communities

Utility interruptions can disproportionately affect vulnerable populations, including the elderly, individuals with disabilities, and those with chronic health issues who rely on electricity for medical equipment. Williamsport, Loyalsock Township, South Williamsport Borough, Old Lycoming Township, and Montoursville Borough may be particularly vulnerable due to their elderly and disabled populations. Adequate preparedness prioritizes these groups by ensuring that backup power systems, such as generators, are in place for facilities that house and serve these populations. Additionally, low-income communities often face challenges related to aging or poorly maintained infrastructure, which can increase the likelihood and duration of utility interruptions. Adequate mitigation should focus on improving infrastructure resilience.

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 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 planning team and other stakeholders involved in the hazard mitigation planning process. The RF system relies mainly on historical data, local knowledge, and consensus from the planning team 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 24 hazards profiled in the 2026 HMP 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. 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 summarizes each of the five categories used for calculating a RF for each hazard. According to the weighting scheme applied, the highest possible RF value is 4.0. In addition to the RF, a column on climate change impacts was added to summarize the anticipated impacts on the frequency, intensity, and duration of each hazard due to climate change. This mirrors the analysis done in the latest state HMP. Climate change ratings reflect what was done in the state plan and include some considerations to findings that are specific to Lycoming County. More information can be found in hazard profiles.

Table 4.4-1 Summary of Risk Factor approach used to rank hazard risk

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, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?*	MINOR	Very few injuries, if any. Only minor property damage 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% and 10.9% of area affected.	2	
	MODERATE	Between 11% and 25% of area affected.	3	
	LARGE	Geater than 25% of area affected.	4	
WARNING TIME *Is there usually some lead time associated with the hazard event? Have warning measures been implemented?*	MORE THAN 24 HRS	Self-defined.	1	10%
	12 TO 24 HRS	Self-defined. *(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)*	2	
	6 TO 12 HRS	Self-defined.	3	
	LESS THAN 6 HRS	Self-defined.	4	

Table 4.4-1 Summary of Risk Factor approach used to rank hazard risk				
Risk Assessment Category	Degree of Risk			Weight Value
	Level	Criteria	Index	
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. *(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)*	3	
	MORE THAN 1 WEEK	Self-defined.	4	
CLIMATE CHANGE *How will climate change impact the other 5 ratings for the hazard?*	NEGATIVE IMPACT	Expected to increase risks	↑	N/A
	POTENTIAL NEGATIVE	Potential to increase risks.	↔	
	LITTLE TO NO IMPACT	No impact or small risk increase through indirect means.	↔	
	POSITIVE IMPACT	Risk expected to decrease.	↓	

4.4.2. Ranking Results

Using the methodology described in Section 4.4.1, Table 4.4-2 lists the Risk Factor calculated for each of the 24 hazards identified in the 2026 HMP Update. Hazards identified as *high* risk have risk factors of 2.5. or greater. Risk Factors ranging from 2.0 to 2.4 were deemed *moderate* risk hazards. Hazards with Risk Factors 1.9 and less are considered *low* risk. Climate change rankings are based on analysis throughout the plan and findings from the 2023 State Hazard Mitigation Plan.

Table 4.4-2 Ranking of hazard types based on Risk Factor methodology.								
HAZARD RISK	HAZARD NATURAL (N) or HUMAN-MADE (M)	RISK ASSESSMENT CATEGORY						RISK FACTOR
		PROBABILITY (1-4)	IMPACT (1-4)	SPATIAL EXTENT (1-4)	WARNING TIME (1-4)	DURATION (1-4)	CLIMATE CHANGE	
HIGH	Flood, Flash Flood, Ice Jam (N)	4	3	3	2	3	↑	3.2
	Transportation Incident (M)	4	3	1	4	1	↔	2.8
	Winter Storm (N)	3	2	4	2	2	↔	2.7
	Wildfire (N)	3	3	1	4	3	↑	2.7

Table 4.4-2 Ranking of hazard types based on Risk Factor methodology.

HAZARD RISK	HAZARD NATURAL (N) or HUMAN-MADE (M)	RISK ASSESSMENT CATEGORY						RISK FACTOR
		PROBABILITY (1-4)	IMPACT (1-4)	SPATIAL EXTENT (1-4)	WARNING TIME (1-4)	DURATION (1-4)	CLIMATE CHANGE	
	Utility Interruption (M)	4	2	1	4	2	↑	2.6
MODERATE	Tornado, Windstorm (N)	3	3	1	3	1	↔	2.4
	Drought (N)	2	2	3	1	4	↑	2.3
	Extreme Temperatures (N)	3	2	2	1	3	↑	2.3
	EH: Hazardous Materials Release	3	2	1	4	2	↔	2.3
	Nuclear Incident (M)	1	2	2	4	4	↔	2.1
	Pandemic (N)	1	2	4	1	3	↔	2.1
	EH: Conventional Oil and Gas Wells (M)	2	2	1	4	2	↔	2.0
	EH: Gas and Oil Pipeline (M)	2	2	1	4	2	↔	2.0
	EH: Unconventional Oil and Gas Wells (M)	2	2	1	4	2	↔	2.0
	Dam Failure (M)	1	3	1	4	2	↑	2.0
LOW	Terrorism	1	3	1	4	1	↔	1.8
	Radon (N)	2	1	2	1	4	↔	1.8
	Landslide (N)	2	2	1	3	1	↑	1.8
	Earthquake (N)	1	1	3	4	1	↔	1.7
	Hailstorm (N)	2	1	2	3	1	↔	1.7
	Invasive Species (N)	3	1	1	2	1	↔	1.7
	Disorientation (M)	2	1	1	4	2	↔	1.7
	Levee Failure (M)	1	2	1	4	1	↔	1.6
	Subsidence, Sinkhole (N)	1	1	1	4	1	↔	1.3

Based on these results, there are four *high* risk hazards, eleven *moderate* risk hazards and nine *low* risk hazards in Lycoming County. Mitigation actions were developed for all high, moderate, and low risk hazards (see Section 6.4). There were four hazards that increased in Risk Factor and one that decreased after consulting with participants and reviewing data. Transportation

Incidents and Wildfire saw the largest increases, due to their Impact ratings moving from 1 to 3. Transportation Incidents moved from a Moderate Risk hazard at 2.2 to a High Risk hazard at 2.8. Wildfire made a similar move from 2.1 to 2.7. Tornado, Windstorm jumped from 1.96 to 2.4, driven by its Probability and Impact ratings moving from 2 to 3. The fourth hazard to increase was Terrorism, which went from a 1.6 to 1.8 rating due to an Impact increase from 2 to 3.

Winter Storm was the only hazard to decrease in rating, with its Probability dropping from 4 to 3 after discussions with municipalities indicated they have experienced this hazard less in recent years.

A risk assessment result for the entire county does not mean that each municipality has the same risk to each hazard. Municipalities completed a *Hazard Risk Assessment Survey* during the planning process evaluate their jurisdictional risk to each hazard. Results from these surveys were reassessed by the HMPT, and the update risk assessment was used to complete Table 4.4-3 which shows the different municipalities in Lycoming County and whether their risk is greater than (>), less than (<), or equal to (=) the risk factor assigned to the county as a whole. Overall, the most prominent shifts reported in hazards since the 2020 HMP update were a decrease in the frequency of winter storms and an increase in the frequency of windstorms that cause utility interruptions. An increase in the perceived threat of terrorism was also reported. Finally, a hazard profile about invasive species was added due to recommendations from in person engagement.

Table 4.4-3 Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk

JURISDICTION	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR																					
	FLOOD, FLASH FLOOD, ICE JAM (N)	TRANSPORTATION INCIDENTS (M)	WINTER STORM (N)	WILDFIRE (N)	UTILITY INTERRUPTION (M)	TORNADO, WINDSTORM (N)	DROUGHT (N)	EXTREME TEMPERATURES (N)	EH: HAZARDOUS MATERIALS RELEASE (M)	NUCLEAR INCIDENTS (M)	PANDEMIC (N)	EH: CONVENTIONAL OIL AND GAS WELLS (M)	EH: GAS AND OIL PIPELINES (M)	EH: UNCONVENTIONAL OIL AND GAS WELLS (M)	DAM FAILURE (M)	TERRORISM (M)	RADON (N)	LANDSLIDE (N)	EARTHQUAKE (N)	HAILSTORM (N)	INVASIVE SPECIES (N)	DISORIENTATION (M)	LEVEE FAILURE (M)	SUBSIDENCE, SINKHOLE (N)
	3.2	*2.8*	*2.7*	*2.7*	*2.6*	*2.4*	*2.3*	*2.3*	*2.3*	*2.1*	*2.1*	*2*	*2*	*2*	*2*	*1.8*	*1.8*	*1.8*	*1.7*	*1.7*	*1.7*	*1.7*	*1.6*	*1.3*
Anthony Township	=	=	=	=	=	=	=	=	=	<	=	<	=	>	=	=	>	=	=	=	=	=	<	<
Armstrong Township	=	=	=	>	=	=	=	=	=	=	=	<	=	<	>	=	=	=	=	=	=	=	<	=
Bastress Township	<	=	=	=	=	=	=	=	=	=	=	<	<	<	<	=	=	=	=	=	=	=	<	<
Brady Township	=	=	=	>	=	=	=	=	=	=	=	<	=	<	=	=	=	<	=	=	=	=	<	=
Brown Township	=	<	=	>	=	=	>	=	=	<	=	<	<	<	<	=	>	=	>	=	>	=	<	<
Cascade Township	>	<	=	>	>	=	=	=	=	=	=	>	=	>	<	=	<	<	=	=	>	=	<	<
Clinton Township	=	=	=	>	=	=	=	=	>	=	=	<	=	<	=	>	=	<	=	=	=	=	<	=
Cogan House Township	=	<	=	=	=	=	>	=	=	<	>	>	<	>	<	=	<	=	=	=	=	=	<	<
Cummings Township	=	<	=	>	=	=	>	=	=	<	=	>	=	>	>	=	=	=	>	=	>	=	<	<
Duboistown Borough	=	=	=	>	=	=	=	=	=	<	=	<	<	<	<	=	>	=	=	=	=	<	<	=
Eldred Township	=	=	=	>	=	=	=	=	=	=	=	<	=	<	>	=	=	=	=	=	=	=	<	<

Table 4.4-3 Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk

JURISDICTION	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR																						
	FLOOD, FLASH FLOOD, ICE JAM (N)	TRANSPORTATION INCIDENTS (M)	WINTER STORM (N)	WILDFIRE (N)	UTILITY INTERRUPTION (M)	TORNADO, WINDSTORM (N)	DROUGHT (N)	EXTREME TEMPERATURES (N)	EH: HAZARDOUS MATERIALS RELEASE (M)	NUCLEAR INCIDENTS (M)	PANDEMIC (N)	EH: CONVENTIONAL OIL AND GAS WELLS (M)	EH: GAS AND OIL PIPELINES (M)	EH: UNCONVENTIONAL OIL AND GAS WELLS (M)	DAM FAILURE (M)	TERRORISM (M)	RADON (N)	LANDSLIDE (N)	EARTHQUAKE (N)	HAILSTORM (N)	INVASIVE SPECIES (N)	DISORIENTATION (M)	LEVEE FAILURE (M)	SUBSIDENCE, SINKHOLE (N)
	3.2	*2.8*	*2.7*	*2.7*	*2.6*	*2.4*	*2.3*	*2.3*	*2.3*	*2.1*	*2.1*	*2*	*2*	*2*	*2*	*1.8*	*1.8*	*1.8*	*1.7*	*1.7*	*1.7*	*1.7*	*1.6*	*1.3*
Fairfield Township	=	>	=	>	=	>	=	=	=	=	=	=	=	=	<	=	=	<	=	=	=	=	<	=
Franklin Township	>	<	=	=	>	>	>	=	=	=	=	<	=	>	<	=	=	=	=	=	=	=	<	<
Gamble Township	=	=	=	>	=	=	=	=	=	=	=	=	=	<	>	=	=	=	=	=	=	=	<	<
Hepburn Township	>	=	=	=	>	>	>	=	=	=	=	=	<	>	=	=	=	=	=	=	=	=	<	<
Hughesville Borough	=	=	=	<	>	>	=	=	=	=	=	<	<	<	<	=	=	<	=	=	=	<	<	<
Jackson Township	=	=	=	=	=	=	=	=	=	<	=	=	<	>	<	=	=	<	=	=	=	=	<	<
Jersey Shore Borough	=	=	=	=	<	>	>	=	=	<	>	<	<	<	<	=	=	<	>	=	=	<	<	<
Jordan Township	=	<	=	=	=	=	=	=	=	=	=	<	=	<	<	=	=	<	=	=	=	=	<	<
Lewis Township	=	>	=	>	>	=	=	=	=	<	=	=	<	>	<	=	=	=	=	=	=	=	<	<
Limestone Township	=	<	=	>	=	=	=	=	=	=	=	<	<	<	>	=	=	<	=	=	=	=	<	>
Loyalsock Township	>	>	=	=	>	>	>	>	>	=	>	=	>	<	<	=	=	=	>	=	=	=	>	=
Lycoming Township	=	=	=	<	=	>	=	=	=	=	=	<	<	>	<	=	=	<	=	=	=	=	<	<

Table 4.4-3 Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk

JURISDICTION	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR																					
	FLOOD, FLASH FLOOD, ICE JAM (N)	TRANSPORTATION INCIDENTS (M)	WINTER STORM (N)	WILDFIRE (N)	UTILITY INTERRUPTION (M)	TORNADO, WINDSTORM (N)	DROUGHT (N)	EXTREME TEMPERATURES (N)	EH: HAZARDOUS MATERIALS RELEASE (M)	NUCLEAR INCIDENTS (M)	PANDEMIC (N)	EH: CONVENTIONAL OIL AND GAS WELLS (M)	EH: GAS AND OIL PIPELINES (M)	EH: UNCONVENTIONAL OIL AND GAS WELLS (M)	DAM FAILURE (M)	TERRORISM (M)	RADON (N)	LANDSLIDE (N)	EARTHQUAKE (N)	HAILSTORM (N)	INVASIVE SPECIES (N)	DISORIENTATION (M)	LEVEE FAILURE (M)	SUBSIDENCE, SINKHOLE (N)
	3.2	*2.8*	*2.7*	*2.7*	*2.6*	*2.4*	*2.3*	*2.3*	*2.3*	*2.1*	*2.1*	*2*	*2*	*2*	*2*	*1.8*	*1.8*	*1.8*	*1.7*	*1.7*	*1.7*	*1.7*	*1.6*	*1.3*
McHenry Township	=	>	=	>	=	=	>	=	=	<	=	>	<	>	<	>	>	=	>	=	>	=	<	<
McIntyre Township	=	<	=	>	=	=	=	=	=	=	=	=	=	>	>	=	=	=	=	=	=	=	=	<
McNett Township	=	<	=	>	=	=	=	=	=	=	=	=	=	>	<	=	=	=	=	=	=	=	<	<
Mifflin Township	=	=	=	=	>	>	=	=	=	<	=	=	=	>	<	=	>	=	=	=	=	=	<	<
Mill Creek Township	=	<	=	=	=	=	=	=	=	=	=	<	=	=	<	=	=	=	=	=	=	=	<	<
Montgomery Borough	=	=	=	=	=	=	=	=	=	=	=	<	<	<	<	=	=	=	=	=	=	<	<	<
Montoursville Borough	=	>	=	>	>	>	=	>	>	=	>	<	<	<	<	=	>	<	>	=	=	<	<	>
Moreland Township	=	<	=	<	=	=	=	=	=	=	=	<	<	=	<	=	>	<	=	=	=	=	<	<
Muncy Borough	=	=	=	=	=	=	=	=	>	=	=	<	<	<	<	=	>	<	=	=	>	<	<	>
Muncy Township	=	=	=	=	=	>	=	=	=	=	=	<	=	<	<	=	>	<	=	=	>	=	<	>
Muncy Creek Township	=	=	=	=	=	=	=	=	=	=	=	<	=	<	<	=	>	=	=	=	>	=	<	=

Table 4.4-3 Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk

JURISDICTION	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR																					
	FLOOD, FLASH FLOOD, ICE JAM (N)	TRANSPORTATION INCIDENTS (M)	WINTER STORM (N)	WILDFIRE (N)	UTILITY INTERRUPTION (M)	TORNADO, WINDSTORM (N)	DROUGHT (N)	EXTREME TEMPERATURES (N)	EH: HAZARDOUS MATERIALS RELEASE (M)	NUCLEAR INCIDENTS (M)	PANDEMIC (N)	EH: CONVENTIONAL OIL AND GAS WELLS (M)	EH: GAS AND OIL PIPELINES (M)	EH: UNCONVENTIONAL OIL AND GAS WELLS (M)	DAM FAILURE (M)	TERRORISM (M)	RADON (N)	LANDSLIDE (N)	EARTHQUAKE (N)	HAILSTORM (N)	INVASIVE SPECIES (N)	DISORIENTATION (M)	LEVEE FAILURE (M)	SUBSIDENCE, SINKHOLE (N)
	3.2	*2.8*	*2.7*	*2.7*	*2.6*	*2.4*	*2.3*	*2.3*	*2.3*	*2.1*	*2.1*	*2*	*2*	*2*	*2*	*1.8*	*1.8*	*1.8*	*1.7*	*1.7*	*1.7*	*1.7*	*1.6*	*1.3*
Nippenose Township	=	=	=	>	=	=	=	=	=	=	=	<	<	<	=	=	=	=	=	=	=	=	<	=
Old Lycoming Township	=	>	=	<	=	=	=	>	=	=	>	<	>	<	<	=	=	=	>	=	=	=	=	<
Penn Township	=	<	=	<	>	>	=	=	=	=	=	<	>	>	=	=	>	=	=	=	=	=	<	<
Piatt Township	=	=	=	=	=	=	=	=	=	<	=	<	=	<	<	=	=	=	=	=	=	=	<	=
Picture Rocks Borough	>	=	=	<	=	=	=	=	=	=	=	<	>	<	=	=	>	=	=	=	>	<	<	<
Pine Township	=	<	=	>	<	=	=	=	=	<	=	>	<	>	=	=	<	<	=	=	=	=	<	<
Plunketts Creek Township	=	<	=	>	=	=	=	=	=	=	=	=	<	>	=	=	=	=	=	=	=	=	<	<
Porter Township	=	>	=	=	=	>	=	=	=	<	>	<	<	<	<	=	=	=	=	=	=	=	<	=
Salladasburg Borough	=	=	=	<	=	=	=	=	=	<	=	<	<	<	<	=	=	<	=	=	=	<	<	<

Table 4.4-3 Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk

JURISDICTION	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR																						
	FLOOD, FLASH FLOOD, ICE JAM (N)	TRANSPORTATION INCIDENTS (M)	WINTER STORM (N)	WILDFIRE (N)	UTILITY INTERRUPTION (M)	TORNADO, WINDSTORM (N)	DROUGHT (N)	EXTREME TEMPERATURES (N)	EH: HAZARDOUS MATERIALS RELEASE (M)	NUCLEAR INCIDENTS (M)	PANDEMIC (N)	EH: CONVENTIONAL OIL AND GAS WELLS (M)	EH: GAS AND OIL PIPELINES (M)	EH: UNCONVENTIONAL OIL AND GAS WELLS (M)	DAM FAILURE (M)	TERRORISM (M)	RADON (N)	LANDSLIDE (N)	EARTHQUAKE (N)	HAILSTORM (N)	INVASIVE SPECIES (N)	DISORIENTATION (M)	LEVEE FAILURE (M)	SUBSIDENCE, SINKHOLE (N)
	3.2	*2.8*	*2.7*	*2.7*	*2.6*	*2.4*	*2.3*	*2.3*	*2.3*	*2.1*	*2.1*	*2*	*2*	*2*	*2*	*1.8*	*1.8*	*1.8*	*1.7*	*1.7*	*1.7*	*1.7*	*1.6*	*1.3*
Shrewsbury Township	=	<	=	=	=	=	=	=	=	=	=	<	<	>	=	=	=	<	=	=	=	=	<	<
South Williamsport	=	>	=	=	=	=	<	>	=	=	>	<	<	<	=	>	>	=	>	=	>	<	>	>
Susquehanna Township	=	=	=	>	=	=	=	=	=	=	=	<	<	<	<	=	=	=	=	=	=	=	<	>
Upper Fairfield Township	=	=	=	=	=	=	>	=	=	=	=	>	=	=	<	=	>	=	=	=	=	=	<	<
Washington Township	=	<	=	>	=	=	=	=	=	=	=	<	<	<	<	=	=	<	=	=	=	=	<	>
Watson Township	=	<	=	>	=	=	>	=	=	<	=	<	=	>	<	=	>	=	>	>	>	=	<	=
Williamsport, City of	>	>	>	>	=	>	=	>	>	=	>	<	<	<	=	>	>	=	>	=	>	<	>	=
Wolf Township	=	=	=	=	>	>	=	<	>	=	=	<	=	=	<	=	=	=	=	=	=	=	<	<
Woodward Township	=	=	=	=	=	>	>	<	>	<	=	<	=	<	<	=	>	=	=	=	=	=	<	<

Table 4.4-3 Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk

JURISDICTION	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR																						
	FLOOD, FLASH FLOOD, ICE JAM (N)	TRANSPORTATION INCIDENTS (M)	WINTER STORM (N)	WILDFIRE (N)	UTILITY INTERRUPTION (M)	TORNADO, WINDSTORM (N)	DROUGHT (N)	EXTREME TEMPERATURES (N)	EH: HAZARDOUS MATERIALS RELEASE (M)	NUCLEAR INCIDENTS (M)	PANDEMIC (N)	EH: CONVENTIONAL OIL AND GAS WELLS (M)	EH: GAS AND OIL PIPELINES (M)	EH: UNCONVENTIONAL OIL AND GAS WELLS (M)	DAM FAILURE (M)	TERRORISM (M)	RADON (N)	LANDSLIDE (N)	EARTHQUAKE (N)	HAILSTORM (N)	INVASIVE SPECIES (N)	DISORIENTATION (M)	LEVEE FAILURE (M)	SUBSIDENCE, SINKHOLE (N)
	3.2	*2.8*	*2.7*	*2.7*	*2.6*	*2.4*	*2.3*	*2.3*	*2.3*	*2.1*	*2.1*	*2*	*2*	*2*	*2*	*1.8*	*1.8*	*1.8*	*1.7*	*1.7*	*1.7*	*1.7*	*1.6*	*1.3*
River Valley Transit Authority	=	>	=	<	>	<	<	<	<	<	<	<	<	<	<	<	<	>	<	<	<	<	<	<

4.4.3. Potential Loss Estimates

Based on various kinds of available data, potential loss estimates were established for flood. Estimates provided in this section are based on Hazus version 6.1, geospatial analysis, and previous events. Estimates are considered *potential* in that they generally represent losses that could occur in a countywide hazard scenario. In events that are localized, losses may be lower, while regional events could yield higher losses.

Potential loss estimates have four basic components, including:

- Replacement Value: Current cost of returning an asset to its pre-damaged condition, using present-day cost of labor and materials.
- Content Loss: Value of building's contents, typically measured as a percentage of the building replacement value.
- Functional Loss: The value of a building's use or function that would be lost if it were damaged or closed.
- Displacement Cost: The dollar amount required for relocation of the function (business or service) to another structure following a hazard event.

This plan employed an enhanced Hazus analysis for floods. As opposed to basic analysis using only default data, enhanced analysis incorporates more recent, up-to-date, or specific data for inclusion in the hazard models. The enhanced data incorporated into this Plan Update include:

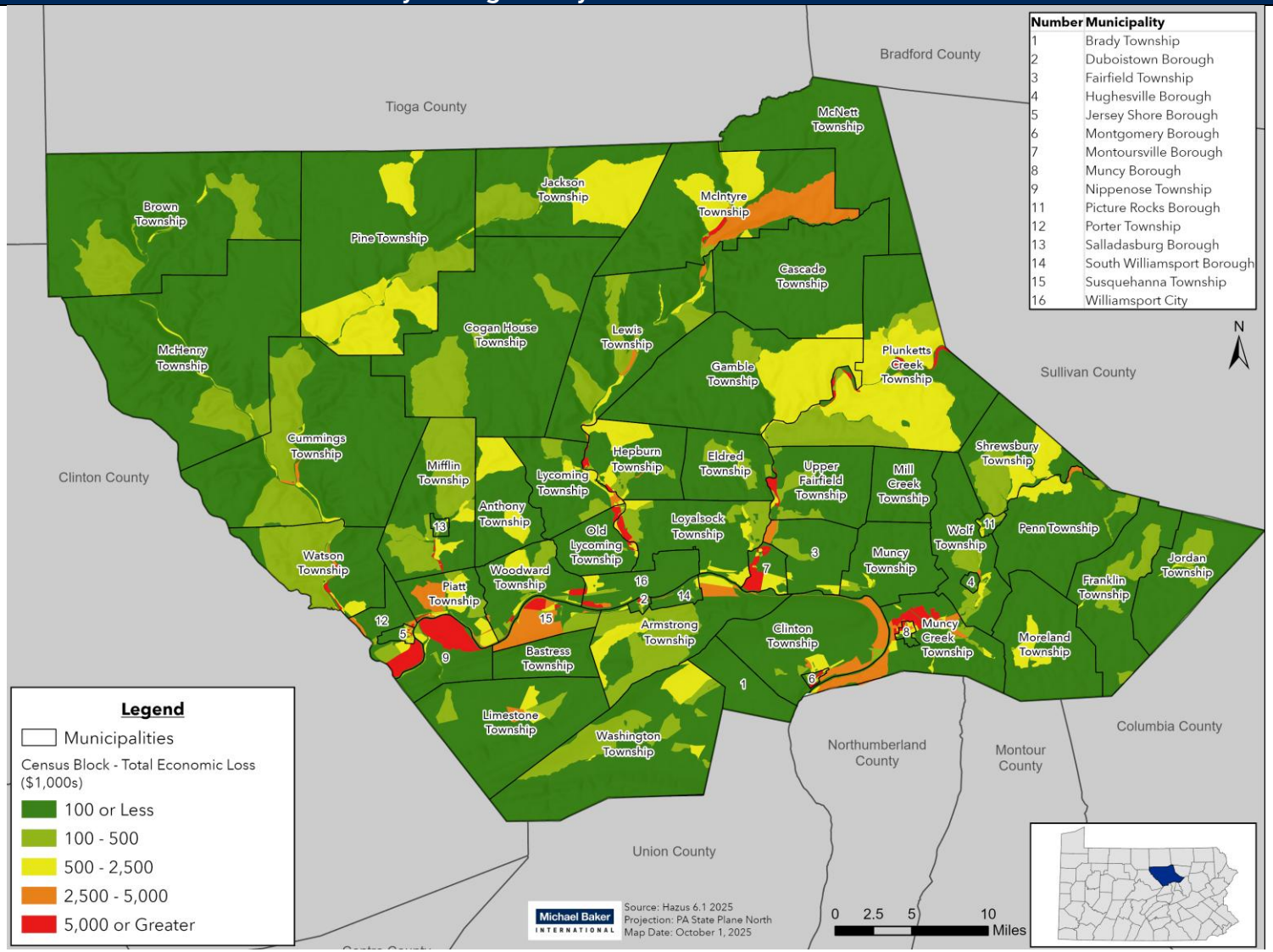
- Updated demographic data from the 2020 Census.
- Updated essential facilities data from the county and other sources.

Using these datasets in Hazus, total building-related losses from a 1%-annual-chance flood in Lycoming County are estimated to equal $921.09 million. Residential occupancies make up 23.2% of the total estimated building-related losses. Damages would be most significant along the Susquehanna River floodway, where most of the vulnerable buildings are located. Total economic loss, including replacement value, content loss, functional loss and displacement cost, from a countywide 1%-annual-chance flood are estimated to equal $1.582 billion. This scenario estimates that about 1,043 buildings will be at least moderately damaged. This is over 70% of the total number of buildings in the scenario. There are an estimated 141 buildings that will be completely destroyed.

In addition, an estimated 2,822 households would be displaced, and 634 people would require temporary shelter. Essential facilities would largely remain undamaged in this scenario, but one fire station, two police stations, and four emergency operations centers are estimated to have at least moderate damage, all of which would experience loss of use. For more details on the Hazus methodology used and additional results reports, see Appendix G.

Below, Figure 4.4.3-1 shows Hazus modeled potential flood losses in Lycoming County. This model is consistent with other data found for flood risk in the county. The greatest losses are expected to be found in areas along the Susquehanna River. However, due to the topography of Lycoming County, flood losses can be expected in nearly every municipality.

Figure 4.4-1 Hazus Modeled Flood Loss in Lycoming County



4.4.4. Future Development and Vulnerability

Risk and vulnerability to natural 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. Lycoming 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 is a main indicator of vulnerability change in Lycoming County. As discussed in Section 2.3, the total population of Lycoming County is estimated to have decreased by 2.6 percent from 2013-2023, indicating the overall population of the county has decreased. This trend is expected to continue as census-based projections estimate an over 1.6% decrease in the population from 2020 to 2050 (Center for Rural Pennsylvania, 2023). The observed decline from 2013-2023 saw 21 municipalities increased in population while 27 decreased. This shows that despite an overall decline in population, there are areas of the county that will experience increases that may impact their vulnerability. Areas of higher density, in the larger municipalities and growing municipalities, face increased vulnerability and increased exposed structures with most hazard events. Larger populations result in increased vulnerability to hazards such as wildfires, floods, and winter storms as more people will be impacted.

Roughly twenty percent of Lycoming County's population is over the age of 65. Older residents pose unique challenges when it comes to evacuation and/or mobility during the rescue and recovery processes that typically occur in the case of a hazard event. Officials may consider partnering with human services organizations to specifically plan for this vulnerable population.

Section 2.5 discusses plans for future development in Lycoming County's Comprehensive Plan. Most of the county's growth is confined to areas along the Susquehanna River. The rest of the county is rural and is planned to remain that way.

The rural nature of the county impacts vulnerability because remote and sparsely populated municipalities also face higher vulnerability to certain hazards because they may not have as easy access to care facilities or response personnel. For instance, the less populated municipalities such as Brown Township, McHenry Township, and McNett Township face increased vulnerability to winter storms and wildfires due to isolation, access issues, and longer emergency response times.

There is also a County Zoning and Subdivision Ordinance that many municipalities have chosen to adopt. Within this ordinance there are regulations for floodplain management that exceed federal standards. This ordinance is detailed in the Capability Assessment Section (5.2.1).

In 2023, Lycoming County completed a Long-Range Transportation Plan Update. Every five years, as required by federal law, the Lycoming County Department of Planning and Community Development updates the WATS MPO Long Range Transportation Plan (LRTP). The current LRTP was adopted December 4, 2023 (Lycoming County, 2023). The LRTP is required by federal law and regulations as part of statewide and metropolitan planning programs. It explores transportation system investment needs and outlines a strategy regarding how best to address the needs. The LRTP reported on the population decline in the county and also noted the aging

of the population and loss of youth population between 1970 and 2020. The integration of the LRTP with other planning mechanisms will influence future development in the county and its concentrated plan for growth. Accounting for an increase in mortality as the population ages and a steadily declining birthrate, the LRTP provides a scenario where the population declines 22% from 2020-2050 (Lycoming County, 2023). These demographic shifts need to be considered when planning for the future. Concentrating areas of growth may help to reduce isolation-based vulnerability of communities with few access routes, no municipal water supply, and low cell phone reception. On the other hand, higher densities mean that more people are likely to be impacted in a hazard event should it strike those more populated areas.

Lycoming County also has a Stormwater Management Plan that was developed in 2010 that focuses on encouraging best management practices that help enforce environmentally sensitive development and encourage development that will limit runoff. As of 2010 all 52 municipalities have adopted this plan. Encouraging better development practices in relation to stormwater management could help make communities less vulnerable to the impacts of flooding.

4.4.5. Community Survey

A community-wide survey was conducted to help understand the on-the-ground conditions and concerns of Lycoming County residents, therefore supporting the assessment of hazard risk and mitigation opportunities in the county. The survey asked respondents two types of questions: mitigation activities completed within the household and hazard concerns. Twenty-one county residents from fourteen municipalities took the survey.

Currently, 76% of respondents are homeowners and all have homeowner's insurance. Two-thirds of renters have rental insurance. However, when it comes to ensuring homes against any type of flooding, only 10% of individuals who responded to the survey have flood insurance, despite Lycoming County's significant vulnerability to flood risk. Other household preparedness and mitigation efforts included discussing what to do in the case of an emergency (65%), preparing a family emergency plan (35%), and put together or purchased an emergency kit (30%). However, 20% of respondents reported that they have done nothing to prepare for a potential hazard. This provides a good opportunity for public education training related to risk, mitigation, and preparedness with 70% of residents reporting they have some level of interest in attending a municipally led hazard mitigation-related event.

Respondents were asked about how informed they are when it comes to the most pressing hazards within Lycoming County, and over half (57%) are very informed and about a quarter (24%) said they were somewhat informed. About 19% stated that there is probably a lot they are not aware of or that they are not sure how informed they are. The top reported hazards of concern included flooding (85%), tornado and windstorm (67%), utility interruption (62%), winter storm (57%), and drought (43%). For information on preparedness and potential hazard risk, email (newsletter or new blasts) and social media are the most desired (71%).

5.CAPABILITY ASSESSMENT

5.1. UPDATE PROCESS SUMMARY

The purpose of the capability assessment is to identify strengths and weaknesses that will affect the ability of the county and participating jurisdictions to implement mitigation actions. It is important to perform a capability assessment to develop a comprehensive and implementable mitigation strategy. Capabilities include a variety of regulations, existing planning mechanisms, and administrative capabilities provided through established agencies or authorities.

The capability assessment has three main components:

1. Document Review - an inventory of the county's existing planning and regulatory tools and a review and incorporation of existing plans and other technical information as appropriate.
2. Discussion of participation in the National Flood Insurance Program.
3. Municipal Capability Assessment - an analysis of municipal capacity from a planning, policy, staffing, training, outreach, and political will standpoint.

Based on these components as well as the vulnerability analysis identified earlier in the plan, Lycoming County can assess its current resources and begin to utilize the legal, regulatory, administrative, financial, and other capabilities which it currently has at its disposal to address the potential hazards the county and its local municipalities are vulnerable to.

Lycoming County has several resources it can access to implement hazard mitigation initiatives including emergency response measures, local planning and regulatory tools, administrative assistance and technical expertise, fiscal capabilities, and participation in local, regional, state, and federal programs. The presence of these resources enables community resiliency through actions taken before, during, and after a hazard event.

For the 2026 HMP update, the county leveraged the FEMA Region 3 Capability Assessment Survey to get input from stakeholders. Like the 2015 and 2020 capability assessments, the survey asked about the common plans and programs; staff and personnel resources; and a self-assessment of capabilities. The Capability Assessment Survey was provided in both hard copy (at meetings) and electronic format (via e-mail and the project website) to each municipality. In addition, Lycoming County Department of Department of Public Safety identified county-level capabilities.

The capability assessment is a good tool to identify local capabilities and to recognize gaps and weaknesses that can be addressed through future mitigation actions. The results of the capability assessment provide useful information for developing an effective mitigation strategy.

Additionally, a number of documents have been reviewed as part of this Plan Update. Some reviews have been derived from the previous plans and updated where applicable. Additional documents have been identified and reviewed for the purpose of integration into other local planning mechanisms. Several plans and ordinances at the county and municipal level have

been reviewed and a summary with options to integrate the data, information, and hazard mitigation goals and actions into other planning mechanisms are included.

The mitigation strategy, including the goals and actions, is incorporated into relevant planning mechanisms based on their pertinence and relevance to specific plans and ordinances. For example, all appropriate structural projects should be included in the Capital Improvements Program. Land use and zoning related projects should be incorporated into the next update of the community comprehensive plans and/or zoning ordinances through collaboration with the County Department of Public Safety. Likewise, information from relevant planning documents was used to inform and update the HMP. A general list of relevant plans and documents and corresponding areas for incorporation are listed below:

Table 5.1-1 Relevant Departments and Documents

RELEVANT DOCUMENTS	HAZARD MITIGATION PLANNING ELEMENTS
Comprehensive Plan/Land Use Plan, Zoning/Subdivision Regulations, Floodplain Ordinance, Open Space Plan, Countywide Action Plan	Demographic data, land use, development trends, and floodplain management information
Stormwater Management Act 167 Plan, Long-Range Transportation Plan, Capital Improvement Plan	Stormwater management and infrastructure data and projects
Evacuation Plan, Emergency Operations/Response Plan, Continuity of Operations Plan	All-hazards information for evacuation, response and recovery
2020 Lycoming County Hazard Mitigation Plan	Mitigation progress and solutions

5.2. CAPABILITY ASSESSMENT FINDINGS

5.2.1. Planning and Regulatory Capability

Lycoming County and participating jurisdictions have several planning and regulatory tools in place to support the goals of hazard mitigation planning. Additionally, these regulations provide opportunities for further mitigating the potentially negative effects of natural hazards.

5.2.1.1. Plans and Regulations

The purpose of a plan/ordinance review as part of this planning process is to:

- Identify existing Commonwealth, regional/county, and municipal initiatives.
- Provide an inventory and review of sample plans and ordinances and identify sections in these documents that address hazard mitigation-related issues.
- Provide a platform to integrate plans and other documents so recommendations and strategies are not in contradiction with one another (e.g., between the HMP and comprehensive plan).

A review of updated and existing zoning and subdivision ordinances, comprehensive plans, open space and recreation plans, stormwater management plans, sediment and erosion control

plans, and emergency operations plans, among others, are summarized below by level of administration (Commonwealth, regional/county, and municipal).

COMMONWEALTH OF PENNSYLVANIA DOCUMENT REVIEW

- The 2023 Update of the **Pennsylvania State All-Hazard Mitigation Plan** includes goals and objectives that are applicable to this Lycoming County Plan Update including:
    - Protect lives, property, environmental quality, and resources of the Commonwealth, including high-risk properties.
    - Enhance consistent coordination, collaboration, and communications among stakeholders.
    - Provide a framework for active hazard mitigation planning and implementation.
    - Increase awareness, understanding, and preparedness across all sectors.

  Hazard identification and risk assessment data for Lycoming County has been incorporated into the appropriate sections of this Plan update from the 2023 PA All-Hazard Mitigation Plan.

- The **Uniform Construction Code (UCC)** is the statewide building code (Act 45 of 1999) that took effect in Pennsylvania in April of 2004. The UCC is mandated by the State for all municipalities in Pennsylvania and establishes minimum regulations for most new construction, including additions and renovations to existing structures. All new construction is required to meet the UCC requirements statewide. Recent changes to the act include Acts 35 and 36 of 2017. Act 35 provided exclusions for certain agricultural buildings. Act 36 resulted in a lot of changes, including requiring a re-review of the 2015 International Code Council, changing the makeup of the UCC Review and Advisory Council, changes to permitting fees, creating a local board of appeals, and establishing a six-month statute of limitations for permit submissions after updated building codes go into effect (Department of Labor and Industry, 2018). On October 26, 2022, the Commonwealth Court ruled that all enforcement of the 2021 accessibility standards must cease and revert to 2018 requirements.

- The **Commonwealth of Pennsylvania Governor's Executive Order 1999-1 (Land Use Planning)** provides the basis for the requirement to integrate hazard mitigation into comprehensive land use planning. As part of this executive order, the Interagency Land Use Team was established, comprising the following state agencies: Department of Agriculture; DCED; DCNR; DEP; Governor's Green Government Council; Fish and Boat Commission; Game Commission; Department of Transportation; and PEMA. One of the most significant outcomes of PEMA's participation on the team is the integration of hazard mitigation goals and objectives into the comprehensive land use planning process.

- The **Pennsylvania Erosion and Sediment Control Code** requires all earthmoving projects in the Commonwealth to develop an erosion and sediment pollution control plan to ensure that proper site development practices are employed for land development and implement best management practices for the control of sediment pollution during construction. PA DEP requires a National Pollution Discharge

Elimination System (NPDES) permit for earthmoving activities exceeding one acre. The permit addresses erosion and sediment pollution control during construction and also addresses post-construction stormwater management.

- **Act 165: Hazardous Materials Emergency Planning and Response Act**, amended in 2001, established a statewide hazardous materials safety program. This created the Hazardous Materials Response Fund, county Hazardous Material Emergency Response Accounts, and further provided duties to PEMA and the Pennsylvania Emergency Management Council. This Act requires facilities with extremely hazardous chemicals on site to create Off-site Emergency Response Plans, which are then presented to Local Emergency Planning Committees.

REGIONAL/COUNTY DOCUMENT REVIEW

The subsections below provide details on the types of major plans and ordinances that Lycoming County and local municipalities use to support the goals of this hazard mitigation plan and provide opportunities for further mitigating the potentially negative effects of natural hazards through regulation.

COMPREHENSIVE PLANS

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. Pennsylvania's Municipalities Planning Code (MPC) (Act 247 of 1968), as reauthorized and amended, requires counties to prepare and maintain a county comprehensive plan and to update it every 10 years. Local municipalities may prepare a comprehensive plan, though they are not required by the MPC.

Regarding hazard mitigation planning, Section 301(a)2 of the MPC requires comprehensive plans to include a plan for land use, which, among other provisions, suggests that the Plan consider 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 considering storm drainage and floodplain management.

Lycoming 2030: Plan the Possible; 2018 County Comprehensive Plan Update identified eight priority issues with most being related to hazard mitigation planning in some capacity. Specifically, the following priority issues can begin to be addressed through the HMP goals and mitigation actions:

- Priority #1: Infrastructure does not meet the needs of all areas of the county such as utilities.
- Priority #4: Flooding, the primary threat to life, properties, and communities through Lycoming County.
- Priority #5: Current land use regulations and enforcement do not consistently and adequately meet community visions and respond to changing conditions.
- Priority #7: Water quality is vital but is vulnerable to a multitude of threats.

- Priority #8: Drugs, particularly heroin and opioids, are creating significant social, economic, public health, and safety problems across the county.

The county, through collaboration with municipal officials, will continue to use zoning to concentrate and guide development within identified growth areas; restore natural floodplains through acquisition, demolition, and potential reconstruction; preserve open space, natural resources, and farmland; and coordinate land use development to provide for mixed use development and brownfield redevelopment. Lastly, related to floodplain management, the Lycoming 2030 incorporates the process to acquire properties in the floodplain, a mitigation action detailed in this HMP. The next comprehensive plan update is on the horizon and should be completed in time to be integrated into the next HMP update.

There are also six **multi-municipal regional plans** designed to address specific issues and characteristics of the following areas within the county: Muncy Creek (2017), Montoursville/Muncy (2017), US-220/I-99 (2017), US-15 (2017), Greater Williamsport Alliance (2017), and Lower Lycoming Creek (2017). These multi-municipal comprehensive plans account for 26 of the 52 municipalities. There have been no updates to these plans since the last HMP.

Similar to the county comprehensive plan, these regional plans focus on priority issues with overlap of the county plan such as drugs, flooding, water quality and stormwater infrastructure, multi-modal transportation systems such as the airport, and future land use regulations. Hazards such as floodplains and steep slopes were critical issues in all of these plans. Note that most municipalities cite the fragmentation of local government in Pennsylvania as a barrier to efficient delivery of public services and project execution. Planning processes should be used to bring municipalities together to share resources and ideas despite operating and governing individually.

All municipalities are covered, in some capacity, under one or more comprehensive plans adopted by the county. The following is a link to the comprehensive plans available via the county's home page:

http://www.lyco.org/dotnetnuke/Home/PlanningandCommunityDevelopment/ComprehensivePlans/tabid/310/Default.aspx.

TRANSPORTATION PLANS

The **WATS MPO** is the single county MPO that covers transportation planning in Lycoming County. WATS's **Long Range Transportation Plan 2023 – 2045** was approved in December 2023. The plan includes a demographic profile and information on land use, employment, natural resources, and transportation system resilience to flooding, landslides, and subsidence. Multimodal and public transportation system inventories are provided before introducing the strategic direction for WATS's long range transportation planning. The plan discusses the guidelines and process for planning and programming activities as well as the implementation and monitoring strategies. Short, medium, and long-term projects are presented along with estimated costs and fiscal constraints. These projects include bridges, highways, roads, safety improvements, airports, and more.

The **2024 Coordinated Public Transit – Human Services Transportation Plan** was developed in 2024 to adhere to federal funding regulations through the Enhanced Mobility for Individuals and Individuals with Disabilities (Section 5310) Program. The plan identifies the public transit needs of individuals with disabilities, older adults, and low-income individuals. It provides strategies for meeting those needs and priorities for securing funding. The plan was developed in partnership with SEDA Council of Governments MPO.

The WATS **Transportation Improvement Program (TIP)** is a collaborative effort with PennDOT, River Valley Transit, and STEP, Inc. to develop a priority list of transportation projects that should be undertaken during the next four fiscal years. These partners work together to identify funding sources for a range of highway, bridge, public transit, bicycle, and pedestrian projects. The 2025 - 2028 Transportation Improvement Plan is available at: https://www.lyco.org/WATS-MPO/TIP.

The **Unified Planning Work Program (UPWP)** is a collaborative effort that describes the transportation-related work activities that the Lycoming County Department of Planning and Community Development, WATS, and the River Valley Transit Authority will do together. The UPWP is developed as a 2-year program document that establishes the work that will be done in that timeframe. The program may be modified to respond to current issues or special needs. The current program years are 2025 – 2027.

The following is a link to more information on transportation planning in Lycoming County: https://www.lyco.org/WATS-MPO.

NATURAL RESOURCE PROTECTION PLANNING

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. Lycoming County adopted its **Recreation, Parks, and Open Space/Greenway Plan** in April 2008. The plan discusses how the county can protect the natural environment by managing woodlands, grasslands, and trails without sacrificing the economic goals of the community. Management of these areas requires balancing recreational uses with providing ecological safety for a number of species of plants and animals. It is recommended that the county update this plan to begin addressing the open space management issues identified in the 2018 Comprehensive Plan and goals and mitigation actions related to stormwater and natural systems protection.

The Lycoming County Municipal Separate Storm Sewer System (MS4) Coalition developed a **Chesapeake Bay Pollutant Reduction Plan (CBPRP)** in April 2015 as required by the Williamsport Area Joint MS4 NPDES Permit. The open space created through the hazard mitigation buyout program was listed as a priority best management practice (BMP) for consideration as riparian buffer restoration and/or tree planting activities moving forward as part of the MS4 permit. Riparian buffer restoration is an effective method of reducing water volume and pollutant discharge to waterways. Buffers create habitat, promote infiltration, and reduce pollution runoff by providing a minimum distance between the water resource and development. At open space restoration locations associated with the flood-prone property buyout program, riparian buffer restoration is recommended. These sites should be

investigated to determine the feasibility of revegetating the properties with native trees and shrubs.

Lycoming County developed a **Countywide Action Plan (CAP)** in 2020 as part of PA DEP's Phase III Watershed Implementation Plan for the Chesapeake Bay. The plan includes initiatives the county and its partners should take to achieve clean water goals, reduce nutrient loads, address flooding issues, and implement best management practices to receive credit. It is not a regulatory plan; it is entirely voluntary. The CAP not only provides a plan for future water management but also helps the county avoid potential additional regulations and promotes eligibility for funding programs.

Lycoming County developed the **Lycoming County Pennsylvania Water Supply Plan** in 2001. The purpose of this plan is to evaluate existing community water system capabilities, project future water needs, identify service deficiencies, evaluate alternative solution strategies and make recommendations to promote coordination and consistency with County and municipal planning efforts. There is an opportunity to update this plan to re-evaluate the actions identified in the plan and identify a plan based on current conditions and needs.

ZONING ORDINANCES

Zoning ordinances enable local municipalities to regulate the use of land to protect the interest and safety of the general public. In Pennsylvania, the MPC establishes authority for municipalities to zone. Zoning ordinances can be designed to address unique conditions or concerns within a given community but must be based in maintaining public health and safety in a community. They may be used to create buffers between structures and high-risk areas, limit the type or density of development, and/or require land development to consider specific hazard vulnerabilities.

Zoning ordinances contain both a map that delineates zoning districts and text documenting the regulations that apply in each zoning district. Lycoming County has adopted a county zoning ordinance that covers municipalities that do not have their own ordinance. The County Partnership Zoning Ordinance covers specifics relating to floodplain management, wind energy development, airport hazard areas, steep and severe slopes, carbonate geology, and woodland protection (wildfire prevention standards). All municipalities in Lycoming County have zoning ordinances.

The following municipalities participate in the county zoning partnership:

- Bastress Township.
- Brown Township.
- Cascade Township.
- Cogan House Township.
- Gamble Township.
- Jackson Township.
- Jordan Township.
- Lewis Township.
- Limestone Township.
- McHenry Township.
- McIntyre Township.
- McNett Township.
- Mifflin Township.
- Moreland Township.
- Penn Township.
- Pine Township.
- Plunketts Creek Township.
- Porter Township.
- Salladasburg Borough.

SUBDIVISION REGULATIONS

Subdivision and land development ordinances (SALDOs) are intended to regulate the development of housing, commercial, industrial, or other uses, including associated public infrastructure, as land is subdivided into buildable lots for sale or future development. Within these ordinances, guidelines on how land will be divided, the placement and size of roads and the location of infrastructure can reduce exposure of development to hazard events.

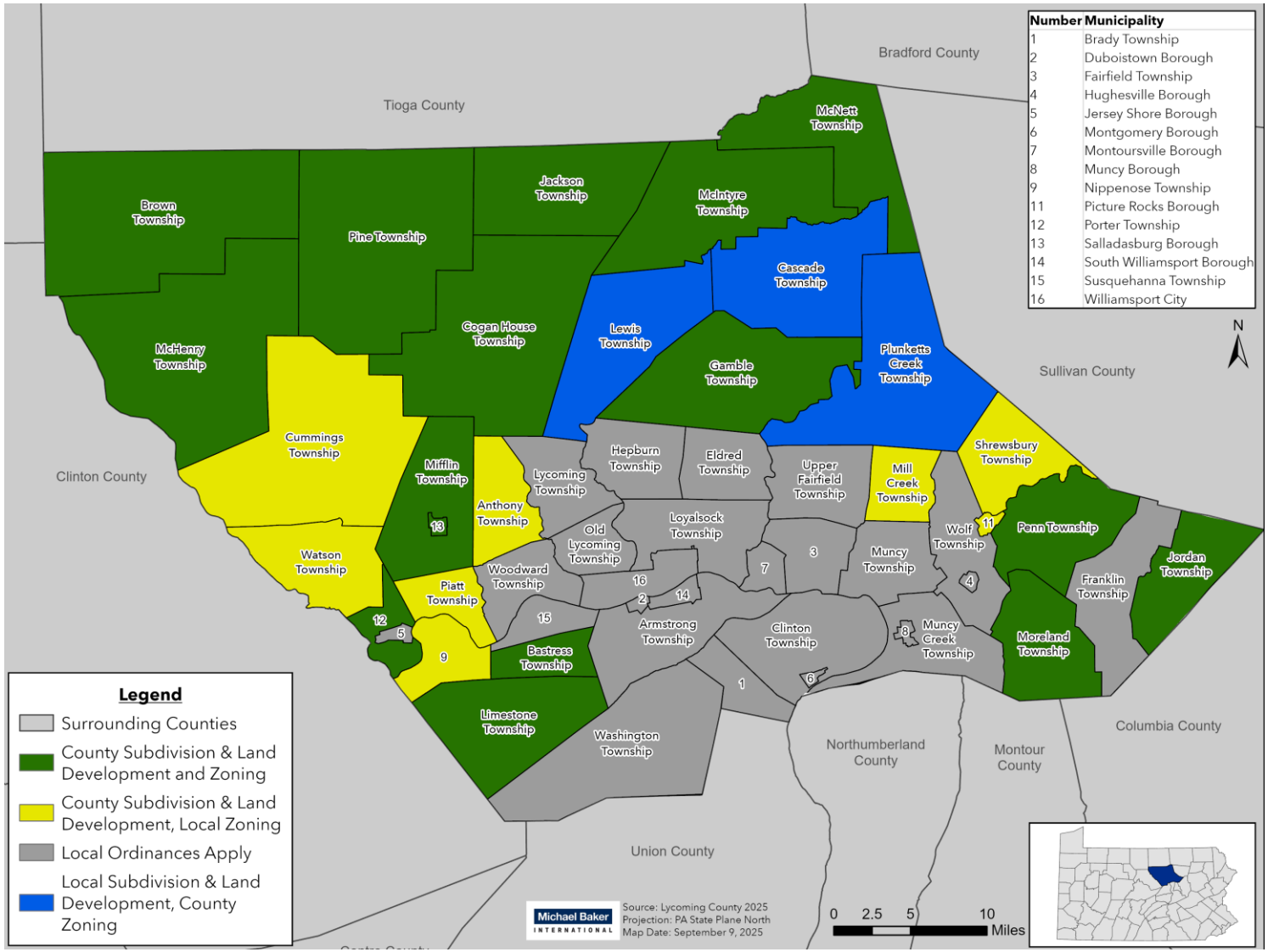
Article V of the MPC authorizes municipalities to prepare, enact, and enforce a SALDO, including regulations to control the layout of streets, minimum lot sizes, and the provision of utilities. The objectives of a SALDO are to do the following:

- 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 Lycoming 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 SALDO, plans must be submitted to the county Planning Commission for review, and the Planning Commission provides comments to the municipality within 30 days. All municipalities in Lycoming County have subdivision regulations. Figure 5.2-1 indicates which municipalities have their own zoning and subdivision ordinances, and which municipalities are covered by county ordinances.

Figure 5.2-1 Who administers subdivisions, land developments and zoning



FLOODPLAIN MANAGEMENT ORDINANCES

Municipalities can regulate construction in floodplains through floodplain ordinances and floodplain management plans. Floodplain management plans describe how the community will reduce the impact of flood events through preventive and corrective actions. Through administration of floodplain ordinances, municipalities can ensure that all new construction or substantial improvements to existing structures located in a floodplain are flood-proofed, dry-proofed, or built above anticipated flood elevations. The NFIP establishes minimum ordinance requirements which must be met for that community to participate in the program.

All 52 municipalities in Lycoming County have enacted floodplain ordinances.

The County's zoning ordinance exceeds federal requirements for floodplain management by:

- Prohibiting the conversion, improvement, expansion or construction of mobile home parks, hospitals, nursing homes, jails, or prisons.
- Prohibiting all construction within the floodway, except for public improvements that would not increase the BFE.
- Requiring one and one-half feet of freeboard for all new construction or substantial improvement of residential structures within the floodplain.
- Requiring all new non-residential structures to be flood proofed.
- Prohibiting fully enclosed structures (basements) below freeboard and requiring partially enclosed structures to allow for the movement of floodwaters and the stabilization of exterior walls.
- Requiring the elevation of critical mechanical utilities above the freeboard and elevation where possible of non-critical utilities.
- Prohibiting the storage of hazardous materials and substances in excess of 550 gallons in the floodplain.

STORMWATER MANAGEMENT PLAN OR ORDINANCE

The proper management of stormwater runoff can improve conditions and decrease the chance of flooding. The Pennsylvania legislature enacted the **Stormwater Management Act (Act 167 of 1978)**, commonly called Act 167, requiring counties to develop stormwater management plans for designated watersheds. This planning effort results in sound engineering standards and criteria being incorporated into local codes and ordinances 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-by-site or municipal boundary basis. Municipalities within the same watershed may require different levels of stormwater control. The result is often a disregard of downstream impacts or the compounding of existing flooding problems.

Act 167 Stormwater Management Plans are intended to improve stormwater management practices, mitigate potential negative impacts from future land uses, and improve the condition of impaired waterways. This type of plan provides local ordinances that incorporate standards and criteria to manage and maintain peak runoff flows throughout the combined watersheds as

development occurs. Also, it is not the intent of an Act 167 plan to solve existing flooding or runoff problems, but to identify for future correction and assure problems do not get worse. More specifically, Act 167 plans do not require municipalities to correct existing drainage 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 as 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 land use considerations. A watershed stormwater management plan is designed to aid municipalities in setting standards for the land uses it has proposed. A major goal of the watershed plan and the attendant municipal regulations is to prevent future drainage problems and avoid the aggravation of existing problems.

The Department of Public Safety reports that all 52 municipalities have adopted the **Lycoming County Stormwater Management Plan** dated May 6, 2010. The Stormwater Management Plan highlights both non-structural BMPs and structural BMPs. Non-structural examples include reducing impervious pavement, maintaining natural swales and filter strips, and enforcing environmentally sensitive development. Structural examples include retention basins, vegetated roofs, and runoff reuse.

BUILDING CODES

T s are important in mitigation, because they incorporate ways to make new structures more disaster resistant. 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 such as strong winds, floods, and earthquakes, and can help mitigate regional hazards like wildfires. In 2003, the Commonwealth of Pennsylvania implemented the **UCC (Act 45 of 1999)**, a comprehensive building code that establishes minimum regulations for most new construction, including additions and renovations to existing structures. The current UCC is based on the 2018 IBC and International Residential Code.

The UCC 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 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.

Local residential and non-residential code officials are required to register and obtain certification within three and five years, respectively. While some municipalities in Lycoming County had already instituted building codes prior to the mandate by the Commonwealth, all municipalities and the county have spent considerable time and resources retraining and becoming certified in the new requirements and revamping their administrative and enforcement procedures.

EMERGENCY MANAGEMENT

Emergency management is a comprehensive, integrated program of mitigation, preparedness, response, and recovery for all types of emergencies and disasters. In Pennsylvania, emergency management begins at the municipal level, as required by the PA Emergency Management Service Code. Every county, city, borough, and township in the Commonwealth is required to have an emergency management coordinator (EMC) selected by the elected officials of the jurisdiction. The ultimate responsibility for emergency management always rests with the chief elected officials and governing body; however, the EMC's role is to develop plans, conduct training, and coordinate all available resources in the community pre- and post-disaster.

The responsibilities of the EMC are outlined in the **Pennsylvania Code, 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 public.
- Participate in all tests, drills, and exercises, including remedial drills and exercises, scheduled by the applicable agency or by the federal government.

All 52 municipalities in Lycoming County have EMCs. It is not uncommon that one EMC covers multiple municipal jurisdictions. Effective partnerships are created in advance of a disaster by the EMC through the development of a proactive, comprehensive emergency operations plan and other planning, training, and exercise programs.

Lycoming County's Emergency Operations Plan (EOP) is an all-hazards plan that 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 Lycoming County. The EOP, or portions thereof, would be implemented when emergency circumstances warrant it.

The Lycoming County EOP was revised in February 2020 and references the county's vulnerabilities to hazard identified in the 2015 HMP Hazard Vulnerability Analysis. Lycoming County's EOP is administered by the county's Department of Public Safety. It assigns responsibility to all response organizations for training, preparation, response, and recovery.

During a disaster, response and recovery efforts are coordinated by an EOC that is staffed by paid and volunteer personnel and representatives from all emergency service departments and agencies involved in operations. When two or more municipalities are involved in a disaster, the county can assume overall emergency coordination. When two or more counties are involved in a disaster, the state can assume overall coordination. When two or more states are involved in a disaster, the federal government can assume overall coordination. The responsibility and authority for emergency management always lies with the lowest level of government affected, and a unified incident command system is implemented that is all inclusive yet is never meant to usurp local authority.

CORONER'S OFFICE RESPONSE PLANNING

The Coroner's Office has developed a response plan for disasters involving mass casualties. The University of Pittsburgh Medical Center and the county have invested over $220,000 to develop the forensic center located at the Williamsport Hospital Campus. The forensic center houses the morgue area for providing autopsy services, dental x-ray equipment for providing dental identification services, a family viewing area, office space, radio, and telephone communications equipment, and a 13′ x 16′ refrigerated cooler with a capacity of approximately 20 decedents. Muncy Valley Hospital has refrigeration to hold two decedents. Additional refrigerated decedent holding areas throughout the county include space for four at Spitler Funeral Home, three at Maneval Funeral Home, and four at McCarty Thomas Funeral Home. In the event the need for space exceeds the 44 available spaces, there is a regional response plan to make regional resources available or to bring in refrigerated trucks. The local plan is coordinated by the county of Lycoming Coroner, and the regional response would be coordinated by the Pennsylvania State Coroners' Association president and regional vice presidents.

MUNICIPAL DOCUMENT REVIEW

During the planning process municipalities were asked to complete Capability Assessment Surveys reporting on their capabilities, including active plans. The following municipalities submitted this form.

Table 5.2-1 Municipalities that Submitted the Capability Assessment Survey

MUNICIPALITY	MUNICIPALITY
Hepburn Township	Penn Township
Hughesville Borough	Picture Rocks Borough
Lycoming Township	Williamsport City
Old Lycoming Township	Wolf Township

In addition, River Valley Transit Authority submitted a survey. Based on the responses, municipalities reported the following active plans. Please note that **Table 5.2-2 is not a comprehensive list of active municipal plans and policies.** These are the plans and policies that municipalities self-reported on in their response to the Capability Assessment Survey.

Table 5.2-2 Active Municipal Plans and Policies

PLAN / POLICY	MUNICIPALITIES
Capital Improvement Plan	• Williamsport City. • River Valley Transit Authority.
Continuity of Operations Plan	• Hepburn Township. • Hughesville Borough. • Lycoming Township. • Williamsport City. • River Valley Transit Authority
Disaster Recovery Plan	• Hepburn Township. • Lycoming Township.
Emergency Operations Plan	• Hughesville Borough. • Old Lycoming Township. • Penn Township. • Williamsport City. • Wolf Township.
Evacuation Plan	• Hepburn Township. • Lycoming Township. • Williamsport City.
Floodplain Management Plan	• Hughesville Borough. • Old Lycoming Township. • Wolf Township.
Historic Preservation Plan	• Williamsport City.
Stormwater Management Plan	• Hughesville Borough. • Old Lycoming Township. • Picture Rocks Borough. • Wolf Township. • Williamsport City.

5.2.1.2. Participation in the National Flood Insurance Program

The Pennsylvania Floodplain Management Act (Act 166 of 1978) requires every municipality with flood hazard areas identified by FEMA to participate in the NFIP and permits all municipalities to adopt floodplain management regulations. The overriding purpose of the

minimum floodplain management regulations as outlined in the CFR is to ensure that participating communities consider flood hazards, to the extent that they are known, in all official actions relating to land management and use. 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.

Municipalities range from "A" to "E" levels of regulation based on their identified flood zones. Regulations become more comprehensive as you move from A to E and are dependent on whether a municipality has identified flood hazard areas, flood elevations, floodways, or coastal high-hazard areas.

The levels are defined as follows:

- A: FEMA has not defined a SFHA in the community.
- B: FEMA has provided a FIRM with approximate A Zones.
- C: FEMA has provided a FIRM with base flood elevations.
- D: FEMA has provided a FIRM with base flood elevations and a map that shows a floodway.
- E: FEMA has provided a FIRM with coastal high hazard areas and no floodways.
- D & E: FEMA has provided a FIRM with both floodways and coastal high-hazard areas.

Table 5.2-2 summarizes NFIP data for all 52 municipalities in Lycoming County, as every municipality participates in the program. The table includes what date they entered the NFIP, the date of their current effective FIRM, their level of regulation (as discussed above), the number of policies, and total coverage. In Lycoming County, two municipalities are Level "A," indicating they have no FEMA identified flood hazard areas, six are Level "B," and 44 are Level "D," indicating that a floodway has been designated for certain flooding sources. There are 801 policies-in-force and $133,257,400 total coverage in the county.

Table 5.2-3 NFIP Participation in Lycoming County (FEMA CIS, 2025, PEMA, 2025).

MUNICIPALITY	FIRM DATE	LEVEL OF REGULATION	# POLICIES	TOTAL COVERAGE	IS THE COMMUNITY IN GOOD STANDING
Anthony Township	6/2/16	B	3	$653,000	Yes
Armstrong Township	6/2/16	D	9	$1,211,000	Yes
Bastress Township	N/A	A	0	$0	Yes
Brady Township	6/2/16	D	0	$0	Yes
Brown Township	6/2/16	D	4	$1,030,000	Yes
Cascade Township	6/2/16	D	0	$0	Yes
Clinton Township	6/2/16	D	7	$783,000	Yes
Cogan House Township	6/2/16	B	1	$250,000	Yes
Cummings Township	6/2/16	D	27	$5,045,000	Yes

Table 5.2-3 NFIP Participation in Lycoming County (FEMA CIS, 2025, PEMA, 2025).					
MUNICIPALITY	FIRM DATE	LEVEL OF REGULATION	# POLICIES	TOTAL COVERAGE	IS THE COMMUNITY IN GOOD STANDING
Duboistown Borough	6/2/16	D	9	$1,238,000	Yes
Eldred Township	6/2/16	D	11	$2,515,000	Yes
Fairfield Township	6/2/16	D	6	$1,534,000	Yes
Franklin Township	6/2/16	D	0	$0	Yes
Gamble Township	6/2/16	D	8	$2,384,000	Yes
Hepburn Township	6/2/16	D	18	$2,986,000	Yes
Hughesville Borough	6/2/16	D	5	$1,584,000	Yes
Jackson Township	6/2/16	B	1	$87,200	Yes
Jersey Shore Borough	6/2/16	D	123	$16,198,000	Yes
Jordan Township	6/2/16	B	1	$210,000	Yes
Lewis Township	6/2/16	D	38	$5,874,200	Yes
Limestone Township	6/2/16	B	2	$177,000	Yes
Loyalsock Township	6/2/16	D	49	$10,980,200	Yes
Lycoming Township	6/2/16	D	37	$4,894,200	Yes
McHenry Township	6/2/16	D	7	$1,315,000	Yes
McIntyre Township	6/2/16	D	11	$1,265,200	Yes
McNett Township	6/2/16	D	0	$0	Yes
Mifflin Township	6/2/16	D	9	$992,200	Yes
Mill Creek Township	N/A	A	0	$0	Yes
Montgomery Borough	6/2/16	D	28	$4,212,000	Yes
Montoursville Borough	6/2/16	D	17	$3,515,000	Yes
Moreland Township	6/2/16	D	0	$0	Yes
Muncy Borough	6/2/16	D	52	$6,986,000	Yes
Muncy Creek Township	6/2/16	D	38	$6,303,000	Yes
Muncy Township	6/2/16	D	2	$570,000	Yes
Nippenose Township	6/2/16	D	11	$1,213,000	Yes
Old Lycoming Township	6/2/16	D	58	$7,212,000	Yes
Penn Township	6/2/16	D	1	$79,000	Yes
Piatt Township	6/2/16	D	14	$1,496,000	Yes
Picture Rocks Borough	6/2/16	D	5	$1,068,000	Yes
Pine Township	6/2/16	D	8	$883,600	Yes
Plunketts Creek Township	6/2/16	D	45	$9,714,000	Yes
Porter Township	6/2/16	D	18	$2,109,000	Yes
Salladasburg Borough	6/2/16	D	8	$1,086,400	Yes
Shrewsbury Township	6/2/16	D	6	$1,107,000	Yes
South Williamsport Borough	6/2/16	D	18	$3,614,000	Yes

Table 5.2-3 NFIP Participation in Lycoming County (FEMA CIS, 2025, PEMA, 2025).					
MUNICIPALITY	FIRM DATE	LEVEL OF REGULATION	# POLICIES	TOTAL COVERAGE	IS THE COMMUNITY IN GOOD STANDING
Susquehanna Township	6/2/16	D	15	$1,796,000	Yes
Upper Fairfield Township	6/2/16	D	11	$2,195,000	Yes
Washington Township	6/2/16	B	1	$300,000	Yes
Watson Township	6/2/16	D	20	$3,123,200	Yes
Williamsport City	6/2/16	D	16	$6,575,000	Yes
Wolf Township	6/2/16	D	17	$3,422,000	Yes
Woodward Township	6/2/16	D	6	$1,422,000	Yes
TOTAL			**801**	**$133,257,400**	

For a community to participate in the NFIP, it must adopt and enforce floodplain management regulations that meet or exceed the minimum NFIP standards and requirements. These standards are intended to prevent loss of life and property, as well as economic and social hardships that result from flooding. Once FEMA provides communities with flood hazard information upon which floodplain management regulations are based, the community is required to adopt a floodplain ordinance that meets or exceeds the minimum NFIP requirements. For communities that participate in the NFIP, substantial damage determinations are required by local floodplain management ordinances. These provisions must be in place for residents of a community to purchase flood insurance through the NFIP. The determination about whether a structure is "substantially damaged" is made at the local government level, generally by a building official or floodplain manager. Substantial damage applies to a structure in the SFHA for which the total cost of repairs is 50 percent or more of the structure's market value before the disaster occurred, regardless of the cause of damage. This percentage could vary among jurisdictions but must not be below NFIP standards. Preliminary damage assessments after a disaster can be used when making substantial damage determinations. If a building within the floodplain is determined to be substantially damaged after a disaster, it will need to be brought into compliance through methods such as elevating the structure and floodproofing utilities. All NFIP participating communities in Lycoming County have either adopted a stand-alone ordinance or have arranged for County administration of floodplain regulations.

Table 5.2-4 below lists the designated individual or agency responsible for implementing the requirements of the NFIP for each participating municipality as of September 2025.

Table 5.2-4 Floodplain Administrators by Municipality (DCED, 2025b)	
MUNICIPALITY	INDIVIDUAL OR AGENCY
Anthony Township	Shelly S. Davis
Armstrong Township	Light Heigel Associates
Bastress Township	John Deitrick, Supervisor
Brady Township	Linda L. Bower

Table 5.2-4 Floodplain Administrators by Municipality (DCED, 2025b)	
MUNICIPALITY	INDIVIDUAL OR AGENCY
Brown Township	Lycoming County Zoning
Cascade Township	Lycoming County Zoning
Clinton Township	Victor Marquardt
Cogan House Township	Roger Hoy
Cummings Township	Paul McKinley
Duboistown Borough	Donald Robinson
Eldred Township	Frank Welsh
Fairfield Township	Code Inspection, Inc.
Franklin Township	Raine Ohnmeiss
Gamble Township	Heath Heller
Hepburn Township	Walter Reed
Hughesville Borough	Jason Jackson
Jackson Township	Wm. Dennis Buttorff
Jersey Shore Borough	Lycoming County Zoning
Jordan Township	John Lavelle
Lewis Township	David Hubbard
Limestone Township	Garth Womer
Loyalsock Township	Victor Marquardt
Lycoming Township	David Hubbard
McHenry Township	Joan Sechrist
McIntyre Township	Terry Stahl
McNett Township	David Hubbard
Mifflin Township	Lycoming County Zoning
Mill Creek Township	Joe Lyons
Montgomery Borough	Zoning Officer, David Hines
Montoursville Borough	Lycoming County Zoning
Moreland Township	Code Inspections Inc
Muncy Borough	Victor Marquadt
Muncy Creek Township	Lycoming County Zoning
Muncy Township	Codes Assessment Professionals
Nippenose Township	Kyle Kehoe (Light-Heigel)
Old Lycoming Township	Lycoming County Zoning
Penn Township	Code Inspections, Inc.
Piatt Township	Craig Gansell
Picture Rocks Borough	William Buttorff
Pine Township	Thomas Schafer
Plunketts Creek Township	David Hubbard
Porter Township	Lycoming County Planning Commission

Table 5.2-4 Floodplain Administrators by Municipality (DCED, 2025b)	
MUNICIPALITY	INDIVIDUAL OR AGENCY
Salladasburg Borough	Alan Little
Shrewsbury Township	Terry Lee Karichner
South Williamsport Borough	Central Keystone COG
Susquehanna Township	Central Keystone COG
Upper Fairfield Township	Todd Pysher
Washington Township	Brent Petrosky
Watson Township	Gary Knarr
Williamsport City	Victor Marquardt
Wolf Township	Dean L Barto
Woodward Township	Acting Zoning Administrator

The NFIP's Community Rating System (CRS) Program provides discounts on flood insurance premiums in 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 reductions in insurance premiums for property owners in both the SFHA and non-SFHA. 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.

There are two municipalities participating in the CRS. Jersey Shore Borough has a Class 8 designation, and those purchasing insurance get a 10% discount. Loyalsock Township has a Class 10 designation, and those purchasing insurance receive no discount. Input provided during the mitigation solutions workshop indicates that the administrative documentation procedures and their associated costs may be a hindrance to municipalities in using this program.

5.2.2. Administrative and Technical Capability

Administrative capability is described by an adequacy of departmental and personnel resources for the implementation of mitigation-related activities. Technical capability relates to an adequacy of knowledge and technical expertise of local government employees or the ability to contract outside resources for this expertise to effectively execute mitigation activities. Common examples of skill sets and technical personnel needed for hazard mitigation include: planners with knowledge of land development/management practices, engineers or professionals trained in construction practices related to buildings and/or infrastructure (e.g. building inspectors), planners or engineers with an understanding of natural and/or human caused hazards, emergency managers, floodplain administrators, land surveyors, scientists familiar with hazards in the community, staff with the education or expertise to assess community vulnerability to hazards, personnel skilled in geographic information systems, resource development staff or grant writers, fiscal staff to handle complex grant application processes.

Within Lycoming County, administrative and technical capability varies widely between the municipalities due mainly to population size and resources. Even neighboring municipalities may exhibit extreme variations in technical capability. Due to their rural nature and low populations, many municipalities struggle with administrative capabilities. For example, some municipalities share secretaries, who are only available for each municipality one day of the week. Based on 13 Capability Assessment Surveys received, municipalities in Lycoming County overall reported limited to moderate administrative and technical capabilities to conduct hazard mitigation activities. In addition to the 13 municipal surveys received, the Susquehanna River Basin Commission reported high administrative and technical capability, while the Williamsport Regional Airport and neighboring Tioga County reported moderate capabilities in this area.

ENGINEERING AND PLANNING

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.

When staff responsible for planning and engineering the structures people rely on are familiar with the hazards that can impact the community, there is a great potential for synergy. These staff members will design communities and structures with hazard impacts in mind, resulting in more sustainable communities and stronger structures. Only Hepburn Township, Lycoming Township, Old Lycoming Township, and the City of Williamsport reported having both an engineering and planning capability. Although some individual municipalities do not have a staff member with an understanding of hazards (natural or otherwise), the county Planning Department will provide consultation in many facets of planning and employ a hazard reduction planner whose focus is the mitigation of natural hazards.

FLOODPLAIN ADMINISTRATOR

Floodplain Administrators (FPAs) 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 mitigation planning and can make recommendations based on the needs and conditions of the community. All 52 municipalities participate in the NFIP and have a designated FPA. Those municipalities that are under the county Zoning Ordinance utilize the county FPA. In some municipalities floodplain management duties are assigned to a staff position with several roles. For Lycoming County, it is not out of the ordinary for a municipal official to hold more than one title. Those municipalities that noted having a FPA often listed their municipal engineer or contracted engineering firm, code enforcement officer, or municipal manager as responsible.

GRANT-WRITING STAFF OR OTHER FISCAL STAFF

Few communities have the financial resources that are required to implement all their 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. The Lycoming County Department of Public Safety can provide assistance on grant writing, especially when it involves multi-municipal initiatives.

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. Picture Rocks Borough, Old Lycoming Township, the City of Williamsport, and River Valley Transit Authority reported

having this capability. Lycoming County staff can provide local municipalities with grants management assistance.

STAFF WITH EXPERIENCE USING MAPPING (GIS) SOFTWARE

Spatial and tabular data are linked in a computerized, visual format through the use of sophisticated GIS technology. Lycoming County has GIS capabilities and can assist municipalities as needed. The county has a comprehensive database and is undertaking initiatives to make GIS more accessible and usable by local municipalities. The county now provides municipalities, and their residents, access to an Esri-based interactive web map which contains relevant land use, assessment, and floodplain layers/data. Additional web maps can be produced or customized upon request. Various maps can be accessed at the following link:

https://lyco.maps.arcgis.com/apps/instant/filtergallery/index.html?appid=67b0157b8d914d96ae258b86f2c86fa9

No municipalities reported having this capability based on the responses received from the Capability Assessment Survey. The City of Williamsport noted that they need professional capacity and software to perform GIS analyses. The county can contact municipalities directly to share more information about opportunities for GIS assistance.

COUNTY PLANNING DEPARTMENT

In Pennsylvania, planning responsibilities are delegated to each county and local municipality through the MPC. Planning agencies are established 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 Lycoming County Planning and Community Development Department 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 Lycoming County Planning and Community Development Department, which works in conjunction with municipal planning commissions where applicable. Continual education of planning commissions and County commissioners is a key function of the Lycoming County Planning and Community Development Department. The county supports training for members by covering the costs for attendance at training sessions and attendance at state and national planning conferences. The development of the Lycoming County Comprehensive Plan and the six multi-municipal plans facilitated an environment of collaboration between the county Planning and Community Development Department and the local municipalities that has resulted in further coordination between local planning initiatives and county planning initiatives.

MUNICIPAL PLANNING COMMISSIONS

As established by the MPC, municipal planning commissions advise municipal staff on matters relating to land use, zoning, or development decisions, providing recommendations for action after reviewing plans, proposals, and applications. Through this, they play a role in guiding community development. Planning commissions may also be responsible for implementing any general or comprehensive plans in the community. Members are typically appointed by the municipal board or council.

River Valley Transit Authority also reported having planners on staff that can assist with hazard mitigation planning responsibilities.

WATS MPO

The WATS MPO is the organization responsible for transportation planning and programming for the Williamsport urbanized area and for Lycoming County. The primary goal is to ensure that transportation planning and expenditures are coordinated and forward-looking for the entire county. WATS is responsible for the development and approval of this crucial document, which guides future transportation development in the region. It consists of a Coordinating Committee, Technical Committee, Bicycle Pedestrian Advisory Committee, and a Transit Advisory Committee. Each committee has their own voting and non-voting membership and meeting schedules. Committee membership includes PennDOT, County commissioners, municipal officials, and transit authorities.

SCIENTISTS FAMILIAR WITH THE HAZARDS OF THE COMMUNITY

The characteristics and impacts of natural and human-caused hazards 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 experts who can describe the technical aspects of hazards in lay terms is important to having a sound mitigation strategy. No municipalities reported that they have access to this technical capability. However, the Pennsylvania College of Technology, an affiliated institution of Penn State University, is located in Williamsport. It could provide academic support by offering related programs in the following: architectural technology, residential construction technology, building construction technology, construction management, civil engineering technology, forest technology, and landscape architecture technology. The Clean Water Institute at Lycoming College is another educational resource that may be able to provide technical expertise to municipalities: http://www.lycoming.edu/biologydept/cwi/.

The basis of hazard mitigation is hazard identification and vulnerability assessment. Conducting vulnerability assessments is a highly technical process. This requires staff with the expertise in identifying hazard potential, assessing risk levels, and understanding community conditions. The Lycoming County Department of Public Safety has a hazard reduction planner on staff who can provide this expertise to municipalities.

5.2.3. Financial Capability

In general, the more financial resources a municipality has, the more technical capability it has from a resource availability perspective. This is not necessarily the case, however, when analyzing technical capability from knowledge/skill level. As such, technical capability must be analyzed by each municipality prior to implementing any hazard mitigation activity. It is important to note, however, that much like fiscal capability, shortfalls in technical capability may be overcome by cooperative arrangements, coordinated efforts, and/or resource efficiency.

Financial capability is important to the implementation of hazard mitigation activities. Every jurisdiction must operate within the constraints of limited financial resources. Based on Capability Assessment Survey responses, fiscal capabilities of municipalities in Lycoming County vary greatly from community-to-community, with reported capabilities described as limited or moderate.

CAPITAL IMPROVEMENT PLAN

The **capital improvement 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 improvement plan should be prepared by the respective county's planning commission and should include a capital budget. While the capital improvement plan is not a funding source, this budget identifies the highest priority projects recommended for funding in the next annual budget. The capital improvement plan is dynamic and can be tailored to specific circumstances. According to survey responses, the City of Williamsport and River Valley Transit Authority have a capital improvement plan, while Penn Township, Hughesville Borough, Wolf Township, and Old Lycoming Township reported having a capital improvement plan under development.

IMPACT FEES FROM UNCONVENTIONAL GAS DRILLING

The **Oil and Gas Act (Act 13 of 2012)** presented major changes to the oil and gas industry in Pennsylvania, including the authorization for local governments to adopt an impact fee and the provision of stronger environmental protections. For example, oil and gas well pad setbacks from private water wells, streams, and buildings increased; bond amounts for catastrophic accidents increased; and public accessibility of information related to chemicals used onsite improved (Pittsburg Post-Gazette, 2012). A portion of the impact fees goes to county conservation districts, the Pennsylvania Fish and Boat Commission, the Pennsylvania Public Utility Commission, PA DEP, PEMA, the Pennsylvania Office of State Fire Commissioner, and PennDOT in order to address statewide issues. A portion of the impact fees goes to local municipalities to address water, wastewater, and road infrastructure maintenance and improvements; emergency preparedness; environmental programs; tax reductions; increased safe/affordable housing; employee training; or planning initiatives (Tochev, 2019).

Projects funded through Act 13 in Lycoming County are in Table 5.2-4 below. Award years are included where available.

Table 5.2-5 Projects Funded through Act 13 (DCED, 2025c)			
AWARDEE	YEAR	AMOUNT	PROJECT
Lycoming Biology Field Station	N/A	$235,089	Loyalsock Creek Restoration Project FMP
Economic and Community Growth Corporation	N/A	$200,000	Williamsport Ballpark Inc - Brownfield to Ball Fields
Lycoming County Commissioners	N/A	$127,284	Muncy Creek Streambank Restoration and Protection Project
Loyalsock Township	N/A	$100,000	Millers Run Stream Restoration Phase I Project
Lycoming County Conservation District	N/A	$53,010	Grafius Run Watershed Project
Jersey Shore Borough	2022	$87,000	Thompson Street Park
South Williamsport Borough	2024	$500,000	South Williamsport Levee Cross Pipe Rehabilitation
Lycoming County	2025	$250,000	Susquehanna River Walk Extension Trail Construction Project
Muncy Creek Township	2025	$74,628	Kiess Memorial Park Walking Path & Concession Area Project
City of Williamsport	2025	$80,000	Young's Woods Park Improvement Project

COMMUNITY DEVELOPMENT BLOCK GRANTS (CDBG)

These grants are designed to assist the vulnerable populations within the community by ensuring affordable housing, creating jobs, and providing direct services. The amount of each grant is determined by a formula that accounts for the community's need, poverty, population, housing, and comparison to other areas. The annual appropriation is divided among the states and local jurisdictions (referred to as "non-entitlement communities" and "entitlement communities"). The following are entitlement communities:

- Central cities of MSAs.
- Cities with at least 50,000 people.
- Some urban counties with at least 200,000 people.
- States provide CDBG funds to non-entitlement jurisdictions.

The majority of CDBG funds are required to be spent to benefit low- and moderate-income people. Also, there is a set of national objectives for the program, including addressing existing conditions that pose a threat to the health and welfare of the community (e.g., low-income housing in a floodplain). All municipalities within Lycoming County have access to CDBG funding, be it directly through the federal or state government or through a competitive county selection process.

To date, CDBG funding has not been allocated to hazard mitigation projects in Lycoming County however the county is partnering with STEP, Inc. to pursue grant funding through CDBG-Disaster Recovery (CDBG-DR) for a housing rehabilitation project that will involve primary

homeowner occupied residences affected by tropical storm Lee. If funding is granted, the project will involve elevations, utility retrofits, and possibly some new construction/additions.

WATER AND SEWER AUTHORITY FEES

Water authorities are multipurpose authorities with water projects, many of which operate both water and sewer systems. The financing of water systems for lease back to the municipality is among the principal activities of the local government facilities' financing authorities. An operating water authority issues bonds to purchase existing facilities or to construct, extend, or improve a system. The primary source of revenue is user fees based on metered usage. The cost of constructing or extending water supply lines can be funded by special assessments against abutting property owners. Tapping fees also help fund water system capital costs. Water utilities are directly operated by municipal governments and by privately owned public utilities regulated by the Pennsylvania Public Utility Commission. The PA DEP has a program to assist with consolidation of small individual water systems to make system upgrades more cost effective.

Sewer authorities 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.

There are four sewer authorities operating in Lycoming County: Williamsport Sanitary Authority, Lycoming County Water and Sewer Authority, West Branch Regional Authority, and Hughesville-Wolf Township Municipal Authority. A key county objective was to move all wastewater treatment plans from the floodplain. This was completed with the regionalization of Muncy and Montgomery into West Branch Regional Authority and the new sewer plant constructed in 2015. In addition, there are nine public water supply authorities: Hughesville Borough Authority, Jersey Shore Area Joint Water Authority, Lycoming County Water and Sewer Authority, Montgomery Water Authority, Muncy Borough Municipal Authority, Williamsport Municipal Water Authority, Montoursville Borough, Ralston Area Joint Authority, Waterville Water Association. Detailed information can be found in the 2001 Lycoming County Water Supply Plan at:
http://www.lyco.org/Portals/1/PlanningCommunityDevelopment/Documents/EDPS_PDFs/WSP_Final_Report.pdf.

Also, Lycoming County Water and Sewer Authority has their own strategic plan, which can be accessed here: https://www.lcwsa.net/strategic-plan.

GENERAL OBLIGATION, REVENUE, AND/OR SPECIAL TAX BONDS

Jurisdictions may decide to dedicate general bonds or similar financing to implement hazard mitigation projects. General obligation bonds are municipal bonds that can be paid back via a variety of revenue sources, including taxes, and are used to fund a variety of projects. Revenue

bonds are required to be paid back via revenues generated from the project they fund. Special tax bonds can be repaid via taxes that do not need to be linked directly to the project being financed. No municipalities surveyed indicated they use these funding mechanisms.

STATE AND FEDERAL FINANCIAL RESOURCES AND GRANT PROGRAMS

The decision and capacity to implement mitigation-related activities is often strongly dependent on availability of local financial resources. While some mitigation actions are less costly than others, it is important that money is available locally to implement policies and projects. Financial resources are particularly important if communities are trying to leverage state or federal mitigation grant funding opportunities that require local-match contributions.

State funding sources that may be available for hazard mitigation planning activities include but are not limited to the following.

- Commonwealth Financing Authority (CFA)/DCED Abandoned Mine Drainage Abatement and Treatment Program.
- CFA/DCED Baseline Water Quality Data Program.
- CFA/DCED First Industries Fund.
- 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 Orphan or Abandoned Well Plugging Program.
- CFA/DCED PA Small Water and Sewer.
- CFA/DCED Sewage Facilities Program.
- CFA/DCED Watershed Restoration Protection Program.
- DCED Business Financing Programs.
- DCED Local Government Capital Project Loan Program.
- DCED Municipal Assistance Program.
- DCED/DEP Coal Refuse Energy and Reclamation Tax Credit Program.
- DCED/DEP Private Dam Financial Assurance Program.
- DCNR Community Conservation Partnerships Program.
- DEP Growing Greener Plus Grants Program.
- PennDOT Pennsylvania Infrastructure Bank Loan.
- Pennsylvania Infrastructure Investment Authority (also known as PENNVEST).
- Pennsylvania Redevelopment Assistance Capital Program.

Federal funding sources that may be available for hazard mitigation planning activities at the time the HMP update was prepared include but are not limited to the following.

- Appalachian Regional Commission POWER Initiative Grant Program.
- Department of Energy Weatherization Assistance Program.
- Department of Homeland Security Grant Program.

- Department of Transportation/Federal Highway Administration Emergency Relief Program.
- Department of Commerce/Economic Development Administration Revolving Loan Fund (ACEDC RLF recipient).
- FEMA Community Disaster Loan Program.
- FEMA NFIP.
- FEMA NFIP Community Rating System.
- FEMA Environmental Planning and Historic Preservation Program.
- FEMA Flood Mitigation Assistance Program.
- FEMA Hazard Mitigation Grant Program (HMGP).
- FEMA Individuals and Households Program.
- FEMA National Dam Safety Program.
- FEMA Public Assistance Program.
- FEMA Regional Catastrophic Preparedness Grant Program.
- Housing and Urban Development (HUD)/Federal Housing Administration (FHA) Title I Property Improvement Loans.
- HUD/FHA Section 203(k) Rehabilitation Mortgage Insurance.
- HUD Section 108 Loan Guarantee Programs.
- Internal Revenue Service Casualty Loss-Special Disaster Provisions .
- NOAA National Weather Service StormReady® Program.
- Small Business Administration Disaster Loan Programs.
- USDA Natural Resources Conservation Service (NRCS) Easement Programs.
- USDA/Farm Service Agency (FSA) Emergency Conservation Program.
- USDA/FSA Emergency Farm Loans.
- USDA/Emergency Forest Restoration Program.
- USDA Non-insured Crop Disaster Assistance Program.
- USDA/NRCS Emergency Watershed Protection Program.
- USDA/NRCS Watershed Protection and Flood Prevention Program .
- USDA Home Renovation Loans .
- USDA/Rural Housing Service (RHS) Community Facilities Loans and Grants .
- USDA/RHS Rural Housing Assistance.
- USDA/RHS Section 502 Single-Family Housing Direct and Guaranteed Loans.
- USDA/RHS Single Family Housing Repair Loans & Grants.
- USDA/RHS Mutual Self-Help Housing Technical Assistance Grants .
- USDA/Risk Management Agency Federal Crop Insurance Program.
- USDA/Rural Development Business & Industry Loan Guarantees.

5.2.4. Education and Outreach

Education and outreach programs 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 USA® or StormReady®; and activities conducted as part of hazard awareness campaigns, such as Tornado or Flood Awareness Month. Some communities have their own public information or communications office to manage outreach initiatives. Overall, programs not relating to certification are not common within the county. River Valley Transit Authority reported that they have public outreach capabilities that can assist the flow of hazard mitigation information to the public within their service area.

PENNDOT LOCAL TECHNICAL ASSISTANCE PROGRAM (LTAP)

The Lycoming County Department of Planning & Community Development and WATS MPO collaborate with PennDOT and all 52 municipalities to identify and address training needs for those responsible for maintaining and upgrading the county's transportation network. Since the 2005 – 2006 program year, there have been 124 courses held with 2,009 attendees. The program now hosts both in-person and virtual courses and webinars. Topics include winter maintenance, road drainage, school transportation, trucking, and asphalt maintenance.

STORMREADY®

StormReady® is an education and outreach program that arms communities with the communication and safety skills needed to save lives and property before, during, and after an event. All of Pennsylvania's 67 counties meet enrollment criteria. Lycoming County was certified as StormReady® in 2000 under this national program. In 2009, Lycoming County renewed its StormReady® Community designation with the NWS and PEMA officials from Central Region. This entailed a thorough inspection of numerous documents and file information by the NWS. Cogan House Township is a StormReady® community, and the City of Williamsport is a supporter.

FLOOD READY

Flood Ready is a webpage on the county website that provides local officials and residents with current stream and rainfall gauge information, emergency road closures, and a link to PennDOT District 3-0 traffic information. The website allows for the timely delivery of information that has the potential to inform and protect first responders, residents, and business owners from adverse events. For example, the public can use the site to better understand safe travel routes in the event of an emergency or storm event by viewing the state and municipal road closures in the county. The portal also provides access to real-time data on precipitation levels and stream heights that can provide advance warning in the event of flooding.

NOAA WEATHER-READY NATION (WRMN) AMBASSADOR

Lycoming County is designated as a NOAA WRMN Ambassador, which recognizes NOAA partners that are improving resilience against extreme weather events. Partners help unify efforts across government, non-profits, academia, and private industry toward making the community and the nation more ready. According to NOAA, ambassadors:

- Promote Weather-Ready Nation messages and themes to their stakeholders.
- Engage with NOAA personnel on potential collaboration opportunities.

- Share their success stories of preparedness and resiliency.
- Serve as an example by educating employees on workplace preparedness.

NOAA supports ambassadors by:

- Providing outreach content about creating a Weather-Ready Nation.
- Exploring innovative approaches for collaboration.
- Assisting with StormReady®/TsunamiReady® opportunities.

FARMLAND PRESERVATION

Farmland preservation measures are important to hazard mitigation. Preserved farms protect soil from erosion and prevent the contamination of local surface water. In addition, farms and forest land are important for recharging the community's aquifer and providing habitat for local wildlife. Lycoming County has an active agricultural land preservation program overseen by a seven-member board. The County Conservation District administers the program.

LYCOMING PARCEL VIEWER

This program allows users to map parcel, floodplain, soil, and zoning information among other things, from the county website at http://lycomap.lyco.org/.

The Lycoming County Flood Map Viewer is a tool available for more in-depth information related to flooding. This is a helpful tool for Lycoming County residents to more accurately assess their level of flood risk:

https://lyco.maps.arcgis.com/apps/webappviewer/index.html?id=a5c92a3a7b794affb1199fecd129fd3e,

Lycoming County Department of Public Safety maintains a Gas Well/Energy Development Information page that includes vehicle identification, rescue/response guidance, and important industry related terms and definitions:

http://www.lyco.org/PublicSafety/GasWellEnergyDevelopmentInformation.aspx.

The Lycoming County Emergency Management Agency coordinates and supports the following programs:

- Emergency Operations Planning for all 52 municipalities.
- Fire Training Courses for all County Emergency Responders.
- Specialized training for Municipal EMCs.
- Emergency planning assistance to public, private and government agencies.
- Drought Management Task Force.
- Flash Flood Warning volunteer program.
- Auxiliary Communications Service volunteer amateur radio program.
- Radiological Emergency Response volunteer program.
- Firefighting Foam Bank administration.
- SKYWARN weather observation volunteer program.
- National Weather Service assistance and cooperation.

- Project Impact support.
- Damage Assessment program.
- Emergency Alert System Warning Program.

FIREWISE USA® PROGRAM

NFPA administers the Firewise USA® Program to encourage local solutions for safety by involving homeowners in taking individual responsibility for preparing their homes from the risk of wildfire. The program provides resources to help homeowners learn how to adapt to living with wildfire and encourages neighbors to work together to take action to prevent losses. The program, aimed at homeowners, provides specific criteria for communities regarding wildfire preparedness, and offers national recognition for their work.

Of the nearly 1,000 active member communities, only two Pennsylvania communities participate in NFPA Firewise USA; none are in Lycoming County. Lycoming County can assist communities in the establishment of a Firewise community rating in cooperation with the Department of Conservation, the Natural Resources Bureau of Forestry, and the Tanker Task Force. The County also provides resources for training through the Bureau of Forestry and community colleges.

5.2.4.1. Community Political Capability

One of the most difficult capabilities to evaluate involves the political will of a jurisdiction to enact meaningful policies and projects designed to mitigate hazard events. The adoption of hazard mitigation measures may be viewed as an impediment to growth and economic development. In many cases, mitigation may not generate interest among local officials when compared with competing priorities. Therefore, the local political climate must be considered when designing mitigation strategies, as it could be the most difficult hurdle to overcome in accomplishing the adoption or implementation of specific actions.

5.2.5. Organizations that Support Mitigation in Lycoming County

The Hazard Mitigation Planning Team held meetings with organizations and county agencies that support mitigation efforts in Lycoming County. This section provides an overview of their work and capabilities that may be leveraged to mitigate hazard risk.

5.2.5.1. STEP, Inc.

STEP, Inc. is a federally legislated non-profit Community Action Agency. It was incorporated in 1966 and serves both Lycoming and Clinton counties. STEP's mission statement is "to engage diverse individuals, families and communities in the pursuit of social and economic success." They are experts at low-income programming and work closely with the county and other organizations to administer several programs that provide services, education, and resources to communities across the county. Several of their programs and initiatives support mitigation and response efforts in Lycoming County.

STEP, Inc. publishes an annual report each year that presents outcomes, stories, and statistics on their work. They have around 300 staff, about half of which works for their Head Start

program, and an average annual budget of $32 million. Around 85% of this budget is federally funded. The majority of programs detailed below are dependent on funding availability. This is an identified gap in the non-profit's ability to consistently deliver assistance. To address this, a mitigation action has been added in Chapter 6 – Mitigation Strategy.

The following section will provide information on the various areas of work STEP, Inc. engages in, organized by individual Pathways.

EARLY LEARNING PROGRAMS

STEP, Inc. manages and runs Lycoming County's Head Start Program. This program is available to all preschool children in Lycoming County, including those with disabilities, free of charge. Currently, there are around 600 children in the program. These children and their families are given access to services and learning programs, including general education, health examinations and screenings, nutrition, family engagement, parent decision making, social services, and specific support for children with disabilities. The goal of the program is to provide quality early learning experiences and healthcare to children.

There is also an Early Head Start Program that provides early, continuous, and comprehensive year-round child and family support services to pregnant women, infants, and toddlers through the age of three. This program provides similar services to the Head Start Program but also offers a home-based model.

The Early Learning Resource Center is a partnership with the Pennsylvania Office of Child Development that serves Lycoming, Clinton, and Tioga counties. It provides support for early learning programs and helps families access childcare services.

HOUSING

STEP, Inc.'s Utilities Assistance Program is a partnership with PPL Electric Utilities and UGI Corporation's subsidiaries, Penn Natural Gas and Central Penn Gas. Customers that qualify for the program are households at or below either 150% or 200% of the Federal Poverty Income Guidelines (FPIG); threshold determines the assistance received. Options are reduced monthly payments, cancellation of a portion of utility debt, and energy education and weatherization services. STEP is also involved in conducting energy efficiency trainings and distributing energy efficiency kits when available.

The Whole-Home Repair Program provides funding, when available, to income-eligible residents for homeowner occupied rehabilitation. For Lycoming County, priority is given to households making $35,850 or less per year (50% of median income), but households up to $62,320 of annual income (80% of median income) are eligible. Priority is also given to seniors aged 62 years or older. There is a maximum allocation of $50,000, which is provided in the form of a grant. Single-family housing and condominium units are both eligible.

As part of STEP's Pathway to Housing Options, Housing & Building Initiatives is a program that offers residential housing rehabilitation, accessibility, and energy-efficient improvements. This

is a collaboration with several local governments and non-profit organizations to leverage local, state, and federal resources to help homeowners develop a plan for improvements and assist in construction. Staff members have design, construction management, and various trade experience. These housing rehabilitation programs have been useful in flood recovery efforts and the structure is in place to do more work as funding allows.

STEP, Inc.'s Weatherization Program uses federal funding to help both homeowners and renters reduce energy costs through an energy audit and resultant weatherization measures deemed appropriate. STEP, Inc. is the Department of Energy weatherization provider for Lycoming County. Eligibility is decided based on household income and size, with houses, apartments, and mobile homes eligible. Priority is given to high energy users, senior citizens, and the disabled. Each dwelling is inspected both visually and with equipment to determine if heating and water systems are operating safely and identify any air leakage. The work done to address any issues is dependent on available funding.

WORKFORCE DEVELOPMENT

STEP, Inc.'s Work Ready program provides employment and training opportunities to individuals referred to the program by the county Assistance Office. The goal is to address any barriers and challenges they may be experiencing in establishing economic success. They are trained and then matched to employment opportunities. Their involvement in the program may include behavior assessments, support groups, life skills, counseling, and substance use treatment.

COMMUNITY COLLABORATION

STEP, Inc. is the recognized case management agency in Lycoming County by PEMA and FEMA. This work is contracted through the Community Action Association Partnership (CAAP), which is funded through PEMA. For this work, STEP conducts damage assessments and augments staff at locations where state or federal personnel have set up for recovery work or case management, such as FEMA Disaster Recovery Centers. Recently, CAAP has worked with community action networks to fulfill case management functions on the ground, working directly with communities.

The Youth Enrichment for Success Program provides assistance to Lycoming County residents aged 16 to 20 on career training and skill development. It is a collaboration between Lycoming Children & Youth Service, Lycoming County Juvenile Probation Office, Lycoming County CareerLink, and the Lycoming County Criminal Justice Advisory Board. Participants take a needs assessment and then are given opportunities for kills development, on-the-job training or shadowing, and further technical training.

STEP, Inc. works with community Referral Partner agencies and Supportive Housing Program partners to provide assistance to Lycoming County renters in avoiding eviction. There are also capabilities to assist homeowners who need help with their mortgage. STEP also works with homeless residents to obtain safe and affordable rental housing. There are tiers to assistance

and some income requirements for renters and homeowners. Financial assistance can range from six months to one year.

The Master Leasing Program also helps homeless residents, especially those who have finished prison sentences, suffer from mental illness, or have been institutionalized. The Pennsylvania Housing Finance Agency provides funding to help find stable housing options for participants. The program also works with individuals on education, employment, transportation, childcare, and budgeting to help promote further stability. Participants may be enrolled for up to one year.

INDEPENDENT LIVING

The STEP Office of Aging is the local Area Agency on Aging. It aids Lycoming County residents aged 60 and older. There are eight senior community centers and two social service offices as part of the support network. The centers provide opportunities for socialization, health screenings, exercise, and nutrition. They also coordinate roughly 400 Meals on Wheels deliveries per day. The office provides information and other assistance to seniors to ensure they remain in their own homes, with case workers helping them assess needs and identify resources.

STEP Transportation provides transportation options to all residents and visitors of Lycoming and Clinton counties. The six-county service area includes Lycoming, Clinton, Union, Northumberland, Montour, and pre-approved medical locations in Tioga and Sullivan counties. There are scheduled trips to Geisinger Medical Center in Montour County. Fares depend on several factors distance, but some riders are eligible for sponsored programs which make fares more accessible. The program provides roughly 500 trips each day to seniors and those with disabilities. There are currently 42 vehicles in the fleet, which can also be used for emergency situations and evacuations.

5.2.5.2. Camp Susque

Camp Susque is a non-denominational Christian camp located in Trout Run, Lewis Township. The camp was founded in 1947 as a summer camp and has grown into a place for the community to come and learn, experience nature, and shelter in times of need. The programming at the camp is mostly for youth campers, but there are events year-round for the community as a whole.

COLLABORATION AND COORDINATION

The staff at Camp Susque coordinate with the Trout Run Volunteer Fire Company during hazard events to provide any assistance needed, typically sheltering. For example, if conditions indicate that low-lying areas in the community are expected to flood, the fire department will work to evacuate residents to Camp Susque to avoid hazardous areas. The camp also works with the department on annual programming and training for staff and the community. At the time of this plan update, Camp Susque is hosting the fire company's meetings due to their facility being out of commission. They also host Red Cross Blood Drives due to this as well.

The camp also has a relationship with Lewis Township in which the camp makes its services and capabilities available in times of need, although no formal agreement exists. The camp's capabilities depend on current capacity, which is typically lower in the summer when camps are ongoing.

In the past, Camp Susque has worked with local food pantries, but this work has diminished recently.

SHELTERING AND MORE

Beyond providing education and a meeting place for local communities, the camp also opens their doors in times of need. The cabins on site have been used to house local residents who are impacted by flooding, extreme cold spells, power outages, and more. This includes bathrooms, laundry facilities, and refrigeration and freezers for storing food. The camp has been exploring an expansion via a new lodge, which will increase their capacity. It is not intended as a means to increase camp attendance, but to increase capabilities for hosting and sheltering the community to provide a place to stay either during hazard events or during recovery. The camp emphasizes that any capital improvement planning they do includes considerations for community needs. Additional upgrades to the electrical infrastructure, including the replacement of a backup generator, are needed but are subject to funding availability.

The camp also provides a consistent internet connection. In August 2024, a local cellphone tower was taken offline due to a hazard event and Camp Susque was able to provide internet to residents looking to stay informed or be in contact with loved ones. They have wired, wireless, and satellite internet capabilities to ensure connection is available.

During COVID-19, Camp Susque participated in county-level planning and response efforts. The camp became a place for individuals, particularly first responders and medical professionals, to isolate and quarantine. In addition to this sheltering, the camp also worked with eight local churches to rent them for remote learning sites for students in the Williamsport School District that were unable to attend from home. This was provided as a free service to students.

STAFF

The staff at Camp Susque have various expertise in EMS training, including CPR, wilderness first aid, and lifeguarding.

5.2.6. Plan Integration

Plan integration recognizes that hazard mitigation is most effective when it works in concert with other plans, regulations, and programs. Per FEMA, plan integration is described as the regular consideration and management of hazard risks in a community's existing planning framework. Plan integration is the process by which communities critically analyze their existing planning framework and align efforts to build a safer, smarter community. Plan integration involves a two-way exchange of information and incorporation of ideas and concepts between hazard mitigation plans (state and local) and other community plans. Specifically, plan integration

involves the incorporation of hazard mitigation principles and actions into community plans and community planning mechanisms into hazard mitigation plans (FEMA, 2015).

In Pennsylvania, integrating hazard mitigation into planning tools is afforded through the MPC in that protecting and promoting safety and health is a purpose of the code. Further, a purpose of the MPC is "to minimize such problems as may presently exist or which may be foreseen," which is the focus of hazard mitigation planning.

When developing the HMP, the county comprehensive plan, multi-municipal plans, EOPs, and various land use ordinances and regulations provided key information. These documents are referenced where appropriate throughout the plan and links to the documents are included in **Appendix A: Bibliography**. 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, and any land use ordinances and regulations.

For example, zoning and other land use regulations can be amended to reflect any 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.

Plan integration is not only accomplished through the MPC and planning tools such as comprehensive plans and zoning ordinances, but through capital improvement planning, area plans such as highway corridors and downtown plans, functional plans like stormwater and open space plans, and public and stakeholder outreach and education. This section highlights key opportunities for plan integration in Lycoming County.

LYCOMING COUNTY COMPREHENSIVE PLAN

The Lycoming County Planning and Community Development Department is responsible for maintaining and updating the county comprehensive plan and the county SALDO. The Planning Commission meets monthly to review, discuss, and comment on municipal subdivision and land development plans. It uses this information to identify necessary revisions and to amend both the comprehensive plan and the SALDO. 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 52 municipalities are covered by the county comprehensive plan.

Technical assistance on community planning matters is provided to the Lycoming County Planning Commission and the county Board of Commissioners through the Lycoming County Planning and Community Development Department. The Planning and Community Development Department administers the county Comprehensive Plan, along with the county

Subdivision and Land Development Ordinance. The Planning and Community Development Department also performs technical reviews of municipal subdivision and land development plans, municipal floodplain ordinances, municipal stormwater management plans and ordinances, and other community planning and development matters.

The 2020 HMP stated the next comprehensive plan update could include mapping, data, and Hazus results in addition to projects that addressed the priority issues regarding stormwater infrastructure and open space management. Any future updates to the comprehensive plan should include considerations from the latest HMP.

In addition to the Lycoming County Comprehensive Plan, there are several multi-municipal planning areas that each have an individual comprehensive plan and planning process for the jurisdictions within each region. The multi-municipal planning areas include: Greater Williamsport Alliance Planning Area, Montoursville-Muncy Planning Area, US-220/I-99 Planning Area, US-15 South Planning Area, Lower Lycoming Creek Planning Area, and Muncy Creek Planning Area.

Article III of the Pennsylvania MPC (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 DMA 2000-required five-year update cycle for HMPs, when possible, will allow the county to better integrate the county comprehensive plan and multi-jurisdictional planning processes and strengthen public participation for both efforts.

Furthermore, each multi-municipal comprehensive plan was reviewed in conjunction with the Lycoming County Comprehensive Plan to inform the Community Profile, as well as other sections of the 2026 Lycoming HMP.

EMERGENCY OPERATIONS PLAN

The county and all 52 municipalities have local EOPs in place or are covered by the county's.

Specific annexes, referred to as Emergency Support Function documents, have been developed to address specific natural and technological hazards that may require an added level of coordination. A mitigation plan that is added as an addendum to an EOP can enhance the recovery process. In order to comply with the PEMA's annual work plan, units of local government are required to prepare and submit a hazard vulnerability analysis, which identifies and assesses the community's risk to natural and human-induced hazards.

The development of Marcellus Shale gas that requires drilling and use of water containing hazardous constituents, construction and maintenance of gas lines, and the movement of heavy equipment has created a suite of new hazards to be accounted for in emergency operations planning. Pennsylvania adopted Act 9 of 2012, mandating that PA DEP establish standards for well safety, and more specifically for emergency response for unconventional well sites. Lycoming County has an Emergency Response Plan for Unconventional Well Sites.

NATURAL RESOURCE PROTECTION PLANS

Natural resource protection plans are designed to protect the natural environment and balance both recreational and development needs of the community. They describe how the community will manage woodlands, grasslands, and trails without sacrificing the economic goals of the community. Natural resource protection is covered in the Recreation, Parks, and Open Space/Greenway Plan (2008), the county comprehensive plan (2018), the Lycoming County Water Supply Plan (2001), and multi-municipal regional plans.

LYCOMING COUNTY ACT 167 STORMWATER MANAGEMENT PLAN

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 the Lycoming County Act 167 Stormwater Management Plan, this HMP's hazard profile on floods, flash floods, and ice jams 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 HMP were also used as a reference to meet Act 167 requirements.

In addition, Act 167 requires the identification of existing and proposed state, federal, and local flood control projects located in the watershed and their design capacities.

Like the HMP, stormwater management plans must be reviewed (and revised, if necessary) every five years. The stormwater management plan was adopted and approved in September 2010. As both plans are maintained by the Lycoming County Planning and Community Development Department, information gathered in the revision of one plan will be incorporated into the revision of the other.

EVACUATION PLANS

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 the 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 county EOP addresses various evacuation situations, such as evacuation plans for dam safety, hazardous material spills, and radiation releases. Emergency Action Plans developed for dams contain evacuation plans, and each municipality's EOP includes identification of traffic and access control points.

DISASTER RECOVERY PLANS

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 emergency demands. In Lycoming County, the DRP is a component of the EOP.

During disasters, the Lycoming County Department of Public Safety staff has a supporting role in staffing the EOC to coordinate information, supply transportation information, coordinate housing efforts for disaster victims, and conduct public damage assessments.

HISTORIC PRESERVATION PLAN

Historic preservation 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. A historic preservation plan may include measures to retrofit or relocate historic treasures out of hazard impact areas. The City of Williamsport has indicated that they have a historic preservation plan.

ACT 537 SEWAGE FACILITIES PLANNING

Pennsylvania Act 537, the Sewage Facilities Planning Act, requires municipalities to develop and implement comprehensive official plans that provide for the resolution of existing sewage disposal problems, provide for the future sewage disposal needs of new land development, and provide for the future sewage disposal needs of the municipality. This planning process is designed to protect the health, welfare, and safety of all Pennsylvanians by protecting the Commonwealth's water resources. While these plans are designed to manage health risks, the planning process associated with keeping these plans current and applicable requires consideration of how local hazards may impact a community's ability to implement these plans in a cost-effective manner. Some hazards that can affect the sewage facilities planning process and implementation include flooding, drought, and terroristic sabotage. In Lycoming County, the key issue of concern is flooding and how it impacts various wastewater treatment plants (WWTPs) and planned expansions.

Lycoming County has nine WWTPs. In recent years, the nutrient reduction mandates associated with the Chesapeake Bay cleanup, and consent orders relating to Combined Sewer Overflows (CSO) and Infiltration & Inflow (I&I) problems, have placed renewed attention on the condition of wastewater infrastructure in the county. Two of the plants, Lycoming County Water and Sewer Authority and Hughesville-Wolf Authority, are relatively new, modern WWTPs that are located in secure areas not threatened by flooding. The two plants operated by the Williamsport Sanitary Authority are located behind the City's levees and are thus protected from flood hazards. However, three of the county's plants located in borough population centers are at significant risk of flooding. Fortunately, all three of these plants are currently undergoing planning to reduce hazard exposure. The Jersey Shore Borough plant will be closed in the coming years, and a new plant will be built outside of the floodplain. Montgomery Boroughis also considering upgrading its plant and possible regional solutions.

In addition to the county's WWTPs, the community collection systems that serve as tributaries to the Williamsport Sanitary Authority plants (Loyalsock and Old Lycoming Townships, and South

Williamsport and Duboistown Boroughs), are being upgraded to reduce the I&I conditions that currently contribute to the CSO problem in the City of Williamsport.

EROSION AND SEDIMENTATION CONTROL

PA DEP Rules and Regulations Chapter 102: Erosion and Sediment Control requires people proposing or conducting earth disturbance activities to develop, implement, and maintain BMPs to minimize the potential for accelerated erosion and sedimentation. The BMPs are designed to protect, maintain, reclaim, and restore water quality of Commonwealth waters in order to protect the health, welfare, and safety of all Pennsylvanians.

Section 102.5 requires that permits be issued by the PA DEP for earth disturbance activities that exceed certain threshold levels depending on the type of activity. Steep slopes, sinkholes, and hazardous materials are examples of some hazards that may be an integral consideration in the permit application review process. In many instances the program is administered by the county Conservation District, which is the case in Lycoming County.

The County Conservation District is a critical partner in the management and protection of natural resources so critical to the economic health of Lycoming County. The Conservation District is in the forefront of efforts to implement BMPs that will protect local waterways and the Chesapeake Bay. Floodplain restoration is one BMP that is being considered, as it not only can reduce erosion that contributes nutrient loads to the waterways but can also reduce flooding hazards.

DROUGHT PLANNING

Under management of the Lycoming County Department of Public Safety, the county maintains a drought task force to deal with drought emergencies. Included in its review is maintenance of the Tanker Task Force, up-to-date listing of water surveys, and list of well drilling companies.

TRANSPORTATION PLANNING

WATS MPO works directly with PennDOT, the county, and other regional organizations on transportation planning initiatives. The cornerstone planning mechanism is the LRTP, which already includes information on resiliency to flooding, landslides, and subsidence. Updates to this plan could include information on risks and mitigation actions identified in the HMP. In addition to the LRTP, transportation planning programs focused on organizing funding and construction projects can include hazard mitigation considerations when identifying priority projects and during the design phases. Current trainings offered include considerations of weather events.

INTEGRATION CAPABILITIES

Based on the capability assessment results and information from the county, all of Lycoming County's jurisdictions have some form of local land use controls, some of which have not been updated recently. As municipalities work to update comprehensive plans and land use ordinances, local governments can go further to use land use regulations to direct development away from hazard-prone areas.

A barrier to plan integration and expanding capabilities is often the lack of resources to accomplish activities that they require. The self-assessment portion of the Capability Assessment survey provided each municipality an opportunity to conduct its own self-assessment of its capability to effectively implement hazard mitigation activities. As part of this process, County and municipal officials were encouraged to consider the barriers to implementing proposed mitigation strategies in addition to the mechanisms that could enhance or further such strategies. In response to the survey questionnaire, local officials classified each of the capabilities as either "limited," "moderate," or "high." Table 5.2-6 shows the answers from each municipality to the self-assessment survey. Table 5.2-7 below summarizes the results as a percentage of responses received. The surveys revealed that no municipalities reported a self-assessment of "High" for any capability type. With available resources being limited and stretched into the foreseeable future, plan integration is extremely relevant and will help leverage existing resources to the maximum extent possible.

Table 5.2-6 Municipal Responses to Capability Questionnaire

MUNICIPALITY	PLANNING & REGULATORY	ADMINISTRATIVE & TECHNICAL	FINANCIAL
Anthony Township	N/A	N/A	N/A
Armstrong Township	N/A	N/A	N/A
Bastress Township	N/A	N/A	N/A
Brady Township	N/A	N/A	N/A
Brown Township	N/A	N/A	N/A
Cascade Township	N/A	N/A	N/A
City of Williamsport	Moderate	Moderate	Moderate
Clinton Township	N/A	N/A	N/A
Cogan House Township	N/A	N/A	N/A
Cummings Township	N/A	N/A	N/A
Duboistown Borough	N/A	N/A	N/A
Eldred Township	N/A	N/A	N/A
Fairfield Township	N/A	N/A	N/A
Franklin Township	N/A	N/A	N/A
Gamble Township	N/A	N/A	N/A
Hepburn Township	Limited	Limited	Limited
Hughesville Borough	Moderate	Moderate	Moderate
Jackson Township	N/A	N/A	N/A
Jersey Shore Borough	N/A	N/A	N/A
Jordan Township	N/A	N/A	N/A
Lewis Township	N/A	N/A	N/A
Limestone Township	N/A	N/A	N/A
Loyalsock Township	N/A	N/A	N/A
Lycoming Township	Limited	Limited	Limited
McHenry Township	N/A	N/A	N/A
McIntyre Township	N/A	N/A	N/A

Table 5.2-6 Municipal Responses to Capability Questionnaire			
MUNICIPALITY	PLANNING & REGULATORY	ADMINISTRATIVE & TECHNICAL	FINANCIAL
McNett Township	N/A	N/A	N/A
Mifflin Township	N/A	N/A	N/A
Mill Creek Township	N/A	N/A	N/A
Montgomery Borough	N/A	N/A	N/A
Montoursville Borough	N/A	N/A	N/A
Moreland Township	N/A	N/A	N/A
Muncy Borough	N/A	N/A	N/A
Muncy Creek Township	N/A	N/A	N/A
Muncy Township	N/A	N/A	N/A
Nippenose Township	N/A	N/A	N/A
Old Lycoming Township	Moderate	Moderate	Moderate
Penn Township	Limited	Limited	Limited
Piatt Township	N/A	N/A	N/A
Picture Rocks Borough	Moderate	Moderate	Limited
Pine Township	N/A	N/A	N/A
Plunketts Creek Township	N/A	N/A	N/A
Porter Township	N/A	N/A	N/A
Salladasburg Borough	N/A	N/A	N/A
Shrewsbury Township	N/A	N/A	N/A
South Williamsport Borough	N/A	N/A	N/A
Susquehanna Township	N/A	N/A	N/A
Upper Fairfield Township	N/A	N/A	N/A
Washington Township	N/A	N/A	N/A
Watson Township	N/A	N/A	N/A
Wolf Township	Moderate	Moderate	Moderate
Woodward Township	N/A	N/A	N/A
River Valley Transit Authority	Limited	Limited	Limited

Table 5.2-7 Summary of Self-Assessment Capability Responses			
CAPABILITY TYPE	LIMITED	MODERATE	HIGH
Planning & Regulatory	37.5%	62.5%	0%
Administrative & Technical	37.5%	62.5%	0%
Financial	50%	50%	0%

6. MITIGATION STRATEGY

6.1. UPDATE PROCESS SUMMARY

The mitigation strategy serves as the long-term road map to reduce the potential losses, vulnerabilities, and shortcomings identified in the Hazard Identification and Risk Assessment section. A typical mitigation strategy includes a list of goals and objectives, with mitigation actions to address the goals and objectives, that are then prioritized, based on the community's need.

Goals are long-term aspirations about the resiliency of the community given the potential effects of hazards. **Objectives** are measurable strategies that the Lycoming County community has determined will be necessary to move closer to attaining each goal. **Actions** are the tasks that are proposed for realizing each objective.

6.1.1. Mitigation Goal and Objective Review

There were 6 goals and 20 objectives identified in the 2020 Lycoming County Hazard Mitigation Plan Update. The Steering Committee reviewed goals and objectives during a Steering Committee Review Meeting on July 15, 2025. The review of the goals and objectives is summarized below in Table 6.1-1. Table 6.2-1 provides a list of the 2026 goals and objectives.

Table 6.1-1 Review of 2020 mitigation strategy goals and objectives.

GOAL 1	Prevent hazards from impacting the community by focusing on providing technical assistance and building more capacity at the municipal level.	Continued to 2026 HMP.
Objective 1.1	Work with the municipalities to create and/or update land use regulations (e.g., zoning, subdivision, and land development).	Continued to 2026 HMP.
Objective 1.2	Complete and/or update stormwater management plans for all the watersheds in the county.	Continued to 2026 HMP.
Objective 1.3	Promote municipal participation in the NFIP and CRS.	Continued to 2026 HMP.
Objective 1.4	Evaluate hazard impacts and potential preventive measures.	Continued to 2026 HMP.
Objective 1.5	Maintain permit tracking.	Continued to 2026 HMP.
Objective 1.6	Coordinate with High Hazard Potential Dam owners and affected officials on dam rehabilitation and funding.	Moved under new HHPD Goal.
GOAL 2	Protect the people, property, and environment in hazard areas.	**Continued to 2026 HMP.**

Table 6.1-1 Review of 2020 mitigation strategy goals and objectives.		
Objective 2.1	Acquire properties within hazard areas.	Continued to 2026 HMP.
Objective 2.2	Retrofit structures to withstand hazard impacts.	Continued to 2026 HMP.
Objective 2.3	Relocate structures to outside of hazard areas.	Continued to 2026 HMP.
Objective 2.4	Ensure future public facilities can withstand hazard impacts.	Continued to 2026 HMP.
GOAL 3	Maintain and enhance emergency services capabilities in the community.	**Continued to 2026 HMP.**
Objective 3.1	Conduct and enhance emergency planning activities.	Continued to 2026 HMP.
Objective 3.2	Improve alert and warning systems.	Continued to 2026 HMP.
GOAL 4	Protect natural resources within the hazard areas.	**Continued to 2026 HMP.**
Objective 4.1	Protect natural functions of waterways.	Continued to 2026 HMP.
Objective 4.2	Protect watersheds in the county.	Continued to 2026 HMP.
Objective 4.3	Protect forestry resources and prevent wildfires.	Continued to 2026 HMP.
GOAL 5	Ensure that stakeholder groups have the necessary information to mitigate against hazard impacts.	**Continued to 2026 HMP.**
Objective 5.1	Promote personal mitigation measures to the general public.	Continued to 2026 HMP.
Objective 5.2	Promote public awareness of previous hazard impacts.	Continued to 2026 HMP.
Objective 5.3	Conduct community outreach regarding hazard mitigation.	Continued to 2026 HMP.
GOAL 6	Implement structural projects to reduce the impacts of hazards.	**Continued to 2026 HMP.**
Objective 6.1	Maintain infrastructure.	Continued to 2026 HMP.
Objective 6.2	Design and implement flood control projects.	Continued to 2026 HMP.

6.1.2. Mitigation Action Review

Mitigation actions have been carried over and developed for the county as well as for each participating jurisdiction. While some actions may be more general in nature and could apply to more than one jurisdiction, most actions are specific to individual jurisdictions. The mitigation actions that were developed were based on the following: issues identified in the hazard identification and risk assessment, gaps identified in the mitigation capability analysis, input from the HMPT, and feedback from the Capability Assessment and Mitigation Strategy Workshop held July 14 and 16, 2025. These mitigation actions may be implemented through a variety of local tools such as changes in ordinances and policies, inclusion into capital improvements budgets, and grant funding.

County and municipal actions in the 2020 Plan were distributed for the July 14 and 15 workshops for review and update. Each action has been assigned one of the following categories:

- "Completed" – Actions that were completed since the adoption of the 2020 Plan.
- "Cancelled" – Actions that were terminated.
- "Deferred" – Actions that had not been initiated since the adoption of the 2020 Plan.
- "On-Going" – Actions that are performed on a regular and continuous basis by the department.

The majority of existing mitigation actions have been carried over into the 2026 Hazard Mitigation Plan Update as they are continuous actions or actions that were not completed. A list of these actions as well as their status is included in Table 6.1-2. Actions were evaluated by the HMPT and municipal officials with the intent of producing a usable mitigation action plan in 2026 with actions and projects that could be completed over the next five years. Appendix C contains a summary of responses provided by municipalities to the *Mitigation Action Progress Report Form*.

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
Anthony Township	Flood, Flash Flood, Ice Jam	Update/revise, and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Anthony Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Armstrong Township	Flood, Flash Flood, Ice Jam	Disseminate pertinent information to municipal officials and residents as needed regarding local contingency planning for water and wastewater facilities once Lycoming County Water and Sewer Authority complete the Integrated Contingency Plan which includes information on more than 35 facilities.				X
Armstrong Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
Armstrong Township	Flood, Flash Flood, Ice Jam	Update/revise, and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Armstrong Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Bastress Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
Bastress Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Brady Township	Flood, Flash Flood, Ice Jam; Subsidence, Sinkhole	Elevation and reconstruction of 1,000 feet of Turnback Road, including pavement reclamation, geotextile reinforcement, installation of 60-foot-long culverts, roadway embankment, guide rails and more.			X	
Brady Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Brady Township	Flood, Flash Flood, Ice Jam	Identify, acquire, and demolish structure with the highest relative vulnerabilities.				X
Brown Township	Urban Fire and Explosion; Wildfire	Radio communications equipment upgrade for fire company.				X
Brown Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Brown Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Cascade Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
Cascade Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Cascade Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Clinton Township	All Hazards	Increase community outreach and education in hazard mitigation process and preparedness.				X
Clinton Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Clinton Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Cogan House Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
Cogan House Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Cogan House Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Cummings Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
Cummings Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Duboistown Borough	Flood, Flash Flood, Ice Jam	Disseminate pertinent information to municipal officials and residents as needed regarding local contingency planning for water and wastewater facilities once Lycoming County Water and Sewer Authority completes the Integrated Contingency Plan which includes information on more than 35 facilities.				X
Duboistown Borough	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
Duboistown Borough	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Duboistown Borough	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Eldred Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
Eldred Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
Eldred Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Fairfield Township	Flood, Flash Flood, Ice Jam	Disseminate pertinent information to municipal officials and residents as needed regarding local contingency planning for water and wastewater facilities once Lycoming County Water and Sewer Authority completes the Integrated Contingency Plan which includes information on more than 35 facilities.				X
Fairfield Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Fairfield Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Franklin Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
Franklin Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Franklin Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Gamble Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range				X

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
		Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				
Gamble Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Gamble Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Hepburn Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
Hepburn Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Hepburn Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Hughesville Borough	Flood, Flash Flood, Ice Jam	Determine feasibility and/or BCA of 43 online Project Opportunity Forms submitted by homeowners for buyout/elevation projects.			X	
Hughesville Borough	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.			X	
Hughesville Borough	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.	X			

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
Jackson Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
Jackson Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Jackson Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Jersey Shore Borough	Flood, Flash Flood, Ice Jam	Determine feasibility and/or benefit-cost analysis of 43 online Project Opportunity Forms submitted by homeowners for buyout/elevation projects.				X
Jersey Shore Borough	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
Jersey Shore Borough	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Jersey Shore Borough	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
Jordan Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
Jordan Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Jordan Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Lewis Township	Flood, Flash Flood, Ice Jam	Reduce flood risk through cleanup and removal of downed trees, branches, and debris in Shoemaker Run and Slacks Run.				X
Lewis Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
Lewis Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Lewis Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Limestone Township	Subsidence and Sinkhole	Examine the possibility of amending/developing local zoning ordinances to direct new development away from areas underlain with carbonate bedrock.				X

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
Limestone Township	Utility Interruption; Flood, Flash Flood, Ice Jam; Terrorism	Disseminate pertinent information to municipal officials and residents as needed regarding local contingency planning for water and wastewater facilities once Lycoming County Water and Sewer Authority completes the Integrated Contingency Plan which includes information on more than 35 facilities.				X
Limestone Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Limestone Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Loyalsock Township	Flood, Flash Flood, Ice Jam; Levee Failure	Obtain levee accreditation (Provisionally Accredited Levee) as part of Risk MAP.				X
Loyalsock Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
Loyalsock Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Loyalsock Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
Lycoming County	Utility Interruption; Tornado, Windstorm; Hailstorm, Winter Storm	Initiate meeting with providers of electric power, land developers, and contractors to examine the cost and potential sources of funding for burying power lines.		X		
Lycoming County	Utility Interruption; Tornado, Windstorm; Hailstorm, Winter Storm	Develop language for potential inclusion in subdivision regulations requiring new power and communications (telephone, cable television) lines to be buried.		X		
Lycoming County	Wildfire	Educate citizens and business owners about removing flammable vegetation or combustible materials from the immediate vicinity of buildings in wooded areas.				X
Lycoming County	Drought; Environmental Hazards	Provide workshops for farmers regarding livestock management and crop survival during times of drought, and/or water supply interruption.		X		
Lycoming County	Drought	Provide education for residents about water-saving landscaping techniques.				X
Lycoming County	Earthquake	Provide information to schools, prisons, and nursing homes about the Great Shake-Out and encourage participation in this educational program about surviving the immediate effects of an earthquake.		X		
Lycoming County	Earthquake	Provide information to residents and business owners to examine the interior of structures to identify objects that may fall		X		

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
		in the event of an earthquake (e.g., tall file cabinets, water heaters). Include information about anchoring.				
Lycoming County	Flood, Flash Flood, & Ice Jam; Tornado, Windstorm; Wildfire; Winter Storm	After a flood event or windstorm, provide information on alternatives to reconstruction of structures that sustain damages more than or equal to 50% of value to property owners.				X
Lycoming County	Wildfire	Adopt Firewise Program.				X
Lycoming County	Utility Interruption; Environmental Hazards	Meet with Lycoming County Water and Sewer Authority (LCWSA) to review the LCWSA Integrated Contingency Plan to facilitate integration into hazard mitigation planning, emergency response, and other planning mechanisms in the county.				X
Lycoming County	Flood, Flash Flood, Ice Jam; Dam Failure	Obtain inundation information for areas near dams from the Pennsylvania Department of Environmental Protection, as it becomes available.	X			
Lycoming County	Radon Exposure	Encourage homeowners to install appropriate devices to monitor and reduce radon exposure in homes.				X
Lycoming County	Flood, Flash Flood, Ice Jam	Transfer information submitted on hard copy hazard mitigation project opportunity forms to the hazard mitigation project opportunity spreadsheet.	X			

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
Lycoming County	Flood, Flash Flood, Ice Jam	Obtain additional structure/property data from tax assessor and complete an enhanced Hazus analysis and incorporate vulnerability information into the HMP.		X		
Lycoming County	Flood, Flash Flood, Ice Jam; Environmental Hazard; Winter Storm	Provide additional maintenance for State Parks and State Forests.		X		
Lycoming County	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Lycoming County	Pandemic and Infectious Disease	Collaborate with the Pennsylvania Department of Health and municipalities to increase outreach and education activities related to COVID-19 mitigation, testing, and vaccination.	X			
Lycoming County	Utility Interruption; Winter Storm; Tornado, Windstorm	Acquire additional backup generators in preparation for potential County and municipal utility interruptions.			X	
Lycoming County	Nuclear Incident	Outside the 10 mi EPZ, Lycoming will continue to participate in exercises and coordinate with neighboring counties on evacuation routes, reception centers, and mass care sites as needed. Considering work on coordinated messaging strategies in the event of a nuclear emergency.				X
Lycoming Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
Lycoming Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
McHenry Township	Flood, Flash Flood, Ice Jam; Subsidence, Sinkhole	Replace underground culvert pipe that is deteriorating under Old State Road.				X
McHenry Township	Flood, Flash Flood, Ice Jam; Subsidence, Sinkhole	Reconstruction of embankment and roadway on Truman Run to prevent future erosion.			X	
McHenry Township	Transportation Incident; Terrorism	Hire Regional Police Department to assist patrolling of increased tourism and traffic on Route 414.				X
McHenry Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
McHenry Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
McIntyre Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
McIntyre Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
McIntyre Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
McNett Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
McNett Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Mifflin Township	Tornado, Windstorm; Winter Storm	Removal of hazardous trees.				X
Mifflin Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
Mifflin Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Mifflin Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Mill Creek Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Mill Creek Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Montgomery Borough	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range				X

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
		Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				
Montgomery Borough	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Montgomery Borough	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Montoursville Borough	Flood, Flash Flood, Ice Jam	Maintain and enforce floodplain management ordinance.				X
Montoursville Borough	Flood, Flash Flood, Ice Jam	Disseminate pertinent information to municipal officials and residents as needed regarding local contingency planning for water and wastewater facilities once Lycoming County Water and Sewer Authority completes the Integrated Contingency Plan which includes information on more than 35 facilities.				X
Montoursville Borough	Flood, Flash Flood, Ice Jam; Levee Failure	Obtain levee accreditation (Provisionally Accredited Levee) as part of Risk MAP.				X
Montoursville Borough	Flood, Flash Flood, Ice Jam	Determine feasibility and/or benefit-cost analysis of 43 online Project Opportunity Forms submitted by homeowners for buyout/elevation projects.				X
Montoursville Borough	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Montoursville Borough	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
Moreland Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
Moreland Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Moreland Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Muncy Borough	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
Muncy Borough	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Muncy Borough	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Muncy Creek Township	Flood, Flash Flood, Ice Jam	Disseminate pertinent information to municipal officials and residents as needed regarding local contingency planning for water and wastewater facilities once Lycoming County Water and Sewer Authority completes the Integrated Contingency Plan which includes information on more than 35 facilities.				X

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
Muncy Creek Township	Flood, Flash Flood, Ice Jam	Determine feasibility and/or BCA of 43 online Project Opportunity Forms submitted by homeowners for buyout/elevation projects.				X
Muncy Creek Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
Muncy Creek Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Muncy Creek Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Muncy Township	Flood, Flash Flood, Ice Jam	Disseminate pertinent information to municipal officials and residents as needed regarding local contingency planning for water and wastewater facilities once Lycoming County Water and Sewer Authority completes the Integrated Contingency Plan which includes information on more than 35 facilities.				X
Muncy Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
Muncy Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Muncy Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Nippenose Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Nippenose Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Nippenose Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Nippenose Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Old Lycoming Township	Flood, Flash Flood, Ice Jam; Levee Failure	Obtain Levee accreditation (PAL) as part of Risk MAP.				X
Old Lycoming Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Old Lycoming Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Penn Township	Flood, Flash Flood, Ice Jam	Disseminate pertinent information to municipal officials and residents as needed regarding local contingency planning for water and wastewater facilities once Lycoming County Water				X

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
		and Sewer Authority completes the Integrated Contingency Plan which includes information on more than 35 facilities.				
Penn Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
Penn Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Penn Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.	X			
Piatt Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.			X	
Piatt Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Piatt Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Picture Rocks Borough	All Hazards	Post relevant notices of future plans and proposed mitigation actions on municipal bulletin.			X	

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
Picture Rocks Borough	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.			X	
Picture Rocks Borough	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.			X	
Pine Township	Flood, Flash Flood, Ice Jam; Transportation Incident	Reconstruction of embankment and roadway narrowing on English Run Road to prevent stream erosion.				X
Pine Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
Pine Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Pine Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Plunketts Creek Township	Wildfire	Install dry hydrants at water's edge along Loyalsock Creek.			X	
Plunketts Creek Township	Disorientation; All Hazards	Work with local carriers to expand and improve cellular coverage.				X
Plunketts Creek Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
Plunketts Creek Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Porter Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Porter Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Salladasburg Borough	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Salladasburg Borough	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Shrewsbury Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
Shrewsbury Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Shrewsbury Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
South Williamsport Borough	Flood, Flash Flood, Ice Jam; Levee Failure	Obtain Levee accreditation (PAL) as part of Risk MAP.				X

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
South Williamsport Borough	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
South Williamsport Borough	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
South Williamsport Borough	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Susquehanna Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
Susquehanna Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Susquehanna Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				
Upper Fairfield Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
Upper Fairfield Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Upper Fairfield Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Washington Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
Washington Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Washington Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Watson Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Watson Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Williamsport, City of	Flood, Flash Flood, Ice Jam	Furnish and install a permanent log picker with electrical distribution system at the Grafius Run Trash Rack at Highland Terrace similar to the one located at Freedom Road and Market Street.			X	

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
Williamsport, City of	Flood, Flash Flood, Ice Jam; Levee Failure	Obtain Levee accreditation (PAL) as part of Risk MAP.				X
Williamsport, City of	Flood, Flash Flood, Ice Jam	Determine feasibility and/or benefit cost analysis of 43 online Project Opportunity Forms submitted by homeowners for buyout/elevation projects.			X	
Williamsport, City of	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Williamsport, City of	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Wolf Township	Flood, Flash Flood, & Ice Jam	Install/replace/repair culverts previously identified as problem areas Township-wide.				X
Wolf Township	Flood, Flash Flood, & Ice Jam	Disseminate pertinent information to municipal officials and residents as needed regarding local contingency planning for water and wastewater facilities once Lycoming County Water and Sewer Authority completes the Integrated Contingency Plan which includes information on more than 35 facilities.				X
Wolf Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X

Table 6.1-2 Status of 2020 Mitigation Actions

COMMUNITY	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
			COMPLETED	CANCELED	DEFERRED	ONGOING
Wolf Township	Flood, Flash Flood, & Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Wolf Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X
Woodward Township	Transportation Incident; Environmental Hazard	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.				X
Woodward Township	Flood, Flash Flood, Ice Jam	Update/revise and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.				X
Woodward Township	Flood, Flash Flood, Ice Jam	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.				X

6.1.3. Mitigation Success

A great deal of mitigation progress has been made on hazard mitigation projects and actions in the last five years. Details on numerous actions marked as "Completed" since the 2020 plan update are summarized below:

STRUCTURE AND INFRASTRUCTURE

- A Williamsport levee groundbreaking ceremony was held on July 15, 2025, at the Hepburn Street Station for the cross-pipe rehabilitation project. The event marked the start of a project to repair and rehabilitate 36 cross pipes within the levee system to improve stormwater drainage and flood mitigation. This project is in response to the county's 2018 comprehensive plan, which identified potential deterioration of the levee as a major threat to the county.
- $1.4 million in federal grants were awarded for water and sewer projects in Lycoming County. These projects will help us replace aging infrastructure and meet new demand in areas that are growing.
    - The Hughesville-Wolf Authority began a $500,000 project to construct an additional aerobic digester for the sewer system. The project was intended to help with freezing issues during the winter.
    - The Muncy Borough Municipal Authority is replacing over 2,000 lineal feet of interceptor sewer and at collection sewer within the Borough of Muncy. The size of the interceptor will be increased from 15 inches to 21 inches diameter to accommodate anticipated flows from proposed sewer extensions in Muncy Creek Township particularly in the PA Route 405 and 442 growth corridors and to help solve costly inflow and infiltration problems with the Borough's aging sewer system.
- Lycoming County's Bridge Bundling Program, which included 14 bridge replacements, was completed in 2023.
- In 2023, Planning and Community Development staff completed the final site restoration of six acquired properties through HMGP funding. Four additional properties were acquired in Muncy Borough, Loyalsock and Old Lycoming Townships. These sites were demolished and sites restored to natural floodplain.
- The second utility elevation property was completed in 2023. The county is working to identify additional homes eligible for utility elevation.
- Lycoming County obtained inundation information for areas near dams and digitized it.
- Hughesville Borough and Penn Township identified, acquired and demolished structures with the highest vulnerabilities.
- Design and engineering work began for the River Walk Extension. The Susquehanna River Walk Extension is a planned, 4-mile, 10-ft wide, paved multi-purpose trail between the River Walk at Maynard Street and the 20-acre riverfront Susquehanna State Park.
- Lewis Township elevated the generator at their municipal building.
- Washington Township elevated two repetitive loss properties, and completed a pipe up size to help mitigate flooding.
- Susquehanna Township installed permanent road closure gates for when low areas of the township floods.

LOCAL PLANS AND REGULATIONS

- Lycoming County transferred information submitted on hard copies of the hazard mitigation project opportunity forms to the hazard mitigation project digital opportunity spreadsheet.
- In 2023, Lycoming County applied for and was awarded $100,000 in Keystone Recreation, Park and Conservation Fund Grant Agreement with the DCNR to update the Lycoming County Comprehensive Recreation, Parks, Open Space and Greenway Plan. The plan will help identify and prioritize recreation projects and greenways throughout the county. Work on this plan started in 2024 and is ongoing.

NATURAL SYSTEMS PROTECTION

- In 2023, Countywide Action Plan funding supported multiple projects, totaling nearly $500,000.
    - Five stream restoration and fish habitat projects were completed:
        - Bennett's Run Stream Restoration.
        - Bottle Run Stream Restoration.
        - Brown Farm Fish Habitat Design.
        - Spring Garden Huntin Club Stream and Habitat Restoration.
        - Pine Run Stream Restoration.
    - The implementation of a cover crop incentive program, managed by the Lycoming County Conservation District.
- Lewis Township removed flood debris from nine of 11 tributaries that lead to Lycoming Creek.
- Lewis Township completed streambank restoration on Trout Run and Grays Run.
- Susquehanna Township raised a section of the creek bank where water has previously flooded to Valley Road.

EDUCATION AND AWARENESS

- In 2023, The Greater Williamsport Area Trail System Wayfinding Project began developing the interconnected system of multimodal trails, contained within Montoursville Borough, Loyalsock Township, South Williamsport Borough, and the City of Williamsport. Lycoming County Planning and Community Development, Susquehanna Greenway Partnership, and MERJE gathered public feedback from trail users, local businesses and organizations while taking inventory of current wayfinding and mapping of the trail system.
- Lycoming County collaborated with the Pennsylvania Department of Health and municipalities to conduct outreach and education activities related to COVID-19 mitigation, testing and vaccination.

6.2. MITIGATION GOALS AND OBJECTIVES

Based on results of the review of the 2020 HMP mitigation goals and objectives established, several goals and objectives were improved in 2026. Table 6.2-1 lists the mitigation goals and objectives established for the 2026 plan. There are 7 goals and 22 objectives identified. Goal 7 was added to address High Hazard Potential Dams. Objective 1.6 has been moved under this new goal. Also, three new objectives were added. One objective addressing socially vulnerable and underserved communities was added under Goal 2. One objective addressing climate change risk was added under Goal 5. One additional objective addressing High Hazard Potential Dams was added under Goal 7.

Table 6.2-1 List of 2026 mitigation goals and objectives.	
GOAL 1	Prevent hazards from impacting the community by focusing on providing technical assistance and building more capacity at the municipal level.
Objective 1.1	Work with the municipalities to create and/or update land use regulations (e.g., zoning, subdivision, and land development).
Objective 1.2	Complete and/or update stormwater management plans for all the watersheds in the county.
Objective 1.3	Promote municipal participation in the NFIP and CRS.
Objective 1.4	Evaluate hazard impacts and potential preventive measures.
Objective 1.5	Maintain permit tracking.
GOAL 2	Protect the people, property, and environment in hazard areas.
Objective 2.1	Acquire properties within hazard areas.
Objective 2.2	Retrofit structures to withstand hazard impacts.
Objective 2.3	Relocate structures to outside of hazard areas.
Objective 2.4	Ensure future public facilities can withstand hazard impacts.
Objective 2.5	Reduce the risk of natural hazards for socially vulnerable populations and underserved communities.
GOAL 3	Maintain and enhance emergency services capabilities in the community.
Objective 3.1	Conduct and enhance emergency planning activities.
Objective 3.2	Improve alert and warning systems.
GOAL 4	Protect natural resources within the hazard areas.
Objective 4.1	Protect natural functions of waterways.
Objective 4.2	Protect watersheds in the county.
Objective 4.3	Protect forestry resources and prevent wildfires.
GOAL 5	Ensure that stakeholder groups have the necessary information to mitigate against hazard impacts.

Table 6.2-1 List of 2026 mitigation goals and objectives.	
Objective 5.1	Promote personal mitigation measures to the general public.
Objective 5.2	Promote public awareness of previous hazard impacts.
Objective 5.3	Conduct community outreach regarding hazard mitigation.
Objective 5.4	Develop and understanding of increased risk from climate change impacts to natural hazards and promote education on potential impacts from increased risk.
GOAL 6	Implement structural projects to reduce the impacts of hazards.
Objective 6.1	Maintain infrastructure.
Objective 6.2	Design and implement flood control projects.
GOAL 7	Protect people and assets from the potential impacts of high hazard potential dams.
Objective 7.1	Coordinate with High Hazard Potential Dam owners and affected officials on dam rehabilitation and funding.
Objective 7.2	Ensure High Hazard Potential Dams are remediated to decrease potential hazard risks.

6.3. IDENTIFICATION AND ANALYSIS OF MITIGATION TECHNIQUES

The mitigation strategy in the updated Hazard Vulnerability Assessment and Mitigation Plan Update should include analysis of a comprehensive range of specific techniques or actions. FEMA, through Local Mitigation Handbook, and PEMA, through the 2025 SOG, 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 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, provide information and training, NFIP outreach, StormReady, and Firewise Communities.

The HMPT reviewed the four types of mitigation techniques and examples of actions at the Risk Assessment and Mitigation Solutions Workshop. Table 6.3-1 provides a matrix identifying the mitigation techniques used for each hazard in the county. The specific actions associated with these techniques are included in Table 6.3-1.

Table 6.3-1 Mitigation Techniques for All Hazards in Lycoming County.

HAZARD	MITIGATION TECHNIQUE			
	LOCAL PLANS AND REGULATIONS	EDUCATION AND AWARENESS PROGRAMS	NATURAL SYSTEMS PROTECTION	STRUCTURAL AND INFRASTRUCTURE PROJECTS
Flood, Flash Flood, Ice Jam (N)	X	X	X	X
Transportation Incident (M)	X			X
Winter Storm (N)	X	X	X	X
Wildfire (N)	X	X	X	X
Utility Interruption (M)	X	X		X
Tornado, Windstorm (N)	X	X	X	X
Drought (N)		X		
Extreme Temperatures (N)		X		
EH: Hazardous Materials Release	X	X		X
Nuclear Incident (M)	X	X		X
Pandemic (N)				X
EH: Conventional Oil and Gas Wells (M)	X	X	X	X
EH: Gas and Oil Pipeline (M)	X	X	X	X
EH: Unconventional Oil and Gas Wells (M)	X	X	X	X
Dam Failure (M)	X	X		X
Terrorism (M)	X	X		
Radon (N)	X	X		
Landslide (N)				X
Earthquake (N)		X		X
Hailstorm (N)	X	X		X
Invasive Species (N)	X	X		
Disorientation (M)		X		X

Table 6.3-1 Mitigation Techniques for All Hazards in Lycoming County.				
HAZARD	MITIGATION TECHNIQUE			
	LOCAL PLANS AND REGULATIONS	EDUCATION AND AWARENESS PROGRAMS	NATURAL SYSTEMS PROTECTION	STRUCTURAL AND INFRASTRUCTURE PROJECTS
Levee Failure (M)				X
Subsidence, Sinkhole (N)	X	X		X

Table 6.3-2 provides a matrix identifying which municipalities have mitigation actions for each of hazards identified in the risk assessment. Each municipality has one action for all high-risk hazards, and for all medium and low risk hazards that they have identified as impacting them. This is identified in table 4.4-3. Table 4.4-3 shows the different municipalities in Lycoming County and whether their risk is greater than (>), less than (<), or equal to (=) the risk factor assigned to the county as a whole. Each municipality has a mitigation action for any hazards identified as greater than or equal to the risk factor of the county. The specific actions associated with these techniques are included in Table 6.4-1 in the next section. River Valley Transit Authority, as a special district, only has actions for specific hazards it is at risk to, which are Flooding, Transportation Incidents, Winter Storms, and Landslides. This was determined after meeting with the authority to discuss their risks and unique position as a special district.

Table 6.3-2 Mitigation Actions Per Hazard for Each Municipality

MUNICIPALITY	FLOOD, FLASH FLOOD, ICE JAM (N)	TRANSPORTATION INCIDENTS (M)	WINTER STORM (N)	WILDFIRE (N)	UTILITY INTERRUPTION (M)	TORNADO, WINDSTORM (N)	DROUGHT (N)	EXTREME TEMPERATURES (N)	EH: HAZ. MATERIALS RELEASE (M)	NUCLEAR INCIDENTS (M)	PANDEMIC (N)	EH: CONV. OIL & GAS WELLS (M)	EH: GAS AND OIL PIPELINES (M)	EH: UNCONV. OIL & GAS WELLS (M)	DAM FAILURE (M)	TERRORISM (M)	RADON (N)	LANDSLIDE (N)	EARTHQUAKE (N)	HAILSTORM (N)	INVASIVE SPECIES (N)	DISORIENTATION (M)	LEVEE FAILURE (M)	SUBSIDENCE, SINKHOLE (N)
Anthony Township	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X	X	X		
Armstrong Township	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X	X		X
Bastress Township	X	X	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X	X		
Brady Township	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X		X	X	X	X		X
Brown Township	X	X	X	X	X	X	X	X	X		X					X	X	X	X	X	X	X		
Cascade Township	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X	X		
Clinton Township	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X		X	X	X	X		X
Cogan House Township	X	X	X	X	X	X	X	X	X		X	X		X		X		X	X	X	X	X		
Cummings Township	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		
Duboistown Borough	X	X	X	X	X	X	X	X	X		X					X	X	X	X	X	X			X
Eldred Township	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	X		
Fairfield Township	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X		X
Franklin Township	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X		
Gamble Township	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		
Hepburn Township	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X		
Hughesville Borough	X	X	X	X	X	X	X	X	X	X	X					X	X		X	X	X			
Jackson Township	X	X	X	X	X	X	X	X	X		X	X		X		X	X		X	X	X	X		

Table 6.3-2 Mitigation Actions Per Hazard for Each Municipality

MUNICIPALITY	FLOOD, FLASH FLOOD, ICE JAM (N)	TRANSPORTATION INCIDENTS (M)	WINTER STORM (N)	WILDFIRE (N)	UTILITY INTERRUPTION (M)	TORNADO, WINDSTORM (N)	DROUGHT (N)	EXTREME TEMPERATURES (N)	EH: HAZ. MATERIALS RELEASE (M)	NUCLEAR INCIDENTS (M)	PANDEMIC (N)	EH: CONV. OIL & GAS WELLS (M)	EH: GAS AND OIL PIPELINES (M)	EH: UNCONV. OIL & GAS WELLS (M)	DAM FAILURE (M)	TERRORISM (M)	RADON (N)	LANDSLIDE (N)	EARTHQUAKE (N)	HAILSTORM (N)	INVASIVE SPECIES (N)	DISORIENTATION (M)	LEVEE FAILURE (M)	SUBSIDENCE, SINKHOLE (N)
Jersey Shore Borough	X	X	X	X	X	X	X	X	X		X					X	X		X	X	X			
Jordan Township	X	X	X	X	X	X	X	X	X	X	X		X			X	X		X	X	X	X		
Lewis Township	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X		
Limestone Township	X	X	X	X	X	X	X	X	X	X	X				X	X	X		X	X	X	X		X
Loyalsock Township	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X	X
Lycoming Township	X	X	X	X	X	X	X	X	X	X	X			X		X	X		X	X	X	X		
McHenry Township	X	X	X	X	X	X	X	X	X		X	X		X		X	X	X	X	X	X	X		
McIntyre Township	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
McNett Township	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X		
Mifflin Township	X	X	X	X	X	X	X	X	X		X	X	X	X		X	X	X	X	X	X	X		
Mill Creek Township	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X		
Montgomery Borough	X	X	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X			
Montoursville Borough	X	X	X	X	X	X	X	X	X	X	X					X	X		X	X	X			X
Moreland Township	X	X	X	X	X	X	X	X	X	X	X			X		X	X		X	X	X	X		
Muncy Borough	X	X	X	X	X	X	X	X	X	X	X					X	X		X	X	X			X
Muncy Township	X	X	X	X	X	X	X	X	X	X	X		X			X	X		X	X	X	X		X
Muncy Creek Township	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	X		X

Table 6.3-2 Mitigation Actions Per Hazard for Each Municipality

MUNICIPALITY	FLOOD, FLASH FLOOD, ICE JAM (N)	TRANSPORTATION INCIDENTS (M)	WINTER STORM (N)	WILDFIRE (N)	UTILITY INTERRUPTION (M)	TORNADO, WINDSTORM (N)	DROUGHT (N)	EXTREME TEMPERATURES (N)	EH: HAZ. MATERIALS RELEASE (M)	NUCLEAR INCIDENTS (M)	PANDEMIC (N)	EH: CONV. OIL & GAS WELLS (M)	EH: GAS AND OIL PIPELINES (M)	EH: UNCONV. OIL & GAS WELLS (M)	DAM FAILURE (M)	TERRORISM (M)	RADON (N)	LANDSLIDE (N)	EARTHQUAKE (N)	HAILSTORM (N)	INVASIVE SPECIES (N)	DISORIENTATION (M)	LEVEE FAILURE (M)	SUBSIDENCE, SINKHOLE (N)
Nippenose Township	X	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X		X
Old Lycoming Township	X	X	X	X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	X	X	
Penn Township	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X		
Piatt Township	X	X	X	X	X	X	X	X	X		X		X			X	X	X	X	X	X	X		X
Picture Rocks Borough	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X			
Pine Township	X	X	X	X	X	X	X	X	X		X	X		X	X	X			X	X	X	X		
Plunketts Creek Township	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X		
Porter Township	X	X	X	X	X	X	X	X	X		X					X	X	X	X	X	X	X		X
Salladasburg Borough	X	X	X	X	X	X	X	X	X		X					X	X		X	X	X			
Shrewsbury Township	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	X	X		
South Williamsport	X	X	X	X	X	X		X	X	X	X				X	X	X	X	X	X	X		X	X
Susquehanna Township	X	X	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X	X		X
Upper Fairfield Township	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X		
Washington Township	X	X	X	X	X	X	X	X	X	X	X					X	X		X	X	X	X		X
Watson Township	X	X	X	X	X	X	X	X	X		X		X	X		X	X	X	X	X	X	X		X
Williamsport, City of	X	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X		X	X
Wolf Township	X	X	X	X	X	X	X		X	X	X		X	X		X	X	X	X	X	X	X		

Table 6.3-2 Mitigation Actions Per Hazard for Each Municipality

MUNICIPALITY	FLOOD, FLASH FLOOD, ICE JAM (N)	TRANSPORTATION INCIDENTS (M)	WINTER STORM (N)	WILDFIRE (N)	UTILITY INTERRUPTION (M)	TORNADO, WINDSTORM (N)	DROUGHT (N)	EXTREME TEMPERATURES (N)	EH: HAZ. MATERIALS RELEASE (M)	NUCLEAR INCIDENTS (M)	PANDEMIC (N)	EH: CONV. OIL & GAS WELLS (M)	EH: GAS AND OIL PIPELINES (M)	EH: UNCONV. OIL & GAS WELLS (M)	DAM FAILURE (M)	TERRORISM (M)	RADON (N)	LANDSLIDE (N)	EARTHQUAKE (N)	HAILSTORM (N)	INVASIVE SPECIES (N)	DISORIENTATION (M)	LEVEE FAILURE (M)	SUBSIDENCE, SINKHOLE (N)
Woodward Township	X	X	X	X	X	X	X		X		X		X			X	X	X	X	X	X	X		
River Valley Transit Authority	X	X	X															X						

6.4. MITIGATION ACTION PLAN

A kick-off meeting for the 2026 Lycoming County Hazard Mitigation Plan Update was held on January, 21, 2025 to develop a framework for the plan. The goals and objectives were presented during this meeting. During the Mitigation Strategy and Capability Assessment Workshops on July 14 and 15, 2025, mitigation techniques were discussed using FEMA's *Mitigation Ideas* document. During the workshop, municipalities were given their *Mitigation Action Progress Report Form* which listed their actions and projects from the 2020 HMP for review and update as described in Section 6.1. Actions that have been deferred or ongoing have been carried over to the 2026 Action Plan and are again proposed for implementation.

In addition, participants were given *New Mitigation Action Forms* to provide any new actions or projects to be included in the plan update. *New Mitigation Action Forms* were also posted to the project website and sent out via email (or post if requested). Meeting participants who were not affiliated with a municipality were provided with *New Mitigation Action Forms* to include new mitigation actions in the 2026 plan.

The final list of mitigation actions is contained in Table 6.4-1. This table provides an overview of the strategy that will be utilized in order to implement each of the proposed mitigation actions. For each action listed in Table 6.4-1, the associated strategy identifies the agency or job title that will be responsible for initiating the work and potential sources of funding for the work. Each strategy also indicates a timeframe for when the action will happen.

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
GOAL 1 PREVENT HAZARDS FROM IMPACTING THE COMMUNITY BY FOCUSING ON PROVIDING TECHNICAL ASSISTANCE AND BUILDING MORE CAPACITY AT THE MUNICIPAL LEVEL.							
1.1	Adopt Firewise Program.	Lycoming County	Local Plans and Regulations; Natural Systems Protection	Wildfire	DCNR; Lycoming County Conservation District; Lycoming County Department of Public Safety	5-year rotation for hazard fuel mitigation projects; Annually for public education projects and training; Three years for updates on Emergency Action Plans	U.S. Forest Service, DCNR
1.2	Enhance radon testing capabilities to assist homeowners, renters, or businessowners in analyzing their risk.	All Municipalities	Local Plans and Regulations	Radon Exposure	Local EMAs	Ongoing	Staff Time
1.3	Develop priority list of areas with steep slopes near critical facilities or roadways that may benefit from ground stabilization planting and/or barrier installation.	Anthony Township; Armstrong Township; Bastress Township; Brown Township; Cogan House Township;	Structure and Infrastructure Projects	Landslide	Local Public Works Departments; Local Planning Departments; Local Engineering Departments	1-3 Years	Municipal Annual Budget

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
1.3	Develop priority list of areas with steep slopes near critical facilities or roadways that may benefit from ground stabilization planting and/or barrier installation.	Cummings Township; Duboistown Borough; Eldred Township; Franklin Township; Gamble Township; Hepburn Township; Lewis Township; Loyalsock Township; McHenry Township; McIntyre Township; McNett Township; Mifflin Township; Mill Creek Township; Montgomery Borough; Muncy Creek Township; Nippenose Township; Old Lycoming					

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
		Township; Penn Township; Piatt Township; Picture Rocks Borough; Plunketts Creek Township; Porter Township; South Williamsport Borough; Susquehanna Township; Upper Fairfield Township; Watson Township; Williamsport, City of; Wolf Township; Woodward Township; River Valley Transit Authority					
1.4	Examine the possibility of amending/developing local zoning ordinances to direct new development away from areas underlain with carbonate bedrock.	Limestone Township	Local Plans and Regulations	Subsidence, Sinkhole	Zoning Official	3-5 years	Municipal and County Annual Budgets

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
1.5	Develop long-term disaster recovery group focused on organizing post-disaster recovery and mitigation efforts. Organize meeting schedule and explore potential funding mechanisms to assist with projects and initiatives.	Lycoming County	Local Plans and Regulations	All Hazards	Lycoming County Department of Public Safety; STEP, Inc.	5 Years	Staff Time
1.6	Hire Regional Police Department to assist patrolling of increased tourism and traffic on Route 414.	McHenry Township	Local Plans and Regulation	Transportation Incident; Terrorism	McHenry Township; Township Supervisors	Ongoing	Municipal Operating Budget
1.7	Maintain and enforce floodplain management ordinance.	Montoursville Borough	Local Plans and Regulations (NFIP)	Flood, Flash Flood, Ice Jam	Lycoming County Department of Public Safety; Montoursville Borough	Ongoing	HMGP, General Fund
1.8	Meet with Lycoming County Water and Sewer Authority to review its Integrated Contingency Plan to facilitate integration into hazard mitigation planning, emergency response, and other planning mechanisms in the county.	Lycoming County	Local Plans and Regulations	Utility Interruption; EH - Hazardous Materials Release; EH - Conventiona	Lycoming County Water and Sewer Authority; Lycoming County Department of Public Safety	6 months	Staff Time

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
				l Wells; EH - Unconventional Wells; EH - Pipelines			
1.9	Plan for and maintain adequate road and debris clearing capabilities.	All Municipalities	Local Plans and Regulations	Winter Storm	Local Public Works Departments	Ongoing	Staff Time
1.10	Outside the 10 mi EPZ, Lycoming will continue to participate in exercises and coordinate with neighboring counties on evacuation routes, reception centers, and mass care sites as needed. Considering work on coordinated messaging strategies in the event of a nuclear emergency.	Lycoming County; Armstrong Township; Bastress Township; Brady Township; Cascade Township; Clinton Township; Eldred Township; Fairfield Township; Franklin Township; Gamble Township; Hepburn Township; Hughesville	Structure and Infrastructure Projects; Local Plans and Regulations; Education and Awareness Programs	Nuclear Incident	Lycoming County EMA; Lycoming County Department of Public Safety; Local EMAs	Ongoing	Staff Time

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
1.10	Outside the 10 mi EPZ, Lycoming will continue to participate in exercises and coordinate with neighboring counties on evacuation routes, reception centers, and mass care sites as needed. Considering work on coordinated messaging strategies in the event of a nuclear emergency.	Borough; Jordan Township; Lewis Township; Limestone Township; Loyalsock Township; Lycoming Township; McIntyre Township; McNett Township; Mill Creek Township; Montgomery Borough; Montoursville Borough; Moreland Township; Muncy Borough; Muncy Township; Muncy Creek Township; Nippenose Township; Old Lycoming Township; Penn					

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
		Township; Picture Rocks Borough; Plunketts Creek Township; Shrewsbury Township; South Williamsport Borough; Susquehanna Township; Upper Fairfield Township; Washington Township; Williamsport, City of; Wolf Township					
1.11	Update/revise, and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.	All Municipalities	Local Plans and Regulations	Flood, Flash Flood, Ice Jam	Lycoming County Department of Public Safety; Municipalities	Ongoing	Staff Time
GOAL 2 PROTECT THE PEOPLE, PROPERTY, AND ENVIRONMENT IN HAZARD AREAS.							
2.1	Acquire additional backup generators in preparation for potential County and municipal utility interruptions.	Lycoming County	Structure and Infrastructure Projects	Utility Interruption; Winter Storm;	Lycoming County EMA; Lycoming County	2 Years	EMA Departme nt Funds, DCED

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
				Tornado, Windstorm	Department of Public Safety		
2.2	After a flood event or windstorm provide information on alternatives to reconstruction of structures that sustain damages more than or equal to 50% of value to property owners.	Lycoming County	Structure and Infrastructure Projects; NFIP	Flood, Flash Flood, & Ice Jam; Tornado, Windstorm; Wildfire; Winter Storm	Lycoming County EMA; Lycoming County Department of Public Safety	5 years	HMGP; Staff Time
2.3	Determine feasibility and/or BCA of 43 online Project Opportunity Forms submitted by homeowners for buyout/elevation projects.	City of Williamsport; Hughesville Borough; Jersey Shore Borough; Montoursville Borough; Muncy Creek Township	Structure and Infrastructure Projects, NFIP	Flood, Flash Flood, Ice Jam	Lycoming County Department of Public Safety; Municipalities, as needed	1 year	HMGP, General Fund
2.4	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.	All Municipalities	Structure and Infrastructure Projects (NFIP)	Flood, Flash Flood, Ice Jam	Lycoming County Department of Public Safety; Municipalities	Ongoing	HMGP
2.5	Retrofit public buildings and critical facilities to reduce future wind and earthquake damage.	All Municipalities	Structure and Infrastructure Projects	Earthquake; Tornado, Windstorm	Local Planning Departments	5 Years	HMGP; Pre-disaster

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
							funding programs
2.6	Install dry hydrants at water's edge along Loyalsock Creek.	Plunketts Creek Township	Natural Systems Protection	Wildfire	Plunkett's Creek Township; Lycoming County Department of Public Safety	As funding becomes available	HMGP; PEMA; General Fund
2.7	Update Flood Mitigation and Evacuation Plan	Picture Rocks Borough	Local Plans and Regulations	Flood, Flash Flood, Ice Jam	Picture Rocks Borough Council	1 Year	Staff Time, HMGP
2.8	Move the following structures out of floodplain/floodway: Lewis Township Office, Post Office, Trout Run VFC, Trout Run VM Church, Lewis Township Maintenance Building, Trout Run Travel Plaza, Trout Run General Store.	Lewis Township	Structure and Infrastructure Projects	Flood, Flash Flood, Ice Jam	Lewis Township; Township Supervisors	5 Years	HMGP; Pre-disaster funding programs
2.9	Complete weatherization upgrades to protect transit infrastructure from the impacts of winter storms.	River Valley Transit Authority	Structure and Infrastructure Projects	Winter Storm	River Valley Transit Authority	5 Years	HMGP; Pre-disaster funding programs; PennDOT

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
2.10	Research, design, and complete infrastructure upgrades to transit system to protect against the impacts of flooding and flash flooding.	River Valley Transit Authority	Structure and Infrastructure Projects	Flood, Flash Flood, Ice Jam	River Valley Transit Authority	5 Years	HMGP; Pre-disaster funding programs; PennDOT
2.11	Coordinate with PEMA and FEMA on pre-hazard event training to address gaps in the administration of local community's Substantial Improvement/Substantial Damage procedures.	Lycoming County	Local Plans and Regulations	Flood, Flash Flood, Ice Jam	Lycoming County Department of Public Safety	1 Year	Staff Time
2.12	Seek additional structure datasets to be able to better analyze asset risk and vulnerability	Lycoming County	Local Plans and Regulation	All Hazards	Lycoming County Department of Public Safety	Ongoing	Staff time
GOAL 3 MAINTAIN AND ENHANCE EMERGENCY SERVICES CAPABILITIES IN THE COMMUNITY.							
3.1	Explore the development of an endowed fund, created by local resources, to be used for case management during the post-disaster mitigation process. Look into example in Tioga County for research and coordination.	Lycoming County	Structure and Infrastructure Projects	All Natural Hazards	Lycoming County Department of Public Safety; STEP, Inc.	5 Years	Staff Time

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
3.2	Improve coordination to reduce risk from hazardous material incidents and conduct information sessions and trainings to educate and prepare local officials and first responders.	Lycoming County; All Municipalities	Education and Awareness Programs	EH - Hazardous Materials	Lycoming County EMA; Local EMAs	Ongoing	Staff Time
3.3	Ensure that emergency responders are training in response to incidents involving gasoline and other flammable liquid products.	Lycoming County; All Municipalities	Education and Awareness Programs	EH - Hazardous Materials Release; EH - Conventional Wells, EH - Unconventional Wells; EH - Pipelines	Lycoming County EMA; Local EMAs	Ongoing	Lycoming County EMA Department Budget; Local General Fund; PEMA
3.4	Develop and maintain stockpile of personal protective equipment (PPE) at strategic locations. Coordinate on distribution of PPE to communities if needed.	Lycoming County; All Municipalities	Structure and Infrastructure Projects	Pandemic and Infectious Disease	Lycoming County EMA; Local EMAs	Ongoing	EMA Budget; Municipal General Funds
3.5	Coordinate with county, state and federal agencies on	Lycoming County; All Municipalities	Education and	Terrorism	Lycoming County EMA;	Ongoing	Staff Time, HMGP

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
	potential mitigation actions for terrorist activities.		Awareness Programs		Lycoming County Department of Public Safety		
3.6	Radio communications equipment upgrade for fire company.	Brown Township	Education and Awareness Programs	Urban Fire and Explosion; Wildfire	Brown Township	Ongoing	Regional Assistance Grant
3.7	Work with local carriers to expand and Improve cellular coverage.	Plunketts Creek Township	Structure and Infrastructure Projects Project	Disorientation; All Hazards	Plunkett's Creek Township; Lycoming County Department of Public Safety	Ongoing	EPMD; Staff Time
GOAL 4 PROTECT NATURAL RESOURCES WITHIN THE HAZARD AREAS.							
4.1	Coordinate with PA DCNR on ways to address invasive species in Lycoming County.	Lycoming County	Local Plans and Regulations	Invasive Species	Lycoming County Department of Public Safety; Lycoming County Conservation District	Ongoing	Staff Time

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
4.2	Reduce flood risk through cleanup and removal of downed trees, branches, and debris in Shoemaker Run and Slacks Run.	Lewis Township	Natural Systems Protection	Flood, Flash Flood, Ice Jam	Lewis Township	2 years	Public Works Budget
4.3	Removal of hazardous trees.	Mifflin Township	Natural Systems Protection	Tornado, Windstorm; Winter Storm	Mifflin Township	Ongoing	Staff Time
GOAL 5 ENSURE THAT STAKEHOLDER GROUPS HAVE THE NECESSARY INFORMATION TO MITIGATE AGAINST HAZARD IMPACTS.							
5.1	Disseminate pertinent information to municipal officials and residents as needed regarding local contingency planning for water and wastewater facilities once Lycoming County Water and Sewer Authority completes the Integrated Contingency Plan which includes information on more than 35 facilities.	Armstrong Township; Duboistown Borough; Fairfield Township; Limestone Township; Montoursville Borough; Muncy Creek Township; Muncy Township; Penn Township; Wolf Township	Structure and Infrastructure Projects, NFIP	Flood, Flash Flood, Ice Jam	Lycoming County Department of Public Safety; Municipalities, as needed	1 year	HMGP, General Fund
5.2	Educate citizens and business owners about removing flammable vegetation or combustible materials from the	Lycoming County; All Municipalities	Education and Awareness Programs	Wildfire	Lycoming County Department of Public Safety;	1-2 years	FEMA Fire Prevention and Safety

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
	immediate vicinity of buildings in wooded areas.				Municipal Fire Departments		Grant (FP&S); Staff Time
5.3	Encourage homeowners to install appropriate devices to monitor and reduce radon exposure in homes.	Lycoming County	Education and Awareness Programs	Radon Exposure	Lycoming County Department of Public Safety; Municipalities	Multi-year, ongoing	HMGP
5.4	Post warning signage at local parks, county fairs, and other outdoor venues.	All Municipalities	Education and Awareness Programs	Hailstorm	Local EMAs	Ongoing	Municipal Annual Budget
5.5	Educate residents and others in the community on safety protocols related to the risks associated with the Susquehanna Steam Electric Station.	Lycoming County; Armstrong Township; Bastress Township; Brady Township; Cascade Township; Clinton Township; Eldred Township; Fairfield Township; Franklin Township; Gamble	Education and Awareness Programs	Nuclear Incident	Lycoming County EMA, Lycoming County Department of Public Safety, Local Municipal EMCs	Ongoing	Staff Time

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
		Township; Hepburn Township; Hughesville Borough; Jordan Township; Lewis Township; Limestone Township; Loyalsock Township; Lycoming Township; McIntyre Township; McNett Township; Mill Creek Township; Montgomery Borough; Montoursville Borough; Moreland Township; Muncy Borough; Muncy Township; Muncy Creek Township;					

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
		Nippenose Township; Old Lycoming Township; Penn Township; Picture Rocks Borough; Plunketts Creek Township; Shrewsbury Township; South Williamsport; Susquehanna Township; Upper Fairfield Township; Washington Township; Williamsport, City of; Wolf Township					
5.6	Work with local outdoor and wildlife organizations to develop and disseminate educational materials for prospective hikers, campers, and others for how to navigate in forests. Include information on how to prepare	Lycoming County; All Municipalities	Education and Awareness Programs	Disorientation	Lycoming County Department of Public Safety; Lycoming County EMA; Local EMAs	Ongoing	Staff Time

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
	before activities and what to do in case of emergency.						
5.7	Promote awareness of pipelines safety guidelines.	Anthony Township; Armstrong Township; Brady Township; Cascade Township; Clinton Township; Cummings Township; Eldred Township; Fairfield Township; Franklin Township; Gamble Township; Jordan Township; Loyalsock Township; McIntyre Township; McNett Township; Mifflin Township; Mill Creek Township;	Education and Awareness Programs	EH - Pipelines	Local EMAs	Ongoing	Staff Time; PEMA

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
		Muncy Township; Muncy Creek Township; Old Lycoming Township; Penn Township; Piatt Township; Picture Rocks Borough; Upper Fairfield Township; Watson Township; Wolf Township; Woodward Township					
5.8	Develop multi-hazard education and awareness programs materials on property level mitigation for various hazards. Utilize STEP's existing community outreach and assistance programs to ensure materials reach socially vulnerable and underserved households. Ensure materials provided include low-cost options for mitigation.	Lycoming County	Education and Awareness Programs	Drought; Extreme Temperature; Earthquake; Flood, Flash Flood, Ice Jam; Radon Exposure; Tornado, Windstorm; Wildfire;	Lycoming County Department of Public Safety; STEP, Inc.	5 Years	Staff Time; HMGP

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
				Winter Storm; Utility Interruption			
5.9	Increase community outreach and education in hazard mitigation process and preparedness.	Clinton Township	Education and Awareness Programs	All Hazards	Clinton Township	Ongoing	Staff Time
5.10	Disseminate information from NISIC and PA DCNR on invasive species of concern in Lycoming County to residents and businesses to promote awareness.	Lycoming County; All Municipalities	Education and Awareness Programs	Invasive Species	Lycoming County Department of Public Safety; Lycoming County Conservation District; Local Planning Departments	Ongoing	Staff Time
5.11	Produce and distribute information for homeowners and renters on how to properly winterize their dwellings to deal with winter storms and extreme cold temperatures. Consider providing technical assistance or financial support to make such improvements for low-income	All Municipalities	Education and Awareness Programs	Extreme Temperatures; Winter Storm	Local Code Officials; Local EMAs	Ongoing	Staff Time

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
	homeowners and renters. Provide communications and outreach materials in all languages relevant to the community.						
5.12	Assist with coordination between residents and utility companies on critical outage events.	All Municipalities	Education and Awareness Programs	Utility Interruption	Local EMAs	Ongoing	Staff Time
5.13	Develop and distribute materials to educate residents on water-saving measures, such as low-flow showerheads and toilets, monitoring water flow while cleaning, and routinely checking for leaks in plumbing.	All Municipalities	Education and Awareness Programs	Drought	Local Planning Departments	1-2 Years	Staff Time, Pre-disaster funding programs
5.14	Provide public education and resources to homeowners and developers for developing in known sinkhole or subsidence prone areas, including how to identify and report sinkholes or subsidence.	Armstrong Township; Brady Township; Clinton Township; Duboistown Borough; Fairfield Township; Limestone Township; Loyalsock	Education and Awareness Programs	Subsidence, Sinkhole	Local EMAs	Ongoing	Staff Time, HMGP

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
		Township; Montoursville Borough; Muncy Borough; Muncy Township; Muncy Creek Township; Nippenose Township; Piatt Township; Porter Township; South Williamsport Borough; Susquehanna Township; Washington Township; Watson Township; Williamsport, City of					
5.15	Post relevant notices of future plans and proposed mitigation actions on municipal bulletin.	Picture Rocks Borough	Education and Awareness Programs	All Hazards	Picture Rocks Borough	Annually	Staff Time
5.16	Provide education for residents about water-saving landscaping techniques.	Lycoming County	Education and	Drought	Lycoming County	Annually	Lycoming County

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
			Awareness Programs		Conservation District		Annual Budget
5.17	Provide workshops for farmers regarding livestock management and crop survival during times of drought, and/or water supply interruption.	Lycoming County	Education and Awareness Programs	Drought; EH - Hazardous Materials Release; EH - Conventional Wells; EH - Unconventional Wells; EH - Pipelines	Lycoming County Department of Public Safety; Lycoming County Conservation District	Annually	USDA, Pennsylvania Dept. of Agriculture, Lycoming County Annual Budget
GOAL 6 IMPLEMENT STRUCTURAL PROJECTS TO REDUCE THE IMPACTS OF HAZARDS.							
6.1	Elevation and reconstruction of 1,000 feet of Turnback Road, including pavement reclamation, geotextile reinforcement, installation of 60-foot-long culverts, roadway embankment, guide rails and more.	Brady Township	Structure and Infrastructure Projects	Flood, Flash Flood, Ice Jam; Subsidence, Sinkhole	Brady Township	3 years	CFA - Multi-Modal Transportation Fund, General Fund

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
6.2	Furnish and install a permanent log picker with electrical distribution system at the Grafius Run Trash Rack at Highland Terrace similar to the one located at Freedom Road and Market Street.	City of Williamsport	Structure and Infrastructure Projects	Flood, Flash Flood, Ice Jam	City of Williamsport	1 year	HMGP
6.3	Implement traffic calming measures at key areas along county roads. Work with PennDOT to address key areas along state roads.	Lycoming County	Structure and Infrastructure Projects	Transportation Incidents	Lycoming County Department of Public Safety	Ongoing	PennDOT, Staff Time
6.4	Install/replace/repair culverts previously identified as problem areas Township-wide.	Wolf Township	Structure and Infrastructure Projects	Flood, Flash Flood, & Ice Jam	PennDOT; Lycoming County Department of Public Safety	As funds become available.	PennDOT, HMGP, Pre-disaster funding programs
6.5	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential	Armstrong Township; Cascade Township; Cogan House Township; Duboistown Borough; Eldred Township; Franklin	Local Plans and Regulations; Structural and Infrastructure Projects	Transportation Incident	Municipalities; Lycoming County (outreach)	3 years	Staff Time

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
	for public use, into local planning.	Township; Gamble Township; Hepburn Township; Jackson Township; Jersey Shore Borough; Jordan Township; Lewis Township; Loyalsock Township; McIntyre Township; Mifflin Township; Montgomery Borough; Moreland Township; Muncy Borough; Muncy Creek Township; Muncy Township; Penn Township; Piatt Township; Pine Township; Shrewsbury Township; South					

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
		Williamsport Borough; Susquehanna Township; Upper Fairfield Township; Washington Township; Wolf Township; Woodward Township					
6.6	Update flood warning system, including the installation of new flood gauges and cameras to increase data quality. Provide community-facing information so people can stay informed.	Lycoming County	Structure and Infrastructure; Education and Awareness Programs	Flood, Flash Flood, Ice Jam	Lycoming County Department of Public Safety	5 Years	HMGP, Pre-disaster funding programs; Staff Time
6.7	Obtain levee accreditation as part of Risk MAP.	City of Williamsport; Loyalsock Township; McIntyre Township; Old Lycoming Township; South	Structure and Infrastructure Projects, NFIP	Flood, Flash Flood, Ice Jam; Levee Failure	Municipalities	Ongoing	General Fund

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
		Williamsport Borough					
6.8	Reconstruction of embankment and roadway narrowing on English Run Road to prevent stream erosion.	Pine Township	Structure and Infrastructure Projects	Flood, Flash Flood, Ice Jam; Transportation Incident	Pine Township	As funding becomes available.	Act 13 Fund, Highway Aid
6.9	Reconstruction of embankment and roadway on Truman Run to prevent future erosion.	McHenry Township	Structure and Infrastructure Projects	Flood, Flash Flood, Ice Jam; Subsidence, Sinkhole	McHenry Township: Township Supervisors; Township Engineer	1 year	PennDOT
6.10	Replace underground culvert pipe that is deteriorating under Old State Road.	McHenry Township	Structure and Infrastructure Projects	Flood, Flash Flood, Ice Jam; Subsidence, Sinkhole	McHenry Township: Township Supervisors; Township Engineer	1 year	PennDOT
6.11	Implement traffic calming measures at key community intersections.	All Municipalities	Structure and Infrastructure Projects	Transportation Incidents	Local Planning and Engineering Departments	Ongoing	Local Planning Funds, PennDOT
6.12	Inspect transit infrastructure to identify key areas of vulnerability	River Valley Transit Authority	Structure and Infrastructure Projects	Transportation Incidents	River Valley Transit Authority	3 Years	Local Planning Funds,

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
	and address issues that will impact operation and safety.						Staff Time, PennDOT
GOAL 7 PROTECT PEOPLE AND ASSETS FROM THE POTENTIAL IMPACTS OF HIGH HAZARD POTENTIAL DAMS.							
7.1	Build partnerships with dam owners. For the dams with poor condition assessments, work with dam owners to identify and prioritize the repairs needed to bring the dams into compliance with dam safety standards.	Lycoming County; Anthony Township; Armstrong Township; Brady Township; Clinton Township; Cummings Township; Gamble Township; Hepburn Township; Limestone Township; McIntyre Township; Nippenose Township; Penn Township; Picture Rocks Borough; Pine Township; Plunketts Creek	Local Plans and Regulations; Education and Awareness Programs	Dam Failure	Lycoming County Department of Public Safety; Municipalities	Multi-year, ongoing	Staff Time

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
		Township; Shrewsbury Township; South Williamsport Borough; Williamsport, City of					
7.2	Once dam hazard areas are identified, communities can consider updating land use ordinances. Consider the implications of recognizing dam inundation areas as sensitive areas in zoning ordinances.	Lycoming County; Anthony Township; Armstrong Township; Brady Township; Clinton Township; Cummings Township; Gamble Township; Hepburn Township; Limestone Township; McIntyre Township; Nippenose Township; Penn	Local Plans and Regulations	Dam Failure	Lycoming County Department of Public Safety; Municipalities	Ongoing	Staff Time

Table 6.4-1 2026 Lycoming County Mitigation Action Plan							
#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
		Township; Picture Rocks Borough; Pine Township; Plunketts Creek Township; Shrewsbury Township; South Williamsport Borough; Williamsport, City of					
7.3	Once structures in dam hazard areas are identified, support mitigation projects that will result in the projection of public and private property from floods of specific magnitudes. Eligible projects include but are not limited to: 1. Acquisition of hazard-prone structures 2. Elevation of flood-prone structures.	Lycoming County; Anthony Township; Armstrong Township; Brady Township; Clinton Township; Cummings Township; Gamble Township; Hepburn	Structure and Infrastructure Projects	Dam Failure	Lycoming County Department of Public Safety; Municipalities	Ongoing	FEMA HHPD, PA DCED PDFAP, Private Funding

Table 6.4-1 2026 Lycoming County Mitigation Action Plan

#	ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD(S)	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE AND NOTES
	3. Minor structural flood control projects. 4. Relocation of structures from hazard-prone areas. 5. Retrofitting of existing buildings, facilities, and infrastructure. 6. Rehabilitating and/or removing dams.	Township; Limestone Township; McIntyre Township; Nippenose Township; Penn Township; Picture Rocks Borough; Pine Township; Plunketts Creek Township; Shrewsbury Township; South Williamsport Borough; Williamsport, City of					
7.4	Conduct Planning and Design work to rehabilitate Maggio Estate No. 2 Dam.	McIntyre Township	Structure and Infrastructure Projects	Dam Failure	Red Run Mountain, Inc.	Fall 2026 to Fall 2029	HHPD 2024 Grant
7.5	Construct the approved rehabilitation design for the Frank E. Heller Dam.	Armstrong Township	Structure and Infrastructure Projects	Dam Failure	Williamsport Municipal Water Authority	Winter 2025/2026 to Winter 2028/2029	HHPD 2022 Grant

At least one mitigation action was established for each hazard in Lycoming County. More than one action is identified for several hazards. Every participating jurisdiction has at least one mitigation action for the hazards they are at risk to.

These mitigation actions have either been carried over from the 2020 HMP or captured during the planning process for the 20206 HMP update. During the development of this plan, there were key findings and takeaways that demonstrated further potential for future mitigation actions. These potential mitigation actions have been outlined in Table 6.4-3 below.

Table 6.4-1 lists the 2026 mitigation actions, many of which will require substantial time commitments from staff at the county and local municipalities. While all these activities will be pursued over the next five years, the reality of limited time and resources requires the identification of the feasibility and priority level of mitigation actions. Prioritization allows the individuals and organizations involved to focus their energies and ensure progress on mitigation activities.

Evaluating mitigation actions involves judging each action against certain criteria to determine its feasibility and potential impact. Actions evaluated and prioritized by applying the Multi-Objective Mitigation Action Prioritization criteria. For each action, scores were assigned to each criterion using the following weighted, multi-objective mitigation action prioritization criteria.

- **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 then given a priority ranking (Low, Medium, and High) based on the following:

- Low Priority: 1.0 – 1.8

- Medium Priority: 1.9 – 2.4
- High Priority: 2.5 – 3.0

Table 6.4-2 presents the cumulative results of the prioritization of mitigation actions.

Table 6.4-2 Mitigation Action Prioritization

ACTION NUMBER	MITIGATION ACTION	MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					TOTAL SCORE
		EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES COMMUNICATIONS/ CRITICAL INFRASTRUCTURE	
1.8	Meet with Lycoming County Water and Sewer Authority (LCWSA) to review the LCWSA Integrated Contingency Plan to facilitate integration into hazard mitigation planning, emergency response, and other planning mechanisms in the County.	2	2	3	3	3	2.5
5.1	Disseminate pertinent information to municipal officials and residents as needed regarding local contingency planning for water and wastewater facilities once Lycoming County Water and Sewer Authority complete the Integrated Contingency Plan which includes information on more than 35 facilities.	2	2	3	3	3	2.5
2.5	Retrofit public buildings and Critical Facilities to reduce future wind and earthquake damage.	3	2	3	1.5	3	2.5
6.7	Obtain Levee accreditation (PAL) as part of Risk MAP.	3	2.5	1	3	3	2.5
2.4	Identify, acquire, demolish, and potentially reconstruct structures with the highest relative vulnerabilities.	3	3	1	3	2	2.5
7.4	Conduct Planning and Design work to rehabilitate Maggio Estate No. 2 Dam.	3	3	1	3	2	2.5

Table 6.4-2 Mitigation Action Prioritization							
ACTION NUMBER	MITIGATION ACTION	MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					TOTAL SCORE
		EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES COMMUNICATIONS/ CRITICAL INFRASTRUCTURE	
7.5	Construct the approved rehabilitation design for the Frank E. Heller Dam.	3	3	1	3	2	2.5
5.8	Develop multi-hazard Education and Awareness Programs materials on property level mitigation for various hazards. Utilize STEP's existing community outreach and assistance programs to ensure materials reach socially vulnerable and underserved households. Ensure materials provided include low-cost options for mitigation.	2	2	4	3	1	2.4
6.2	Furnish and install a permanent log picker with electrical distribution system at the Grafius Run Trash Rack at Highland Terrace similar to the one located at Freedom Road and Market Street.	2	3	1	3	3	2.4
2.1	Acquire additional backup generators in preparation for potential County and municipal utility interruptions.	2	2	3	2	3	2.4
3.7	Work with local carriers to expand and Improve cellular coverage.	2	1.5	3	3	3	2.4
5.9	Increase community outreach and education in hazard mitigation process and preparedness.	2	1.5	3	3	3	2.4
7.3	Once structures in dam hazard areas are identified, support mitigation projects that will result in the projection of public and private property from floods of specific magnitudes. Eligible projects include but are not limited to: 1. Acquisition of hazard-prone structures	2.5	2	2	2	3	2.3

Table 6.4-2 Mitigation Action Prioritization								
ACTION NUMBER	MITIGATION ACTION	MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					TOTAL SCORE
		EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES COMMUNICATIONS/ CRITICAL INFRASTRUCTURE	
	2. Elevation of flood-prone structures. 3. Minor structural flood control projects 4. Relocation of structures from hazard-prone areas 5. Retrofitting of existing buildings, facilities, and infrastructure 6. Rehabilitating and/or removing dams.						
6.6	Update flood warning system, including the installation of new flood gauges and cameras to increase data quality. Provide community-facing information so people can stay informed.	2	3	1	4	1	2.3
2.10	Research, design, and complete infrastructure upgrades to transit system to protect against the impacts of flooding and flash flooding.	3	2	1	3	3	2.3
1.2	Enhance radon testing capabilities to assist homeowners, renters, or businessowners in analyzing their risk	3	2.5	2	1	2	2.2
6.1	Elevation and reconstruction of 1,000 feet of Turnback Road, including pavement reclamation, geotextile reinforcement, installation of 60-foot-long culverts, roadway embankment, guide rails and more.	3	2.5	2	1	2	2.2
6.4	Install/replace/repair culverts previously identified as problem areas Township-wide.	2.5	2	2	3	1.5	2.2
2.9	Complete weatherization upgrades to protect transit infrastructure from the impacts of winter storms.	3	2	1	3	2	2.2

Table 6.4-2 Mitigation Action Prioritization							
ACTION NUMBER	MITIGATION ACTION	MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					TOTAL SCORE
		EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES COMMUNICATIONS/ CRITICAL INFRASTRUCTURE	
2.11	Coordinate with PEMA and FEMA on pre-hazard event training to address gaps in the administration of local community's Substantial Improvement/Substantial Damage procedures.	3	2	1	3	2	2.2
3.1	Explore the development of an endowed fund, created by local resources, to be used for case management during the post-disaster mitigation process. Look into example in Tioga County for research and coordination.	2	1	4	2	2	2.1
5.14	Provide public education and resources to homeowners and developers for developing in known sinkhole or subsidence prone areas, including how to identify and report sinkholes or subsidence.	2	3	1	2	2	2.1
1.12	Update/revise, and adopt floodplain management ordinance as part of NFIP compliance and Risk MAP.	2.5	2	1	3	2	2.1
2.2	After a flood event or windstorm provide information on alternatives to reconstruction of structures that sustain damages more than or equal to 50% of value to property owners.	2.5	2.5	1	3	1	2.1
4.2	Reduce flood risk through clean up and removal of downed trees, branches, and debris in Shoemaker Run and Slacks Run.	2.5	2.5	1	3	1	2.1
6.3	Implement traffic calming measures at key areas along county roads. Work with PennDOT to address key areas along state roads.	2	2	1.5	3	2	2.1

Table 6.4-2 Mitigation Action Prioritization								
ACTION NUMBER	MITIGATION ACTION	MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					TOTAL SCORE
		EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES COMMUNICATIONS/ CRITICAL INFRASTRUCTURE	
6.9	Reconstruction of embankment and roadway on Truman Run to prevent future erosion.	2	2	1	3	2.5	2.0
6.10	Replace underground culvert pipe that is deteriorating under Old State Road.	2	2	1	3	2.5	2.0
6.8	Reconstruction of embankment and roadway narrowing on English Run Road to prevent stream erosion.	2	2	1	3	2.5	2.0
2.8	Move the following structures out of floodplain/floodway: Lewis Township Office, Post Office, Trout Run VFC, Trout Run VM Church, Lewis Township Maintenance Building, Trout Run Travel Plaza, Trout Run General Store.	3	1	1	3	3	2.0
5.12	Assist with coordination between residents and utility companies on critical outage events.	3	2	1	1	3	2.0
1.5	Develop long-term disaster recovery group focused on organizing post-disaster recovery and mitigation efforts. Organize meeting schedule and explore potential funding mechanisms to assist with projects and initiatives.	2	1	4	2	1	2.0
2.7	Update Flood Mitigation and Evacuation Plan	2	2	1	3	2	2.0
5.13	Develop and distribute materials to educate residents on water-saving measures, such as low-flow showerheads and toilets, monitoring water flow while cleaning, and routinely checking for leaks in plumbing.	2	2	1	3	2	2.0
2.12	Seek additional structure datasets to be able to better analyze asset risk and vulnerability	2	1.5	2	2	3	2.0

Table 6.4-2 Mitigation Action Prioritization

ACTION NUMBER	MITIGATION ACTION	MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					TOTAL SCORE
		EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES COMMUNICATIONS/ CRITICAL INFRASTRUCTURE	
6.5	Integrate deficient locally owned bridge (20 feet or longer) projects, identified in the Lycoming County WATS Long Range Transportation Plan, currently classified as status inactive and deemed essential for public use, into local planning.	2.5	1.5	2	1	3	2.0
5.2	Educate citizens and business owners about removing flammable vegetation or combustible materials from the immediate vicinity of buildings in wooded areas.	2	3	1	1	2	2.0
6.12	Inspect transit infrastructure to identify key areas of vulnerability and address issues that will impact operation and safety.	2	2	1	3	2	2.0
2.3	Determine feasibility and/or BCA of 43 online Project Opportunity Forms submitted by homeowners for buyout/elevation projects.	2.5	2	1	3	1	1.9
5.17	Provide workshops for farmers regarding livestock management and crop survival during times of drought, and/or water supply interruption.	1.5	2	2.5	2	1	1.9
5.16	Provide education for residents about water-saving landscaping techniques.	1.5	2	2	2	1.5	1.8
5.15	Post relevant notices of future plans and proposed mitigation actions on municipal bulletin.	1.5	1.5	3	2	1	1.8
6.11	Implement traffic calming measures at key community intersections.	2	1	1	3	3	1.8

Table 6.4-2 Mitigation Action Prioritization

ACTION NUMBER	MITIGATION ACTION	MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					TOTAL SCORE
		EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES COMMUNICATIONS/ CRITICAL INFRASTRUCTURE	
7.1	Build partnerships with dam owners. For the dams with poor condition assessments, work with dam owners to identify and prioritize the repairs needed to bring the dams into compliance with dam safety standards.	2	2	1	1	3	1.8
1.7	Maintain and enforce floodplain management ordinance.	2	2	1	2	1	1.7
1.9	Plan for and maintain adequate road and debris clearing capabilities	2	1	1	3	2	1.7
3.2	Improve coordination to reduce risk from hazardous material incidents and conduct information sessions and trainings to educate and prepare local officials and first responders.	1	2	1	2	2	1.6
3.3	Ensure that emergency responders are training in response to incidents involving gasoline and other flammable liquid products.	1	2	1	2	2	1.6
3.5	Coordinate with county, state and federal agencies on potential mitigation actions for terrorist activities.	1	2	1	2	2	1.6
3.4	Develop and maintain stockpile of PPE at strategic locations. Coordinate on distribution of PPE to communities if needed.	1	2	1	3	1	1.6
7.2	Once dam hazard areas are identified, communities can consider updating land use ordinances. Consider the implications of recognizing dam inundation areas as sensitive areas in zoning ordinances.	1.5	1.5	2	1	2	1.6

Table 6.4-2 Mitigation Action Prioritization							
ACTION NUMBER	MITIGATION ACTION	MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					TOTAL SCORE
		EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES COMMUNICATIONS/ CRITICAL INFRASTRUCTURE	
5.4	Post warning signage at local parks, county fairs, and other outdoor venues.	1.5	1.5	1.5	1	2	1.5
2.6	Install dry hydrants at water's edge along Loyalsock Creek.	2	2	1	1	1	1.5
4.3	Removal of hazardous trees.	2	2	1	1	1	1.5
1.10	Outside the 10 mi EPZ, Lycoming will continue to participate in exercises and coordinate with neighboring counties on evacuation routes, reception centers, and mass care sites as needed. Considering work on coordinated messaging strategies in the event of a nuclear emergency.	2	1	1.5	1	2	1.5
1.4	Examine the possibility of amending/developing local zoning ordinances to direct new development away from areas underlain with carbonate bedrock.	3	1	1	1	1	1.4
4.1	Coordinate with PA DCNR on ways to address invasive species in Lycoming County.	2	1	1	1	2	1.4
5.7	Promote awareness of pipelines safety guidelines.	2	1	1	1	2	1.4
5.10	Disseminate information from National Invasive Species Information Center (NISIC) and PA DCNR on invasive species of concern in Lycoming County to residents and businesses to promote awareness.	2	1	1	1	2	1.4

Table 6.4-2 Mitigation Action Prioritization

ACTION NUMBER	MITIGATION ACTION	MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					TOTAL SCORE
		EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES COMMUNICATIONS/ CRITICAL INFRASTRUCTURE	
5.11	Produce and distribute information for homeowners and renters on how to properly winterize their dwellings to deal with winter storms and extreme cold temperatures. Consider providing technical assistance or financial support to make such improvements for low-income homeowners and renters. Provide communications and outreach materials in all languages relevant to the community.	2	1	1	1	2	1.4
5.5	Educate residents and others in the community on safety protocols related to the risks associated with the Susquehanna Steam Electric Station.	1	2	1	1	1	1.3
1.1	Adopt Firewise Program.	1.5	1.5	1	1	1	1.3
1.3	Develop priority list of areas with steep slopes near critical facilities or roadways that may benefit from ground stabilization planting and/or barrier installation.	1.5	1.5	1	1	1	1.3
1.6	Hire Regional Police Department to assist patrolling of increased tourism and traffic on Route 414.	1.5	1.5	1	1	1	1.3
3.6	Radio communications equipment upgrade for fire company.	1.5	1.5	1	1	1	1.3
5.3	Encourage homeowners to install appropriate devices to monitor and reduce radon exposure in homes.	1.5	1.5	1	1	1	1.3
5.6	Work with local outdoor and wildlife organizations to develop and disseminate educational materials for prospective hikers, campers, and others for how to navigate in forests. Include information on how	1	1	1.5	1	1	1.1

Table 6.4-2 Mitigation Action Prioritization								
ACTION NUMBER	MITIGATION ACTION	MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					TOTAL SCORE
		EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES COMMUNICATIONS/ CRITICAL INFRASTRUCTURE	
	to prepare before activities and what to do in case of emergency.						

7. PLAN MAINTENANCE

7.1. UPDATE PROCESS SUMMARY

Once this Plan has received approval from PEMA and FEMA, the Plan will be adopted by the Lycoming County Commissioners and all participating jurisdictions. This HMP is intended to be a 'living document'. Plan adoption, though important, is not considered the final step in the planning process but rather as a first step to implementation. The plan monitoring and maintenance schedule is a cycle of events that involve periodic review, adjustments, and improvement. Plan monitoring also provides an opportunity to recognize other planning initiatives within the county that may benefit from the incorporation of risk and/or mitigation objectives detailed in this HMP. This section establishes a method to monitor how the Plan will be evaluated and maintained.

7.2. MONITORING, EVALUATING, AND UPDATING THE PLAN

Monitoring, evaluating, and updating this plan is critical to maintaining its value and success in Lycoming County hazard mitigation efforts. Ensuring effective implementation of mitigation activities paves the way for continued momentum in the planning process and gives direction for the future. This section explains who will be responsible for maintenance activities and what those responsibilities entail. It also provides a methodology and schedule of maintenance activities including a description of how the public will be involved on a continued basis. The HMSC elected to keep the methodology and schedule similar to what was outlined in the 2020 HMP. The HMSC will continue to put more emphasis on integrating the mitigation goals, objectives, and actions identified in the mitigation strategy into the other ongoing planning efforts to ensure implementation and tracking of actions throughout the five-year plan maintenance process.

In order to ensure that the Plan continues to provide a framework of reducing risk in Lycoming County, the Department of Public Safety will take responsibility in overseeing the progress made on the implementation of the plan at least annually, but also as deemed necessary based on the occurrence of a disaster or another occasion that necessitates the review of the HMP. Evaluation of the 2026 HMP will not only include an investigation of whether mitigation actions were completed, but also an assessment of how effective those actions were in mitigating losses. A review of the qualitative and quantitative benefits (or avoided losses) of mitigation activities will support this assessment. The results of the evaluation will then be compared to the goals and objectives established in the plan and decisions will be made regarding whether actions should be discontinued or modified in any way considering new developments in the community. Progress will be documented by the Department of Public Safety for use in the next HMP update.

Each municipality will designate a community representative to monitor mitigation activities and hazard events within their respective communities. The local EMC would be suitable for this role. This individual will be asked to work with the Department of Public Safety to provide

updates on applicable mitigation actions and feedback on changing hazard vulnerabilities within their community.

The municipal monitor will also be responsible for reviewing the planning and land use regulatory element of the municipality's capability assessment to identify potential opportunities for continued incorporation of the HMP into local planning mechanisms and will also identify locally generated plans, information, reports, etc. that may be capable of being incorporated into the update of the 2026 HMP.

In addition to conducting an annual review of the plan, the HMSC will review the plan within 30 days of a disaster. The risk assessment and mitigation strategy will be evaluated and any changes to community priorities or status will be documented. The HMP will receive a full, detailed update every five years, as required to reflect the current risk, vulnerabilities, development trends and as mitigation actions are implemented. While an annual report will be completed each year, any state and Federal guidance or policy changes from PEMA and FEMA, respectively, will be addressed in the five-year update. The municipalities will not be responsible for making any changes to the HMP document as part of annual reviews; their role will be to document information and report that back to the county. A copy of each Annual Plan Review will be provided to PEMA and FEMA and included as official documentation in the next 5-year HMP update.

The 2026 HMP will be updated before the plan's expiration date (5 years after the FEMA approval date), as required by DMA 2000, or following a disaster event. Future plan updates will account for any new hazard vulnerabilities, special circumstances, or new information that becomes available. During the five-year review process, the following questions will be considered as criteria for assessing the effectiveness of the Lycoming County HMP:

- Has the nature or magnitude of hazards affecting the county changed?
- Are there new hazards that have the potential to impact the county?
- Is there updated, or more quantitative, risk assessment data available related to the identified hazards in the plan? Can this data be integrated into the analysis to better assess vulnerability, and depict the risk of communities to the hazards?
- Do the identified goals and actions address current and expected conditions?
- Have mitigation actions been implemented or completed?
- Has the implementation of identified mitigation actions resulted in expected outcomes?
- Are current resources adequate to implement the plan?
- Should additional local resources be committed to address identified hazards?
- Are there current or upcoming planning mechanisms or initiatives in which the mitigation strategy should be considered for integration?

Issues that arise during monitoring and evaluation which require changes to the risk assessment, mitigation strategy, and other components of the plan will be incorporated during future updates.

7.3. CONTINUED PUBLIC INVOLVEMENT

As was done during development of the 2020 HMP, the HMSC will involve the public during annual review periods by providing an opportunity to review and submit feedback. The public will have access to the current HMP through their local municipal office or on the Lycoming County government website. Information on upcoming events related to the HMP or solicitation for comments will be announced via newsletters, social media, and the county website. The public is encouraged to submit comments on the HMP at any time. The HMSC will incorporate all relevant comments during the next update of the hazard mitigation plan.

The citizens of Lycoming County are encouraged to submit their comments to elected officials and/or members of the Hazard Mitigation Steering Committee. To promote public participation, Lycoming County welcomed comments on the HMP for a 30-day period. This offered the public the opportunity to share their comments and observations. All comments received will be maintained and considered by the Hazard Mitigation Steering Committee when updating the HMP.

The comprehensive plan; capital improvements plan; building code, municipal floodplain management regulations, EOP, and zoning ordinance are identified for incorporation of hazard mitigation actions once the Plan is adopted. Each of these mechanisms will continue to be used to meet the intent of this Plan, as appropriate. Likewise, as these planning mechanisms are updated, they will be considered for incorporation into the HMP during the annual review process and/or the five-year cycle update.

The county and participating jurisdictions may propose additional mitigation actions for inclusion throughout the five-year cycle but must submit new mitigation actions through the Department of Public Safety which will request an HMP amendment by contacting the PEMA State Hazard Mitigation Planner. FEMA Region 3 must officially approve all additions and will amend the HMP by issuing an HMP Amendment Approval letter. In the event that the plan is amended, its approval date will remain the same.

8. PLAN ADOPTION

The Plan was submitted to the Pennsylvania State Hazard Mitigation Planner and to FEMA on January 8, 2026. FEMA granted approval-pending-adoption on April X, 2026. Full approval from FEMA was received after each jurisdiction adopted the plan.

This section of the plan includes copies of the local adoption resolutions passed by Lycoming County and its municipal governments as well as a completed Local Mitigation Plan Review Crosswalk. Adoption resolution templates are provided to assist the county and municipal governments with recommended language for future adoption of the HMP.

Lycoming County Hazard Mitigation Plan

County Adoption Resolution

Resolution No. _____

Lycoming County, Pennsylvania

WHEREAS, the municipalities of Lycoming County, Pennsylvania, are most vulnerable to natural and human-made hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, Lycoming 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 Lycoming County Hazard Mitigation Plan has been developed by the Lycoming County Department of Public Safety, in cooperation with other County departments, local municipal officials, and the citizens of Lycoming County, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Lycoming County Hazard Mitigation Plan, and

WHEREAS, the Lycoming County Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural and human-made hazards that face the county and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for the county of Lycoming that:

- The Lycoming 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 Lycoming County Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2026

ATTEST: LYCOMING COUNTY COMMISSIONERS

_____ By _____

By _____

By _____

Lycoming County Hazard Mitigation Plan

Municipal Adoption Resolution

Resolution No. _____

<Borough/Township of Municipality Name>, Lycoming County, Pennsylvania

WHEREAS, the *<Borough/Township of Municipality Name>*, Lycoming County, Pennsylvania, is most vulnerable to natural and human-made hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, the *<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 Lycoming County Hazard Mitigation Plan has been developed by the Lycoming 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 Lycoming County Hazard Mitigation Plan, and

WHEREAS, the Lycoming County Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural and human-made hazards that face the county and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for the *<Borough/Township of Municipality Name>*:

- The Lycoming County Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the *<Borough/Township>*, and
- The respective officials and agencies identified in the implementation strategy of the Lycoming County Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2026

ATTEST: *<BOROUGH/TOWNSHIP OF MUNICIPALITY NAME>*

_____ By _____

By _____

By _____

Lycoming County Hazard Mitigation Plan

Special District Adoption Resolution

Resolution No. _____

<Special District Name>, Lycoming County, Pennsylvania

WHEREAS, the <*Special District Name*>, Lycoming County, Pennsylvania, is most vulnerable to natural and human-made hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, the <*Special District 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 Lycoming County Hazard Mitigation Plan has been developed by the Lycoming County Department of Public Safety, in cooperation with other County departments, and leaders and citizens within and/or serviced by <*Special District Name*>, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Lycoming County Hazard Mitigation Plan, and

WHEREAS, the Lycoming County Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural and human-made hazards that face the county, its municipal governments, and its special districts,

NOW THEREFORE BE IT RESOLVED by the governing body for the <*Special District Name*>:

- The Lycoming County Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the <*Special District Name*>, and
- The respective officials and agencies identified in the implementation strategy of the Lycoming County Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2026

ATTEST:

_____

<SPECIAL DISTRICT NAME>

By _____

By _____

By _____