Snyder County 2025 Hazard Mitigation Plan

Prepared for:

Snyder County Emergency Management Agency

9 West Market Street, P.O. Box 217

Middleburg, PA 17842

Prepared by:

MCM Consulting Group, Inc.

328 Innovation Boulevard

State College, PA 16803

Certification of Annual Review Meetings

YEAR	DATE OF MEETING	PUBLIC OUTREACH ADDRESSED? *	SIGNATURE
2025			
2026			
2027			
2028			
2029			

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

Record of Changes

DATE	DESCRIPTION OF CHANGE MADE, MITIGATION ACTION COMPLETED, OR PUBLIC OUTREACH PERFORMED	CHANGE MADE BY (PRINT NAME)	CHANGE MADE BY (SIGNATURE)

Table of Contents

Figures

Tables

Acronyms

AACT: American Academy of Clinical Toxicology

ACHA: American College Health Association

ACMT: American College of Medical Toxicology

AHJ: Authority Having Jurisdiction

AMD: Acid Mine Drainage

ANSI: American National Standards Institute

ASAM: American Society of Addiction Medicine

ASHRAE: American Society of Heating, Refrigerating, and Air-Conditioning Engineers

ASIRT: Association for Safe International Road Travel

BFE: Base Flood Elevation

CBRNE: Chemical, Biological, Radiological, Nuclear, or Explosive

CDC: Centers for Disease Control and Prevention

CERT: Community Emergency Response Team

CFR: Code of Federal Regulations

CFS: Commodity Flow Study

CHSN: College Health Surveillance Network

CCIDRAP: Center for Infectious Disease Research and Policy

CRS: Community Rating System

DCNR: Department of Conservation and Natural Resources

DDAP: Department of Drug and Alcohol Programs

DEA: Drug Enforcement Administration

DFIRM: Digital Flood Insurance Rate Map

DMA: Disaster Mitigation Act

DPS: Department of Public Safety

EF: Enhanced Fujita

EIA: Energy Information Administration

EMA: Emergency Management Agency

EMPG: Emergency Management Performance Grant

EMS: Emergency Medical Services

EOP: Emergency Operations Plan

EPA: Environmental Protection Agency

EPCRA: Emergency Planning and Community Right-To-Know Act

EPZ: Emergency Planning Zone

FBI: Federal Bureau of Investigations

FEMA: Federal Emergency Management Agency

FMA: Flood Mitigation Assistance Grant Program

FRA: Federal Railroad Association

GIS: Geographic Information Systems/Sciences

HAZUS: Hazards U.S. Software

HMA: Hazard Mitigation Assistance

HMEP: Hazardous Material Emergency Planning Grant

HMGP: Hazard Mitigation Grant Planning

HMP: Hazard Mitigation Plan

HMRF: Hazardous Material Response Fund

HSCA: Hazardous Sites Cleanup Act

HSGP: Homeland Security Grant Program

HVE: Homegrown Violent Extremist

ICC: International Code Council

IES: Illuminating Engineering Society

LEPC: Local Emergency Planning Committee

LGTBQ: Lesbian, Gay, Bisexual, Trans & Queer

LPT: Local Planning Team

MAT: Medication-Assisted Treatment

MPC: Municipalities Planning Code

NARM: Notification and Resource Manual

NAS: Neonatal Abstinence Syndrome

NCDC:	National Climatic Data Center
NCEI:	National Centers for Environmental Information
NFIP:	National Flood Insurance Program
NFPA:	National Fire Protection Association
NIH:	National Institute of Health
NLD:	National Levee Database
NOAA:	National Oceanic and Atmospheric Administration
NTP:	Narcotic Treatment Program
NWS:	National Weather Service
OIH:	Opioid-Induced Hyperalgesia
OUD:	Opioid Use Disorder
PA DCED:	Pennsylvania Department of Community and Economic Development
PA DEP:	Pennsylvania Department of Environmental Protection
PA DOA:	Pennsylvania Department of Agriculture
PA GWIS:	Pennsylvania Groundwater Information System
PA HART:	Pennsylvania Helicopter Aquatic Rescue Team
PAWNVCP:	Pennsylvania West Nile Virus Control Program
PDMP:	Prescription Drug Monitoring Program
PDSI:	Palmer Drought Severity Index
PEMA:	Pennsylvania Emergency Management Agency
PennDOT:	Pennsylvania Department of Transportation
PHMSA:	Pipeline and Hazardous Materials Safety Administration
PISC:	Pennsylvania Invasive Species Council
POD:	Points of Dispensing
PWSA:	Public Water Service Area
RF:	Risk Factor
SARA:	Superfund Amendments and Reauthorization Act
SC:	Steering Committee

SFHA:	Special Flood Hazard Area
TRI:	Toxic Release Inventory
UCC:	Uniform Construction Code
US HHS:	United States Department of Health and Human Services
USACE:	Untied States Army Corp of Engineers
USDA:	United States Department of Agriculture
USDA FS:	United States Department of Agriculture Forest Service
USGS:	United States Geological Survey
WL:	Working Level
WMD:	Weapon of Mass Destruction
WUI:	Wildland Urban Interface

Executive Summary

Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. Hazard mitigation focuses attention and resources on county and municipal policies and actions that will produce successive benefits over time. State and local governments engage in hazard mitigation planning to identify risks and vulnerabilities associated with natural as well as human-caused hazards and develop long-term strategies for protecting people and property from future hazard events. Mitigation plans are key to breaking the cycle of disaster damage, reconstruction, and repeated damage. This plan represents the work of citizens, elected and appointed government officials, business leaders, and volunteer and nonprofit groups to protect community assets, preserve the economic viability of the community, and save lives.

In 2023, the Snyder County Emergency Management Agency contracted the services of a consulting agency to revise and update the Snyder County Hazard Mitigation Plan. The plan was successfully updated in accordance with the requirements set forth by PEMA and FEMA. The updated Snyder County Hazard Mitigation Plan was adopted by the Snyder County Commissioners in 2025. All twenty-one municipalities adopted the 2019 Snyder County Hazard Mitigation Plan as the municipal hazard mitigation plan, and it is anticipated that all participating municipalities will adopt the 2025 Snyder County Hazard Mitigation Plan Update.

The Snyder County Commissioners secured a grant to complete the 2025 update to the Snyder County Hazard Mitigation Plan. MCM Consulting Group, Inc. was hired to assist the county with the update of the plan. The planning kick-off meeting was conducted on November 20, 2023.

The planning process for the 2025 Snyder County Hazard Mitigation Plan Update consisted of the following:

- Identification and prioritization of the hazards that may affect the county and its municipalities.
- Assessment of the county's and municipalities' vulnerability to these hazards.
- Identification of the mitigation actions and projects that can reduce that vulnerability.
- Development of a strategy for implementing the actions and projects, including identifying the agency(ies) responsible for that implementation.

Throughout the planning process, the general public was given the opportunity to comment on the existing HMP and provide suggestions for the updated version. Due to COVID-19, public meetings were conducted via an online survey to provide residents an opportunity to provide input on the HMP. Several meetings were held in person with a virtual option, and participants were invited to submit surveys and other documents via an online survey.

The following hazards were identified by the local planning team as presenting the highest risk to the county and its municipalities:

Natural hazards:

- Drought
- Earthquake
- Extreme Temperatures
- Flooding, Flash Flooding, Ice Jam Flooding
- Hurricane and Tropical Storm
- Invasive Species
- Landslide
- Pandemic and Infectious Disease
- Radon Exposure
- Subsidence and Sinkhole
- Tornado/Windstorm
- Wildfire
- Winter Storm

Human-caused hazards:

- Blighted Properties
- Dam Failure
- *Emergency Services Shortages
- Environmental Hazards / Hazardous Materials
- Substance Use Disorder
- Terrorism/Cyberterrorism Incidents
- Transportation Accidents
- Utility Interruption

A total of twenty-one hazards have been identified in the 2025 Snyder County Hazard Mitigation Plan. A total of thirteen identified hazards were listed in the previous 2019 plan update. The new hazards include extreme temperature, invasive species, pandemic and infectious disease, radon exposure, blighted properties, emergency services shortage, substance use disorder, and terrorism/cyberterrorism incidents.

To mitigate against the effects of these hazards, the local planning team identified the following goals for hazard mitigation over the next five years:

- Reduce potential injury/death and damage to existing community assets due to floods, flash floods, and ice jams.
- Reduce potential injury/death and damage to community assets due to all hazards.
- Promote disaster-resistant future development.
- Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.
- Improve response and recovery capabilities.
- Protect critical infrastructure.

Mitigation actions are specific projects and activities that help achieve goals. A total of forty-eight actions were developed for this plan update as they pertain to hazards identified by the local planning team. The 2019 Snyder County Hazard Mitigation Plan consisted of eighty-nine total actions. The individual objectives and actions that will be implemented are shown in Section 6.4. Each municipality was provided the opportunity to submit new project opportunity forms for this update. During the 2019 HMP update all project opportunities and mitigation actions were compiled into the Snyder County mitigation action plan and not separated into their own documents. For the 2025 HMP update all project opportunities are in their own table rather than in the mitigation action plan. One project opportunity was submitted for this hazard mitigation plan update.

The 2025 Snyder County Hazard Mitigation Plan is the cornerstone to reducing Snyder County's vulnerability to disasters. It is the commitment to reducing risks from hazards and serves as a guide for decision makers as they commit resources to reducing the effects of hazards. Hazard mitigation is the only phase of emergency management specifically dedicated to breaking the cycle of damage, reconstruction, and repeated damage.

The 2025 Snyder County Hazard Mitigation Plan is a living document that reflects ongoing hazard mitigation activities and requires monitoring, evaluating, and updating to ensure the mitigation actions are implemented. To facilitate the hazard mitigation planning process and adhere to regulatory requirements, the plan will be reviewed annually, and any major revisions will be incorporated into the five-year update.

1. Introduction

1.1. Background

The Snyder County Board of Commissioners, in response to the Disaster Mitigation Act of 2000 (DMA 2000), organized a countywide hazard mitigation planning effort to prepare, adopt, and implement a multi-jurisdictional Hazard Mitigation Plan (HMP) for Snyder County and all of its twenty-one municipalities. The Snyder County Emergency Management Agency was charged by the County Board of Commissioners to prepare the 2025 plan. The 2019 HMP has been utilized and maintained during the five-year life cycle.

The Snyder County Commissioners were successful in securing hazard mitigation grant funding to update the county hazard mitigation plan. The pre-disaster mitigation grant funding was administered by the Pennsylvania Emergency Management Agency and provided to Snyder County as a sub-grantee. The Snyder County Commissioners assigned the Snyder County Emergency Management Agency with the primary responsibility to update the hazard mitigation plan. MCM Consulting Group, Inc. was selected to complete the update of the HMP. A local hazard mitigation planning team was developed comprised of government leaders and citizens from Snyder County. This updated HMP will provide another solid foundation for the Snyder County Hazard Mitigation Program.

Hazard mitigation describes sustained actions taken to prevent or minimize long-term risks to life and property from hazards and to create successive benefits over time. Pre-disaster mitigation actions are taken in advance of a hazard event and are essential to breaking the disaster cycles of damage, reconstruction, and repeated damage. With careful selection, successful mitigation actions are cost-effective means of reducing risk of loss over the long term.

Hazard mitigation planning has the potential to produce long-term and recurring benefits. A core assumption of mitigation is that current dollars invested in mitigation practices will significantly reduce the demand for future dollars by lessening the amount needed for recovery, repair, and reconstruction. These mitigation practices will also enable local residents, businesses, and industries to reestablish themselves in the wake of a disaster, getting the economy back on track sooner with less interruption.

1.2. Purpose

The purpose of this all-hazard mitigation plan (HMP) is:

- Protect life, safety, and property by reducing the potential for future damages and economic losses that result from hazards.
- Qualify for additional grant funding, in both the pre-disaster and the post-disaster environment.
- Speed recovery and redevelopment following future disaster events.
- Demonstrate a firm local commitment to hazard mitigation principles.
- Comply with both state and federal legislative requirements for local hazard mitigation plans.

1.3. Scope

This Snyder County Multi-Jurisdictional Hazard Mitigation Plan serves as a framework for saving lives, protecting assets, and preserving the economic viability of the forty-eight municipalities in Snyder County. The HMP outlines actions designed to address and reduce the impact of a full range of natural hazards facing Snyder County, including drought, earthquakes, flooding, tornadoes, hurricanes/tropical storms, invasive species, and severe winter weather. Human-caused hazards such as transportation accidents, emergency services shortage, hazardous materials spills, and fires are also addressed.

A multi-jurisdictional planning approach was utilized for the Snyder County HMP update, thereby eliminating the need for each municipality to develop its own approach to hazard mitigation projects, common mitigation goals and objectives, and an evaluation of a broad capabilities assessment examining policies and regulations throughout the county and its municipalities.

1.4. Authority and References

Authority for this plan originates from the following federal sources:

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

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

- Pennsylvania Emergency Management Services Code. Title 35, Pa C.S. Section 101

- Pennsylvania Municipalities Planning Code of 1968, Act 247 as reenacted and amended by Act 170 of 1988.
- Pennsylvania Stormwater Management Act of October 4, 1978. P.L. 864, No. 167

The following Federal Emergency Management Agency (FEMA) guides and reference documents were used to prepare this document:

- FEMA 386-1: Getting Started. September 2002
- FEMA 386-2: Understanding Your Risks: Identifying Hazards and Estimating Losses. August 2001
- FEMA 386-3: Developing the Mitigation Plan. April 2003
- FEMA 386-4: Bringing the Plan to Life. August 2003
- FEMA 386-5: Using Benefit-Cost Review in Mitigation Planning. May 2007
- FEMA 386-6: Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning. May 2005
- FEMA 386-7: Integrating Manmade Hazards into Mitigation Planning. September 2003
- FEMA 386-8: Multijurisdictional Mitigation Planning. August 2006
- FEMA 386-9: Using the Hazard Mitigation Plan to Prepare Successful Mitigation Projects. August 2008
- FEMA Local Multi-Hazard Mitigation Planning Guidance. July 1, 2008
- FEMA National Fire Incident Reporting System 5.0: Complete Reference Guide. January 2008
- FEMA Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards. January 2013
- FEMA Rehabilitation of High Hazard Potential Dams: Grant Program Guidance, 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 6, 2009
- PEMA: All-Hazard Mitigation Planning Standard Operating Guide, 2020.

The following document produced by the National Fire Protection Association (NFPA) provided additional guidance for updating this plan:

NFPA 1600: Standard on Disaster/Emergency Management and Business Continuity Programs. 2011

2. Community Profile

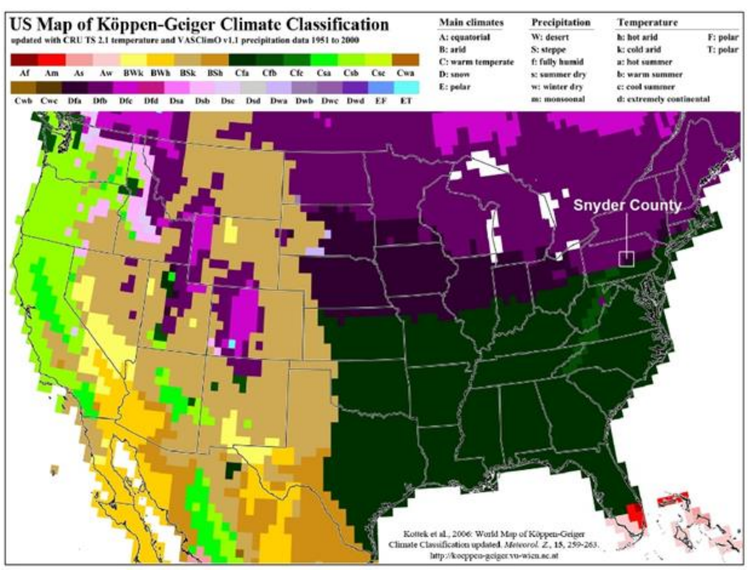
2.1. Geography and the Environment

Snyder County covers approximately 332 square miles and is situated in central Pennsylvania. The county is bordered by Mifflin County in the west, Union County to the north, Northumberland County to the east, and Juniata County to the south. Snyder County lies within the Ridge and Valley Province. The county is the 53rd ranked county in terms of population within the Commonwealth of Pennsylvania. There is a total of 328.8 square miles of land and 3.2 square miles of water.

Snyder County presents a wide range of topographic features. The surface ranges from almost level on plateaus and in valleys, to rolling and hilly in other areas. Elevations in the county range from a high of 2,188 feet at Shade Mountain in West Perry Township in the southeastern portion of the county, to a low of approximately 415 feet in Penn Township along the Susquehanna River.

The Köppen-Geiger Climate Areas map classifies Snyder County, and the rest of Pennsylvania, as Humid Continental, which can be seen in *Figure 1 – Köppen-Geiger Climate Map*. While the counties of Pennsylvania share many weather similarities, there are also a few unique characteristics to the area.

Figure 1 - Köppen-Geiger Climate Map



According to current data, the climate in Snyder County is temperate, being characterized by moderately hot summers and moderately severe winters. In winter, the average temperature is 31.78˚F and the average daily minimum temperature is 23.05˚F. In summer, the average temperature is 69.73˚F and the average daily maximum temperature is 80.95˚F. The average amount of snowfall each winter is 29.00 inches.

River and stream valleys dominate the landscape of Snyder County. The Susquehanna River is the primary feature and runs along the eastern border of the county. Other major water features include Middle Creek and Penns Creek.

Snyder County is comprised of six watersheds:

Table 1 - Watersheds in Snyder County

Watersheds in Snyder County
Juniata River
Kishacoquillas Creek
Middle Creek
Penns Creek
Susquehanna River
West Branch Mahantango Creek

2.2. Community Facts

Snyder County was founded on March 2, 1855 from parts of Union County. The county was named after former Governor of Pennsylvania, Simon Snyder. The county seat, Middleburg Borough, was incorporated as borough on September 25, 1860.

The following boroughs and townships are located in Snyder County:

- Boroughs: Beavertown, Freeburg, McClure, Middleburg, Selinsgrove, Shamokin Dam
- Townships: Adams, Beaver, Center, Chapman, Franklin, Jackson, Middlecreek, Monroe, Penn, Perry, Spring, Union, Washington, West Beaver, West Perry

The National Park Service's (NPS) National Register of Historic Places lists enter number location in Snyder County that are considered historic properties or buildings. These buildings can be found in *Table 2 – Snyder County National Historic Places*, including the year that the building was added to the list and the municipality where it is located.

Table 2 - Snyder County National Historic Places

Snyder County National Historic Places		
Building/Location Name	**Date Added to NRHP**	**Municipality**
Governor Simon Snyder Mansion	08/25/1978	Selinsgrove Borough
Seibert Hall, Susquehanna University	10/25/1979	Selinsgrove Borough
Selinsgrove Hall, Susquehanna University	10/25/1979	Selinsgrove Borough

2.3. Population and Demographics

The total population for Snyder County is 40,452 based on 2020 United States Census Bureau. The total change in population for Snyder County from 2010 to 2020 was an increase of 1,052 and a change of 2.67%. The most populous municipality in the county is Selinsgrove Borough, with a population of 5,923 residents as of the 2020 U.S. Census. The municipalities in the county that had the largest percentage of decrease from 2010 to 2020 were West Beaver Township with a 20.70% decrease, Middlecreek Township with a 8.80% decrease, and Middleburg Borough with a 8.10% decrease. The municipalities that had the highest percentage of increase for the period from 2010 to 2020 were McClure Borough with a 38.20% increase, Freeburg Borough with a 27.70% increase, and Jackson Township with a 22.30% increase. *Table 3 – Population Change in Snyder County* illustrates the trends and data from United States Census Bureau. These figures are based off data from the United States Census Bureau in 2020. *Figure 5 – Snyder County Population Density* illustrates the average population density values per census track in the various municipalities of Snyder County.

Table 3 - Population Change in Snyder County

Population Change in Snyder County from 2010-2020			
Municipality	**2010 Census**	**2020 Census**	**Percent of Change 2010-2020 (%)**
Adams Township	943	892	-5.4
Beaver Township	499	437	-12.4
Beavertown Borough	1,357	1080	-20.4
Center Township	1,890	2,110	-11.6
Chapman Township	1,715	1,593	-7.1
Franklin Township	1,894	2,115	11.7
Freeburg Borough	621	793	27.7
Jackson Township	1,333	1,630	22.3
McClure Borough	872	1,205	38.2

Population Change in Snyder County from 2010-2020			
Municipality	**2010 Census**	**2020 Census**	**Percent of Change 2010-2020 (%)**
Middleburg Borough	1,757	1,615	-8.1
Middlecreek Township	2,282	2,082	-8.8
Monroe Township	3,877	4,126	6.4
Penn Township	4,239	4,388	3.5
Perry Township	1,787	2,138	19.6
Selinsgrove Borough	5,621	5,923	5.4
Shamokin Dam Borough	1,931	1,812	-6.2
Spring Township	1,568	1,479	-5.7
Union Township	1,381	1,449	-4.9
Washington Township	1,665	1,672	0.4
West Beaver Township	1,289	1,022	-20.7
West Perry Township	879	891	1.4
Source: United States Census Bureau (2024), 2020 Census Data			

During this hazard mitigation planning period, socially vulnerable populations were reviewed for Snyder County. For the purposes of this hazard mitigation plan, socially vulnerable populations include the unhoused and unsheltered populations of Snyder County, individuals who have mobility challenges, and those populations which may have not had an active role in hazard mitigation planning in the past. Social vulnerability can also include portions of the population that may not have access to specific resources or community lifelines. In Snyder County, this includes, but is not limited to, populations with limited internet access, those individuals who do not have easy access to public transportation, and those populations that are not near grocery or food community lifelines. In Snyder County, populations located far from grocery stores or food locations are at increased vulnerability to natural and human-caused hazards.

Vulnerable populations in Snyder County are represented by a variety of different groups. The Snyder County Area Agency on Aging represents older individuals in Snyder County. The local planning team for this hazard mitigation plan made efforts to include individuals from the Snyder County unserved and underserved populations in the county.

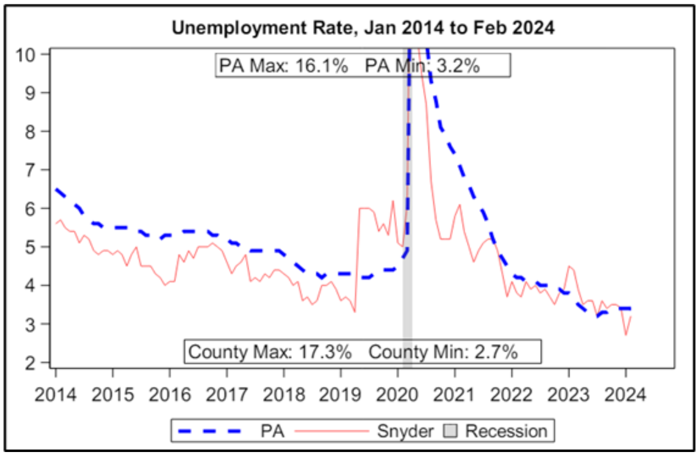
As of the 2022 American Community Survey data reports there are approximately 16,003 housing units in Snyder County, Pennsylvania. Of these housing units, there are an estimated 14,430 households within the county, with an average household size of 2.57 persons. Married couples make up a plurality of households in the county, occupying 55.7% of households, with an average family size of 3.08 persons. The estimated owner-occupied housing rate of Snyder County is 75.4%, with an overall occupancy rate of 90.17% of all units. The median value of the owner-occupied housing units in Snyder County from 2018 to 2022 is $197,300.00. The median monthly owner's costs for a structure with a mortgage was $1,353.00 and the median monthly owner's costs for a structure without a mortgage was $529.00. The median gross rent for rental properties in Snyder County was $849.00 for the same date range.

The racial composition of the county is 96.4% White, 1.4% Black or African American, 2.6% Hispanic or Latino, 0.2% American Indian and Alaska Native, 0.7% Asian, 0.1% Native Hawaiian and other Pacific Islander, and 1.2% two or more races. The median age of Snyder County is 40.0 years of age, which is lower than the median age of Pennsylvania at 40.8 years of age and higher than the national median of 38.5 years of age. The percentage of Snyder County under the age of 5 years old is 5.2%, between the ages of 18 and 64 years old is 59.7% and aged 65 years old and older is 19.8%.

The median household income for households in Snyder County is $65,914.00 and the poverty rate of Snyder County is 9.8% of the total population. The poverty rate for the Commonwealth of Pennsylvania as a whole is 11.8%. There are approximately 1,734 veterans in Snyder County. The median veteran income in Snyder County as of 2022 was $43,208.00, with 7.4% of Snyder County veterans living below the poverty level. The veteran unemployment rate in the county was approximately 1.3%.

The Covid-19 Pandemic created an increase in unemployment and interruptions in employment throughout the United States, to include Pennsylvania and Snyder County. According to Pennsylvania Department of Labor and Industry data, there was a large spike in unemployment both across the Commonwealth and Snyder County. At the height of the Covid-19 Pandemic in the spring of 2020, the unemployment rate for Snyder County hit 17.3% of the working population of the county. That is higher than the peak unemployment percentage for Pennsylvania, which peaked at 16.1% of the working population of the entire state. *Figure 2 – Unemployment Rate Jan. 2014 to Feb. 2024* illustrates the trend and large spike in unemployment. The unemployment rate for Snyder County in February 2024 was 3.2%, which roughly accounted for 19,700 working age adults (ages 16 to 65). The total estimated workforce for Snyder County was 19,000 working age adults (ages 16 to 65) in February 2024.

Figure 2 - Unemployment Rate Jan. 2014 to Feb. 2024



Source: Pennsylvania Department of Labor & Industry

Snyder County's leading industries are manufacturing, education, healthcare, social services, and retail trade. The primary employment providers within Snyder County are displayed below in *Table 4 – Snyder County Top Employers.*

Table 4 - Snyder County Top Employers

Snyder County Top Employers (Excluding State Employers)	
Ranking	**Company**
1	Wood-Mode LLC
2	Susquehanna University
3	National Beef Packing Company
4	Selinsgrove Area School District
5	Professional Building Systems Inc
6	Wal-Mart Associates Inc
7	United Cerebral Palsy of Central PA
8	Conestoga Wood Specialties
9	Midd-West School District
10	Family Practice Center PC
Source: Pennsylvania Department of Labor & Industry, 2023	

The top employers' data was obtained through the Pennsylvania Department of Labor and Industry, Center for Workforce Information and Analysis. This data only provided a list of employers, their ranking, and North American Industry Classification System (NAICS) descriptions. *Table 5 – Quarterly Census of Employment and Wages, 2022 Annual Averages in Snyder County* only calls out how many locations per NAICS description and total number of employees.

Table 5 - Quarterly Census of Employment and Wages, 2022 Annual Averages in Snyder County

Quarterly Census of Employment and Wages, 2022 Annual Averages in Snyder County					
NAICS	**Description**	**Number of Locations**	**Number of Employees**	**Employment Percentage**	**Average Wages**
11	Agriculture, Forestry, Fishing, and Hunting	29	341	2.2%	$39,101.00
21	Mining, Quarrying, and Oil & Gas	1	ND	ND	ND
22	Utilities	11	ND	ND	ND
23	Construction	96	668	4.3%	$53,768.00
31-33	Manufacturing	78	3,440	22.1%	$52,836.00
42	Wholesale Trade	35	581	3.7%	$58,840.00
44-45	Retail Trade	175	2,865	18.4%	$28,266.00
48-49	Transportation and Warehousing	54	439	2.8%	$43,736.00
51	Information	5	91	0.6%	$27,226.00
52	Finance and Insurance	44	217	1.4%	$65,249.00
53	Real Estate, Rental, and Leasing	17	120	0.8%	$37,552.00
54	Professional and Technical Services	45	340	2.2%	$70,808.00
55	Management of Companies and Enterprises	2	ND	ND	ND
56	Administrative and Waste Services	31	222	1.4%	$33,113.00
61	Educational Services	24	ND	ND	ND
62	Healthcare and Social Assistance	116	2,310	14.9%	$51,010.00

Quarterly Census of Employment and Wages, 2022 Annual Averages in Snyder County					
NAICS	**Description**	**Number of Locations**	**Number of Employees**	**Employment Percentage**	**Average Wages**
71	Arts, Entertainment, and Recreation	16	199	1.3%	$12,709
72	Accommodation and Food Services	89	1,599	10.3%	$19,836.00
81	Other Services (Except Public Administration)	83	392	2.5%	$29,810.00
92	Public Administration	36	369	2.4%	$45,616.00
-	**Total, All Industries**	**985**	**15,544**	**100.0%**	**$43,741.00**
Source: PA DLI (2022), NAICS (North American Industry Classification System)					

2.4. Land Use and Development

Snyder County is composed of twenty-one municipalities, which include:

- Fifteen townships
- Six boroughs

The majority of acreage in Snyder County is forested, while approximately 40.32% (or 85,547 acres) of the acreage is agriculture. Snyder County has a total acreage of 212,172 acres in the Bay watershed and the county is mostly made up of natural land which consists of forests, streams, and wetlands.

Snyder County has approximately 210,432 acres of total land area, and 2,048 acres of water area, with a population per square mile of 120.9 persons based on 2020 data estimates. Forested areas make up approximately 55% of the county, while agriculture makes up approximately 40% of the total land area in Snyder County, and high density urban, low density urban, water, transitional, resource extraction, quarries, and wetlands each account for approximately 5% of the land area.

Systems

The specific systems in Snyder County must also be considered when discussing the community characteristics. Food, water, and shelter are of primary concern when looking at a community's lifelines. As Snyder County is a rural county, food areas and grocery stores are spread over a wide geographic area. Specific grocery stores can be found in, but are not limited to, Selinsgrove Borough, Shamokin Dam Borough, and Middleburg Borough. Water in Snyder County is primarily provided by small, local water authorities and public water suppliers. Local domestic water wells are also prevalent throughout the entire community. Shelter features in Snyder County during emergencies can include municipal borough and township buildings and any buildings that are currently part of emergency response and recovery planning for Snyder County.

2.5. Data Sources

The following data sources were used during the update process:

- United States Census Bureau.
- National Climatic Data Center (NCDC).
- National Oceanic and Atmospheric Administration (NOAA).
- Pennsylvania Department of Conservation and Natural Resources (PA DCNR).
- Pennsylvania Department of Environmental Protection (PA DEP).
- Pennsylvania Department of Labor and Industry (PA DLI).
- Pennsylvania Groundwater Information System (PaGWIS).
- Pennsylvania Emergency Incident Reporting System. (PEIRS)
- Pennsylvania Emergency Management Agency (PEMA).
- Snyder County Comprehensive Plan 2001.

The countywide Digital Flood Insurance Rate Maps (DFIRM) were used for all flood risk analysis and estimation of loss. The Snyder County DFIRMs were approved and effective in 2013. The DFIRM database provides flood frequency and elevation information used in the flood hazard risk assessment. Other Snyder County GIS datasets including road centerlines, structures, and municipalities were utilized in conjunction with the DFIRM data.

In order to assess the vulnerability of different jurisdictions to the hazards, data on past occurrences of damaging weather events was compiled. A large number of natural-hazard events were gathered from the National Climatic Data Center (NCDC) database. The NCDC is a division of the United States Department of Commerce’s National Oceanic and Atmospheric Administration (NOAA). Information on hazard events is compiled by the NCDC from data gathered by the National Weather Service (NWS), another division of NOAA. The data is then presented by the NCDC as tabular data that can be queried in the United States Storm Events database, which “documents the occurrences 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). The classification of storm events in the database is based off of data collected from around the United States and the Commonwealth of

Pennsylvania, so the data may not be filed under the correct storm category due to user input error. The reason for this data issue results from some storm events falling under multiple categories, including but not limited to winter storm, ice storm, tornado, hurricane / tropical storm, flooding, and flash flooding. Many of the events listed in the United States Storm Events database can fall under multiple of these categories. In an effort to include a comprehensive list of prior storm events for Snyder County, search queries with multiple storm classifications were conducted for each hazard.

Throughout the risk and vulnerability assessment included in Section 4 of this Hazard Mitigation Plan, descriptions of limited data indicate some areas in which the county and the 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.

This hazard mitigation plan evaluates the vulnerability of the county's community lifelines. For the purposes of this plan, critical infrastructure facilities are those entities that are essential to the health, welfare, and safety of the community. This includes but is not limited to airports, emergency medical service (EMS) stations, communication facilities and towers, day care centers and preschools, fire departments, hospitals and medical facilities, police departments, schools, and senior living facilities. The locations of these facilities were provided by the Snyder County GIS Department.

Geographic Information Systems (GIS) Data

GIS data was utilized in risk assessment, estimation of loss and the development of map products for the hazard mitigation plan update. A foundation of data was available from the Snyder County GIS Department. Some of the utilized data was downloaded from the Pennsylvania Spatial Data Access (PASDA). A large portion of the plan utilizes census data from the United States Census Bureau, but the 2020 census data collection and dissemination was disrupted due to the Covid-19 Pandemic in 2020 and 2021. The 2020 census was delayed, and the information received during the census was spread out due to social distancing and the limiting of census takers going door to door to gather information.

The Snyder County GIS Department provided the following layers for use in the development of hazard profiles and hazard profile mapping for the 2025 Hazard Mitigation Plan Update:

- Snyder County EMS Districts
- Snyder County Fire Boundaries

- Snyder County Fire Stations
- Snyder County Incorporated Municipalities
- Snyder County Medical Facilities
- Snyder County Police Stations
- Snyder County Quadrants
- Snyder County Site Structure Address Points
- Snyder County Parcels

The following GIS Data layers were developed for use in the 2025 Hazard Mitigation Plan Update:

- Snyder County Adjacent Counties
- Snyder County Airports
- Snyder County Community Lifelines
- Snyder County Dam Inventory
- Snyder County Electric Substations
- Snyder County Electric Transmission Lines
- Snyder County Groundwater Withdrawal Points
- Snyder County Historic Streams
- Snyder County Lakes and Ponds
- Snyder County Levee Areas
- Snyder County National Register of Historic Places – Buildings
- Snyder County Oil and Gas Locations
- Snyder County Power Plants
- Snyder County Slope Features
- Snyder County Site Structure Address Points in Special Flood Hazard Area
- Snyder County State Roads
- Snyder County Tornado Impacted Municipalities
- Snyder County Tornado Paths
- Snyder County Toxic Release Inventory Locations
- Snyder County Wildland Urban Interface
- Snyder County Zip Codes

Figure 3 - Snyder County Basemap

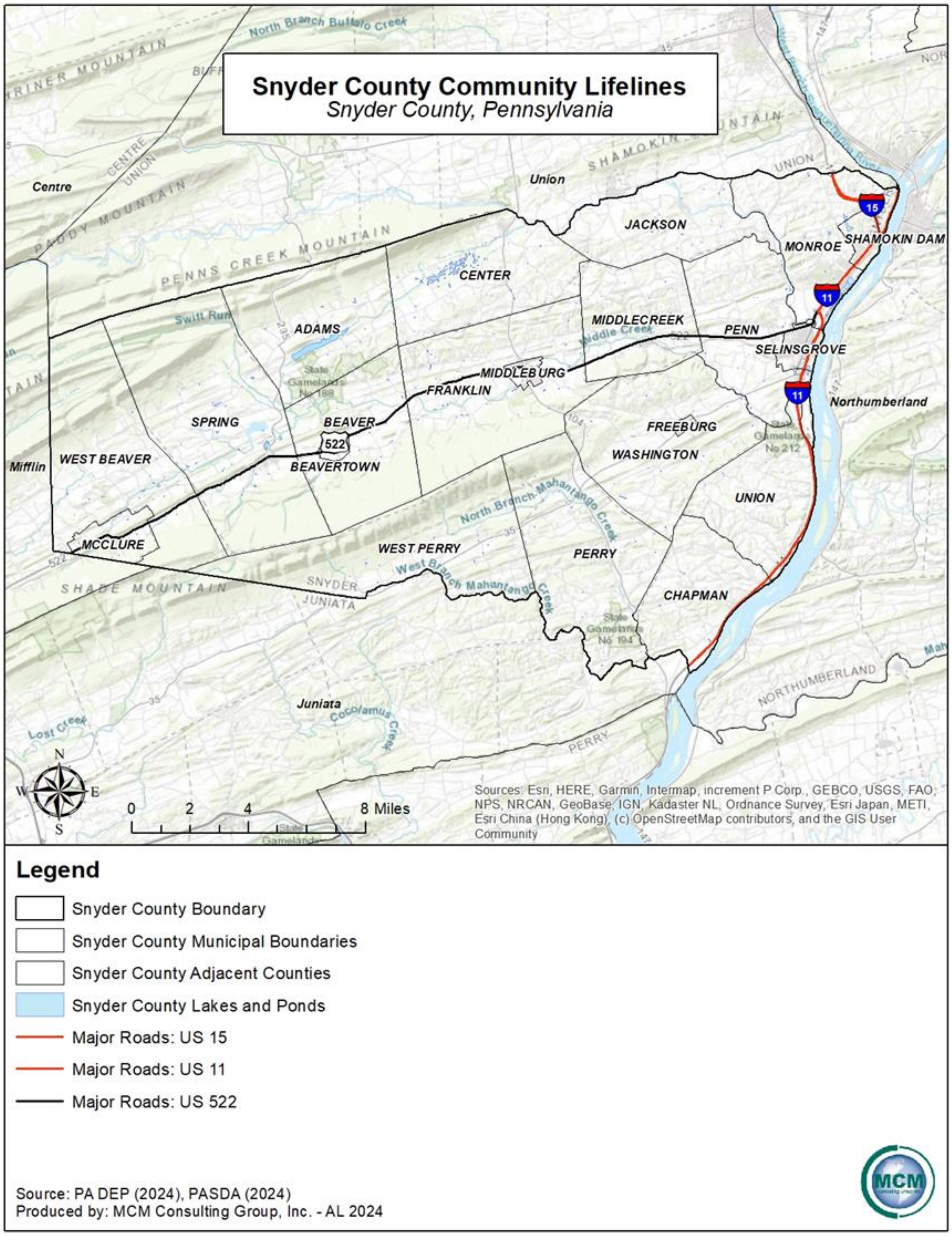


Figure 4 - Snyder County Watersheds

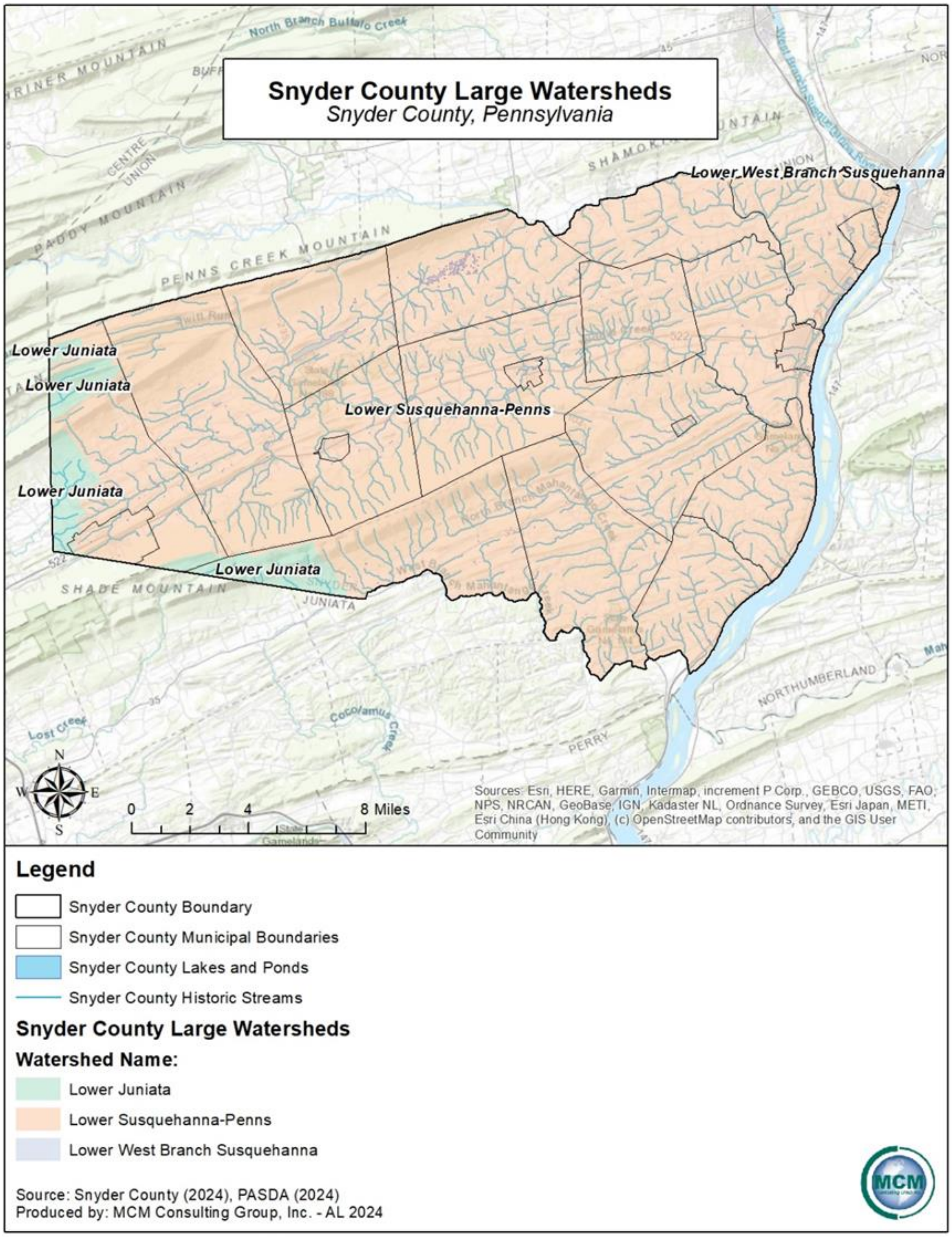


Figure 5 - Snyder County Population Density

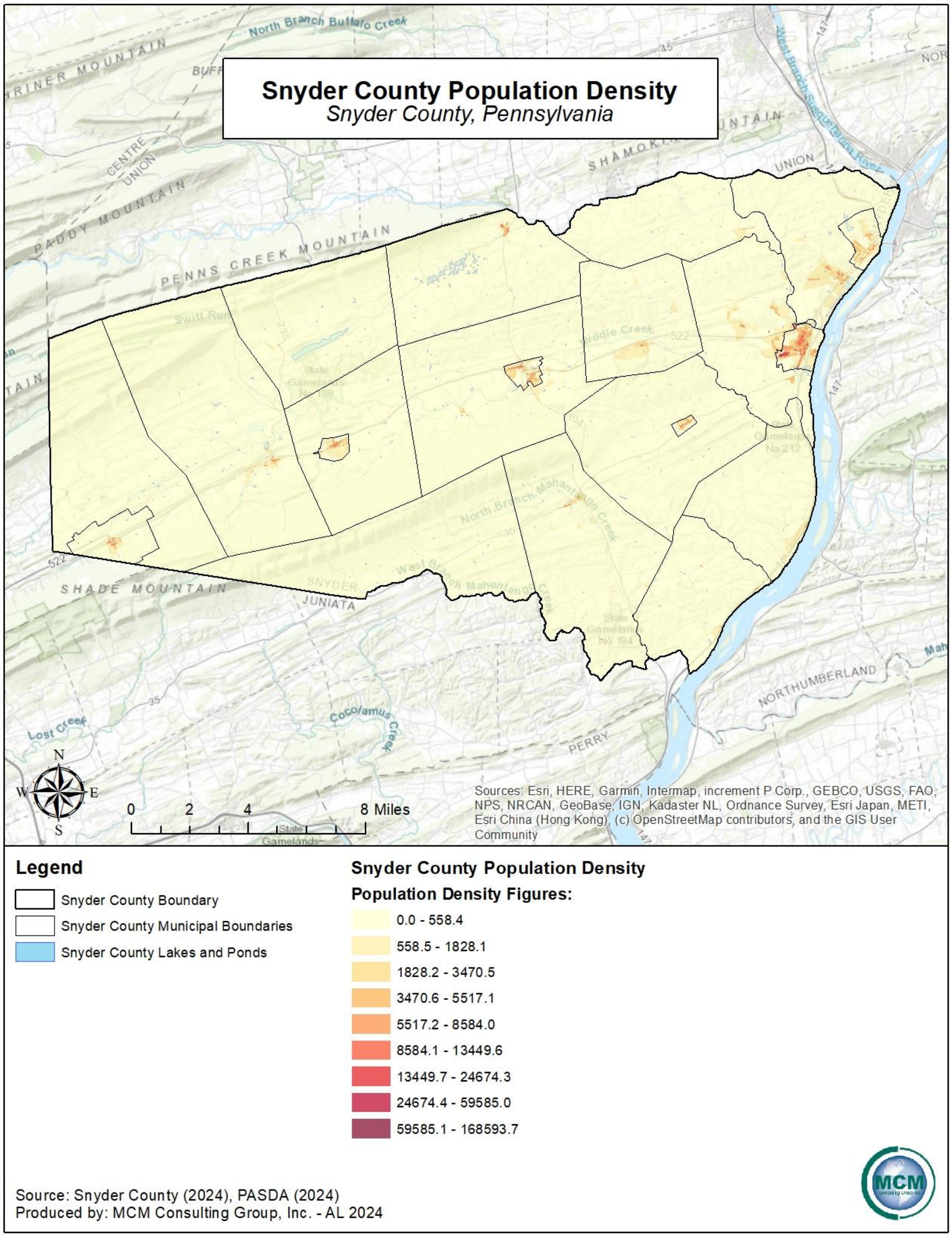
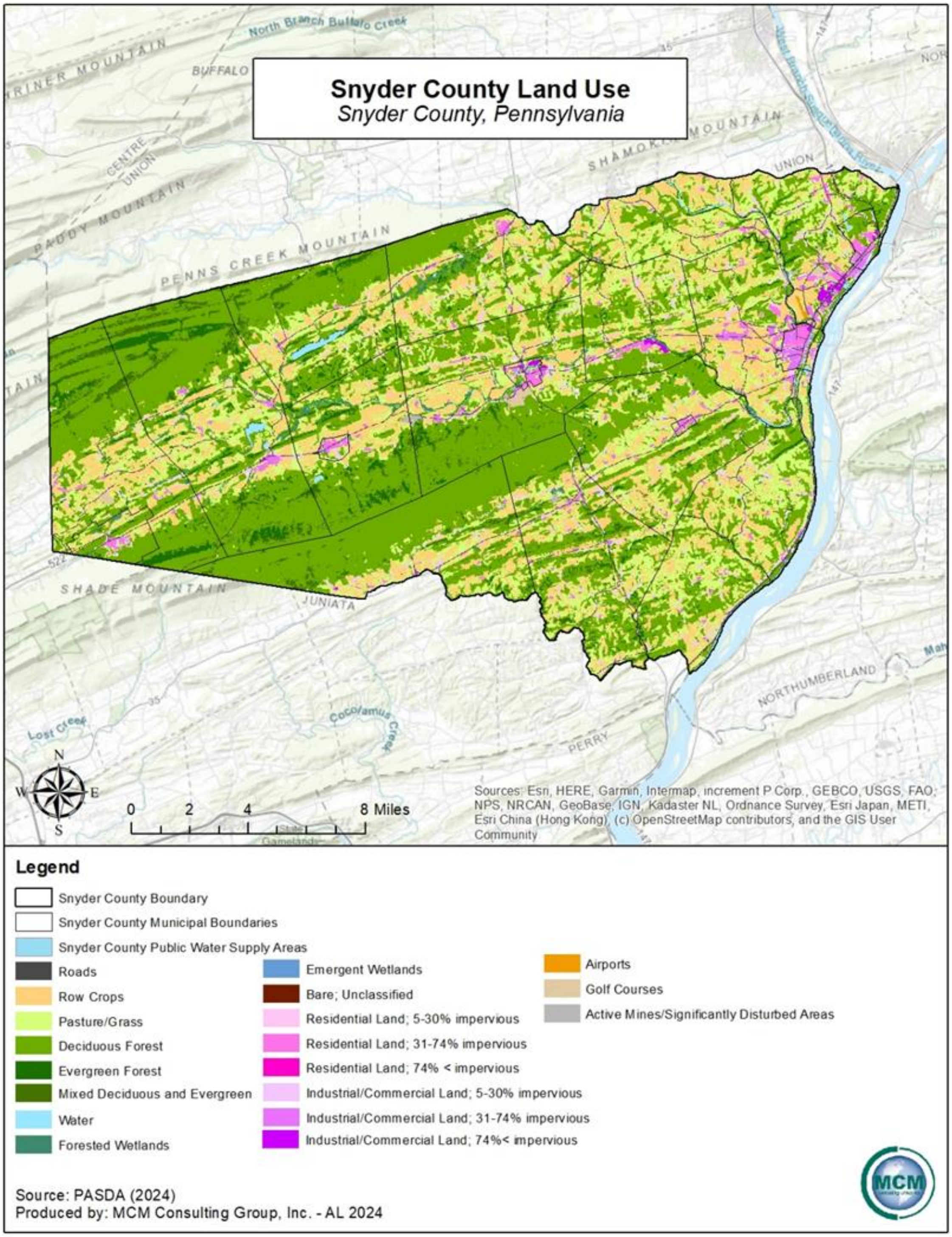


Figure 6 - Snyder County Land Use



3. Planning Process

3.1. Update Process and Participation Summary

The Snyder County Hazard Mitigation Plan update began November 20, 2023. The Snyder County Commissioners were able to secure a hazard mitigation grant to start the process. The Snyder County Emergency Management Agency was identified as the lead agency for the Snyder County Hazard Mitigation Plan update. The planning process involved a variety of key decision makers and stakeholders within Snyder County. Snyder County immediately determined that the utilization of a contracted consulting agency would be necessary to assist with the plan update process. MCM Consulting Group, Inc. was selected as the contracted consulting agency to complete the update of the hazard mitigation plan. The core hazard mitigation team, which was referred to as the steering committee, included officials from the Snyder County Emergency Management Agency and MCM Consulting Group, Inc. (MCM).

The process was developed around the requirements laid out in the Federal Emergency Management Agency (FEMA) Local Hazard Mitigation Crosswalk, referenced throughout this plan, as well as numerous other guidance documents including, but not limited to, Pennsylvania's All-Hazard Mitigation Standard Operating Guide, FEMA's State and Local Mitigation Planning How-to Guide series of documents (FEMA 386-series), and the National Fire Protection Association (NFPA) 1600 Standard on Disaster/Emergency Management and Business Continuity Programs.

MCM Consulting Group, Inc. assisted the Snyder County Emergency Management Agency in coordinating and leading public involvement meetings, local planning team meetings, analysis, and the writing of the updated HMP. The Snyder County Local Planning Team (LPT) worked closely with MCM in the writing and review of the HMP. MCM conducted project meetings and local planning team meetings throughout the update process. Due to COVID-19, meetings were held with the option to attend virtually. Meeting agendas, meeting minutes and sign-in sheets were developed and maintained for each meeting conducted by MCM. These documents are detailed in Appendix C of this plan.

Public meetings with local elected officials were held, as well as work sessions and in-progress review meetings with the Snyder County Local Planning Team and staff. At each of the public meetings, respecting the importance of local knowledge, municipal officials were strongly encouraged to submit hazard mitigation project opportunity forms, complete their respective portions of the capability's assessment and review, and eventually adopt the county hazard mitigation plan. Snyder County will continue to work with all local municipalities to collect local hazard mitigation project opportunities.

The HMP planning process consisted of:

- Applying for and receiving a hazard mitigation planning grant (HMPG) to fund the planning project.
- Announcing the initiative via press releases and postings on the county website.
- Involving elected and appointed county and municipal officials in a series of meetings, training sessions, and workshops.
- Identifying capabilities and reviewed the information with the municipalities.
- Identifying hazards.
- Assessment of risk and analyzing vulnerabilities.
- Identifying mitigation strategies, goals, and objectives.
- Developing an implementation plan.
- Announcing completion via press releases and postings on the county website.
- Plan adoption at a public meeting of the Snyder County Board of Commissioners.
- Plan submission to FEMA and PEMA.

The 2025 Snyder County HMP was completed January 1, 2025. The 2025 plan follows an outline developed by PEMA which provides a standardized format for all local HMPs in the Commonwealth of Pennsylvania. The 2025 HMP format is consistent with the PEMA recommended format. The 2025 Snyder County HMP combined dam failure and levee failure profiles; and has added additional hazard profiles to the HMP, and these additional profiles increased the subsections in section 4.3 of the HMP.

3.2. The Planning Team

The 2025 Snyder County Hazard Mitigation Plan update was led by the Snyder County Steering Committee. The Snyder County Steering Committee provided guidance and leadership for the overall project. The steering committee assisted MCM Consulting Group, Inc. with dissemination of information and administrative tasks. *Table 6 – Steering Committee* outlines the individuals that comprised this team.

Table 6 - Steering Committee

Snyder County Hazard Mitigation Plan Update Steering Committee		
Name	**Organization**	**Position**
Derick Shambach	Snyder County EMA	Director

Snyder County Hazard Mitigation Plan Update Steering Committee		
Name	**Organization**	**Position**
Lincoln Kaufman	Snyder County Planning Department	Director
Trish Treaster	Snyder County	Administrative Assistant
Michael Rearick	MCM Consulting Group, Inc.	Director of Operations
Adam Leister	MCM Consulting Group, Inc.	Senior GIS Consultant
Daniel Becker	MCM Consulting Group, Inc.	Consultant
Valerie Zents	MCM Consulting Group, Inc.	Senior Consultant
Alyssa Rusnock	MCM Consulting Group, Inc.	Project Coordinator
Ashley Day	MCM Consulting Group, Inc.	Project Coordinator

In order to represent the county, the Snyder County Steering Committee developed a diversified list of potential local planning team (LPT) members. Members that participated in the 2019 hazard mitigation plan were highly encouraged to join the 2025 team. The steering committee then provided invitations to the prospective members and provided a description of duties to serve on the LPT. The invitations for members of the LPT were disseminated by the Snyder County Emergency Management Agency utilizing letters, email, and telephone calls. These invitations included local and regional agencies involved in HMP activities, agencies with the authority to regulate development, neighboring communities, businesses and academia, and representatives for county offices and agencies involved in reaching out to socially vulnerable populations. The LPT worked throughout the process to plan and hold meetings, collect information, and conduct public outreach.

The stakeholders listed in *Table 7 – Local Planning Team* served on the 2025 Snyder County Hazard Mitigation Local Planning Team, actively participated in the planning process by attending meetings, completing assessments, surveys, and worksheets and/or submitting comments. All potential local planning team members were presented with an email invitation prior to the local planning team kickoff meeting on March 5, 2024. Those invitation letters for the local planning team are included in Appendix C – Support Documentation of this hazard mitigation plan update.

Individuals representing local interests in dams were presented with the opportunity to participate in the local planning team. Emails were sent to officials involved in the ownership of dams. Increased participation for representatives for socially vulnerable and unserved populations in Snyder County is a goal for the next planning period, and mitigation actions can be found in section 6.4.

Table 7 - Local Planning Team

Snyder County Hazard Mitigation Plan Local Planning Team		
Name	**Organization**	**Position**
Nellie Abate	PennDOT	Highway Maintenance
Rick Bailey	Monroe Township	Zoning Officer
Matthew Beaver	PA DCNR Bureau of Forestry	District Forester
Steve Bowers	Penn Valley Airport	Manager
R. Clark Camp	Adams Township	Road Master
Kerry Colville-Wood	Hummel Station	Manager
Ashlee Crownover	Mifflin County Office of Public Safety	Planning Officer/Data Analyst
Julie Hartley	Penn Township	Manager
Teresa Hibbs	Center Township	Secretary
Mark Hoffman	West Perry Township	Supervisor
Ed Hovenstine	Shamokin Dam Borough	Manager
Ethan Howard	Penn State Extension	Area 5 Client Relationship Manager
Bill Hummel	Juniata County Emergency Services	Director
Bobby Jones	Chapman Township	Supervisor
Lincoln Kaufman	Snyder County Planning Commission	Director
John Kauffman	Spring Township	Supervisor
Daniel Kuhns	Adams Township	Chairman
Phil Lucas	Mifflin County Office of Public Safety	Director
Esther Martin	Union Township	Secretary
Sara Maul	Selinsgrove Borough	Borough Council
Shannon Moyer	Middlecreek Township	Fire Chief
Lindsey Mull	Selinsgrove Borough	Deputy Zoning
Elizabeth Paige	Middleburg Borough	Administrator
Steve Renninger	West Perry Township	Supervisor
Diana Reynolds	Jackson Township	Secretary/Treasurer
Fred Scholl	Chapman Township	Roadmaster
Derick Shambach	Snyder County Emergency Management Agency	Director
Scott Shambach	Monroe Township - Meck-Tech	Consultant
Kathy Shea	Franklin Township	Secretary/Treasurer
Chuck Steininger	Jackson Township	Emergency Management Coordinator
John Stuck	Middlecreek Township	Assistant Fire Chief

Snyder County Hazard Mitigation Plan Local Planning Team		
Name	**Organization**	**Position**
Trish Treaster	Snyder County Emergency Management Agency	Administrative Assistant
Judy Varner	Middlecreek Township	N/A
Frederick Wagner	Beavertown Borough	EMA
Jake Wagner	Perry Township and Washington Township	Emergency Management Coordinator
Jason Winey	Snyder County Conservation District	District Manager

3.3. Meetings and Documentation

Meetings with local elected officials and the local planning team were held as needed. At each of the meetings, municipal officials were strongly encouraged to submit hazard mitigation project opportunity forms, complete their respective portions of the capability assessment, review and eventually adopt the multi-jurisdictional HMP. *Table 8 – HMP Process Timeline* lists the meetings held during the HMP planning process, which organizations and municipalities attended and the topic that was discussed at each meeting. All meeting agendas, sign-in sheets, presentation slides, and other documentation is in Appendix C.

The draft plan was made available for public review on November 6, 2024. The draft was advertised on Snyder County's social media page and was made available digitally on the Snyder County website at: https://www.snydercounty.org/departments/planning-commission/

The public comment period remained open until December 11, 2024. All public comments were submitted via an online survey or in writing to Derick Shambach the Snyder County Emergency Management Agency Director. Public commenting was available during the public comment period via a Survey Monkey link that was advertised on the county website and social media pages. No public comments were received for this planning period, so no comments are included in Appendix C of this hazard mitigation plan update.

Table 8 - HMP Process Timeline

Snyder County HMP Process Timeline		
Date	**Meeting**	**Description**
11/20/2023	Snyder County Hazard Mitigation Steering Committee Kickoff Meeting	Meeting was used to determine individuals to invite to the local planning team and to review the draft project schedule.

Snyder County HMP Process Timeline		
Date	**Meeting**	**Description**
02/07/2024	Snyder County Hazard Mitigation Local Planning Team Meeting	Meeting was used to review the project schedule and discuss roles and responsibilities for the hazard mitigation plan. Initial worksheets were introduced and reviewed (Hazard ID, capability assessments, project opportunity, and NFIP survey).
03/05/2024	Snyder County Municipality Kickoff Meetings	Meeting was used to review the project schedule and discuss roles and responsibilities for the hazard mitigation plan at the municipal level. Initial worksheets were introduced and reviewed (Hazard ID, capability assessment, project opportunity, and NFIP survey).
05/14/2024	Local Planning Team Meeting – Risk Assessment	Meeting was used to discuss the status of the initial documentation requests. Selection of hazards for the 2025 hazard mitigation plan was conducted. The risk factor assessment was started at the meeting but was finished by the LPT after the meeting.
05/30/2024	Local Planning Team Meeting – Mitigation Strategy Meeting #1	Meeting was used to begin the mitigation strategy section edits for Snyder County. The 2019 mitigation strategy review began.
05/30/2024	Snyder County Municipality Meetings	Meetings were held to review completed paperwork from municipalities. Project opportunity forms were also completed by municipalities.
06/11/2024	Local Planning Team Meeting – Mitigation Strategy Meeting #2	Meeting was used to continue the mitigation strategy section for Snyder County. This included review of 2019 mitigation actions and development of 2025 mitigation strategy items.

Snyder County HMP Process Timeline		
Date	**Meeting**	**Description**
06/18/2024	Local Planning Team Meeting – Mitigation Strategy Meeting #3	Meeting was held to finalize the mitigation strategy section for Snyder County. This included review of 2025 mitigation actions and goals and objectives.
06/18/2024	Snyder County Public Meeting – Risk Assessment	Meeting was held to present the risk assessment section to the public.
07/09/2024	Local Planning Team Meeting – Mitigation Strategy and Plan Review	Meeting was held to finalize any remaining items for the mitigation strategy section and to review aspects of plan prior to local planning team review.
08/08/2024	Local Planning Team Meeting – Mitigation Strategy Evaluation and Prioritization	Meeting was held to finalize the mitigation strategy evaluation and prioritization.
11/06/2024	Snyder County Public Meeting – Draft Plan	Meeting was held to present the draft plan to the public.
11/06/2024 – 12/11/2024	Snyder County Public Comment Period	Public comment period for Snyder County.
12/16/2024 – 12/23/2024	PEMA Review	PEMA review of the Snyder County Hazard Mitigation Plan.
01/01/2025 – 02/17/2025	FEMA Review	FEMA review of the Snyder County Hazard Mitigation Plan.
03/01/2025	Adoption of Hazard Mitigation Plan.	Adoption of Hazard Mitigation Plan.

3.4. Public and Stakeholder Participation

Snyder County engaged numerous stakeholders and encouraged public participation during the HMP update process. Advertisements for public meetings were completed utilizing the local newspaper and the Snyder County website. Copies of those advertisements are in Appendix C. Municipalities and other county entities were invited to participate in various meetings and encouraged to review and update various worksheets and surveys. Copies of all meeting agendas, meeting minutes and sign-in sheets are located in Appendix C. Worksheets and surveys completed by the municipalities and other stakeholders are located in appendices of this plan update as well. Municipalities were also encouraged to review hazard mitigation related items with other constituents located in the municipality like businesses, academia, private and nonprofit interests.

The tools listed below were distributed with meeting invitations, provided directly to municipalities for completion and return to the Snyder County Emergency Management Agency or at meetings to solicit information, data, and comments from both local municipalities and other key stakeholders. Responses to these worksheets and surveys are available for review at the Snyder County Emergency Management Agency.

1. **Risk Assessment Hazard Identification and Risk Evaluation Worksheet**: Capitalizes on local knowledge to evaluate the change in the frequency of occurrence, magnitude, or impact and/or geographic extent of existing hazards and allows communities to evaluate hazards not previously profiled using the Pennsylvania Standard List of Hazards.
2. **Capability Assessment Survey**: Collects information on local planning, regulatory, administrative, technical, fiscal, and political capabilities that can be included in the countywide mitigation strategy.
3. **Municipal Project Opportunity Forms and Mitigation Actions**: Copies of the 2019 mitigation opportunity forms that were included in the current HMP were provided to the municipalities for review and amendment. These opportunities are located in Appendix G. The previous mitigation actions were provided and reviewed at update meetings. New 2025 municipal project opportunity forms are included as well, located in Appendix G.

In an effort to capture public input, the Snyder County LPT held in person meetings and offered on-line surveys. Members of the public were also encouraged to contact Snyder County Emergency Management Agency or MCM Consulting Group, Inc. with any comments or questions regarding this update. Any public comment that was received during public meetings or during the draft review of the plan were documented and included in the plan. Copies of newspaper public meeting notices, website posted public notices, and other correspondence are included in Appendix C of this plan.

Snyder County invited all contiguous counties to review the 2025 draft hazard mitigation plan. A letter was sent to the emergency management coordinator in Union, Northumberland, Juniata, Mifflin, and Centre counties in Pennsylvania, on XX/XX/XXXX. Copies of these letters are included in Appendix C Multi-Jurisdictional Planning.

3.5. Multi-Jurisdictional Planning

Snyder County used an open, public process to prepare this HMP. Meetings and letters to municipal officials were conducted to inform and educate them about hazard mitigation planning and its local requirements. Municipal officials provided information related to existing codes and ordinances, the risk and impacts of known hazards on local infrastructure and critical facilities and recommendations for related mitigation opportunities. The pinnacle to the municipal involvement process was the adoption of the final plan. *Table 9 – Municipality Worksheets, Surveys, and Forms Participation* reflects the municipalities participation by completing worksheets, surveys, and forms.

Table 9 - Municipality Worksheets, Surveys, and Forms Participation

Snyder County HMP Worksheets, Surveys, and Forms Participation					
Municipality	**Capability Assessment Survey**	**Risk Assessment Hazard Identification and Risk Evaluation Worksheet**	**NFIP**	**Risk Factor**	**Hazard Mitigation Opportunity Form Review and Updates**
Adams Township	X	X			
Beaver Township	X		X		
Beavertown Borough					
Center Township	X	X	X		
Chapman Township	X	X	X		
Franklin Township	X	X	X	X	
Freeburg Borough					
Jackson Township	X	X	X	X	
McClure Borough	X	X	X		
Middleburg Borough	X	X	X	X	
Middlecreek Township	X	X	X	X	
Monroe Township	X	X	X	X	
Penn Township	X	X	X	X	
Perry Township	X	X	X	X	
Selinsgrove Borough	X	X			
Shamokin Dam Borough	X	X	X	X	
Spring Township	X	X			
Union Township		X			
Washington Township	X	X	X	X	
West Beaver Township	X		X	X	
West Perry Township	X	X	X		X

The majority of the twenty-one municipalities within Snyder County adopted the 2019 Snyder County Hazard Mitigation Plan as the municipal hazard mitigation plan. The goal of the Snyder County Local Planning Team is to have 100% participation by municipalities in adopting the 2025 Snyder County Hazard Mitigation.

The table above was completed with the most accurate information available at the time of the writing of this Hazard Mitigation Plan Update. Since the writing of this plan, some of the municipalities listed above have provided information to Snyder County which updates their participation status.

4. Risk Assessment

4.1. Update Process Summary

A key component to reducing future loss is to first have a clear understanding of what the current risks are and what steps may be taken to lessen their threat. The development of the risk assessment is a critical first step in the entire mitigation process, as it is an organized and coordinated way of assessing potential hazards and risks. The risk assessment identifies the effects of both natural and human-caused hazards and describes each hazard in terms of its frequency, severity, and county impact. Numerous hazards were identified as part of the process.

A risk assessment evaluates threats associated with a specific hazard and is defined by probability and frequency of occurrence, magnitude, severity, exposure, and consequences. The Snyder County risk assessment provides in-depth knowledge of the hazards and vulnerabilities that affect Snyder County and its municipalities. This document uses an all-hazards approach when evaluating the hazards that affect the county and the associated risks and impacts each hazard presents.

This risk assessment provides the basic information necessary to develop effective hazard mitigation/prevention strategies. Moreover, this document provides the foundation for the Snyder County Emergency Operations Plan (EOP), local EOPs and other public and private emergency management plans.

The Snyder County risk assessment is not a static document, but rather, is a biennial review requiring periodic updates. Potential future hazards include changing technology, new facilities and infrastructure, dynamic development patterns and demographic and socioeconomic changes into or out of hazard areas. By contrast, old hazards, such as brownfields and landfills, may pose new threats as county conditions evolve.

Using the best information available and geographic information systems (GIS) technologies, the county can objectively analyze its hazards and vulnerabilities. Assessing past events is limited by the number of occurrences, scope and changing circumstances. For example, ever-changing development patterns in Pennsylvania have a dynamic impact on traffic patterns, population density and distribution, storm water runoff and other related factors. Therefore, limiting the risk assessment to past events is myopic and inadequate.

The Snyder County Local Planning Team (LPT) reviewed and assessed the change in risk for all natural and human-caused hazards identified in the 2019 hazard mitigation plan. The mitigation planning team then identified hazards that were outlined within the Pennsylvania Hazard Mitigation Plan but not included in the 2019 Snyder County Hazard Mitigation Plan that could impact Snyder County. The team utilized the hazard identification and risk evaluation worksheet that was provided by the Pennsylvania Emergency Management Agency.

The Snyder County Steering Committee met with municipalities and provided guidance on how to complete the municipal hazard identification and risk evaluation worksheet. Nineteen municipalities in Snyder County returned a completed worksheet. This information was combined with the county information to develop an overall list of hazards that would need to be profiled.

Once the natural and human-caused hazards were identified and profiled, the local planning team then completed a vulnerability assessment for each hazard. An inventory of vulnerable assets was completed utilizing GIS data and local planning team knowledge. The team used the most recent Snyder County assessment data to estimate loss to particular hazards. Risk factor was then assessed to each of the twenty-one hazards utilizing the hazard prioritization matrix. This assessment allows the county and its municipalities to focus on and prioritize local mitigation efforts on areas that are most likely to be damaged or require early response to a hazard event.

4.2. Hazard Identification

4.2.1. Presidential and Gubernatorial Disaster Declarations

Table 10 – Presidential & Gubernatorial Disaster Declaration contains a list of all Presidential and Gubernatorial disaster declarations that have affected Snyder County and its municipalities from 1955 through 2023, according to the Pennsylvania Emergency Management Agency.

Table 10 - Presidential & Gubernatorial Disaster Declaration

Presidential Disaster Declarations and Gubernatorial Declarations and Proclamations		
Date	**Hazard Event**	**Action**
January 1966	Heavy Snow	Gubernatorial Proclamation of Emergency
June 1972	Flood (Tropical Storm Agnes)	Gubernatorial Proclamation of Emergency
June 1972	Flood, Tropical Storm Agnes	Presidential Disaster Declaration
February 1974	Truckers' Strike	Gubernatorial Proclamation of Emergency
April 1975	High Winds	Gubernatorial Proclamation of Emergency
September 1975	Flood (Hurricane Eloise)	Gubernatorial Proclamation of Emergency

Presidential Disaster Declarations and Gubernatorial Declarations and Proclamations		
Date	**Hazard Event**	**Action**
September 1975	Severe Storms, Heavy Rains, Flooding – Hurricane Eloise	Presidential Disaster Declaration
October 1976	Flood	Gubernatorial Proclamation of Emergency
October 1976	Severe Storms, Flooding	Presidential Disaster Declaration
January 1978	Heavy Snow	Gubernatorial Proclamation of Emergency
February 1978	Blizzard	Gubernatorial Proclamation of Emergency
July 1991	Drought	Gubernatorial Proclamation of Emergency
March 1993	Blizzard	Gubernatorial Proclamation of Emergency
March 1993	Blizzard	Presidential Emergency Declaration
January 1994	Severe Winter Storms	Gubernatorial Proclamation of Emergency
March 1994	Winter Storm, Severe Storm	Presidential Disaster Declaration
September 1995	Drought	Gubernatorial Proclamation of Emergency
January 1996	Flooding	Gubernatorial Proclamation of Emergency
January 1996	Severe Winter Storms	Gubernatorial Proclamation of Emergency
January 1996	Blizzard	Presidential Disaster Declaration
January 1996	Flooding	Presidential Disaster Declaration
December 1998	Drought	Gubernatorial Proclamation of Emergency
July 1999	Drought	Gubernatorial Proclamation of Emergency
September 1999	Flash Flooding (Tropical Depression Dennis)	Gubernatorial Proclamation of Emergency
September 1999	Hurricane Floyd	Gubernatorial Proclamation of Emergency
September 1999	Hurricane Floyd	Presidential Disaster Declaration
February 2003	Severe Winter Storm	Gubernatorial Proclamation of Emergency
September 2003	Hurricane Isabel/Henri	Gubernatorial Proclamation of Emergency
September 2004	Tropical Depression Ivan	Gubernatorial Proclamation of Emergency
September 2004	Tropical Depression Ivan	Presidential Disaster Declaration
September 2005	Hurricane Katrina	Gubernatorial Proclamation of Emergency
September 2005	Hurricane Katrina	Presidential Emergency Declaration
June 2006	Flooding	Gubernatorial Proclamation of Emergency

Presidential Disaster Declarations and Gubernatorial Declarations and Proclamations		
Date	**Hazard Event**	**Action**
June 2006	Severe Storms, Flooding, and Mudslides	Presidential Proclamation of Emergency
September 2006	Tropical Depression Ernesto	Gubernatorial Proclamation of Emergency
February 2007	Severe Winter Storm	Gubernatorial Proclamation of Emergency
February 2007	Severe Winter Storm	Presidential Disaster Declaration
April 2007	Severe Winter Storm	Gubernatorial Proclamation of Emergency
February 2010	Winter Storms	Gubernatorial Proclamation of Emergency
January 2011	Winter Storm	Gubernatorial Proclamation of Emergency
August 2011	Hurricane Irene	Gubernatorial Proclamation of Emergency
September 2011	Remnants of Tropical Storm Lee	Presidential Emergency Declaration
October 2012	Hurricane Sandy	Gubernatorial Proclamation of Emergency
October 2012	Hurricane Sandy	Presidential Emergency Declaration
March 2017	Severe Winter Weather	Gubernatorial Proclamation of Emergency
January 2018	Opioid Disaster	Gubernatorial Proclamation of Emergency
August 2018	Severe Weather	Gubernatorial Proclamation of Emergency
January 2019	Winter Storm	Gubernatorial Proclamation of Emergency
March 2020	COVID-19	Gubernatorial Proclamation of Emergency
March 2020	COVID-19	Presidential Emergency Declaration
March 2020	COVID-19	Presidential Major Disaster Declaration
December 2020	Winter Storm	Gubernatorial Proclamation of Emergency
February 2021	Winter Storm	Gubernatorial Proclamation of Emergency
April 2021	Civil Disturbance	Gubernatorial Proclamation of Emergency
August 2021	Hurricane Ida	Gubernatorial Proclamation of Emergency
Source: Pennsylvania Emergency Management Agency and Federal Emergency Management Agency, 2024		

4.2.2. Summary of Hazards

The Snyder County LPT was provided the Pennsylvania Standard List of Hazards to be considered for evaluation in the 2025 HMP Update. Following a review of the hazards considered in the 2019 HMP and the standard list of hazards, the local planning team decided that the 2025 plan should identify, profile, and analyze twenty-one hazards. These twenty-one hazards include all of the hazards profiled in the 2019 plan. The list below contains the hazards that have the potential to impact County Name as identified through previous risk assessments, the Snyder County Hazard Vulnerability Analysis and input from those who participated in the 2025 HMP update. Hazard profiles are included in Section 4.3 for each of these hazards.

Identified Natural Hazards

Drought

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

Earthquake

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.

Extreme Temperature

Extreme heat often results in the highest number of annual deaths of all weather-related hazards. In most of the United States, extreme heat is defined as a long period (2 to 3 days) of high heat and humidity with temperatures above 90 degrees. 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, Flash Flooding, and Ice Jam Flooding

Flooding is the temporary condition of partial or complete inundation of normally dry land, and it is the most frequent and costly of all-natural hazards in Pennsylvania. Flash flooding is usually a result of heavy localized precipitation falling in a short time period over a given location, often along mountain streams and in urban areas where much of the ground is covered by impervious surfaces. Winter flooding can include ice jams which occur when warm temperatures and heavy rain cause snow to melt rapidly. Snow melt combined with heavy rains can cause frozen rivers to swell, 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.

Hurricane/Tropical Storm

Hurricanes, tropical storms, and nor'easters are classified as cyclones and are any closed circulation developing around a low-pressure center in which the winds rotate counterclockwise (in the Northern Hemisphere) and whose diameter averages 10-30 miles across. Potential threats from hurricanes include powerful winds, heavy rainfall, storm surges, coastal and inland flooding, rip currents, tornadoes, and landslides. The Atlantic hurricane season runs from June 1 to November 30.

Invasive Species

An invasive species is a species that is not indigenous to the ecosystem under consideration and whose introduction causes or is likely to cause economic, environmental, or human harm. These species can be any type of organism: plant, fish, invertebrate, mammal, bird, disease, or pathogen.

Landslide

In a landslide, masses of rock, earth or debris move down a slope. Landslides can be caused by a variety of factors, including earthquakes, storms, fire, and human modification of land. Areas that are prone to landslide hazards include previous landslide areas, areas on or at the base of slopes, areas in or at the base of drainage hollows, developed hillsides with leach field septic systems, and areas recently burned by forest or brush fires.

Pandemic and Infectious Disease

A pandemic is a global outbreak of disease that occurs when a new virus emerges in the human population, spreading easily in a sustained manner, and causing serious illness. An epidemic describes a smaller scale infectious outbreak, within a region or population, that emerges at a disproportionate rate. Infectious disease outbreaks may be widely dispersed geographically, impact large numbers of the population, and could arrive in waves lasting several months at a time.

Radon Exposure

Radon is a radioactive gas produced by the breakdown of uranium in soil and rock that can lead to lung cancer in people exposed over a long period of time. Most exposure comes from breathing in radon gas that enters homes and buildings through foundation cracks and other openings. According to the DEP, approximately 40% of Pennsylvania homes have elevated radon levels.

Subsidence/Sinkhole

Land subsidence is a gradual settling or sudden sinking of the ground surface due to the movement of subsurface materials. A sinkhole is a subsidence feature resulting from the sinking of surficial material into a pre-existing subsurface void. Subsidence and sinkholes are geologic hazards that can impact roadways and buildings and disrupt utility services. Subsidence and sinkholes are most common in areas underlain by limestone and can be exacerbated by human activities such as water, natural gas, and oil extraction.

Tornadoes/Windstorm

A tornado is a narrow, violently rotating column of air that extends from the base of a thunderstorm to the ground. About 1,250 tornadoes hit the U.S. each year, with about sixteen hitting Pennsylvania. Damaging winds exceeding 50-60 miles per hour can occur during tornadoes, severe thunderstorms, winter storms, or coastal storms. These winds can have severe impacts on buildings, pulling off the roof covering, roof deck, or wall siding and pushing or pulling off the windows.

Wildfire

A wildfire is an unplanned fire that burns in a natural area. Wildfires can cause injuries or death and can ruin homes in their path. Wildfires can be caused by humans or lightning, and can happen anytime, though the risk increases in periods of little rain. In Pennsylvania, 98% of wildfires are caused by people.

Winter Storm

A winter storm is a storm in which the main types of precipitation are snow, sleet, or freezing rain. A winter storm can range from a moderate snowfall or ice event over a period of a few hours to blizzard conditions with wind-driven snow that lasts for several days. Most deaths from winter storms are not directly related to the storm itself, but result from traffic accidents on icy roads, medical emergencies while shoveling snow, or hypothermia from prolonged exposure to cold.

Identified Human Caused Hazards

Building/Structural Collapse/Blighted Properties

Buildings and other engineered structures, including bridges, may collapse if their structural integrity is compromised, especially due to effects from other natural or human-made hazards. Older buildings or structures, structures that are not built to standard codes, or structures that have been weakened are more susceptible to be affected by these hazards.

Dam Failure

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

Emergency Services

Emergency medical services (EMS) and fire department services play a crucial role in the emergency response system, and the functionality of these emergency services directly impacts many of the other hazard profiles in this report. Both EMS and fire services face challenges from lack of funding and lower rates of volunteerism.

Environmental Hazards/Hazardous Materials

Environmental hazards are hazards that pose threats to the natural environment, the built environment and public safety through the diffusion of harmful substances, materials, or products. Environmental hazards include the following:

- Hazardous material releases: at fixed facilities or as such materials are in transit and including toxic chemicals, infectious substances, biohazardous waste and any materials that are explosive, corrosive, flammable, or radioactive (PL 1990-165, § 207(e)).
- Air or Water Pollution; the release of harmful chemical and waste materials into water bodies or the atmosphere, for example (National Institute of Health Sciences, July 2009; Environmental Protection Agency, Natural Disaster PSAs, 2009).
- Superfund Facilities: hazards originating from abandoned hazardous waste sites listed on the National Priorities List (Environmental Protection Agency, National Priorities List, 2009).
- Manure Spills: involving the release of stored or transported agricultural waste, for example (Environmental Protection Agency, Environmental Impacts of…, 1998).
- Product Defect or Contamination; highly flammable or otherwise unsafe consumer products and dangerous foods (Consumer Product Safety Commission, 2003).

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

Substance Use Disorder

Substance use disorder occurs when an individual becomes physically dependent on a drug, either legal or illegal. The most likely focal point of substance use disorder relates to opioid addiction, a class of drugs that reduces pain. "Opioid" is used as a broad term and includes opiates, which are drugs naturally extracted from certain types of poppy plants, and narcotics. Substance abuse can lead to overdose, which can be fatal.

Terrorism/Cyberterrorism Incidents

Terrorism is the 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. Cyberterrorism refers to acts of terrorism committed using computers, networks, and the internet. The most widely cited definition comes from Denning's Testimony before the Special Oversight Panel on Terrorism: "Cyberterrorism…is generally understood to mean unlawful attacks and threats of attack against computers, networks, and the information stored therein when done to intimidate or coerce a government or its people in furtherance of political or social objectives. Further, to qualify as cyberterrorism, an attack should result in violence against persons or property, or at least cause enough harm to generate fear".

Transportation Accidents

Transportation accidents are technological hazards involving the nation's system of land, sea, and air transportation infrastructure. A flaw or breakdown in any component of this system can and often does result in a major disaster involving loss of life, injuries, property and environmental damage, and economic consequences.

Utility Interruption

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

- Geomagnetic Storms; including temporary disturbances of the Earth's magnetic field resulting in disruptions of communication, navigation, and satellite systems (National Research Council et al., 1986).
- Fuel or Resource Shortage; resulting from supply chain breaks or secondary to other hazard events, for example.
- Electromagnetic Pulse; originating from an explosion or fluctuating magnetic field and causing damaging current surges in electrical and electronic systems (Institute for Telecommunications Sciences, 1996).
- Information Technology Failure; due to software bugs, viruses, or improper use (Rainer Jr., et al, 1991).
- Ancillary Support Equipment; electrical generating, transmission, system-control, and distribution-system equipment for the energy industry (Hirst & Kirby, 1996).
- Public Works Failure; damage to or failure of highways, flood control systems, deep-water ports and harbors, public buildings, bridges, dams, for example (Unit-ed States Senate Committee on Environment and Public Works, 2009).
- Telecommunications System Failure; Damage to data transfer, communications, and processing equipment, for example (FEMA, 1997)
- Transmission Facility or Linear Utility Accident; liquefied natural gas leakages, explosions, facility problems, for example (United States Department of Energy, 2005)
- Major Energy, Power, Utility Failure; interruptions of generation and distribution, power outages, for example (United States Department of Energy, 2000).

4.2.3. Climate Change

Impacts of Climate Change on Identified Hazards

Humans have become the dominant species on Earth and our society and influence is globalized. Human activity such as the large-scale consumption of fossil fuels and de-forestation has caused atmospheric carbon dioxide concentrations to significantly increase and a notable diversity of species to go extinct. The result is rapid climate change unparalleled in Earth's history and an extinction event approaching the level of a mass extinction (Barnosky et al., 2011; Wake & Vredenburg, 2008). The corresponding rise of average atmospheric temperatures is intensifying many natural hazards, and further threatening biodiversity. The effects of climate change on these hazards are expected to intensify over time as temperatures continue to rise, so it is prudent to be aware of how climate change is impacting natural hazards.

The most obvious change is in regard to extreme temperature. As average atmospheric temperatures rise, extreme high temperatures become more threatening, with record high temperatures outnumbering record low temperatures 2:1 in recent years. As climate change intensifies, it is expected that the risk of extreme heat will be amplified whereas the risk of extreme cold will be attenuated. Some studies show increased insect activities during a similar rapid warming event in Earth's history. Other studies make projections that with the warming temperatures and lower annual precipitation that are expected with climate change, there will be an expansion of the suitable climate for mosquitos, potentially increasing the risk of infectious disease.

Climate change is likely to increase the risk of droughts (Section 4.3.1). Higher average temperatures mean that more precipitation will fall as rain rather than snow, snow will melt earlier in the spring, and evaporation and transpiration will increase. Along with the prospect of decreased annual precipitation, the risk of hydrological and agricultural drought is expected to increase (Sheffield & Wood, 2008). Correspondingly this will impact wildfires. Drought is accompanied by drier soils and forests, resulting in an elongated wildfire season and more intense and long-burning wildfires (Pechony & Shindell, 2010). However, the Southwest United States is at a greater risk of this increased drought and wildfire activity than Snyder County in the Eastern United States.

While it may seem counterintuitive considering the increased risk of drought, there is also an increased risk of flooding associated with climate change (Section 4.3.4). Warmer temperatures mean more precipitation will fall as rain rather than snow. Combined with the fact that warmer air holds more moisture, the result is heavier and more intense rainfalls and dam and levee failures. Similarly, winter storms are expected to become more intense, if possibly less frequent. Climate change is also expected to result in more intense hurricanes and tropical storms. With the rise of atmospheric temperatures, ocean surface temperatures are rising, resulting in warmer and more moist conditions where tropical storms develop (Stott et al., 2010). A warmer ocean stores more energy and is capable of fueling stronger storms. It is projected that the Atlantic hurricane season is elongating, and there will be more category 4 and 5 hurricanes than before (Trenberth, 2010).

Climate change is contributing to the introduction of new invasive species (Section 4.3.6). As maximum and minimum seasonal temperatures change, non-native species are able to establish themselves in previously inhospitable climates where they have a competitive advantage. This may shift the dominance of ecosystems in the favor of non-native species, contributing to species loss and the risk of extinction.

This type of sudden global change is novel to humanity. Despite the myriad of well thought out research, there is still much uncertainty surrounding the future of the Earth. All signs point to the intensification of the hazards mentioned above, especially if human society and individuals do not make swift and significant changes combat species losses.

Where applicable, climate change will be discussed for each hazard profile in this hazard mitigation plan. All natural hazards will have a discussion on climate change vulnerability, while certain human-caused hazards may not experience significant vulnerabilities from climate change adaptation and will not have direct narrative addressing those impacts.

Climate change was also taken into account when capabilities were being reviewed and mitigation actions were being developed and updated.

4.3. Hazard Profiles

4.3.1. Drought

4.3.1.1 Location and Extent

While Pennsylvania is generally more water-rich than many U.S. states, the commonwealth may experience drought conditions intermittently throughout the calendar year. A drought is broadly defined as a time period of prolonged dryness that contributes to the depletion of ground and surface water. Droughts are regional climatic events, so when such an event occurs in Snyder County, impacts are not restricted to the county and are often more widespread. The spatial extent of the impacted area can range from localized areas in Pennsylvania to the entire Mid-Atlantic region.

There are three types of droughts:

Meteorological Drought – A deficiency of moisture in the atmosphere compared to average conditions. Meteorological drought is defined by the duration of the deficit and degree of dryness and is often associated with below average rainfall. Depending on the severity of the drought, it may or may not have a significant impact on agriculture and the water supply.

Agricultural Drought – A drought inhibiting the growth of crops, due to a moisture deficiency in the soil. Agricultural drought is linked to meteorological and hydrologic drought.

Hydrologic Drought – A prolonged period without rainfall that has an adverse effect on streams, lakes, and groundwater levels, potentially impacting agriculture.

Droughts are often the leading contributing factor to wildfires, as they leave areas with little to no moisture.

4.3.1.2 Range of Magnitude

The average annual precipitation of 43.10 inches (rain) occurs primarily during the spring and summer months. This value is derived from an average of ten years of mean annual precipitation data for Snyder County. Rural farming areas of Snyder County are most at risk when a drought occurs. A drought can create a significant financial burden for the community. Approximately 97% of Snyder County farms are family-owned and operated. Additionally 68.4% of the county farmland use is devoted to crop cultivation, 17.1% of farmland is woodland, 5.7% is pastureland, and 8.8% is for other purposes. Wildfires are often the most severe secondary effect associated with drought. Wildfires can devastate wooded and agricultural areas, structures near high wildfire loads, and farm production facilities, thus threatening natural resources. Prolonged drought conditions can have a lasting impact on the economy and can cause major ecological changes, such as increases in scrub growth, flash flooding, and soil erosion.

Long-term water shortages during severe drought conditions can have a significant impact on agribusiness, public utilities, and other industries reliant on water for production services. Snyder County also has a growing agritourism business that would be threatened by long-term drought.

Local municipalities may, with the approval of the Pennsylvania Emergency Management Council, implement local water rationing. These individual water rationing plans, authorized through provisions of 4 PA code Chapter 120, will require specific limits on individual water consumption to achieve significant reductions in use. Under mandatory water usage restrictions imposed by the commonwealth and/or local municipalities, procedures are provided for granting of variances to consider individual hardships and economic dislocations. *Table 11 – Drought Preparation Phases* shows the FEMA-defined levels of drought severity along with suggested actions, requests, and goals.

Table 11 - Drought Preparation Phases

Drought Preparation Phases				
Phase	**General Activity**	**Actions**	**Request**	**Goal**
Drought Watch	Early stages of planning and alert for drought possibility.	Increased water monitoring, awareness, and preparation for response among government agencies, public water suppliers, water users, and the public.	Voluntary water conservation.	Reduce water use by 5%.
Drought Warning	Coordinate a response to imminent drought conditions and potential water shortages.	Reduce shortages – relieve stressed sources, develop new sources if needed.	Continue voluntary water conservation, impose mandatory water use restrictions if needed.	Reduce water use by 10 – 15%.

Drought Preparation Phases				
Phase	**General Activity**	**Actions**	**Request**	**Goal**
Drought Emergency	Management of operations to regulate all available resources and respond to emergency.	Support essential and high priority water uses and avoid unnecessary uses.	Possible restrictions on all nonessential water uses.	Reduced water use by 15%.
Source: Pennsylvania Department of Environmental Protection, 2017				

The commonwealth uses five parameters to assess drought conditions:

- Stream flows (compared to benchmark records)
- Precipitation (measured as the departure from normal, thirty-year average precipitation)
- Reservoir storage levels in a variety of locations such as three New York City reservoirs in the upper Delaware River Basin
- Groundwater elevations in several counties (comparing to past month, past year, and historic records)
- Soil moisture via the Palmer Drought Index as seen in *Table 12 – Palmer Drought Severity Index*, which is a soil moisture algorithm calibrated for relatively homogenous regions which measures dryness based on recent precipitation and temperature.

Table 12 - Palmer Drought Severity Index

Palmer Drought Severity Index (PDSI)	
Severity Category	**PDSI Value**
Extremely Wet	4.0 or more
Very Wet	3.0 to 3.99
Moderately Wet	2.0 to 2.99
Slightly Wet	1.0 to 1.99
Incipient Wet Spell	0.5 to 0.99
Near Normal	0.49 to -0.49
Incipient Dry Spell	-0.5 to -0.99
Mild Drought	-1.0 to -1.99
Moderate Drought	-2.0 to -2.99
Severe Drought	-3.0 to -3.99

Palmer Drought Severity Index (PDSI)	
Severity Category	**PDSI Value**
Extreme Drought	-4.0 or less

The effects of a drought can be far-reaching both economically and environmentally. Economic impacts include reduced productivity of aquatic resources, mandatory water use restrictions, well failures, cutbacks in industrial production, agricultural losses, and limited recreational opportunities. Environmental impacts of drought include those found in *Table 13 – Economic and Environmental Impacts of Drought Events* and qualifies the potential economic and environmental impacts from a drought event.

Table 13 - Economic and Environmental Impacts of Drought Events

Economic and Environmental Impacts of Drought Events	
Economic	**Environmental**
- Reduced productivity of aquatic resources - Mandatory water use restrictions - Well failures - Cutbacks in industrial production - Agricultural losses - Limited recreational opportunities	- Hydrologic effects - Adverse effects on animal populations - Damage to plant communities - Increased number and severity of fires - Reduced soil quality - Air quality effects - Loss of quality in landscape

4.3.1.3 Past Occurrence

The Pennsylvania Department of Environmental Protection (PA DEP) maintains the most comprehensive data on drought occurrences across the commonwealth. Descriptions of drought status categories (i.e., watch, warning, and emergency) are included in the "Range of Magnitude" section above. The declared drought status from 1980 to 2021 is shown in *Table 14 – Past Drought Events in Snyder County*.

The National Oceanic and Atmospheric Administration (NOAA) has archived records showing extreme droughts for the commonwealth in 1931 and a prolonged event in the 1960s as seen in *Figure 7 – Pennsylvania Palmer Drought Index 1900 – 1999*.

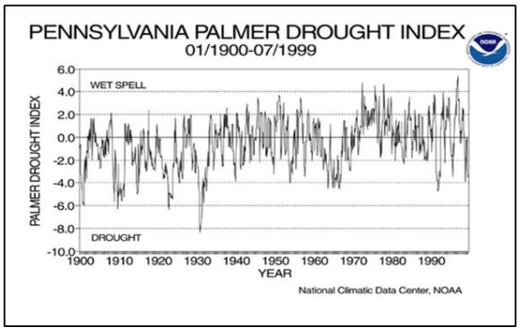
Based on the county's more recent disaster history and other drought occurrence data, the worst drought event in Snyder County occurred in the summer of 1999. Extended dry weather spurred Governor Thomas Ridge to declare a drought emergency in fifty-five counties. During this event, precipitation deficits for that summer averaged five to seven inches below normal; the Susquehanna River hit record low flows, streams were dry, and many wells were depleted. Crop damage losses totaled over $500 million statewide, and those losses equated to 70% to 100% of crop production. There were additional losses from the decline of milk production. Also, the state asked municipal and private water suppliers to restrict local water use.

Table 14 - Past Drought Events in Snyder County

Past Drought Events in Snyder County			
Start Date	**End Date**	**Drought Status**	**Event Duration (days)**
11/18/1980	04/20/1982	Emergency	518
04/26/1985	12/19/1985	Watch	237
07/07/1988	08/24/1988	Watch	48
08/24/1988	12/12/1988	Warning	110
03/03/1989	05/15/1989	Watch	73
06/28/1991	07/24/1991	Warning	26
07/24/1991	04/20/1992	Emergency	271
04/20/1992	06/23/1992	Warning	64
09/01/1995	09/20/1995	Warning	19
09/20/1995	11/08/1995	Emergency	49
11/08/1995	12/18/1995	Warning	40
07/17/1997	01/16/1998	Watch	183
12/03/1998	12/16/1998	Warning	13
12/16/1998	03/15/1999	Emergency	89
03/15/1999	06/10/1999	Watch	87
06/10/1999	07/20/1999	Warning	40
07/20/1999	09/30/1999	Emergency	72
09/30/1999	05/05/2000	Watch	218
08/08/2001	12/05/2001	Watch	119
12/05/2001	06/14/2002	Warning	191
08/09/2002	09/05/2002	Watch	27
09/05/2002	11/07/2002	Warning	63
04/11/2006	06/30/2006	Watch	80
08/06/2007	01/11/2008	Watch	158
09/16/2010	11/10/2010	Watch	55
03/24/2015	07/10/2015	Watch	108
08/02/2016	12/16/2016	Watch	136
12/16/2016	02/14/2017	Warning	60
04/06/2017	05/16/2017	Watch	40
02/14/2017	04/06/2017	Watch	51
09/10/2020	01/07/2021	Watch	119
08/31/2022	12/08/2022	Watch	99
06/15/2023	08/24/2023	Watch	70
Source: Pennsylvania Department of Environmental Protection, 2024			

Past Drought Events in Snyder County			
Start Date	End Date	Drought Status	Event Duration (days)
**Gubernatorial Disaster Declaration			

Figure 7 – Pennsylvania Palmer Drought Index 1900 – 1999



The warmest July on record in Pennsylvania occurred in 2020, and sixteen counties entered Drought Watch status on August 21 of that year. In June 2021, dry conditions were again affecting the commonwealth.

4.3.1.4 Future Occurrence

It is difficult to forecast the exact severity and frequency of future drought events. Climate change may lead to increased uncertainty and extremity of climate events. Snyder County experienced severe drought between 5% to 10% of the time between 1895 and 1995, as seen in *Figure 8 – Palmer Drought Severity Index*. This report can be used to make a rough estimate of the future probability of drought in Snyder County, although it does not account for changes introduced by climate change. Drought conditions are expected to become more severe with climate change, as evaporation and transpiration will increase with higher temperatures.

Figure 8 - Palmer Drought Severity Index

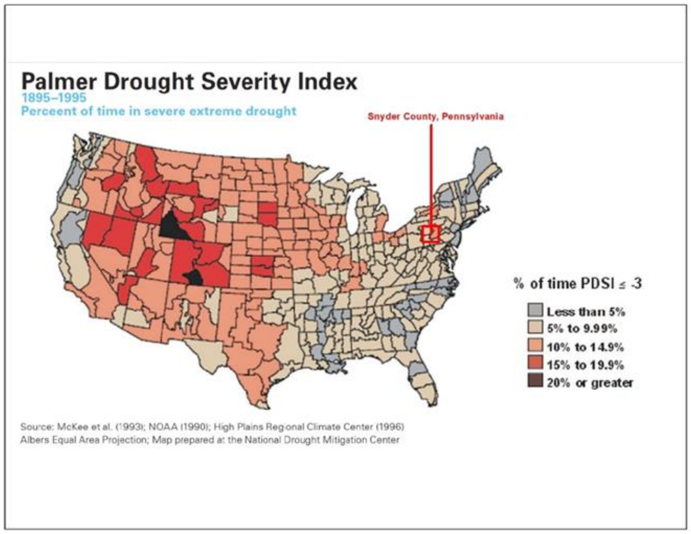


Figure 9 – Current Drought Index for Pennsylvania below shows that Snyder County is currently in normal condition at the time of writing this plan.

The potential for a drought to occur in Snyder County is high. Given the frequency of drought watches issued for Snyder County and its municipalities, the county can reasonably expect to be under a drought watch at least once per year. While some form of drought condition frequently exists in Snyder County, the impact depends on the duration of the event, severity of conditions, and area affected. The map above shows that Snyder County, and most of Pennsylvania, is currently (and most often) in normal (non-drought) conditions.

As stated above, trends indicate climate change will influence the frequency of droughts in the future. As global temperatures rise, weather patterns will change, increasing the number of dry days an area experiences. This could result in more drought periods for a local or regional area. Droughts could also become longer in duration, compared to previous patterns.

4.3.1.5 Vulnerability Assessment

The magnitude of 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.

Land use and major development is a factor that has the potential to impact the vulnerability to drought in Snyder County. Land use, especially agricultural land use, can exacerbate dry conditions, and these agricultural areas can be damaged by drought. There are 85,547 acres of farmland in Snyder County. If the number of agricultural acres increases, that increases the potential vulnerability for drought impacts. Conversely, if the agricultural acres decrease, the potential vulnerability of agriculture to drought decreases. Drought can also have an adverse effect on forested areas. Approximately 55% of land use in Snyder County is forest areas, including deciduous, evergreen, mixed deciduous and evergreen, forested wetlands, and emergent wetlands. There are also three state game lands and one state forest that make up a large portion of the county. Long periods of drought can increase the potential for wildfires and invasive species that could damage these forested areas. Economic benefits through the provision of wood products would also be affected.

There are many hazards that can be considered cascading hazards related to drought events. Wildfire is the most severe cascading hazard effect associated with drought. Wildfires can devastate wooded and agricultural areas, threatening natural resources and farm production facilities. With drought events, water infiltration into the ground becomes more difficult. This lack of infiltration can result in flash flooding events in areas of steep slopes, canyons, and rolling hills. A loss of vegetation from a drought can also increase the occurrence of landslides in areas of steep slopes with loose packed soil profiles. A discussion on the county's vulnerability to flash floods, landslides, and wildfire can be found in Section 4.3.4.5, 4.3.7.5, and 4.3.12.5 respectively.

Droughts can have adverse effects on farms and other water-dependent industries resulting in local economic loss. Areas of extensive agriculture use are particularly vulnerable to drought; 85,547 acres of Snyder County, or roughly 40.3% of the 212,172 total land acreage, make up farmland (United States Department of Agriculture [USDA], 2022 Census). The total number of farms in Snyder County is 792, and the average acreage for farms in Snyder County is 108 acres. Snyder County ranks 10th of sixty-seven counties in the commonwealth for agricultural production, totaling over $259.12 million annually. Agricultural production from crops, including nursery and greenhouse crops, accounts for more than $30.79 million in commerce annually. Production from livestock, poultry, and their products accounts for $228.34 million annually. The livestock that has the greatest potential to be impacted are the broilers and other meat-type chickens and pullets. There are approximately 2,874,575 broilers and other meat-type chickens and 595,107 pullets. Acreage for farming has decreased since the 2017 USDA Census when there was a reported total of 98,978 farming and drought vulnerable acres.

Snyder County also has 747 domestic wells and seventeen irrigation wells that would be adversely impacted by drought events. This impact would lead to lower water levels for at least 747 households and potentially seventeen large farms. This well information was obtained by using the PA GEOCODE application to find well information from 01/01/2000 to 03/18/2024.

Additionally, emergency services can be adversely impacted by drought as a cascading hazard. Local fire departments often utilize ponds, creeks, and streams for water onboard fire apparatus. With low water levels in waterbodies, responders may be unable to draft enough water to efficiently respond to and extinguish a fire. Also, with an increased number of potential wildfires due to drought conditions, agencies may not have the personnel to efficiently respond to all fires in a timely manner.

A map of properties with tillable agricultural land use, forestry, and other land in the county vulnerable to drought is shown below in *Figure 10 – Drought-Vulnerable Land Use and Public Water Supply*.

Populations in Snyder County, including the socially vulnerable, underserved, and unserved populations, are at different levels of vulnerability. The socially vulnerable have an increased risk due to the unsheltered or homeless not having access to reliable sources of water. Also, those individuals who are considered socially vulnerable because of location in rural areas are also at an increased risk because of agricultural and well status.

As seen in *Table 3 – Population Change in Snyder County*, eleven of the twenty-one municipalities in Snyder County have experienced a population loss since the 2010 decennial census. Ten municipalities have seen a net population increase from the 2010 decennial census to the 2020 decennial census. The municipalities that have experienced an increase are Franklin Township, Freeburg Borough, Jackson Township, McClure Borough, Monroe Township, Penn Township, Perry Township, Selinsgrove Borough, Washington Township, and West Perry Township. Based on this information, it can be speculated that these ten municipalities may have an increased risk to drought conditions, since 2010, due to the increase in population.

Municipalities with high risk due to drought:

- Franklin Township
- Freeburg Borough
- Jackson Township

- McClure Borough
- Monroe Township
- Penn Township
- Perry Township
- Selinsgrove Borough
- Washington Township
- West Perry Township

Drought also has the potential to impact historic and cultural resources in Snyder County. Snyder County has three historic or cultural properties or buildings, and drought could impact utility delivery to those locations. These historic and cultural properties are the Governor Simon Snyder Mansion, Selinsgrove Hall, and Siebert Hall. All properties in Snyder County that are part of the National Register of Historic Places have the same vulnerability to drought. No one property has a greater risk than the others, but each of the historic and cultural properties is vulnerable at some level.

Drought events in Snyder County can impact certain systems and community lifelines that are tied into the historic or cultural properties. Water utilities can be directly impacted by drought events when prolonged dry weather lowers the available water in reservoirs and water systems used by a county or a community. Drought could impact electric utilities if moving water is used in electric generation. When water is used for electric generation, drought events could cause lower utilization and efficiency. This is more common in the western United States, but it could occur if any counties in Pennsylvania utilize water for power generation. Currently, Snyder County does not use waterpower for electric generation. Other systems that could potentially be impacted by a drought event are wastewater utilities and any nuclear power generation that uses water in its process.

Figure 9 - Current Drought Index for Pennsylvania

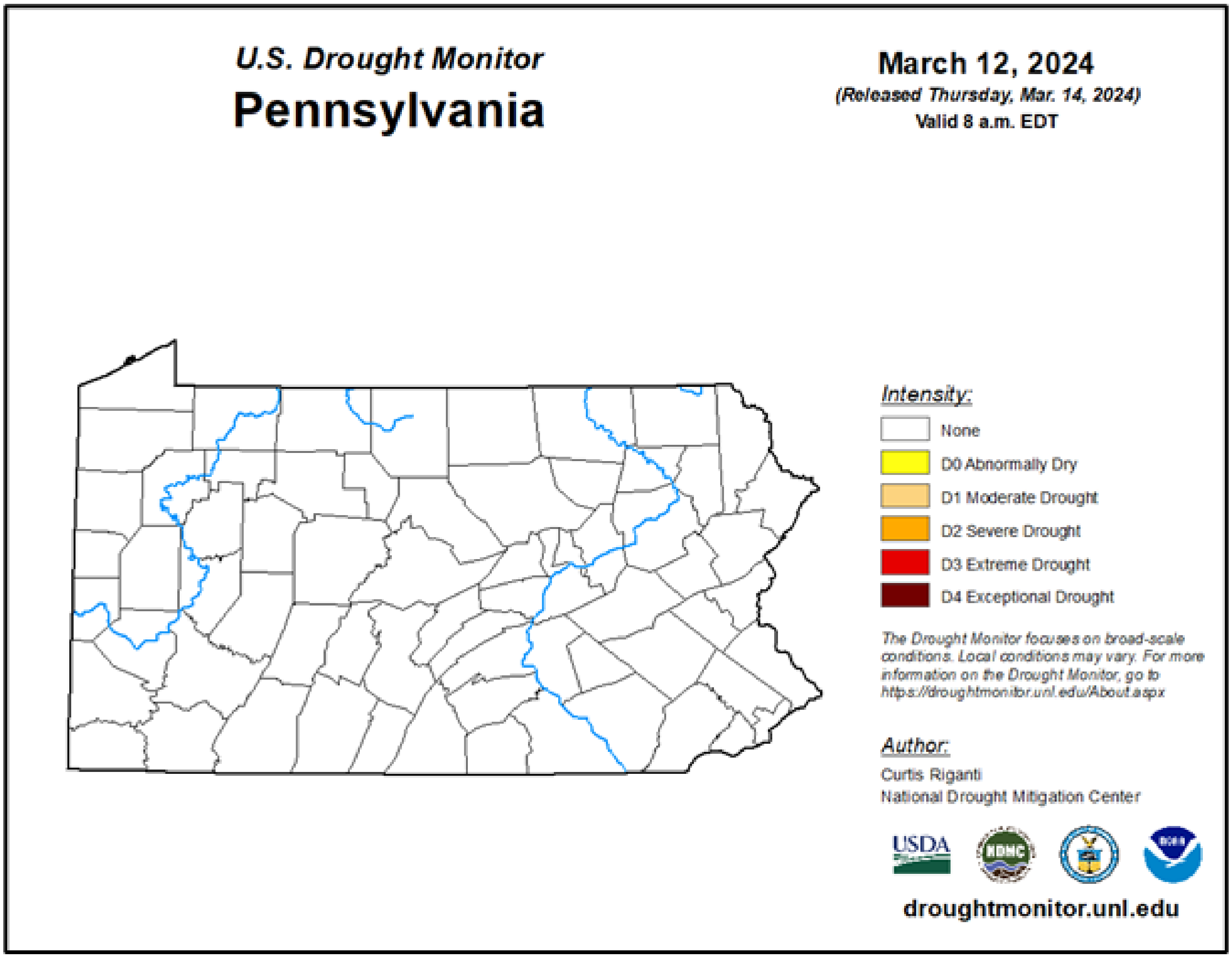
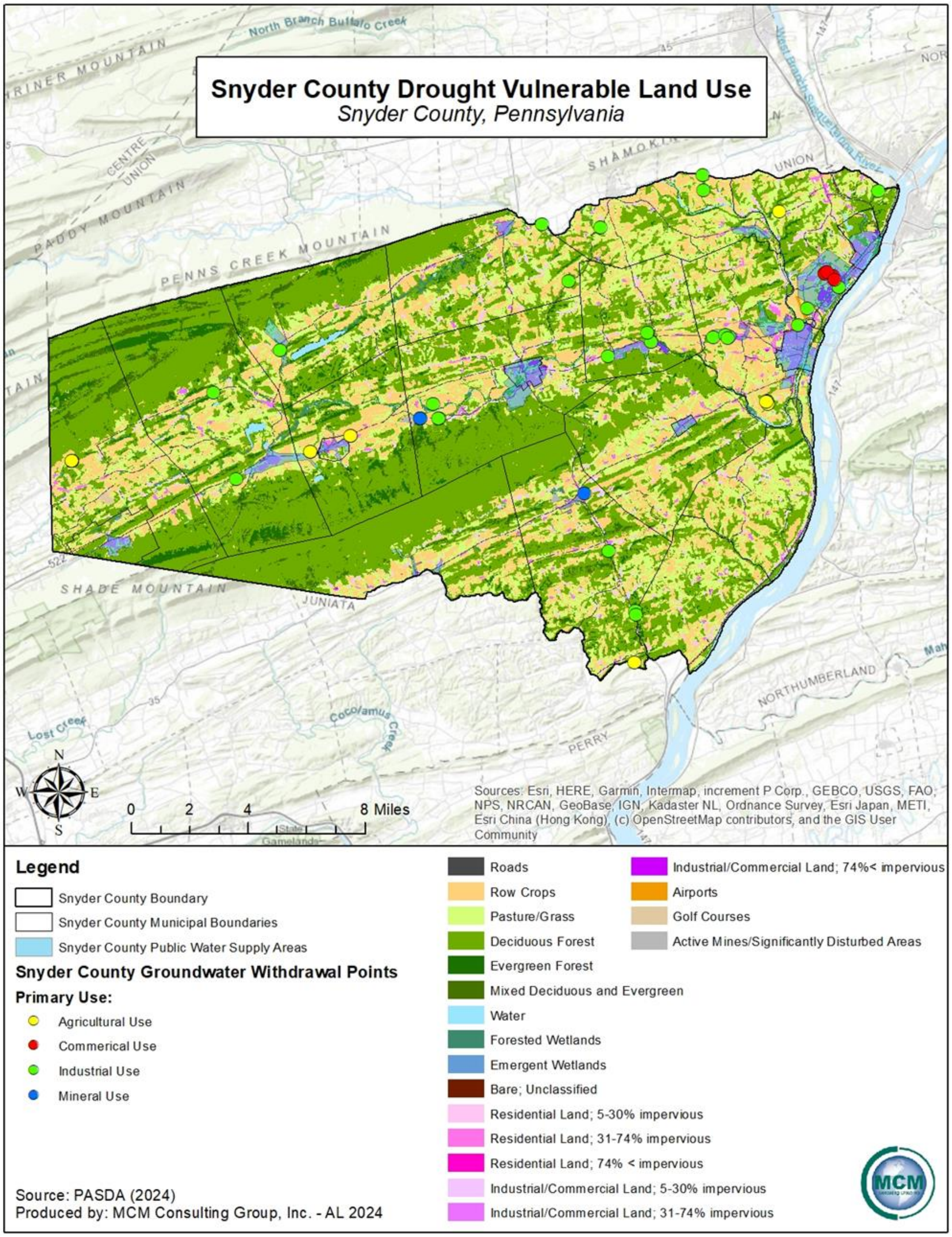


Figure 10 - Drought-Vulnerable Land Use and Public Water Supply

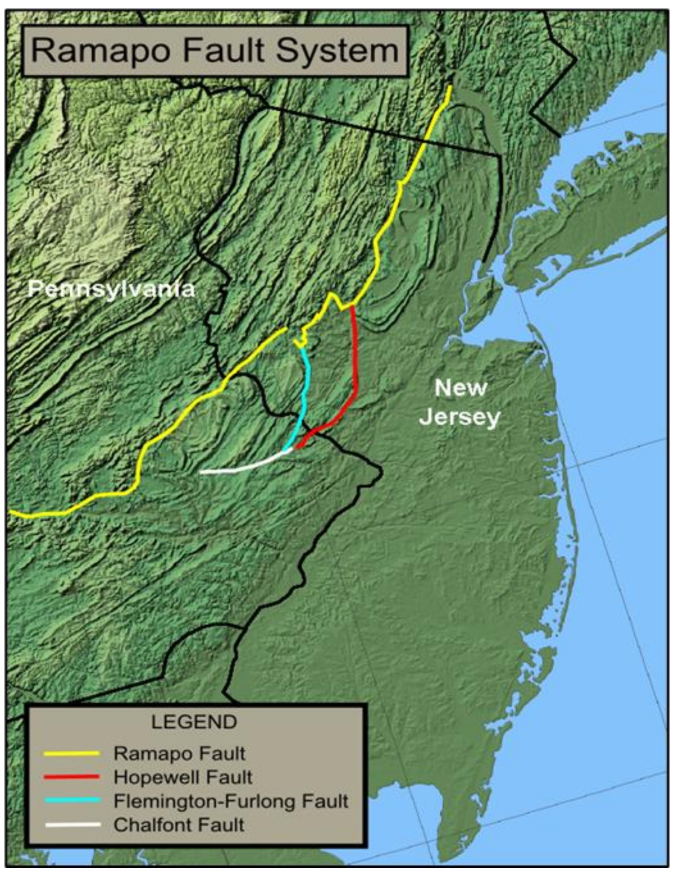


4.3.2. Earthquake

4.3.2.1 Location and Extent

An earthquake is sudden movement of the earth's surface caused by the release of stress accumulated within or along the edge off the earth's tectonic plates, a volcanic eruption, or by a human induced explosion (DCNR, 2007). Earthquake events in Pennsylvania, including Snyder County, are usually mild events, impacting areas no greater than 60 miles in diameter from the epicenter. A majority of earthquakes occur along boundaries between tectonic plates, and some earthquakes occur at faults on the interior of plates. Today, Eastern North America, including Snyder County, Pennsylvania, is far from the nearest plate boundary. That plate boundary is the Mid-Atlantic Ridge and is approximately 2,000 miles to the east, under the Atlantic Ocean. The Ramapo Fault System runs through New York, New Jersey, and eastern Pennsylvania (See *Figure 11 - Ramapo Fault System*). This fault system is associated with some small earthquakes, and it is thought unlikely to produce significant disruption.

Figure 11 - Ramapo Fault System



When the supercontinent of Pangaea broke apart about 200 million years ago, the Atlantic Ocean began to form. Since then, many faults have developed. Locating all the faults would be an ideal approach to identifying the region's earthquake hazard; however, many of the fault lines in this region have no seismicity associated with them. The best way to determine earthquake history for Snyder County is to conduct a probabilistic earthquake-hazard analysis with the earthquakes that have already happened in and around the county. (See *Figure 12 - Pennsylvania Earthquake Hazard Zones*). Nevertheless, the United States Geological Survey (USGS) indicates that Snyder County has a low earthquake risk, and no historical earthquake event has had an epicenter within the county boundary.

Natural gas extraction of the Marcellus/Utica Shale formation (see *Figure 13 - Pennsylvania Oil and Gas Geology*) has occurred in many regions of the commonwealth, but eastern and southeastern Pennsylvania are not among them. Hydraulic fracturing, or fracking, is used to extract the gas, and the process is thought to lead to an increase in seismic activity (Meyer, 2016).

However, fracking does not appear to be linked to the increased rate of magnitude three and larger earthquakes (USGS 2014). In recent years, permits for extraction of the natural gas and oil in the commonwealth have been issued by the Pennsylvania Department of Environmental Protection, but no records of requested permits for gas extraction or injection wells were found for Snyder County at the writing of this plan.

4.3.2.2 Range of Magnitude

Earthquakes result in the propagation of seismic waves, which are detected using seismographs. These seismograph results are measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake. *Table 15 - Richter Scale* summarizes Richter Scale magnitudes as they relate to the spatial extent of impacted areas. The Modified Mercalli Intensity Scale (*Table 16 - Modified Mercalli Intensity Scale*) is an alternative measure of earthquake intensity that is scaled by the impacts of the earthquake event. Earthquakes have many secondary impacts, including disrupting critical facilities, transportation routes, public water supplies and other utilities.

Table 15 - Richter Scale

Richter Scale	
Richter Magnitude	**Earthquake Effects**
Less than 3.5	Not generally 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.

Table 16 - Modified Mercalli Intensity Scale

Modified Mercalli Intensity Scale			
Scale	**Intensity**	**Earthquake Effects**	**Richter Scale Magnitude**
I	**Instrumental**	Detected only on seismographs.	<4.2
II	**Feeble**	Some people feel it.	
III	**Slight**	Felt by people resting, like a truck rumbling by.	
IV	**Moderate**	Felt by people walking.	
V	**Slightly Strong**	Sleepers awake; church bells ring.	<4.8
VI	**Strong**	Trees sway; suspended objects swing; objects fall off shelves.	<5.4
VII	**Very Strong**	Mild alarm, walls crack, plaster falls.	<6.1
VIII	**Destructive**	Moving cars uncontrollable, masonry fractures, poorly constructed buildings damaged.	<6.9
IX	**Ruinous**	Some houses collapse, ground cracks, pipes break open.	

Modified Mercalli Intensity Scale			
Scale	**Intensity**	**Earthquake Effects**	**Richter Scale Magnitude**
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 of infrastructure, trees fall, ground rises and falls in waves.	>8.1

4.3.2.3 Past Occurrence

According to USGS, no known earthquakes have had an epicenter within Snyder County since 1724, before which local seismology cannot be known. However, several seismic events that occurred outside the county boundary may have been felt in the region.

On August 23, 2011, a 5.9 earthquake occurred in Virginia, and a 2.2 earthquake shook Reading, Pennsylvania (Berks County), on July 19, 2019. Further, a 3.4 earthquake struck Mifflintown (Juniata County) on June 13, 2019, and Bolivar (Westmoreland County) experienced a 2.9 event on October 6, 2020. Parts of the county may have experienced some of the shock waves from these minor earthquakes and others that have occurred around the region, most notably New Jersey. The strongest recorded earthquake in Pennsylvania history (5.2) occurred on September 25, 1998 in northwestern Pennsylvania and is known as the Pymatuning Earthquake for its epicenter near Pymatuning Lake. The effects of the earthquake were felt across the commonwealth and were blamed for many wells in the region near the epicenter losing their water, while new springs appeared and old wells reemerged. A three-month date range revealed 120 dry household-supply wells on the ridge of Jamestown and Greenville, Pennsylvania. Declines of up to 100 feet were observed on a ridge where at least eighty of the wells resided. The degree of the damage varied. Some of the wells lost all power or could barely hold their yields and some of the water in wells turned black or began to smell of sulfur.

The most likely impetus of the wells drying was due to an increase in hydraulic conductivity of shale rock under this area caused by the earthquake. The quake affected the existing faults and created new faults in the shale. This created more permeability for the water to leak down from the hilltops on the ridge down to the valleys following the contours of the Meadville shale.

Because the effects of large earthquakes can be felt hundreds of miles away, the historical earthquake epicenters near Snyder County are shown below at *Figure 14 – Pennsylvania Earthquake Activity.* A wider depiction of earthquake occurrences in the northeastern United States may be found here: *https://earthquake.usgs.gov/earthquakes/map/?extent=14.26438,-141.32813&extent=56.51102,-48.60352*

4.3.2.4 Future Occurrence

Earthquake activity and intensities are difficult to predict, but a probabilistic analysis of prior earthquakes can assist in gauging the likelihood of future occurrences. *Figure 12 - Earthquake Hazard Zones* in 4.3.2.1 shows that Snyder County is in a very low hazard zone for earthquake activity according to the USGS (2014), suggesting a low probability of earthquake occurrence. However, according to the USGS, there has been a recent trend increasing the frequency of magnitude three and larger earthquakes in the central and eastern U.S. (*Table 17 - Recent Earthquake Trends in Northeastern United States*). This uptick in seismicity may be due to hydraulic fracturing activities, and specifically occurs due to wastewater from the fracking process being injected into the earth (Meyer, 2016). Recent studies have moved towards being able to predict such induced seismicity by looking at uplift after injections, but more work needs to be done to confirm uplift as a reliable indicator of induced seismicity (Shirzei et al., 2016). It is important to note that seismicity can occur even after wells become inactive and injection rates decline (Shirzaei et al., 2016).

Isostatic Rebound is a hypothesis for earthquake occurrence that has been conceptualized for many years, according to Charles Scharnberger, a retired professor of geology at Millersville University, who monitors the seismic station there. Scharnberger said Pennsylvania earthquakes are somewhat of a mystery, but they could have something to do with the westward shift of the North American tectonic plate. Though the plates meet in California, where most of the seismic activity occurs, that movement still causes stress, squeezing and pressure along the entire length of the plate, reverberating as far back as the East Coast. A 3.4 earthquake like the one in Mifflintown, Juniata County in 2019 is in the medium range for Pennsylvania and may occur every couple of years. According to the USGS, this was the strongest earthquake felt or originating in Pennsylvania that year. It was followed by a 1.3 aftershock.

The chances of a devastating earthquake are low, but do exist, according to Scharnberger, His calculations on the probability of a severe earthquake based on the historic record indicate it is about a one in 200 chance in any given year.

Table 17 - Recent Earthquake Trends in Northeastern United States

Earthquake Trends in Northeastern U.S.	
Year	**Number of Magnitude 3+ Earthquakes**
2015	0
2016	3
2017	4
2018	0
2019	5
2020	3
Source: USGS, 2020	

Climate change has the potential to increase the earthquake activity felt in the United States, including in Snyder County. Although not a direct cause of earthquakes, climate change can worsen droughts and their duration. Droughts can exacerbate the fault lines in an area, resulting in a greater potential for seismology events. During droughts, groundwater is also increasingly pumped, which could cause changes in fault areas. This effect is more common on the west coast of the United States, but with climate change, these impacts can become more common across the country and the world.

4.3.2.5 Vulnerability Assessment

According to the U.S. Geological Society Earthquake Hazards Program, an earthquake hazard is anything associated with an earthquake that may affect a resident's normal activities. For Snyder County, this could include surface faulting, ground shaking, landslides, liquefaction, dried or rejuvenated water wells, tectonic deformation, and seiches (sloshing of a closed body of water from earthquake shaking).

Earthquakes usually occur without warning and can impact areas a great distance from their point of origin (epicenter). Ground shaking is the greatest risk to building damage within Snyder County. Risk to public safety and loss of life from an earthquake is dependent upon the severity and proximity of the event. Injury or death to those inside buildings, or people walking below building ornamentation and chimneys is a higher risk to Snyder County's general public during an earthquake. Infrastructure is more at risk on the east coast than the west coast because its buildings are older.

Snyder County has historic and cultural properties that could be adversely impacted by earthquakes. There are six historic properties or structures in Snyder County that are registered with the National Register of Historic Places.

These locations are:

- Aline Covered Bridge
- An unnamed bridge between Monroe Township and Penn Township
- Dreese’s Covered Bridge
- Gross Bridge
- Selinsgrove Hall and Seibert Hall
- Snyder, Gov. Simon, Manson

There are 275 bridges published by the Pennsylvania Department of Transportation that could be damaged and made unusable by a major earthquake event. These locations are evenly distributed throughout the county and damage to any of them would be detrimental to transportation and emergency response in Snyder County. The breakdown of bridge conditions can be seen in *Table 18 – Bridge Conditions in Snyder County.*

Table 18 - Bridge Conditions in Snyder County

Bridge Conditions in Snyder County			
Condition	**Ownership Category**	**Number of Bridges**	**Total**
Good	State	114	238
	Local	124	
Fair	State	5	16
	Local	11	
Poor	State	14	21
	Local	7	
Source: PA DOT, 2024			

Municipalities with high risk due to earthquakes:

- Franklin Township
- Freeburg Borough
- Jackson Township

- McClure Borough
- Monroe Township
- Penn Township
- Perry Township
- Selinsgrove Borough
- Washington Township
- West Perry Township

As seen in *Table 3 – Population Change in Snyder County*, eleven of the twenty-one municipalities in Snyder County have experienced a population loss since the 2010 decennial census. Ten municipalities have seen a net population increase from the 2010 decennial census to the 2020 decennial census. Based on this information, it can be speculated that these eleven municipalities may have increased earthquake vulnerability, since 2010, due to the increase in population.

Land use may factor into the potential impact of earthquakes for municipalities that have had a population change with increased building construction. With only ten municipalities experiencing population increases between the 2010 decennial census and the 2020 decennial census, it can be speculated that there has not been a net increase in residential construction in Snyder County.

Figure 12 - Pennsylvania Earthquake Hazard Zones

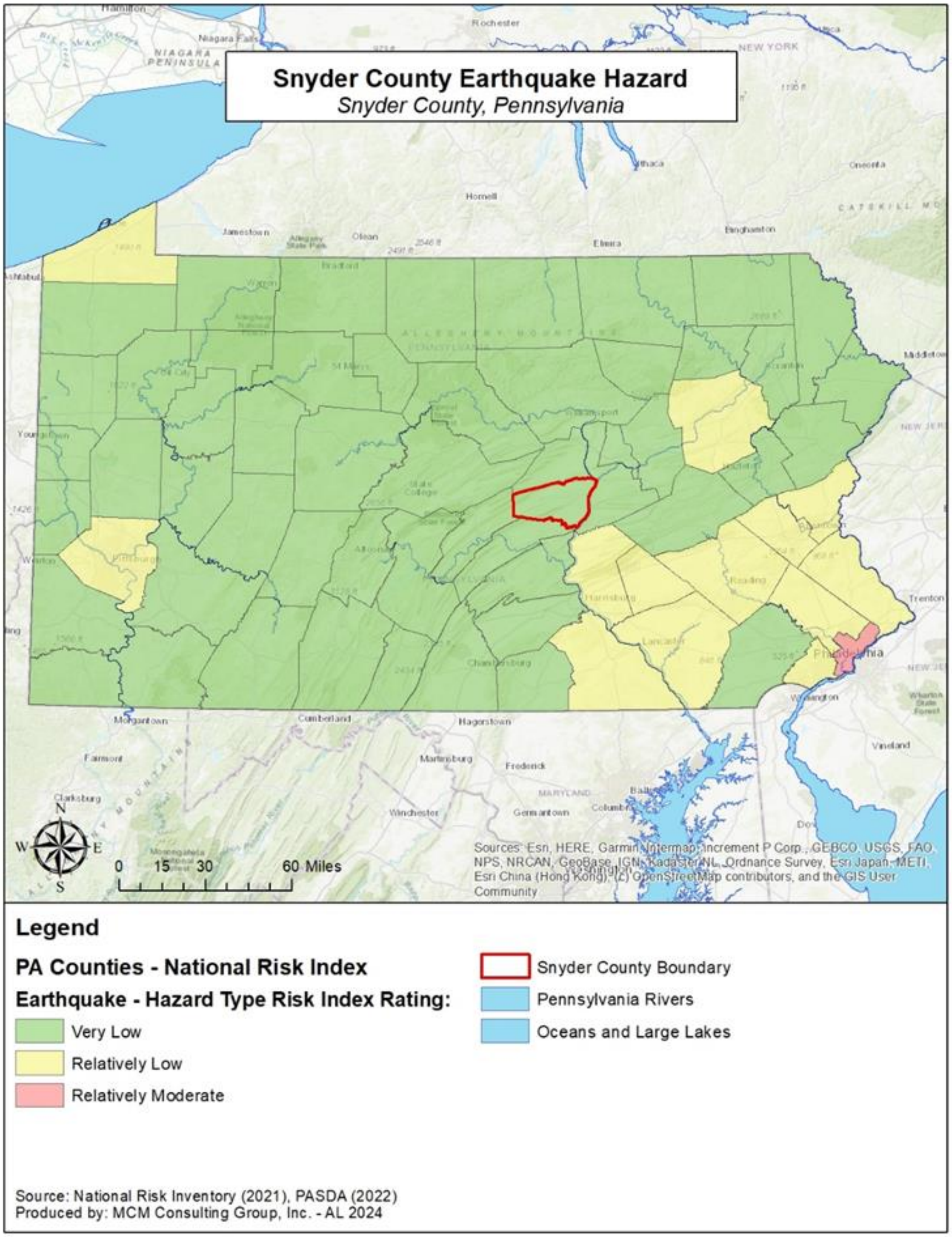


Figure 13 - Pennsylvania Oil and Gas Geology

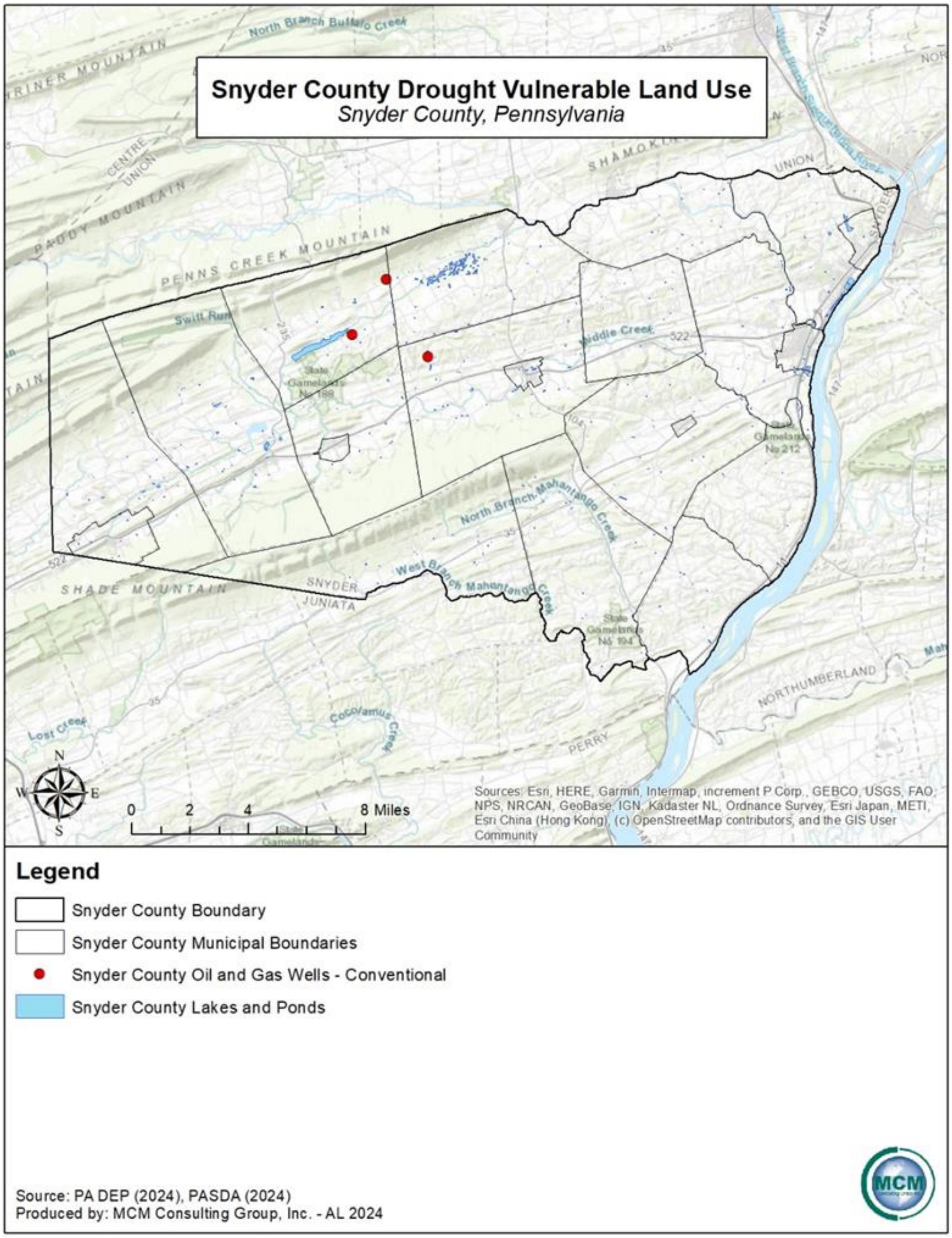
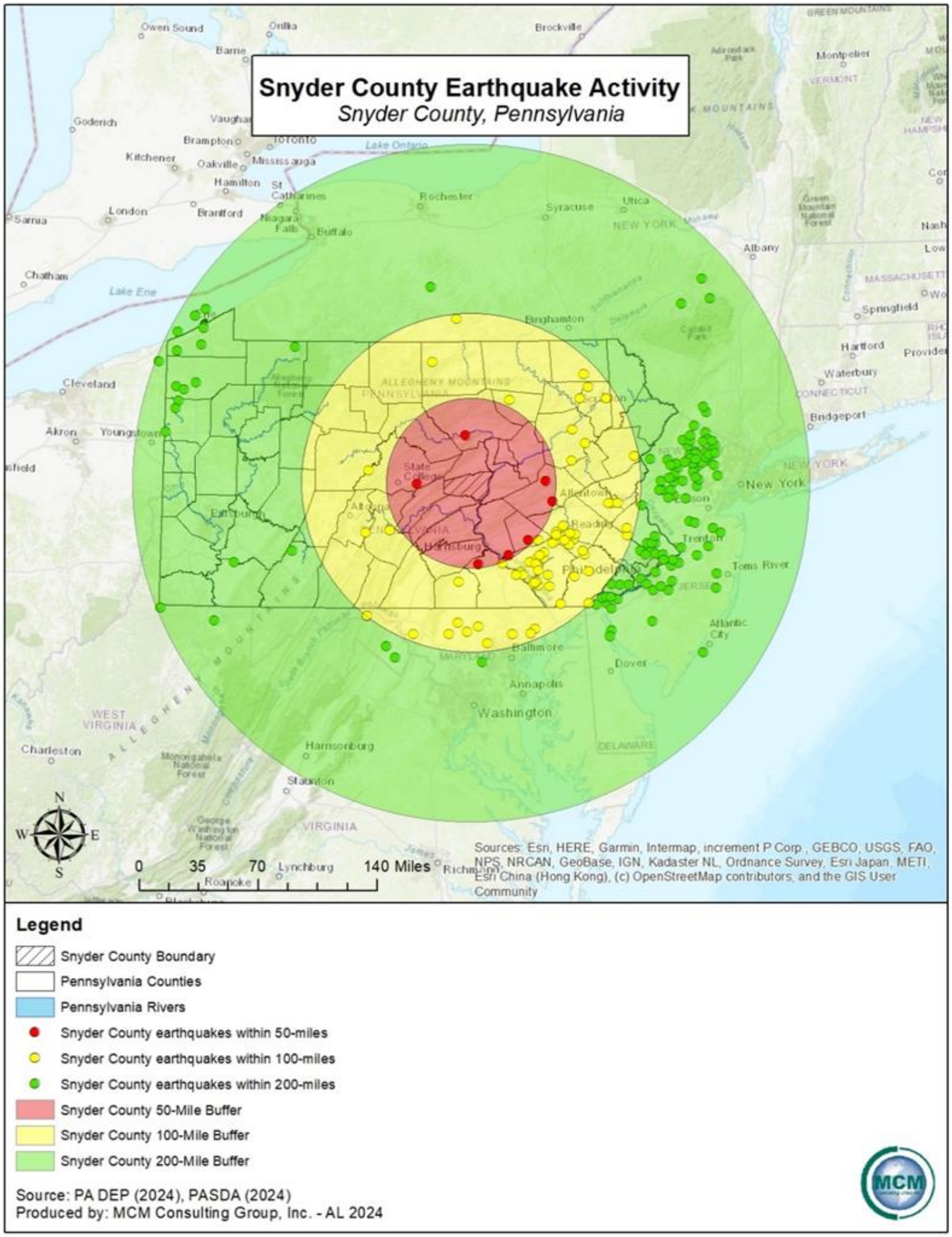


Figure 14 - Pennsylvania Earthquake Activity



4.3.3. Extreme Temperature

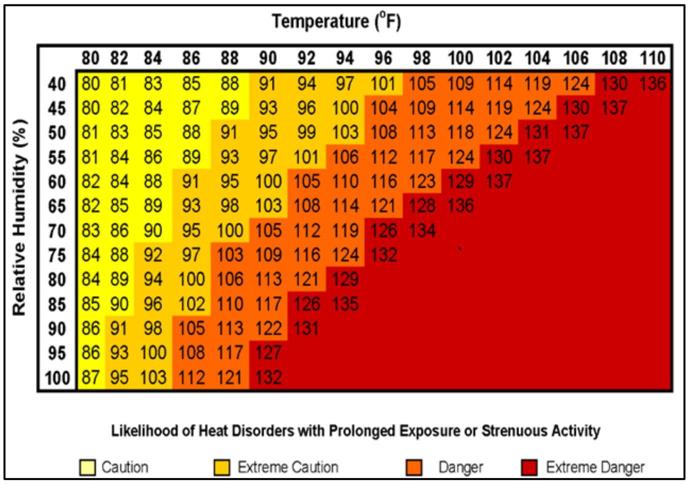
4.3.3.1 Location and Extent

Pennsylvania, and more specifically, Snyder County can experience many different temperature extremes. High temperatures occur about ten days per year at any location in Pennsylvania. However, southern parts of the state experience more than twice this number. Freezing temperatures occur on an average of 100 or more days per year with longest freeze-free period at near sea level locations such as northwest Pennsylvania (adjacent to Lake Erie). Extreme temperatures can be devastating – extreme heat can cause sunburn, heat cramps, heat exhaustion, heat stroke, and dehydration, while extreme cold can cause hypothermia and frostbite. Both can potentially cause long-lasting disabilities. January is typically the coldest month for Snyder County, with average temperatures of 27.8°F. *Figure 18 - Average Minimum Temperature Trends for Pennsylvania* shows the average minimum temperatures in Pennsylvania with Snyder County identified. July has typically been the warmest month for Snyder County, with an average temperature of 73.8°F. *Figure 19 - Average Maximum Temperature Trends for Pennsylvania* shows the average maximum temperatures in Pennsylvania with Snyder County identified. Temperatures can vary across Snyder County due to elevation changes in topography.

4.3.3.2 Range of Magnitude

When extreme temperature events occur, they typically impact the entirety of Snyder County, including the surrounding region. Extreme heat is described as temperatures that hover at least 10ºF above the average high temperature for a region during the summer months. Extreme heat is responsible for more deaths in Pennsylvania than all other natural disasters combined. Temperature advisories, watches, and warnings are issued by the National Weather Service relating impacts to the range of temperatures typically experienced in Pennsylvania. Heat advisories are issued when the heat index temperature is expected to be equal to 100°F, but less than 105°F. Excessive heat warnings are issued when heat indices are expected to reach or exceed 105°F and are issued within twelve hours of the onset. Excessive heat watches are issued when there is a possibility that excessive heat warning criteria may be experienced within twenty-four to seventy-two hours, but their occurrence and timing are still uncertain. A potential worst-case extreme temperature scenario would occur if widespread areas of the Commonwealth experienced 90°F or higher temperatures for an extended number of days. The heat could overwhelm the power grid and cause widespread blackouts, cutting off vital HVAC services for residents. It could create crisis management issues for senior citizens on fixed incomes, the homeless, and other vulnerable populations. The heat index is a measurement that takes into account both the temperature and relative humidity, and it is calculated as shown in *Figure 15 - National Weather Service's Heat Index Matrix*.

Figure 15 - National Weather Service's Heat Index Matrix



Temperature (°F)

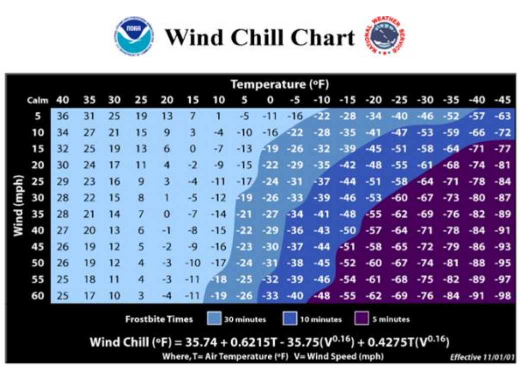
Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

Extreme cold temperatures drop well below typical temperatures and are often associated with winter storm events. Wind can make the apparent temperature drop further, and exposure to such extreme cold temperatures can cause hypothermia, frost bite, and death. Wind chill warnings are issued when wind chills drop to -25°F or lower. While this threshold applies to the entire state, the threshold for advisories varies based on regions. Wind chill advisories are issued in the south and western sections of Pennsylvania, when wind chill values drop to -10°F to -24°F. Wind chill advisories are issued in the southern-central to northern sections of the Commonwealth when wind chills drop to -15°F to -24°F. The National Weather Service created a wind chill chart which shows the time frostbite takes to set in depending on temperature and wind speed as shown in *Figure 16 - National Weather Service's Wind Chill Matrix*.

Figure 16 - National Weather Service's Wind Chill Matrix



Wind Chill Chart

Temperature (°F)

Wind (mph) / Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes | 10 minutes | 5 minutes

$$\text{Wind Chill } (°F) = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

Source: NOAA NWS, 2001

4.3.3.3 Past Occurrence

Snyder County has had more past occurrences of extreme cold incidents than extreme heat due to the geographic location of the county. *Table 19 - Past Extreme Temperature Occurrences for Snyder County* shows the past occurrence events associated with extreme temperature (hot and cold) that have occurred in Snyder County. The data in the table was reported from 1950 to the year 2023. Due to the source used, no further events have been documented since 2023, however, events most likely have occurred without being documented. With a total of five different extreme temperature events that have occurred, four of the events were extreme cold related while the remaining one was extreme heat related. There were no reports of death or injury related to the occurrences. However, numerous sources have provided information regarding past occurrences and losses associated with extreme temperature in Snyder County and the Commonwealth as a whole. Due to the number of sources available with information, number of events and losses could vary slightly in number.

Data from the National Climatic Data Center reports that there have been 787 extreme temperature episodes in Pennsylvania from 2000 through the end of 2023, resulting in a total of ninety-seven deaths and 103 injuries. Out of the 787 events, 525 of them were extreme cold related with four deaths. The other 262 events were extreme heat related with ninety-three deaths and 103 injuries across the state. The biggest event began on July 21, 2011, and ended on July 24, 2011. This event also had a significant effect on Snyder County itself. In the 2011 event, there were a total of twenty-two deaths and forty-eight injuries during the course of the event across the commonwealth. Record-breaking heat temperatures were experienced in over thirty different counties.

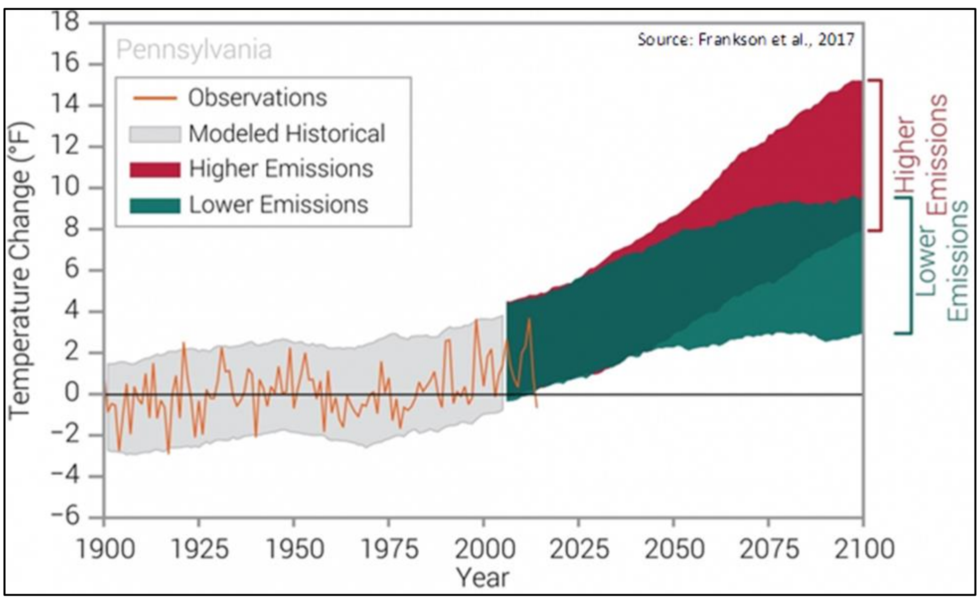
Table 19 - Past Extreme Temperature Occurrences for Snyder County

Past Extreme Temperature Occurrences for Snyder County		
Location	**Date**	**Type**
Snyder County	02/05/2007	Extreme Cold/Wind Chill
Snyder County	02/05/2007	Extreme Cold/Wind Chill
Snyder County	02/10/2008	Extreme Cold/Wind Chill
Snyder County	07/21/2011	Excessive Heat
Snyder County	02/15/2015	Extreme Cold/Wind Chill
Source: NOAA, 2024		

4.3.3.4 Future Occurrence

Extreme temperatures will continue to impact Snyder County in the future. Anthropogenic climate change is causing extreme climatic events to occur more frequently, suggesting that extreme temperatures are becoming a more threatening hazard as the impacts of climate change intensify. The annual average temperature has increased by 1.2˚F across the continental United States during the years 1986 to present compared to the time period 1901 to 1960, and temperatures are expected to continue rising. *Figure 17 – Observed and Projected Temperature Change for Pennsylvania* shows these projected changes in temperature for Pennsylvania based on climate models considering the possibilities of increased and decreased levels of greenhouse gas emissions. In recent years, record high temperatures have outnumbered record low temperatures 2:1, so it is expected that the risk of extreme heat will be amplified whereas the risk of extreme cold will be attenuated. The Northeastern United States is expected to experience twenty to thirty more days with temperatures above 90˚F, and twenty to thirty fewer days below freezing by approximately 2050. While there may be fewer extreme cold events, those that do occur are expected to reach record-setting low temperatures more often. Historically, Snyder County has had more extreme cold events than extreme heat events due to the geographic location of the county; however, this balance is expected to shift somewhat in the coming years to include a greater proportion of extreme heat events.

Figure 17 - Observed and Projected Temperature Change for Pennsylvania



Source: Frankson et al., 2017

4.3.3.5 Vulnerability Assessment

Extreme temperatures are usually a regional hazard when they occur. The very old (sixty-five years or older, accounting for 19.8% of Snyder County population) and the very young (five years or younger, accounting for 5.2% of Snyder County population) are most vulnerable to extreme temperatures due to risk factors, mobility challenges, and disabilities. Extreme temperatures can increase the demand for utility services, often resulting in an increased cost which some consumers may be unable to afford. The increased demand for services may cause a decrease in availability of these services or failure of the system. A decrease or failure of the utility system during extreme temperature events would put a large population at great risk. Extreme temperature events can also drastically increase the volume of emergency calls, potentially overwhelming the public safety communications center. Extreme heat events can also contribute to drought conditions, which in turn increase the risk of wildfire, as discussed in Section 4.3.12.

All properties in Snyder County that are part of the National Register of Historic Places have the same risk to extreme temperature. No one property has a greater risk than the others, but each of the historic and cultural properties is vulnerable at some level.

Municipalities with high risk due to extreme temperatures:

- Adams Township
- Beaver Township
- Beavertown Borough
- Center Township
- Chapman Township
- Franklin Township
- Freeburg Borough
- Jackson Township
- McClure Borough
- Middleburg Borough
- Middlecreek Township
- Monroe Township
- Penn Township
- Perry Township
- Selinsgrove Borough
- Shamokin Dam Borough
- Spring Township

- Union Township
- Washington Township
- West Beaver Township
- West Perry Township

Extreme temperatures can have a significant impact on land use within Snyder County. Higher temperatures can affect the mountain snowpacks and vegetation land. It is important to note that higher land use and irrigation can cause more intense extreme temperatures. Based on this information it can be speculated that higher land use within the municipalities in Snyder County will be impacted.

As seen in *Table 3 – Population Change in Snyder County,* eleven of the twenty-one municipalities in Snyder County have experienced a population loss since the 2010 decennial census. Ten municipalities have seen a net population increase from the 2010 decennial census to the 2020 decennial census. Based on this information, it can be speculated that Franklin Township, Freeburg Borough, Jackson Township, McClure Borough, Monroe Township, Penn Township, Perry Township, Selinsgrove Borough, Washington Township, and West Perry Township may have an increased vulnerability to extreme temperatures, since 2010, due to the increase in population. Populations in Snyder County, including the socially vulnerable and unserved populations, are at different levels of vulnerability. The socially vulnerable have an increased risk due to the unsheltered or homeless not having proper, and adequate, access to shelter and heating, ventilation, and air conditioning (HVAC) to protect them from extreme temperature events.

Extreme temperatures can have a significant impact on natural areas. Consecutive days of excessive heat or extreme cold can lead to the diminishment of natural habitats such as forests, rivers, and mountains as seen in Snyder County. Excessive heat and extreme cold can cause these areas to lose the nourishment that is needed for these areas to survive and destroy the equilibrium within them. If trends continue there will be more days of excessive heat in the coming years that could impact the equilibrium in these natural areas and change their geographic features. Extreme temperatures and lack of rainfall can lead to drought and the diminishment of rivers and vegetation within the area.

Extreme temperatures can have significant impacts on systems and community lifelines that are essential for the operations of an area. The changing nature of extreme temperature events could account for different levels of impact for every system in an area. For example, excessive cold may disrupt water systems, potentially resulting in frozen or broken pipes due to water freezing in the system because of the lower temperatures. Extreme heat events may increase the demand for potable water for consumption and water for irrigation. This could result in lower reservoir levels and increased concern for water rationing. If extreme temperatures continue for an extended period, or if the extreme temperatures occur while a drought event is ongoing, the vulnerability of an area could be critical. Extreme temperatures could impact the power system by causing an increase for air conditioning in extreme heat events. When power demand is high for an already over-taxed power system, rolling power interruptions or brownouts can occur. This is more typical in the western United States but could occur in Pennsylvania if the conditions are met.

Figure 18 - Average Minimum Temperature Trends for Pennsylvania

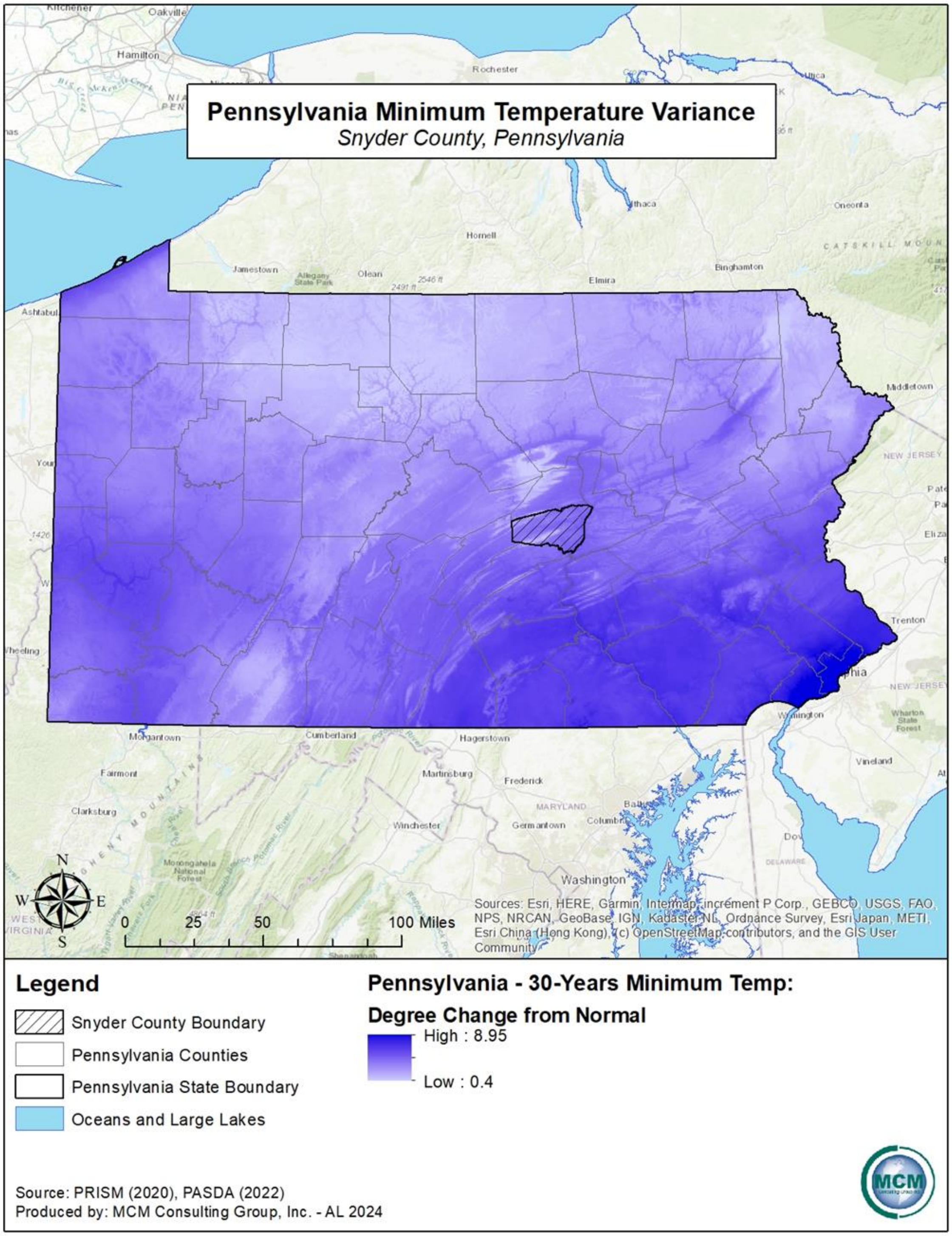
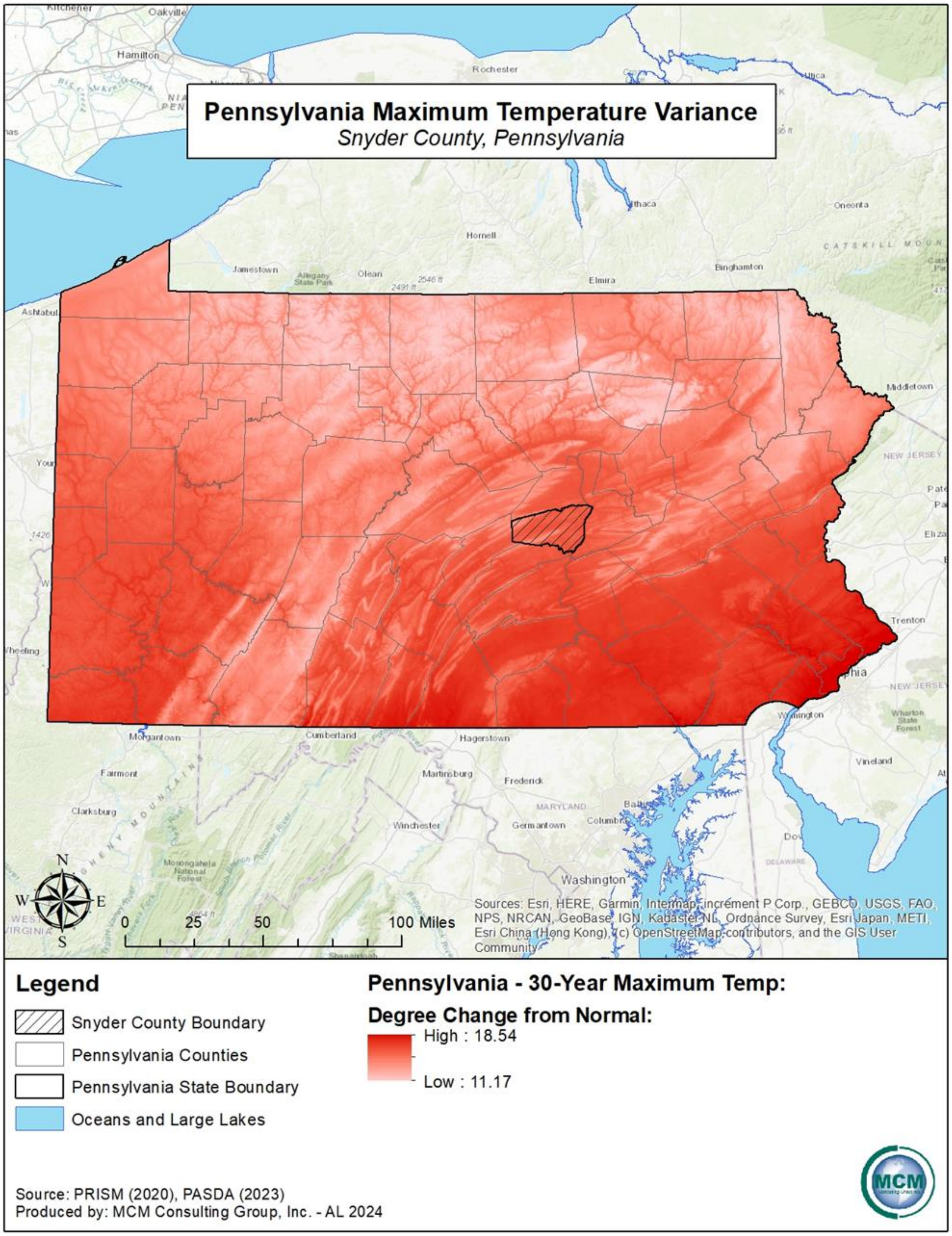


Figure 19 - Average Maximum Temperature Trends for Pennsylvania



4.3.4. Flooding, Flash Flooding, Ice Jam Flooding

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 hazards in Pennsylvania. Flooding events are generally the result of excessive precipitation. General flooding is typically experienced when precipitation occurs over a given river basin for an extended period. Flash flooding is usually the result of heavy, localized precipitation falling in a short period of time over a given location, often in mountain streams and mountainous regions, and in urban areas where much of the ground is covered in impervious surfaces. Flash floods are relatively common in Snyder County and the severity of those flood events is dependent upon a combination of creek, stream, and river basin topography and physiography, hydrology, precipitation, and weather patterns. Present soil conditions, the degree of vegetative clearing, and the presence of impervious cover must also be considered when determining the severity of a flood or flash flood event.

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. All forms of flooding can damage infrastructure.

Floodplains are lowlands adjacent to rivers, streams, and creeks that are subject to recurring floods. The size of the floodplain is described by the recurrence interval of a given flood event. 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 flood that has a 10% chance of occurring in a given year is smaller than a floodplain associated with a flood that has a 0.2% chance of occurring.

The National Flood Insurance Program (NFIP) publishes digital flood insurance rate maps (DFIRMs). These maps identify the 1% annual chance flood area. The special flood hazard area (SFHA) and base flood elevations (BFE) are developed from the 1% annual chance flood event as seen in *Figure 20 – Flooding and Floodplain Diagram*. Structure located within the SFHA have a 26% chance of flooding in a thirty-year period. The SFHA serves as the primary regulatory boundary used by FEMA, the Commonwealth of Pennsylvania, and the Snyder County local government. Federal floodplain management regulations and mandatory flood insurance purchase requirements apply to the following high-risk special flood hazard areas in *Table 20 – Flood Hazard High Risk Zones*. Appendix D of this hazard mitigation plan includes a flooding vulnerability map for each municipality in Snyder County with vulnerable structures and community lifeline facilities identified using the most current DFIRM data for Snyder County.

Past flooding events have been primarily caused by heavy rains, which cause small creeks and streams to overflow their banks, often leading to road closures. Flooding poses a threat to community lifeline facilities, agricultural areas, and those who reside or conduct business in the floodplain. The most significant hazard exists for facilities in the floodplain that process, use, or store hazardous materials. A flood could potentially release and transport hazardous materials throughout the area. Most flood damage to a property and structure located in the floodplain is caused by water exposure to the interior, high velocity water, and debris flow.

Figure 20 - Flooding and Floodplain Diagram

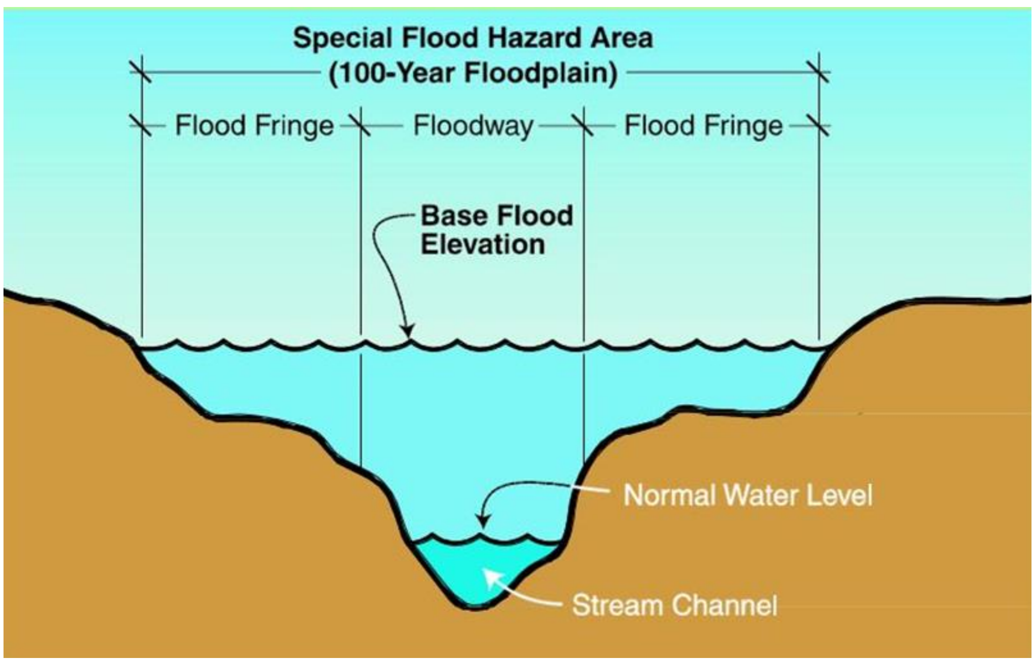


Table 20 - Flood Hazard High Risk Zones

Flood Hazard High Risk Zones	
Zone	**Description**
A	Areas subject to inundation by the 1% annual chance flood event. Because detailed hydraulic analysis has not been performed, no base flood elevations or flood depths are shown.

Flood Hazard High Risk Zones	
Zone	**Description**
AE	Areas subject to inundation by the 1% annual chance flood event determined by detailed methods. BFEs are shown within these zones.
AH	Areas subject to inundation by the 1% annual chance shallow flooding (usually areas of ponding) where average depths are 1 – 3 feet. BFEs derived from detailed hydraulic analysis are shown in this zone.
AO	Areas subject to inundation by the 1% annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are 1 – 3 feet. Average flood depths derived from detailed hydraulic analysis are shown within this zone.
AR	Areas that result from the decertification of a previously accredited flood protection system that is determined to be in the process of being restored to provide base flood protection.
Source: FEMA, 2017	

4.3.4.2 Range of Magnitude

The Susquehanna River basin has caused significant flooding in Snyder County, specifically on the following streams, creeks, and their tributaries:

- Susquehanna River
    - Penns Creek
    - Middle Creek
    - Mahantango Creek

Several factors determine the severity of floods, including rainfall intensity and duration, topography, ground cover, and the rate of snowmelt. Water runoff is greater in areas with steep slopes and little to no vegetative ground cover. The mountainous terrain of Snyder County can cause more severe floods as runoff reaches receiving water bodies more rapidly over steep terrain. The is of particular concern for areas along steep slopes and on the edges of valleys throughout Snyder County.

Urbanization typically results in the replacement of vegetative ground cover with impermeable surfaces like asphalt and concrete, increasing the volume of surface runoff and stormwater, particularly in areas with poorly planned stormwater drainage systems. A large amount of rainfall over a short time can cause flash flood events. Flash floods can occur very quickly and with little warning. A flash flood can also be deadly because of the rapid rise in water levels and devastating flow velocities. The more developed areas in the county can easily be susceptible to flash floods because of the significant presence of impervious surfaces, such as streets, sidewalks, parking lots, and driveways. Additionally, small amounts of rain can cause floods in locations where the soil is still frozen, saturated from a previous wet period or if the areas is largely covered in impermeable surfaces such as parking lots, paved roadways, and other developed areas. The county occasionally experiences intense rainfall from tropical storms in late summer and early fall, which can potentially cause flooding as well.

Severe flooding can cause injuries and deaths and can have long-term impacts on the health and safety of citizens. Severe flooding can also result in significant property damage, potentially disrupting the regular function of community lifeline facilities and can have widespread negative effects on local economies. Industrial, commercial, and public infrastructure facilities can become inundated with flood waters, threatening the continuity of government and business. The vulnerable populations must be identified and located in flooding situations, as they are often homebound. Mobile homes and manufactured structures are especially vulnerable to high water levels. Flooding can have significant environmental impacts when the flood water release and/or transport hazardous materials.

The most severe flooding in Central Pennsylvania and South-Central Pennsylvania has been associated with the Susquehanna River Basin. The greatest magnitude of county wide flooding impacts was reported as a result of Hurricane Agnes in 1972. Hurricane Agnes deposited a large amount of rain on Ohio, western Pennsylvania, northern West Virginia, and southwestern New York, with an average of 8 ½ inches of rain reported over most areas. This large amount of rain contributed to widespread and record setting flooding across the Commonwealth of Pennsylvania. Pennsylvania experienced an estimated $2.1 billion in damage and forty-eight deaths.

Severe flooding also comes with secondary effects that could have long lasting impacts on the population, economy, and infrastructure within Snyder County. Power failures are the most common secondary effect associated with flooding. Coupled with a shortage of critical services and supplies, power failures could cause a public health emergency. Community lifelines, such as sewage and water treatment facilities, could fail, causing sewage overflows and the contamination of groundwater and drinking water. Flooding also has the potential to trigger cascading hazards, such as landslides, hazardous material spills, and dam failures.

The maximum threat of flooding for Snyder County is estimated by looking at the potential loss data and repetitive loss data, both analyzed in the risk assessment section of the hazard mitigation plan. In these cases, the severity and frequency of damage can result in permanent population displacement, and businesses may close if they are unable to recover from the disaster.

Estimation of potential loss is completed through FEMA's HAZUS software. A level two HAZUS scenario was performed for the entirety of Snyder County. The FEMA Global Flood Risk Report and other reports generated by the software at the end of the scenario were utilized to estimate the amount of damage and loss from a flood. The total building loss for a 100-year flood based on a HAZUS level two scenario is displayed in *Table 21 – HAZUS Building Economic Loss Figures*. The total business interruption values occurring from a proposed 100-year flood based on FEMA HAZUS data is illustrated in *Table 22 – HAZUS Business Interruption Economic Loss Figures*. *Figure 21 – Loss by Occupancy Type* illustrates the breakdown of economic losses by either residential, commercial, industrial, or other use type.

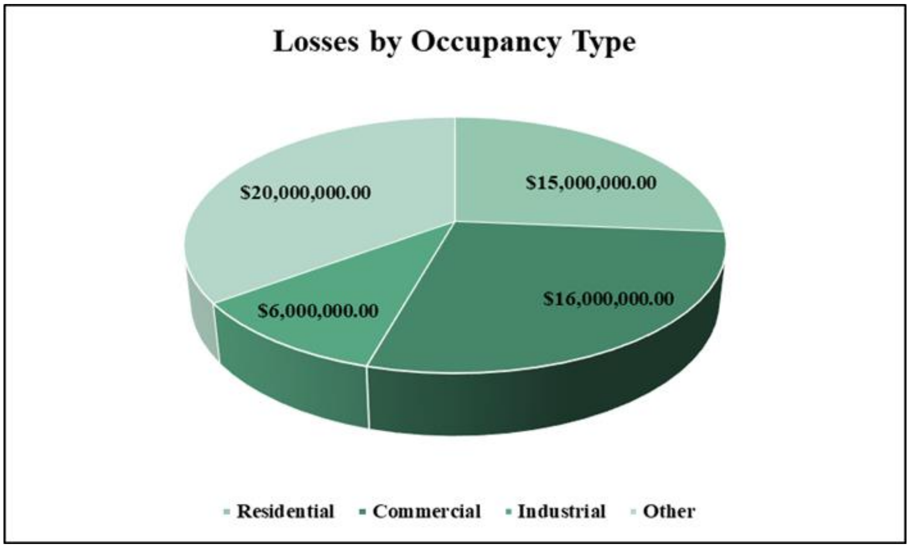
Table 21 - HAZUS Building Loss Figures

HAZUS Building Economic Loss Figures					
	Residential	**Commercial**	**Industrial**	**Other**	**Total**
Building:	$8,080,000.00	$2,030,000.00	$1,440,000.00	$330,000.00	**$11,880,000.00**
Content:	$3,660,000.00	$5,320,000.00	$3,200,000.00	$2,150,000.00	**$14,330,000.00**
Inventory:	$0.00	$170,000.00	$640,000.00	$0.00	**$810,000.00**
Subtotal:	**$11,740,000.00**	**$7,520,000.00**	**$5,280,000.00**	**$2,480,000.00**	**$27,020,000.00**
Source: HAZUS, 2024					

Table 22 - HAZUS Business Interruption Economic Loss Figures

HAZUS Business Interruption Economic Loss Figures					
	Residential	**Commercial**	**Industrial**	**Other**	**Total**
Income:	$10,000.00	$3,900,000.00	$110,000.00	$530,000.00	**$4,550,000.00**
Relocation:	$2,280,000.00	$930,000.00	$130,000.00	$280,000.00	**$3,620,000.00**
Rental Income:	$740,000.00	$710,000.00	$30,000.00	$20,000.00	**$1,500,000.00**
Wage:	$20,000.00	$3,430,000.00	$200,000.00	$16,770,000.00	**$20,420,000.00**
Subtotal:	**$3,050,000.00**	**$8,970,000.00**	**$470,000.00**	**$17,600,000.00**	**$30,090,000.00**
Source: HAZUS, 2024					

Figure 21 - Loss by Occupancy Type



Although floods can cause deaths, injuries, and damage to property, they are naturally occurring events that benefit riparian systems which have not been disrupted by human actions. Such benefits include groundwater recharge and the introduction of nutrient rich sediments which improves soil fertility. However, human development often disrupts natural riparian buffers by changing land use and land cover, and the introduction of chemical or biological contaminants that often accompany human presence and can contaminate habitats after flood events.

4.3.4.3 Past Occurrence

Snyder County has experienced numerous flooding, flash flooding, and ice jam events in the past. The flooding and flash flooding were caused by a variety of heavy storms, inclement weather, tropical storms, and other issues. A summary of recent flood event history for Snyder County from January 2000 to March 2024 is found in *Table 23 – Past Flood and Flash Flood Events*. Details of each event can be found in NOAA's National Center for Environmental Information (NCEI) database. Additional data was also acquired by examining Snyder County's WebEOC information from 2000 to 2024.

Table 23 - Past Flood and Flash Flood Events

Past Flood and Flash Flood Events			
Event Location	**Event Date**	**Event Type**	**Property Damage Estimate**
Snyder County (Entire County)	09/23/2003	Flood	$0.00*

Past Flood and Flash Flood Events			
Event Location	**Event Date**	**Event Type**	**Property Damage Estimate**
Middleburg Borough	09/23/2003	Flash Flood	$0.00*
Snyder County (Entire County)	12/11/2003	Flood	$0.00*
Snyder County (Entire County)	09/17/2004	Flood	$0.00*
Snyder County (Entire County)	03/29/2005	Flood	$0.00*
Snyder County (Entire County)	04/02/2005	Flood	$0.00*
Snyder County (Entire County)	04/03/2005	Flood	$0.00*
Snyder County (Entire County)	11/29/2005	Flood	$0.00*
Snyder County (Entire County)	06/27/2006	Flash Flood	$0.00*
Snyder County (Entire County)	08/27/2006	Flood	$0.00*
Middleburg Borough	09/02/2006	Flood	$0.00*
Selinsgrove Borough	03/06/2011	Flood	$0.00*
Center Township	03/10/2011	Flood	$0.00*
Beaver Springs Borough	05/02/2011	Flash Flood	$0.00*
Jackson Township	09/07/2011	Flood	$230,000.00*
Shamokin Dam Borough	05/08/2013	Flash Flood	$0.00*
Jackson Township	03/12/2015	Flood	$0.00*
		Total:	**$230,000.00***
Source: NCEI NOAA, 2024 *Property Damage Values are estimated and are not exact figures. Data from NCEI and WebEOC			

The National Flood Insurance Program (NFIP) identifies properties that frequently experience flooding. Repetitive loss properties are structures insured under the NFIP which have had at least two paid flood losses of more than $1,000 over any ten-year period since 1978. The hazard mitigation assistance (HMA) definition of a repetitive loss property is a structure covered by a contract for flood insurance made available under the NFIP that has incurred flood-related damage on two occasions, in which the cost of repair, on average, equaled or exceeded 25% of the market value of the structure at the time of each such flood event; at the time of the second incidence of flood-related damage, the contract for flood insurance contains increased cost of compliance coverage. *Table 24 – Repetitive Loss Properties* illustrates the communities that have repetitive loss properties, the total building payments, the contents payments, and the number of losses and properties. There are 130 repetitive loss properties in Snyder County. *Table 25 – Summary of Type of Repetitive Loss Properties by Municipality* illustrates the breakdown of type of repetitive loss properties in Snyder County.

A property is considered a severe repetitive loss property either when there are at least four losses each exceeding $5,000 or when there are two or more losses where the building payments exceed the property value. *Table 26 – Severe Repetitive Loss Properties* illustrates the communities within Snyder County that have severe repetitive loss properties, the total building payments, the contents payments, and the number of losses and properties. The data used in the table is based on data provided by PEMA.

Most municipalities in Snyder County participate in the NFIP. Information on each participating municipality can be found in *Table 27 – Municipal NFIP Policies & Vulnerability*.

Table 24 - Repetitive Loss Properties

Repetitive Loss Properties						
Community Name	**Community Number**	**Cumulative Building Payment**	**Cumulative Contents Payment**	**Sum of Total Paid**	**Losses**	**Properties**
Center Township	422591	$26,124.12	$5,037.50	$31,161.62	4	1
Chapman Township	422034	$7,741.37	$510.89	$8,252.26	3	1
Chapman Township	422034	$64,106.41	$4,701.15	$68,807.56	3	1
Chapman Township	422034	$27,780.30	$0.00	$27,780.30	2	1
Jackson Township	422036	$57,920.66	$25,863.11	$83,783.77	2	1
Jackson Township	422036	$15,983.61	$2,800.00	$18,783.61	2	1
Jackson Township	422036	$19,842.17	$3,831.25	$23,673.42	2	1
Jackson Township	422036	$24,300.00	$8,529.00	$32,829.00	2	1
Jackson Township	422036	$19,625.01	$4,374.36	$23,999.37	2	1
Middleburg Borough	420807	$1,480.65	$9,852.37	$11,333.02	4	1
Middleburg Borough	420807	$7,920.10	$0.00	$7,920.10	2	1

Repetitive Loss Properties						
Community Name	**Community Number**	**Cumulative Building Payment**	**Cumulative Contents Payment**	**Sum of Total Paid**	**Losses**	**Properties**
Middleburg Borough	420807	$31,541.70	$2,600.00	$34,141.70	2	1
Middlecreek Township	422037	$0.00	$21,033.05	$21,033.05	3	1
Middlecreek Township	422037	$4,658.29	$9,134.28	$13,792.57	3	1
Middlecreek Township	422037	$7,956.85	$0.00	$7,956.85	2	1
Middlecreek Township	422037	$19,020.38	$3,964.93	$22,985.31	2	1
Monroe Township	421020	$41,481.69	$5,604.29	$47,085.98	5	1
Monroe Township	421020	$22,353.00	$12,186.58	$34,539.58	3	1
Monroe Township	421020	$17,481.87	$9,818.25	$27,300.12	3	1
Monroe Township	421020	$45,998.33	$13,045.52	$59,043.85	4	1
Monroe Township	421020	$207,448.62	$12,850.31	$220,298.93	6	1
Monroe Township	421020	$46,743.94	$14,601.68	$61,345.62	4	1
Monroe Township	421020	$80,827.44	$0.00	$80,827.44	4	1
Monroe Township	421020	$21,254.99	$18,160.94	$39,415.93	3	1
Monroe Township	421020	$61,484.75	$25,365.44	$86,850.19	4	1
Monroe Township	421020	$88,242.41	$10,000.00	$98,242.41	3	1
Monroe Township	421020	$34,538.17	$12,600.00	$47,138.17	3	1
Monroe Township	421020	$31,249.08	$3,197.60	$34,446.68	2	1

Repetitive Loss Properties						
Community Name	**Community Number**	**Cumulative Building Payment**	**Cumulative Contents Payment**	**Sum of Total Paid**	**Losses**	**Properties**
Monroe Township	421020	$11,401.54	$0.00	$11,401.54	2	1
Monroe Township	421020	$27,086.88	$0.00	$27,086.88	3	1
Monroe Township	421020	$55,997.56	$12,317.84	$68,315.40	2	1
Monroe Township	421020	$40,059.80	$4,840.57	$44,900.37	3	1
Monroe Township	421020	$63,537.92	$846.82	$64,384.74	3	1
Monroe Township	421020	$57,597.00	$889.05	$58,486.05	2	1
Monroe Township	421020	$27,665.45	$6,867.11	$34,532.56	2	1
Monroe Township	421020	$19,505.33	$0.00	$19,505.33	3	1
Monroe Township	421020	$13,357.34	$1,118.70	$14,476.04	2	1
Monroe Township	421020	$40,826.86	$26,282.26	$67,109.12	3	1
Monroe Township	421020	$7,873.77	$597.50	$8,471.27	2	1
Monroe Township	421020	$49,592.26	$21,411.16	$71,003.42	4	1
Monroe Township	421020	$101,712.82	$13,578.33	$115,291.15	3	1
Monroe Township	421020	$45,998.16	$3,842.28	$49,840.44	4	1
Penn Township	421024	$33,955.69	$0.00	$33,955.69	2	1
Penn Township	421024	$32,808.87	$11,164.26	$43,973.13	3	1
Penn Township	421024	$67,734.86	$0.00	$67,734.86	3	1

Repetitive Loss Properties						
Community Name	**Community Number**	**Cumulative Building Payment**	**Cumulative Contents Payment**	**Sum of Total Paid**	**Losses**	**Properties**
Penn Township	421024	$56,529.17	$17,582.01	$74,111.18	2	1
Penn Township	421024	$32,142.14	$73.03	$32,215.17	3	1
Penn Township	421024	$5,054.52	$0.00	$5,054.52	2	1
Penn Township	421024	$86,534.43	$20,401.11	$106,935.54	4	1
Penn Township	421024	$75,180.84	$12,354.48	$87,535.32	2	1
Perry Township	422038	$20,537.32	$8,490.09	$29,027.41	2	1
Perry Township	422038	$31,300.41	$8,666.93	$39,967.34	2	1
Perry Township	422038	$17,161.07	$0.00	$17,161.07	2	1
Selinsgrove Borough	425387	$30,613.12	$38,994.07	$69,607.19	4	1
Selinsgrove Borough	425387	$14,514.46	$0.00	$14,514.46	2	1
Selinsgrove Borough	425387	$68,004.45	$3,649.67	$71,654.12	3	1
Selinsgrove Borough	425387	$44,452.69	$0.00	$44,452.69	3	1
Selinsgrove Borough	425387	$19,003.22	$1,220.26	$20,223.48	3	1
Selinsgrove Borough	425387	$27,838.72	$0.00	$27,838.72	3	1
Selinsgrove Borough	425387	$19,654.66	$3,308.79	$22,963.45	2	1
Selinsgrove Borough	425387	$5,734.77	$0.00	$5,734.77	2	1
Selinsgrove Borough	425387	$26,613.50	$0.00	$26,613.50	3	1

Repetitive Loss Properties						
Community Name	**Community Number**	**Cumulative Building Payment**	**Cumulative Contents Payment**	**Sum of Total Paid**	**Losses**	**Properties**
Selinsgrove Borough	425387	$14,575.46	$432.26	$15,007.72	3	1
Selinsgrove Borough	425387	$124,869.65	$14,819.36	$139,689.01	3	1
Selinsgrove Borough	425387	$77,615.79	$0.00	$77,615.79	3	1
Selinsgrove Borough	425387	$31,305.68	$0.00	$31,305.68	2	1
Selinsgrove Borough	425387	$24,781.36	$566.04	$25,347.40	3	1
Selinsgrove Borough	425387	$39,434.36	$5,060.06	$44,494.42	3	1
Selinsgrove Borough	425387	$113,622.00	$12,356.60	$125,978.60	3	1
Selinsgrove Borough	425387	$39,251.83	$368.51	$39,620.34	3	1
Selinsgrove Borough	425387	$48,386.33	$1,828.66	$50,214.99	3	1
Selinsgrove Borough	425387	$85,284.55	$0.00	$85,284.55	3	1
Selinsgrove Borough	425387	$21,006.78	$6,217.60	$27,224.38	2	1
Selinsgrove Borough	425387	$26,696.83	$8,665.50	$35,362.33	3	1
Selinsgrove Borough	425387	$65,374.32	$2,743.66	$68,117.98	3	1
Selinsgrove Borough	425387	$19,162.22	$2,793.26	$21,955.48	3	1
Selinsgrove Borough	425387	$44,591.19	$13,706.27	$58,297.46	3	1
Selinsgrove Borough	425387	$76,132.96	$778.85	$76,911.81	3	1
Selinsgrove Borough	425387	$21,542.00	$2,657.65	$24,199.65	3	1

Repetitive Loss Properties						
Community Name	**Community Number**	**Cumulative Building Payment**	**Cumulative Contents Payment**	**Sum of Total Paid**	**Losses**	**Properties**
Selinsgrove Borough	425387	$38,078.19	$4,877.35	$42,955.54	3	1
Selinsgrove Borough	425387	$72,694.90	$5,409.89	$78,104.79	3	1
Selinsgrove Borough	425387	$18,604.62	$0.00	$18,604.62	3	1
Selinsgrove Borough	425387	$7,459.89	$207.60	$7,667.49	2	1
Selinsgrove Borough	425387	$52,527.05	$4,355.69	$56,882.74	3	1
Selinsgrove Borough	425387	$61,424.16	$0.00	$61,424.16	3	1
Selinsgrove Borough	425387	$18,840.29	$10,064.85	$28,905.14	2	1
Selinsgrove Borough	425387	$75,455.28	$6,035.40	$81,490.68	3	1
Selinsgrove Borough	425387	$52,474.72	$4,812.77	$57,287.49	3	1
Selinsgrove Borough	425387	$26,899.91	$3,600.00	$30,499.91	2	1
Selinsgrove Borough	425387	$47,041.85	$2,689.64	$49,731.49	3	1
Selinsgrove Borough	425387	$20,891.34	$2,687.00	$23,578.34	3	1
Selinsgrove Borough	425387	$18,854.56	$668.96	$19,523.52	3	1
Selinsgrove Borough	425387	$18,168.09	$0.00	$18,168.09	3	1
Selinsgrove Borough	425387	$106,487.64	$39,529.72	$146,017.36	3	1
Selinsgrove Borough	425387	$131,915.38	$23,668.85	$155,584.23	3	1
Selinsgrove Borough	425387	$33,004.46	$8,567.26	$41,571.72	2	1

Repetitive Loss Properties						
Community Name	**Community Number**	**Cumulative Building Payment**	**Cumulative Contents Payment**	**Sum of Total Paid**	**Losses**	**Properties**
Selinsgrove Borough	425387	$10,318.28	$0.00	$10,318.28	2	1
Selinsgrove Borough	425387	$26,901.15	$145.00	$27,046.15	3	1
Selinsgrove Borough	425387	$17,440.02	$5,803.62	$23,243.64	3	1
Selinsgrove Borough	425387	$100,181.18	$20,000.00	$120,181.18	3	1
Selinsgrove Borough	425387	$41,754.77	$0.00	$41,754.77	3	1
Selinsgrove Borough	425387	$55,491.95	$2,527.77	$58,019.72	3	1
Selinsgrove Borough	425387	$45,185.57	$0.00	$45,185.57	2	1
Selinsgrove Borough	425387	$46,600.00	$1,618.80	$48,218.80	2	1
Selinsgrove Borough	425387	$83,212.85	$0.00	$83,212.85	3	1
Selinsgrove Borough	425387	$28,758.67	$0.00	$28,758.67	2	1
Selinsgrove Borough	425387	$21,041.00	$2,191.94	$23,232.94	2	1
Selinsgrove Borough	425387	$50,510.75	$0.00	$50,510.75	2	1
Selinsgrove Borough	425387	$22,900.00	$8,000.00	$30,900.00	2	1
Selinsgrove Borough	425387	$45,552.48	$19,575.94	$65,128.42	2	1
Selinsgrove Borough	425387	$31,695.33	$0.00	$31,695.33	2	1
Selinsgrove Borough	425387	$37,084.61	$0.00	$37,084.61	2	1
Selinsgrove Borough	425387	$5,873.85	$0.00	$5,873.85	2	1

Repetitive Loss Properties						
Community Name	**Community Number**	**Cumulative Building Payment**	**Cumulative Contents Payment**	**Sum of Total Paid**	**Losses**	**Properties**
Selinsgrove Borough	425387	$30,021.32	$909.81	$30,931.13	2	1
Selinsgrove Borough	425387	$43,952.21	$0.00	$43,952.21	2	1
Selinsgrove Borough	425387	$20,985.04	$0.00	$20,985.04	2	1
Selinsgrove Borough	425387	$14,876.58	$0.00	$14,876.58	2	1
Selinsgrove Borough	425387	$20,285.44	$1,697.38	$21,982.82	2	1
Selinsgrove Borough	425387	$34,389.36	$0.00	$34,389.36	2	1
Selinsgrove Borough	425387	$46,047.07	$80.65	$46,127.72	3	1
Selinsgrove Borough	425387	$18,984.33	$0.00	$18,984.33	2	1
Selinsgrove Borough	425387	$2,693.34	$0.00	$2,693.34	2	1
Selinsgrove Borough	425387	$48,854.81	$0.00	$48,854.81	2	1
Selinsgrove Borough	425387	$47,229.33	$1,916.32	$49,145.65	2	1
Shamokin Dam Borough	420809	$7,841.00	$1,006.00	$8,847.00	2	1
Shamokin Dam Borough	420809	$37,425.63	$56.00	$37,481.63	3	1
Shamokin Dam Borough	420809	$48,359.05	$0.00	$48,359.05	4	1
Shamokin Dam Borough	420809	$6,384.60	$0.00	$6,384.60	2	1

Repetitive Loss Properties						
Community Name	**Community Number**	**Cumulative Building Payment**	**Cumulative Contents Payment**	**Sum of Total Paid**	**Losses**	**Properties**
Shamokin Dam Borough	420809	$22,461.83	$0.00	$22,461.83	3	1
Union Township	422040	$65,441.49	$14,449.83	$79,891.32	3	1
Total:		**$5,173,878.04**	**$728,307.14**	**$5,902,185.18**	**350**	**130**
Source: FEMA, 2024						

Table 25 - Summary of Type of Repetitive Loss Properties by Municipality

Summary of Type of Repetitive Loss Properties by Municipality					
Municipality	**Type**				
	Non-Residential	**2-4 Family**	**Single Family**	**Condo**	**Other Residential**
Center Township	0	0	1	0	0
Chapman Township	0	0	3	0	0
Jackson Township	1	0	6	0	0
Middleburg Borough	1	0	2	0	0
Middlecreek Township	1	0	4	0	0
Monroe Township	3	0	26	0	0
Penn Township	0	0	8	0	0
Perry Township	0	0	3	0	0
Selinsgrove Borough	2	8	66	0	0
Shamokin Dam Borough	2	0	4	0	0
Union Township	0	0	2	0	0
Source: FEMA, 2024					

Table 26 - Severe Repetitive Loss Properties

Severe Repetitive Loss Properties						
Community Name	**Community Number**	**Cumulative Building Payments**	**Cumulative Contents Payments**	**Sum of Total Paid**	**Losses**	**Properties**
Jackson Township	422036	$39,901.06	$17,820.00	$57,721.06	5	1

Severe Repetitive Loss Properties						
Community Name	**Community Number**	**Cumulative Building Payments**	**Cumulative Contents Payments**	**Sum of Total Paid**	**Losses**	**Properties**
Jackson Township	422036	$51,480.61	$28,256.20	$79,736.81	3	1
Monroe Township	421020	$99,108.21	$9,665.61	$108,773.82	6	1
Monroe Township	421020	$70,850.34	$11,182.82	$82,033.16	6	1
Monroe Township	421020	$50,522.54	$2,491.75	$53,014.29	4	1
Selinsgrove Borough	425387	$55,772.26	$0.00	$55,772.26	4	1
Selinsgrove Borough	425387	$88,019.07	$0.00	$88,019.07	4	1
Shamokin Dam Borough	420809	$26,745.67	$8,851.21	$35,596.88	4	1
Union Township	422040	$105,721.66	$13,627.73	$119,349.39	5	1
	Total:	**$588,121.42**	**$91,895.32**	**$680,016.74**	**41**	**9**
Source: FEMA, 2024						

Table 27 - Municipal NFIP Policies & Vulnerability

Municipal Participation in the National Flood Insurance Program			
Municipal Name	**Community Number**	**Initial FHBM**	**Latest Mapping Dates**
Adams Township	422031	12/13/1974	11/16/2007
Beaver Township	422032	11/01/1974	11/16/2007
Beavertown Borough	420805	05/31/1974	11/16/2007
Center Township	422591	12/06/1974	11/16/2007
Chapman Township*	422034	03/28/1975	08/24/2021
Franklin Township	422035	11/15/1974	11/16/2007
Freeburg Borough	422030	12/13/1974	11/16/2007
Jackson Township	422306	11/22/1974	11/16/2007
McClure Borough	420806	07/30/1976	11/16/2007

Municipal Participation in the National Flood Insurance Program			
Municipal Name	**Community Number**	**Initial FHBM**	**Latest Mapping Dates**
Middleburg Borough	420807	02/20/1973	11/16/2007
Middlecreek Township	422037	01/10/1975	11/16/2007
Monroe Township	421020	02/01/1974	11/16/2007
Penn Township	421024	07/22/1977	11/16/2007
Perry Township	422038	01/03/1975	08/24/2021
Selinsgrove Borough*	425387	05/04/1973	08/24/2021
Shamokin Dam Borough	420809	01/16/1974	08/24/2021
Spring Township	422039	01/17/1975	11/16/2007
Union Township	422040	07/18/1975	08/24/2021
Washington Township	422041	01/17/1975	08/24/2021
West Beaver Township	422507	01/24/1975	11/16/2007
West Perry Township	422042	11/01/1974	11/16/2007
Source: FEMA, 2024 Note: FHBM: Flood Hazard Boundary Map Note: * denotes a community rating system (CRS) eligible municipality			

4.3.4.4 Future Occurrence

Flooding is a frequent problem throughout the Commonwealth of Pennsylvania. Snyder County will certainly be impacted by flooding events in the future, as Snyder County experiences some degree of flooding annually. The threat of flooding is compounded in the late winter and early spring months, as melting snow can overflow streams, creeks, and tributaries, increasing the amount of groundwater, clogging stormwater culverts and bridge openings. The NFIP recognizes the 1% annual chance flood, also known as the base flood of a one-hundred-year flood, as the standard for identifying properties subject to federal flood insurance purchase requirements. A 1% annual chance flood is a flood which has a 1% chance of occurring in a given year or is likely once every one-hundred years. The digital flood insurance maps (DFIRMs) are used to identify areas subject to the 1% annual chance of flooding.

A property's vulnerability to a flood is dependent upon its location in the floodplain. Properties along the banks of a waterway are the most vulnerable. The property within the floodplain is broken into sections depending on its distance from the waterway. The ten-year flood zone has a 10% chance of being flooded every year. However, this label does not mean that this area cannot flood more than once every ten years. This label simply designates the probability of a flood of this magnitude every year. Further away from this area is the fifty-year floodplain. This area includes all of the ten-year floodplain plus additional property. The probability of a flood of this magnitude occurring during a one-year period is 2%. A summary of flood probability is shown in *Table 28 – Flood Probability Summary*.

Table 28 - Flood Probability Summary

Flood Probability Summary	
Flood Recurrence Intervals	**Annual Chance of Occurrence**
10-year	10.00%
50-year	2.00%
100-year	1.00%
500-year	0.20%
Source: FEMA, 2009	

The future occurrences of flooding, flash flooding, and ice jam flooding in Snyder County are expected to increase due to the rate of climate change in the Commonwealth of Pennsylvania, and the world. Climate change will include ocean temperature rise, which result in more intense hurricane and tropical storm seasons in the Atlantic Ocean. This intensity could result in an increase in the number of hurricanes and tropical storms that could impact Pennsylvania and Snyder County. These hurricanes and tropical storms could result in a large volume of precipitation occurring over a short period of time, resulting in a flood or flash flood event. It is important to note that these impacts are the secondary result of other hazards, increased by climate change, that could result in flooding events.

4.3.4.5 Vulnerability Assessment

Riverine and Stream Flooding

Snyder County is vulnerable to stream and river flooding on an annual basis. Flooding puts the entire population at some level of risk, whether through flooding of homes, businesses, places of employment, roadways, sewers, or water infrastructure. Flooding can cause significant power outages and poor road conditions that can lead to heightened transportation accident risk.

County community lifelines are the most vulnerable buildings and services when riverine and stream flooding is considered. Community lifeline facilities are facilities that, if damaged, would present an immediate threat to life, public health, and safety. Facilities that use and store hazardous materials pose a potential threat to the environment during flooding events if flooding causes a leak, inundation, or equipment failure. Appendix D of this hazard mitigation plan includes a flooding vulnerability map for each municipality in Snyder County, with vulnerable structures and community lifeline facilities that are located within the special flood hazard area.

Table 29 – Expected Damage to Essential Facilities (HAZUS) illustrates the estimated damage levels to certain essential facilities based on classifications in the HAZUS General Building Stock. There are no facilities that are estimated to be moderately or severely damaged by the flooding scenario.

Table 29 – Expected Damage to Essential Facilities (HAZUS)

Expected Damage to Essential Facilities				
Classification	**Number of Facilities**			
	Total:	**At Least Moderate:**	**At Least Substantial:**	**Loss of Use:**
Emergency Operations Center	1	0	0	0
Fire Stations	14	0	0	0
Hospitals	0	0	0	0
Police Stations	6	0	0	0
Schools	32	0	0	0

Table 30 - County Structures Within Special Flood Hazard Area shows the number of site structure address points within the Special Flood Hazard Area as well as the community lifeline facilities. This information was compiled using the Special Flood Hazard Area and GIS data provided by the Snyder County.

Table 30 - County Structures Within Special Flood Hazard Area

County Structures Within Special Flood Hazard Area		
Municipality	**Site Structure Address Points Within Flood Area**	**Community Lifelines within Flood Area**
Adam Township	0	0
Beaver Township	34	0
Beavertown Borough	4	0
Center Township	13	0
Chapman Township	72	1
Franklin Township	56	0
Freeburg Borough	20	0
Jackson Township	82	0
McClure Borough	15	1

County Structures Within Special Flood Hazard Area		
Municipality	**Site Structure Address Points Within Flood Area**	**Community Lifelines within Flood Area**
Middleburg Borough	69	3
Middlecreek Township	51	0
Monroe Township	338	7
Penn Township	151	3
Perry Township	45	0
Selinsgrove Borough	756	3
Shamokin Dam Borough	80	0
Spring Township	17	0
Union Township	64	0
Washington Township	5	0
West Beaver Township	1	0
West Perry Township	14	0
Totals:	**1,887**	**18**

Table 31 – Community Lifeline Facilities Additional Information illustrates the additional information including name, the municipality, and the type of facility for each community lifeline facility that falls within the Special Flood Hazard Area for Snyder County. This information was compiled using Snyder County's GIS information with the assistance of the Snyder County.

Table 31 - Community Lifeline Facilities Additional Information

Community Lifeline Facilities Additional Information		
Type of Facility:	**Facility Name:**	**Municipality:**
Community Lifelines		
Grocery Store	Dollar General	Chapman Township
Fire Department	McClure Fire Company	McClure Borough
Food Pantry	Grace Covenant - GraceWork Food	Middleburg Borough
Sewage Treatment Plant	Middleburg Sewer Plant	
Grocery Store	Grimm's Central Market IGA	
Grocery Store	Walmart Supercenter	Monroe Township
Pharmacy	Walmart Pharmacy - Selinsgrove	
Electric Substation	Electric 147498	
Electric Substation	Electric 173020	

Community Lifeline Facilities Additional Information		
Type of Facility:	**Facility Name:**	**Municipality:**
Power Plant	Panda Hummel Station, LLC.	
Power Plant	Sunbury Generation LP	
Airport	Penn Valley Airport	
Grocery Store	Dressler's Farm Stand	Penn Township
Sewage Treatment Plant	Eastern Snyder County Regional Authority	
Pharmacy	CVS - Selinsgrove	
Butcher	Troutman's Meat and Market	Selinsgrove Borough
Police Department	Selinsgrove Police Department	
Food Pantry	Saint Paul’s Loaves and Fishes Food Pantry	

There are no properties that are considered historic and cultural for Snyder County that are registered with the National Register of Historic Place that are in the Special Flood Hazard Area.

Flash Flooding

Flash flooding is a common occurrence in Snyder County and can occur anywhere in the county. A large portion of flash flooding occurs in populated areas that have increased impervious ground cover. During the risk assessment process, numerous resources were utilized to determine flash flooding locations in Snyder County. Municipalities were asked to identify locations within the municipality that were prone to frequent flash flooding. The National Climatic Data Center was also queried to determine flash flood vulnerable areas. This data is reflected in *Table 23 – Past Flood and Flash Flood Events* above.

Locations that are identified as vulnerable to flash flooding in Snyder County are as follows:

- Beaver Springs Borough
- Middleburg Borough
- Selinsgrove Borough
- Shamokin Dam Borough

Although the above locations were identified as vulnerable areas in Snyder County, they are not the only locations that are vulnerable to flash flooding. The Snyder County Hazard Mitigation Team will continue to work with municipalities to identify vulnerable flash flooding locations and identify vulnerable populations and community lifelines.

Municipalities with an increased risk to flooding, flash flooding, and ice jam flooding (due to the intersection with the Special Flood Hazard Area):

- Adams Township
- Beaver Township
- Beavertown Borough
- Center Township
- Chapman Township
- Franklin Township
- Freeburg Borough
- Jackson Township
- McClure Borough
- Middleburg Borough
- Middlecreek Township
- Monroe Township
- Penn Township
- Perry Township
- Selinsgrove Borough
- Shamokin Dam Borough
- Spring Township
- Union Township
- West Beaver Township
- West Perry Township

All of the population of Snyder County, including the unserved and the underserved populations, are at an increased vulnerability to flooding hazards. All municipalities in Snyder County directly interface with the regulatory flood boundaries in county. Unserved and underserved populations have the potential to be more vulnerable to flooding hazards in Snyder County. Homeless, unsheltered, and displaced persons would not have housing or homes to use as a shelter in the event of a flooding hazard. Those populations also may not have easy access to warning systems or alerts for flash flooding hazards. All of the county could be at increased vulnerability, specifically any populations located on the Susquehanna River or Penns Creek.

Systems in Snyder County are at increased vulnerability to flooding hazards. All of the utilities in Snyder County could be adversely impacted by very specific flooding and flash flooding events. Utilities may be damaged or destroyed from a flooding event, or from a cascading hazard from flooding events. Major flooding could cause an issue in the delivery of services, including electricity, to the citizens and residents of Snyder County.

While flooding does not typically adversely affect natural areas, a comprehensive vulnerability assessment was completed for natural areas in Snyder County, including public recreation areas, state parks, state game lands, and any other outdoor or natural area resources.

The following natural areas directly intersected with areas of the Special Flood Hazard Area (SFHA) for Snyder County:

- Bald Eagle State Forest
- C.F. Walker Lake Public Recreation Fishing and Boating Access
- Mahantango Public Recreation Fishing and Boating Access
- Middle Creek Lake Public Recreation Fishing Access
- State game land 188
- State game land 194
- State game land 212
- State game land 233

Not all of these locations will be impacted by every flooding event in Snyder County, but at least some of the areas listed above will be impacted due to their close proximity to the Special Flood Hazard Area (SFHA).

Impacts of flooding, flash flooding, and ice jam flooding can also be influenced by population change. As seen in *Table 3 – Population Change in Snyder County*, eleven municipalities have experienced population growth between the 2010 decennial census and the 2020 decennial census. Based on this information, it can be speculated that these eleven municipalities have an increased vulnerability to flooding, flash flooding, and ice jam flooding hazards, since 2010. This increased vulnerability is due to more potential development and that development encroaching on high vulnerability areas for Snyder County, including near the Special Flood Hazard Area.

Land use is a factor that has the potential to impact the vulnerability to flooding, flash flooding, and ice jam flooding in Snyder County. Land use, in the form of a built environment, such as residential and commercial expansion, especially in the Special Flood Hazard Area or areas directly adjacent, could increase the severity impact of these hazards. The change of land use from areas of easy infiltration of groundwater to impervious surfaces can increase the severity and the frequency of flash floods, increasingly in areas where flash floods have occurred in the past. An influx of people, commercial enterprises, and infrastructure development also increases the vulnerability of areas to flooding, flash flooding, and ice jam flooding.

4.3.5. Hurricane and Tropical Storm

4.3.5.1 Location and Extent

Snyder County does not have any open-ocean coastline areas. However, the impacts from coastal storms such as tropical storms and hurricanes can expand inland. Tropical depressions are cyclones with maximum sustained winds of less than 39 miles per hour (mph). The system becomes a tropical storm when the maximum sustained winds reach between 39 and 74 miles per hour. When wind speeds exceed 74 mph, the system is considered a hurricane. Tropical storms impacting Snyder County develop in tropical or sub-tropical waters found in the Atlantic Ocean, Caribbean Sea, or Gulf of Mexico. Another type of tropical storms is the nor'easter, which is a large cyclone that rotates clockwise and is typically associated with the Atlantic Ocean and the East Coast of the United States between North Carolina and Massachusetts. The name nor'easter comes from the direction that the strongest winds typically blow from the cyclone.

While Snyder County is located about 150 miles inland of the East Coast of the United States, tropical storms can track inland and cause heavy rainfall and strong winds. Snyder County is located inland of the East Coast region, designated by FEMA, as being Hurricane-Susceptible (see *Figure 22 – Pennsylvania Wind Zones*). Snyder County falls within Wind Zone II, as shown in *Figure 22 – Pennsylvania Wind Zones*. Snyder County's presence in Wind Zone II suggests that shelters and critical facilities should be able to withstand winds that range up to 160 MPH. Tropical storms and hurricanes are regional and seasonal events that can impact very large areas that are hundreds to thousands of miles across over the life of the storm. Hurricane and tropical storm seasons are typically from June to November. All communities within Snyder County are equally subject to the impacts of hurricanes and tropical storms that track near the county. Areas in Snyder County which are subject to flooding, wind, and winter storm damage are particularly vulnerable.

4.3.5.2 Range of Magnitude

The impact tropical storms or hurricane events have on an area is typically measured in terms of wind speed. Flood damage results from intense precipitation and wind, typically from coastal storms, which impact Snyder County. Expected damage from hurricane force winds is measured using the Saffir-Simpson Scale (*Table 32 – Saffir-Simpson Scale).* The Saffir-Simpson Scale categorizes hurricane intensity linearly based upon maximum sustained winds, barometric pressure, and storm surge potential. Categories three, four, and five are classified as "major" hurricanes, but category one and two storms can contain potential significant storm surge. Category one storms result in very dangerous winds with some damage, while category two storms result in extremely dangerous winds with extensive damage. Category three storms result in devastating damage and category four/five storms result in catastrophic damage. Although major hurricanes comprise only 20% of all tropical cyclones making landfall, they account for over 70% of the damage in the United States. While hurricanes can cause high winds and associated impacts, it is also important to recognize the potential for flooding events during hurricanes, tropical storms, and nor'easters. In Snyder County wind impacts from tropical events include downed trees and utility poles to cause utility interruptions. Mobile homes, because they may not be well-anchored, have a greater potential to be impacted by high winds. Additionally, these storms can produce high volumes of rainfall that cause flash flooding which can be followed by stream and riverine flooding. The risk assessment and associated impact for flooding events is included in Section 4.3.4.

Table 32 - Saffir-Simpson Scale

Saffir-Simpson Hurricane Scale		
Category	Wind Speed	
	mph	knots
5	≥156	≥135
4	131-155	114-134
3	111-130	96-113
2	96-110	84-95
1	74-95	65-83
Non-Hurricane Classifications		
Tropical Storm	39-73	34-64
Tropical Depression	0-38	0-33

4.3.5.3 Past Occurrence

Table 33 – History of Coastal Storms Impacting Snyder County lists all coastal storms that have impacted Snyder County from 1952 to 2024 *Figure 23 – Historic Tropical Storms/Hurricanes in Pennsylvania* identifies some past hurricanes that had an inland path through Pennsylvania.

Figure 24 – Historic Tropical Storms/Hurricanes in Snyder County identifies some past hurricanes that have had an inland path through Snyder County.

Hurricane Agnes was a severe coastal storm event in June 1972 that impacted Snyder County after making first landfall as a hurricane near Florida, Agnes weakened and exited back into the Atlantic off the North Carolina coast. The storm moved along the coast and made a second landfall near New York City as a tropical storm and merged with an extra-tropical low-pressure system over Pennsylvania. This brought extremely heavy rains to Pennsylvania that caused major flooding. Pennsylvania incurred $2.8 billion in damages. There were fifty storm related deaths statewide. However, in Snyder County, the most significant effects of Hurricane Agnes were due to secondary flooding**.** Agnes was only a category one hurricane but dropped more than fifteen inches of rain in the northeastern United States. Pennsylvania received the greatest amount of flood damage.

Hurricane Irene and Tropical Storm Lee impacted and caused damage to Snyder County Although they were separate events, Hurricane Irene and Tropical Storm Lee together caused significant rainfall in Snyder County due to how close the events took place. First, Tropical Storm Lee caused significant flooding in the central and eastern counties in Pennsylvania with wind damage that caused utility outages for 1-2 days. Then, Hurricane Irene caused additional flooding with utility interruptions for 5-8 days. Many flooding events took place in the county during this time.

Hurricane Sandy was another coastal storm event that caused significant damage to Snyder County. Sandy caused significant wind damage and utility interruptions for multiple days. Hurricane Sandy ranks among the most damaging coastal storms to ever impact Snyder County. In Snyder County more than 2,000 people, or more than 5% of the county's population, were without power for an extended period. This included 1,486 customers in Franklin Township in Snyder County (Daily Item, 2012).

Table 33 - History of Coastal Storms Impacting Snyder County

History of Coastal Storms Impacting Snyder County			
Year	**Name**	**Knots (at time of impact Snyder County)**	**Storm Category**
2021	Fred	20 Knots	Extratropical Storm
2018	Florence	25 Knots	Extratropical Storm
2012	Sandy	55 Knots	Extratropical Storm

History of Coastal Storms Impacting Snyder County			
Year	**Name**	**Knots (at time of impact Snyder County)**	**Storm Category**
2006	Ernesto	35 Knots	Extratropical Storm
1999	Dennis	20 Knots	Tropical Depression
1994	Beryl	15 Knots	Tropical Depression
1992	Danielle	25 Knots	Tropical Depression
1988	Chris	20 Knots	Extratropical Storm
1979	Frederic	35 Knots	Tropical Storm
1979	David	40 Knots	Tropical Storm
1968	Candy	25 Knots	Extratropical Storm
1963	*Unnamed*	25 Knots	Tropical Depression
1959	Gracie	25 Knots	Extratropical Storm
1955	Diane	35 Knots	Tropical Storm
1955	Connie	45 Knots	Tropical Storm
1954	Hazel	70 Knots	Extratropical Storm
1952	Able	50 Knots	Tropical Storm
Source: NOAA, 2024			

4.3.5.4 Future Occurrence

Although hurricanes and tropical storms can cause flood events consistent with 100 and 500-year flood levels, the probability of occurrence of hurricanes and tropical storms is measured relative to wind speed. *Table 34 – Annual Probability of Wind Speeds* shows the annual probability of winds that reach the strength of tropical storms and hurricanes in Snyder County and the surrounding areas based on a sample period of forty-six years. According to FEMA, there is a 8.32% probability each year that Snyder County will experience winds from coastal storms that could cause minimal to moderate damages (*Table 34 – Annual Probability of Wind Speeds).* The potential future impacts from a tropical storm or hurricane will be approximately 91.59%. The probability of winds exceeding 118 mph is less than .0766% annually.

Table 34 - Annual Probability of Wind Speeds

Annual Probability of Wind Speeds		
Wind Speed (mph)	**Saffir-Simpson Scale**	**Annual Probability of Occurrence (%)**
45-77	Tropical Storms/Category 1 Hurricane	91.59
78-118	Category 1 to 2 Hurricanes	8.32
119-138	Category 3 to 4 Hurricanes	.0766
139-163	Category 4 to 5 Hurricanes	.0086
164-194	Category 5 Hurricanes	.00054
195+	Category 5 Hurricanes	.00001
Source: FEMA, 2000		

There has been an increase in North Atlantic hurricane activity since the 1970s with locations of peak intensity tropical cyclones migrating poleward coinciding with tropics expansion. An index potential hurricane destructiveness suggests an increase over the past thirty years. Variability in tropical cyclone activity in the Atlantic is due to natural variability in ocean circulation, volcanic eruptions, and Saharan dust, as well as climate change resulting from greenhouse gases and sulfate aerosols.

Climate change is causing atmospheric temperatures to rise, which corresponds to a rise in ocean surface temperatures, resulting in warmer and moister conditions where tropical storms develop. However, the relationship between climate change and hurricanes can be complex due to the many other factors that are associated with hurricane development which include wind shear and air pollution. Warmer oceans store more energy and are capable of fueling stronger storms and it is projected that Atlantic hurricanes will become more intense and produce more precipitation as ocean surface temperatures rise. The storms associated with tropical storms/hurricanes can also linger around for a longer period of time in a given place due to the climate change which enhances destructive impacts in the future. Other possible connections of hurricanes in the near future related to climate change are the length of hurricane season and seeing more hurricanes earlier or later than usual hurricane season. There are expected to be more category four and five hurricanes in the Atlantic and the hurricane season may be elongated, all which impact the future of Snyder County.

4.3.5.5 Vulnerability Assessment

The impacts of climate change are tangible and hazardous realities. Tropical storms tracking nearby Snyder County can not only cause high winds, but also heavy rains to occur. A vulnerability assessment for hurricanes and tropical storms focusses on the impacts of flooding and severe winds. Flooding associated from hurricanes/tropical storms can occur in areas throughout Snyder County which can cause damage to buildings and infrastructure. The assessment for flood-related vulnerability is addressed in Section 4.3.4.5, including HAZUS, and a discussion of wind related vulnerability is addressed in Section 4.3.11.5. Due to the impact of hurricanes and tropical storms, the vulnerability for Snyder County is moderate. Potential economic losses could include direct building loss and business interruption. Direct building loss is direct damage to any building or structure. Business interruption includes relocation, employee wage loss, expenses, income loss, etc. Snyder County vulnerability level is moderate for direct building loss.

As seen in *Table 3 – Population Change in Snyder County*, eleven of the twenty-one municipalities in Snyder County have experienced a population loss since the previous decennial census in 2010. However, ten municipalities saw minor, total population growth over the same period. Based on this information, it can be hypothesized that these ten municipalities may have an increased vulnerability of hurricane and tropical storm conditions, since 2010, due to the increase in population.

Hurricanes and tropical storms may disproportionately affect underserved, unserved, and socially vulnerable populations, amplifying existing hardships. Fragile infrastructure in these areas is more prone to damage, which can hinder evacuation and rescue efforts. Limited access to resources exacerbates challenges during and after the storms, from securing safe shelter to obtaining essential supplies. Vulnerable communities often lack financial resilience, facing prolonged economic setbacks as local businesses may suffer.

Municipalities with high risk to hurricane and tropical storm (based on previous GIS tracks):

- Adams Township
- Beaver Township
- Beavertown Borough
- Center Township
- Chapman Township
- Franklin Township
- Freeburg Borough
- Jackson Township

- McClure Borough
- Middleburg Borough
- Middlecreek Township
- Monroe Township
- Penn Township
- Perry Township
- Selinsgrove Borough
- Shamokin Dam Borough
- Spring Township
- Union Township
- Washington Township
- West Beaver Township
- West Perry Township

Land use is a factor that has the potential to impact hurricane and tropical storm severity. Land use, in the form of a built environment, such as residential expansion, can cause hurricane impact severity to increase. This impact severity increases because as the built environment expands and becomes more complex, the impact the event will have on that area also increases. This is due to an influx of people, infrastructure, and critical infrastructure and community lifelines in harm's way.

Hurricanes and tropical storms exert profound impacts on both natural and cultural areas. Ecologically, these intense weather events can result in habitat destruction, altering landscapes, and threatening biodiversity. Erosion and flooding may harm delicate ecosystems. Culturally, these storms endanger heritage sites, historic structures, and artifacts, eroding tangible, and intangible cultural elements. Sustainable recovery efforts must embrace an integrated approach, recognizing the interconnected vulnerability of natural, historical, and cultural landscapes to the formidable forces of hurricanes and tropical storm.

Figure 22 - Pennsylvania Wind Zones

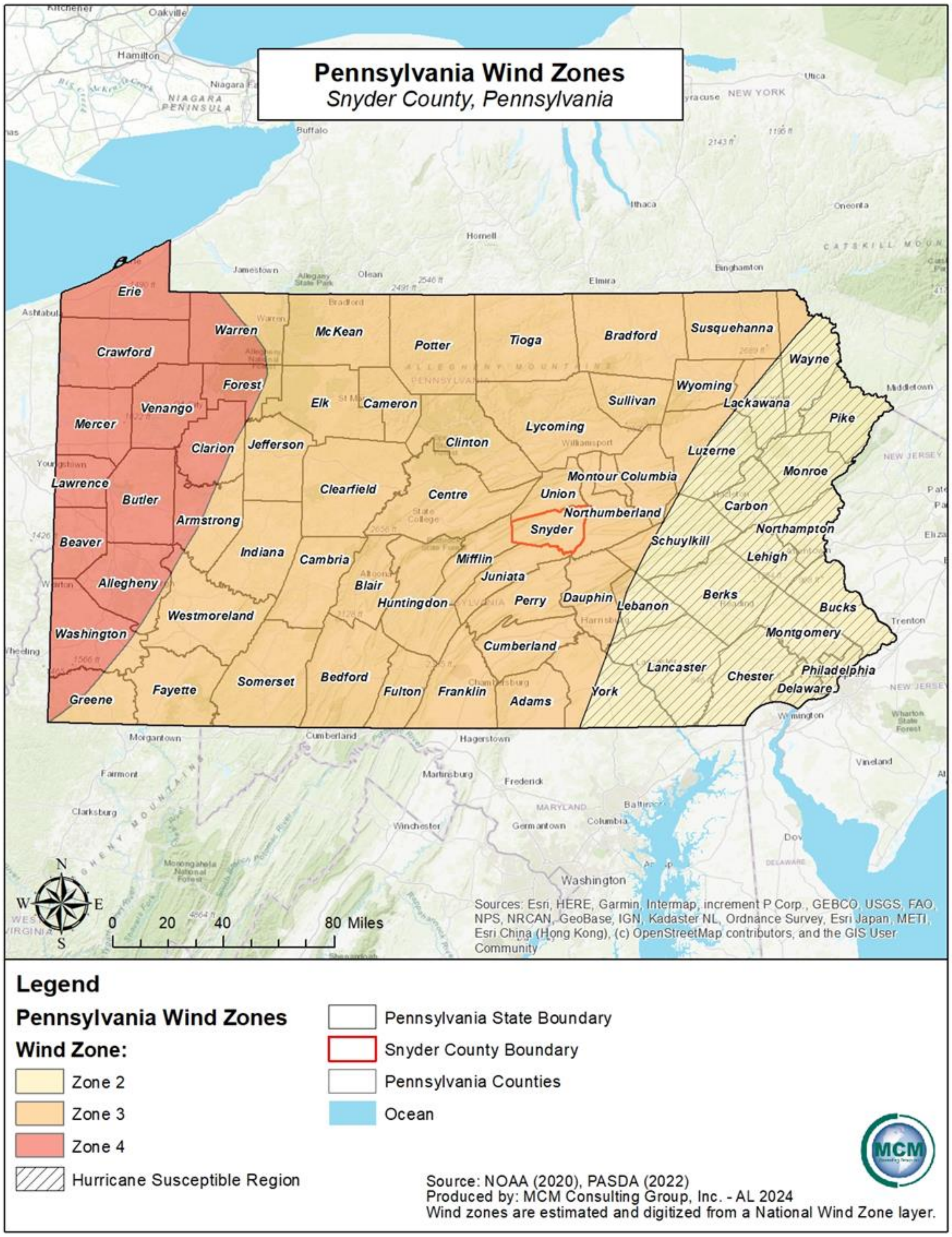


Figure 23 - Historic Tropical Storms/Hurricanes in Pennsylvania

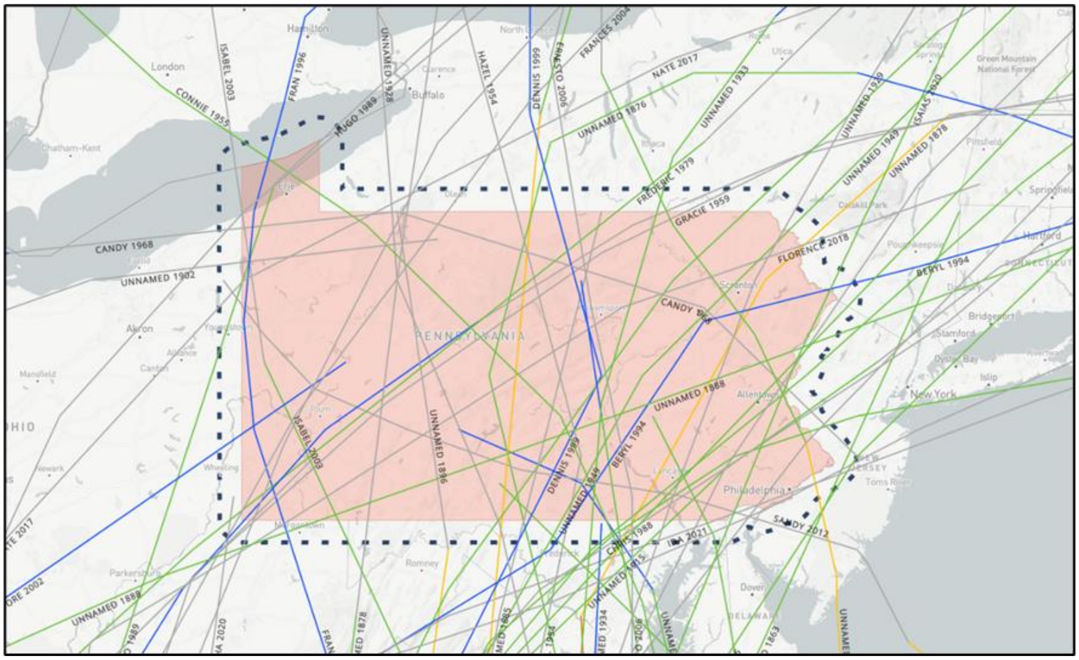
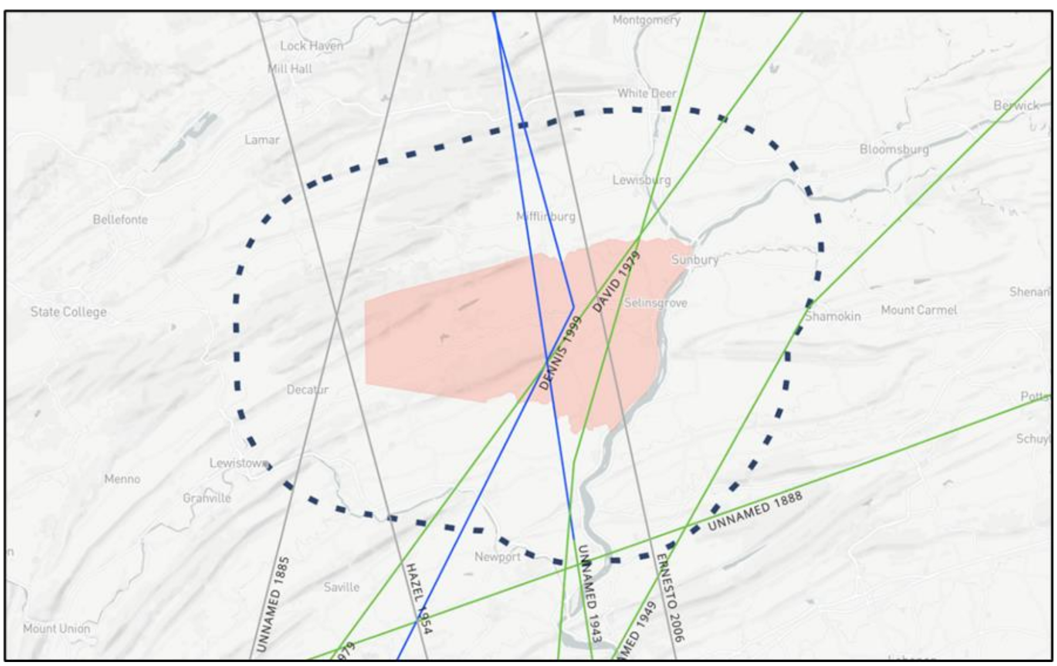


Figure 24 - Historic Tropical Storms/Hurricanes in Snyder County



4.3.6. Invasive Species

4.3.6.1 Location and Extent

An invasive species is a species that is not indigenous to a given ecosystem and that, when introduced to a non-native environment, tends to thrive. The spread of an invasive species often alters ecosystems, which can cause environmental and economic harm and pose a threat to human health. Often, an invasive species spreads and reproduces quickly. Invasive species are not limited to organisms that come from a foreign country. Invasive species can come from a different region in the United States. The main instigator of invasive species is human activity. Either intentionally or unintentionally, other species may accompany people when they travel, introducing the stowaway species to a novel ecosystem. In a foreign ecosystem, a transported species may thrive, potentially restructuring the ecosystem and threatening its health. Common pathways for invasive species introduction to Pennsylvania include but are not limited to:

- Contamination of internationally traded products
- Hull fouling
- Ship ballast water release
- 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

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

Aquatic Invasive Species (AIS) are nonnative invertebrates, fishes, aquatic plants, and microbes that threaten the diversity or abundance of native species, the ecological stability of the infested waters, human health and safety, or commercial, agriculture, or recreational activities dependent on such waters.

Terrestrial Invasive Species (TIS) are nonnative plants, vertebrates, arthropods, or pathogens that complete their lifecycle on land instead of in an aquatic environment and whose introduction does or is likely to cause economic/environmental damage or harm to human health.

The location and extent of invasive threats is dependent on the preferred habitat of the species, as well as the species' ease of movement and establishment. For example, kudzu vine is an aggressive vascular plant. With wide ecological parameters and ease of spread, the vine is a more widespread invasive species threat. Other species' spread, such as the spotted lantern fly, has been limited by state agency activity. First discovered in Berks County in 2014, the spotted lantern fly was placed under a quarantine by the Pennsylvania Department of Agriculture in thirteen counties. *Table 35 - Prevalent Invasive Species* lists invasive species that have been found in Snyder County.

4.3.6.2 Range of Magnitude

The magnitude of invasive species threats ranges from nuisance to widespread killer. Some invasive species are not considered agricultural pests, and do not harm humans or cause significant ecological problems. For example, Brown Marmorated Stink Bugs are not considered to be agricultural pests and do not harm humans. Other invasive species can have many negative impacts and cause significant changes in the composition of ecosystems. For example, the Emerald Ash Borer creates a 99% mortality rate in any ash tree it infects. The aggressive nature of many invasive species can cause significant reductions in biodiversity by crowding out native species. This can affect the health of individual host organisms as well as the overall well-being of the affected ecosystem. An example of a worst-case scenario for invasive species in Pennsylvania is the Emerald Ash Borer in Snyder County and the surrounding region (see *Figure 25 - Emerald Ash Borer Infestation in Pennsylvania*).

Another example of an invasive pest is the hemlock woolly adelgid. Hemlock woolly adelgid is a fluid-feeding insect that feeds on hemlock trees throughout eastern North America, including Pennsylvania. The egg sacs of these insects look like the tips of cotton swabs clinging to the undersides of hemlock branches. Hemlock woolly adelgid was introduced from Asia into the Pacific Northwest in 1924. It is likely to have been introduced into the northeastern United States in the 1950s, and it was first discovered in Pennsylvania in 1967. To date, all sixty-seven counties in Pennsylvania, including Snyder County, have been infested with this insect. See *Figure 26 - Hemlock Woolly Adelgid Infestation in Pennsylvania*. Eastern hemlock (Pennsylvania's state tree) and Carolina hemlocks (found further south in the Smoky Mountain sections of the Appalachians) are more susceptible to hemlock woolly adelgid damage than Asian and western hemlock trees due to feeding tolerance and predators that protect the latter species. Hemlock woolly adelgid sucks fluid from the base of hemlock needles. It may also inject toxins into the tree as it feeds, accelerating needle drop and branch dieback. Although some trees die within four years, trees often persist in a weakened state for many years.

Hemlocks that have been affected by hemlock woolly adelgid often have a grayish-green appearance (hemlocks naturally have a shiny, dark green color).

A final example of an invasive species is the Spotted Lanternfly. The Spotted Lanternfly is a harmful invasive species which feeds on plants, damaging or destroying them. This can negatively impact the areas of Pennsylvania known for outdoor scenery and activities. According to the Penn State Extension, the Spotted Lanternfly is a significant threat to Pennsylvania agriculture, landscapes, and natural ecosystems, including grape, tree-fruit, hardwood, and nursery industries, which collectively are worth nearly $18 billion to the state's economy, outdoor recreation, and biodiversity. The Spotted Lanternfly was found in Snyder County prior to 2023, and it is undoubtedly continuing to spread. The State Department of Agriculture gives the total number of infected counties as fifty-two, as of 2024. *Figure 27 – Pennsylvania Spotted Lanternfly Infestation* illustrates the counties in Pennsylvania that are considered to be in the quarantine zone for this pest.

The magnitude of an invasive species threat is generally amplified when the ecosystem or host species is already stressed, such as in times of drought. The already weakened state of the native ecosystem causes it to succumb to an infestation more easily. A worst-case example could be the Hemlock Woolly Adelgid causing reduced biodiversity, increased wildfire potential, and thermal harm to small stream cold water fisheries and habitats.

4.3.6.3 Past Occurrence

Invasive species have been entering Pennsylvania since the arrival of European settlers, but not all occurrences required government action. Snyder County is known for its great number of geographic features. There are various state game lands within the area which include state game lands 188, 194, and 212, and other well-known areas in the county that have significant amounts of forest land and lakes which species may invade. Due to the vast area of forests, there are many invasive terrestrial species that have been widespread in Snyder County and are common problems throughout the Commonwealth. Some of the most prevalent problematic species in Snyder County include:

- Emerald Ash Borer
- Hemlock Woolly Adelgid
- Spotted Lanternfly

Many of the extreme problematic species have been around for many years. However, the most recent problematic species are the Emerald Ash Borer, Hemlock Wooly Adelgid, and the Spotted

Lanternfly. In 2007, both the Emerald Ash Borer and Hemlock Wooly Adelgid were both newly spotted species that caused extreme damage. Even more recently than 2007, the Spotted Lanternfly appeared in Snyder County. It was in 2014 that the spotted lanternfly was first found in the commonwealth.

Table 35 - Prevalent Invasive Species lists problematic non-native species that are established in Snyder County. While all species listed here are not native to Snyder County, some species are considered to pose a more severe ecological threat than some of the others.

Table 35 - Prevalent Invasive Species

Prevalent Invasive Species		
Common Name	**Scientific Name**	**Type**
Asiatic Clam	Corbicula fluminea	Animal
Autumn Olive	Elaeagnus umbellata	Plant
Butter-and-eggs	Linaria vulgaris	Plant
Climbing Nightshade	Solanum dulcamara var. dulcamara	Plant
Common Carp	Cyprinus carpio	Animal
Common Crown-vetch	Coronilla varia	Plant
Curly-leaf Pondweed	Potamogeton crispus	Plant
Emerald Ash Borer	Agrilus planipennis	Animal
Flathead Catfish	Pylodictis olivaris	Animal
Garlic Mustard	Alliaria petiolata	Plant
Goldfish	Carassius auratus	Animal
Greenside Darter	Etheostoma blennioides	Animal
Hamilton's Spindletree	Euonymus hamiltonianus	Plant
Hemlock Woolly Adelgid	Adelges tsugae	Animal
Japanese Barberry	Berberis thunbergii	Plant
Japanese Stiltgrass	Microstegium vimineum	Plant
Jumping Worms	Amynthas-Metaphire spp.	Animal
Lady's Thumb	Persicaria maculosa	Plant
Mile-a-minute vine	Persicaria perfoliata	Plant
Princess Tree	Paulownia tomentosa	Plant
Ravenna Grass	Tripidium ravennae	Plant
Red-eared Slider	Trachemys scripta elegans	Animal
Rusty Crayfish	Faxonius rusticus	Animal

Prevalent Invasive Species		
Common Name	**Scientific Name**	**Type**
Spotted Lanternfly	Lycorma delicatula	Animal
Sweetclover	Melilotus officinalis	Plant
Tree-of-Heaven	Ailanthus altissima	Plant
White Mulberry	Morus alba	Plant
Wild Basil	Clinopodium vulgare	Plant
Source: iMapInvasives, 2024.		

4.3.6.4 Future Occurrence

According to the Pennsylvania Invasive Species Council (PISC), the probability of future occurrence for invasive species threats is growing due to the increasing volume of transported goods, increasing 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 counties and regions. In 2017, Pennsylvania alone imported over $83 billion in goods from abroad, including agricultural, forestry, and fishery goods that commonly carry unknow pests. Climate change is contributing to the introduction of new invasive species. As maximum and minimum seasonal temperatures change, pests can establish themselves in previously inhospitable climates. This also gives introduced species an earlier start and increases the magnitude of their growth, possibly shifting the dominance of ecosystems in the favor of non-native species. In order to combat the increase in future occurrences, the PISC released the Invasive Species Management Plan in April 2010 and updated the plan in 2017. The plan outlines the Commonwealth's goals for managing the spread of nonnative invasive species and creates a framework for responding to threats through research, action, and public outreach and communication. More information can be found here: https://www.agriculture.pa.gov/Plants_Land_Water/PlantIndustry/GISC/Pages/default.aspx.

There are several invasive species that are found near Snyder County but have not yet been detected inside the county (see *Table 36 – Future Vulnerable Species*). Especially in cases like this, control efforts, heightened awareness, and public outreach and education can help prevent an invasive species from becoming established in the future. Once a species is established, it is more difficult to eradicate it from an ecosystem, so prevention is very important. The emerald ash borer, the hemlock woolly adelgid, and the spotted lanternfly are all widespread and highly problematic (as shown highlighted in red in *Table 36 – Future Vulnerable Species*). The development of appropriate plans will assist the county in reducing the possibility of a future encounter with any of these species. Working toward keeping these species from entering the area would be beneficial to the forests of Snyder County.

Table 36 - Future Vulnerable Species

Future Vulnerable Species		
Scientific Name	**Common Name**	**Type**
Allegheny Crayfish	Faxonius obscurus	Animal
Bohemian Knotweed	Reynoutria x bohemica	Plant
Bull Thistle	Cirsium vulgare	Plant
Callery Pear	Pyrus calleryana	Plant
Canada Thistle	Cirsium arvense	Plant
Creeping Smartweed	Polygonum caespitosum var. longisetum	Plant
Eastern Helleborine	Epipactis helleborine	Plant
English Ivy	Hedera helix	Plant
Eurasian Water-milfoil	Myriophyllum spicatum	Plant
Golden Bamboo	Phyllostachys aurea	Plant
Honeysuckle	Lonicera spp	Plant
Indian Mock Strawberry	Duchesnea indica	Plant
Japanese Angelica Tree	Aralia elata	Plant
Japanese Honeysuckle	Lonicera japonica	Plant
Japanese Hop	Humulus japonicus	Plant
Japanese Spiraea	Spiraea japonica	Plant
Kudzu	Pueraria montana var. lobata	Plant
Multiflora Rose	Rosa multiflora	Plant
Musk Thistle	Carduus nutans	Plant
Norway Maple	Acer platanoides	Plant
Orange-eye Butterfly-bush	Buddleja davidii	Plant
Oriental Bittersweet	Celastrus orbiculatus	Plant
Purple Loosestrife	Lythrum salicaria	Plant
Reed Canary Grass	Phalaris arundinacea	Plant
Shrubby Bushclover	Lespedeza bicolor	Plant
Slider	Trachemys scripta	Animal
Spongy Moth	Lymantria dispar	Animal
Touch-me-not Bittercress	Cardamine impatiens	Plant
Wineberry	Rubus phoenicolasius	Plant

Future Vulnerable Species		
Scientific Name	**Common Name**	**Type**
Zebra Mussel	Dreissena polymorpha	Animal
Source: iMapInvasives, 2024.		

4.3.6.5 Vulnerability Assessment

Snyder County's vulnerability to invasion depends on the species in question. Human activity and mobility are ever increasing, and combined with the prospects of climate change, invasive species are becoming increasingly threatening. Invasive species can have adverse economic effects by impacting agriculture and logging activities. Natural forest ecosystems provide clean water, recreational opportunities, habitat for native wildlife, and places to enjoy the tranquility and transcendence of nature. The balance of forest ecosystems and forest health are vulnerable to invasive species threats. While there is significant acreage of wetlands, waterways, state parks, and game lands in Snyder County where forest managers can impact invasive species, private lands can provide refuge for invasive species if landowners are unaware of or apathetic towards the threat.

Since there are large swatches of public land in Snyder County, there is a risk of future damage from invasive species that are present in the area. With about 530,560 acres of total land in Snyder County, there is vulnerability to various land sites and waterways. If an invasive species were to invade the popular terrestrial areas or waterways in Snyder County, a negative impact could occur. The invasion from an invasive species could cause damage to the scenic and natural resources needed in the county. Additionally, tourism for the county is vulnerable to the invasive species as well and would be affected if the parks were destroyed. Therefore, a great amount of land and native wildlife within Snyder County are at risk with the presence of invasive species.

An interesting facet of the invasive species problem in Pennsylvania is that deer do not eat many invasive plants, giving invasive species a competitive advantage over the native species that deer prefer. As such, the management of deer populations in Snyder County has a significant impact on the vulnerability of an ecosystem to invasive species, where overpopulation of deer favors invasive species.

The Governor's Invasive Species Council of Pennsylvania (PISC) has identified over 100 species threats that are or could potentially become significant in Pennsylvania. Of these threats, county and municipal leaders believe that the most significant are invasive forest pests like the Emerald Ash Borer, Hemlock Woolly Adelgid, the Spotted Lanternfly, and plants like the Tree-of-Heaven which have all been identified in red in *Table 35 - Prevalent Invasive Species.*

Due to the past experiences with invasive plants in the county, there are five primary components which help with managing invasive plants to lower vulnerability:

Prioritize: Public use areas such as state parks and other healthy forest ecosystems should be prioritized over developed and private areas. Locations with lower densities of invasive plants are often easier to control and should be given quick attention. Locations where humans are disturbing the landscape opens up niche space, and often times the aggressive invasive species move in faster than native species. Such locations include areas around road work, ditch/culvert work, logging activities, stream improvement/stabilization and bridge work. Some species pose a higher risk than others - invasive species are easiest to control before they become widespread and established in an area, and for that reason, species that are less widespread should be prioritized for management.

Locate: Detailed locations should be recorded for invasive plants so sites can be easily relocated, treated, and monitored.

Delineate: The scale and extent of the infestation should be recorded and mapped so that the progress of the infestation can be monitored.

Control: Methods of control depend on the specific infestation, but the most common approaches are mechanical (cutting and hand-pulling) and chemical (herbicide treatments).

Monitor: Identified sites should be monitored and revisited as often as several times in a growing season (depending on the location/species). Monitoring can allow for early detection of spreading infestations. Most importantly, it prevents a relapse towards full-blown infestation.

It is best to act before a species can become established in the county, so forest management such as park rangers should be aware of invasive species found nearby Snyder County, but not yet present in the county (priority species in *Table 36 – Future Vulnerable Species*). Public outreach and education are important to increase knowledge of these species to improve identification and prevention of invasion. Without action, due to the instances and extent of the current infestations, it is reasonable to project that the county's vulnerability will increase.

Municipalities with a potential increased risk to invasive species:

- Franklin Township
- Freeburg Borough
- Jackson Township
- McClure Borough

- Monroe Township
- Penn Township
- Selinsgrove Borough
- Washington Township
- West Perry Township

All of the socially vulnerable populations in Snyder County may be at an increased vulnerability to invasive species. The homeless and the unsheltered populations are at risk due to not having a structure in which to reside. Also, the economically vulnerable of Snyder County may not have the capability to fix or hire pest control if their homes are damaged or overrun by invasive species.

The historic properties in Snyder County are at different levels of vulnerability to invasive species. Climate change and its relationship with invasive species has a major correlation. According to the U.S Geological Survey, climate change has been creating a new pathway for invasive species to be introduced into the environment. As an example, the rise in temperature allows existing invasive species to expand their geographic area. Also, climate change hinders the tools for eliminating invasive species.

As seen in *Table 3 – Population Change in Snyder County*, eleven of the twenty-one municipalities in Snyder County have experienced a population loss since the previous decennial census, conducted in 2010. However, Franklin Township, Freeburg Borough, Jackson Township, McClure Borough, Monroe Township, Penn Township, Perry Township, Selinsgrove Borough, Washington Township, and West Perry Township saw minor total population increases. Based on this information, it can be speculated that these ten municipalities may have an increased/equivalent risk to invasive species, since 2010, due to the increase in population and, potentially, construction.

Land use is a major factor with the severity of invasive species. Land use, in the form of a built environment, such as residential expansion, can cause invasive species impact severity to increase. Impact severity increases because as the built environment expands and becomes more complex, the impact the event will have on that area also increases because there is an influx of people, infrastructure, and critical infrastructure in the hazard area. According to Smithsonian Environmental Research Center, invasive species thrive on major land use disturbances, as an example the logging of a forest or flooding to a wetland can create conditions that invasive species thrive on to move into a specific area.

Figure 25 - Emerald Ash Borer Infestation in Pennsylvania

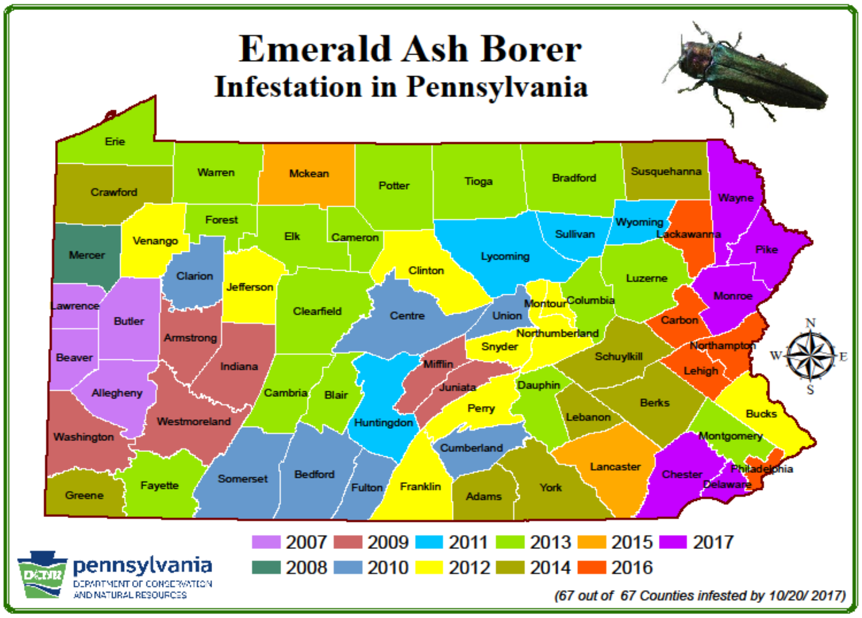


Figure 26 - Hemlock Woolly Adelgid Infestation in Pennsylvania

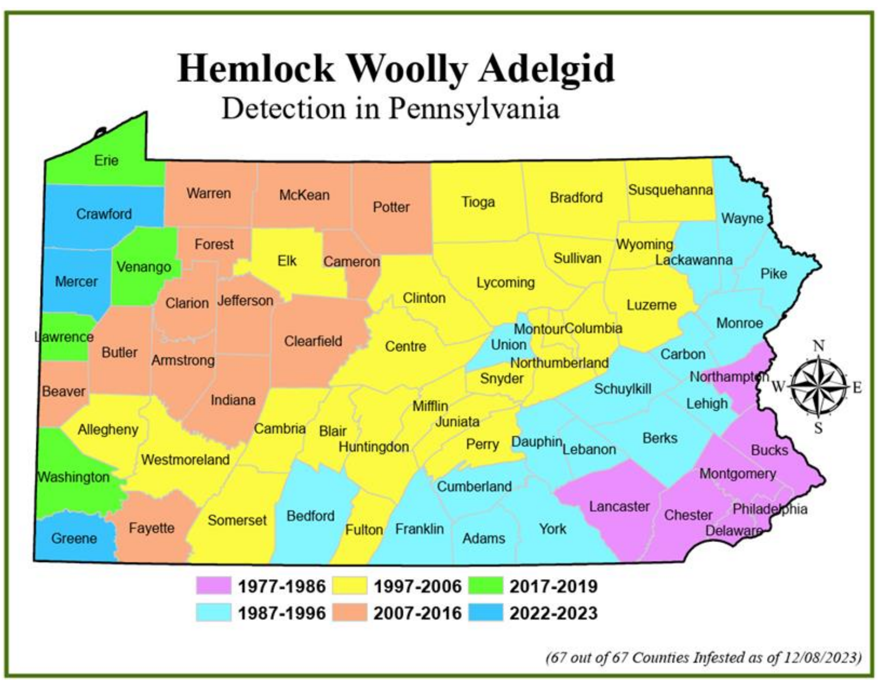
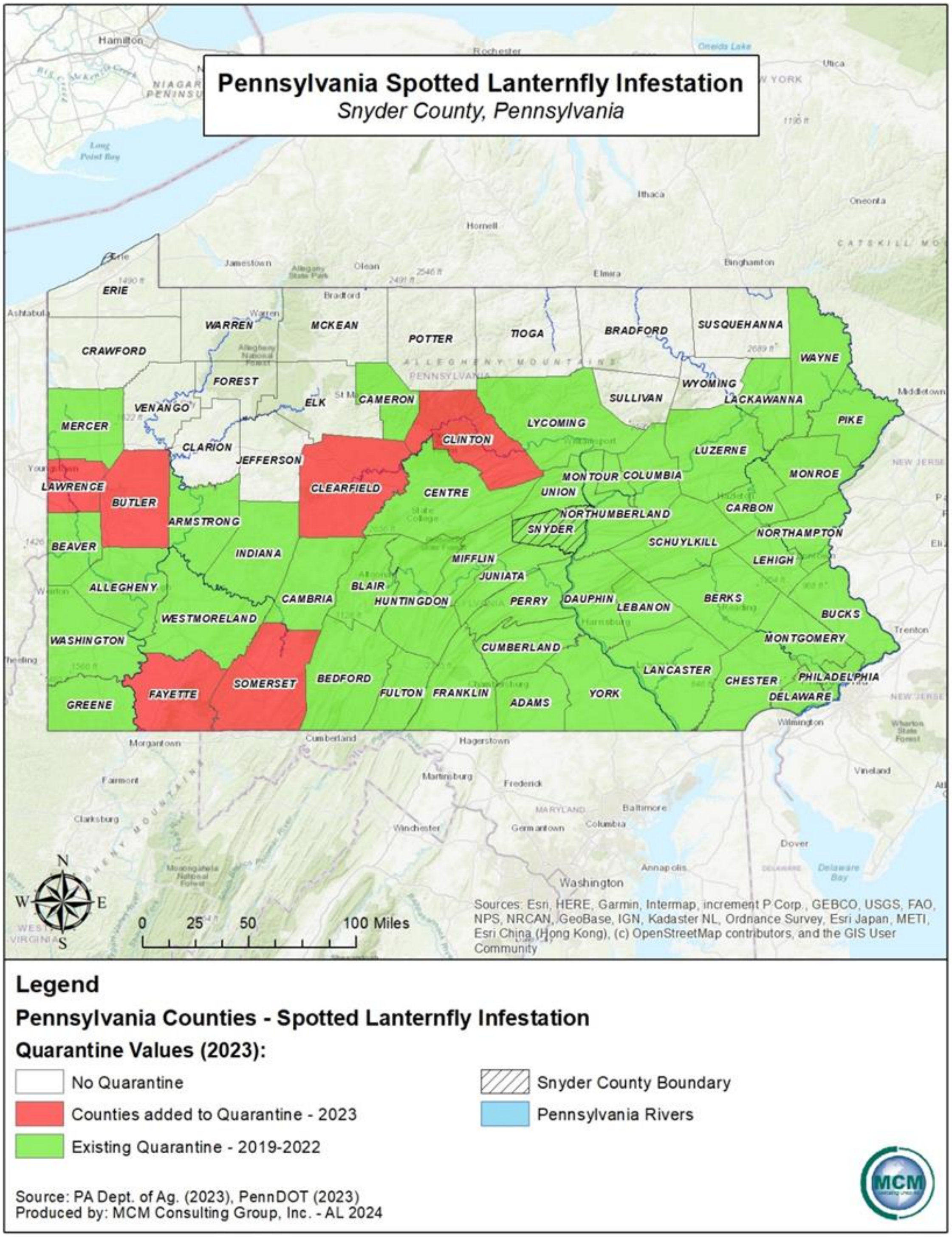


Figure 27 - Pennsylvania Spotted Lanternfly Infestation



4.3.7. Landslide

4.3.7.1 Location and Extent

Rock falls and other slope failures can occur in areas of Snyder County with moderate to steep slopes. Many slope failures are associated with precipitation events – periods of sustained above-average precipitation, specific rainstorms, or snowmelt events. Rockfalls, rockslides, rock topples, block slides, debris flows, mud flows, and mud slides are all forms of landslides. 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 and water content, and removing vegetation cover. Areas where this type of human activity is common are areas that were excavated along highways and other roadways.

The Pennsylvania Department of Conservation and Natural Resources (PA DCNR) describes landslide susceptibility in Snyder County as generally moderate/high. *Figure 28 – Landslide Hazard Areas* shows areas of landslide susceptibility in Snyder County. A majority of Snyder County is located in the Ridge and Valley physiographic province which is known for high vulnerability along lake bluffs and stream banks, including all forms of landslide. Steep slopes are evenly spread throughout the county and there are locations that can be prone to landslides in almost every municipality.

4.3.7.2 Range of Magnitude

Landslides cause damage to transportation routes, utilities, and buildings. They can also create travel delays and other side effects for transportation of people and material. Fortunately, death and injuries due to landslides are relatively rare in Pennsylvania. Almost all of the known deaths due to landslides have occurred when rocks fall or other slide along highways involve vehicles. Storm-induced debris flows are the only other type of landslide likely to cause injuries. As residential and recreational development increase on and near steep mountain slopes, the hazard from these rapid events will also increase. Most Pennsylvania landslides are moderate to slow moving and damage objects and buildings, rather than people.

The Pennsylvania Department of Transportation (PennDOT) and large municipalities incur substantial costs due to landslide damage and to additional construction costs for new roads in known landslide-prone areas. A 1991 estimate showed an average of $10 million per year is spent on landslide repair contracts across the Commonwealth of Pennsylvania and a similar amount is spent on mitigation costs for grading projects (DCNR, 2009). A number of highway sites in Pennsylvania need temporary or permanent repair at an estimated cost of between

$300,000.00 and $2 million each. Similar landslide events that effect traffic and roadways throughout the commonwealth occur intermittently throughout the year. A 7,500-pound rockslide closed down parts of Pennsylvania State Route 11 in Montour County, Pennsylvania in November of 2020 for a number of weeks. Events of similar magnitude can and have occurred in and around Snyder County.

The 2023 Pennsylvania Hazard Mitigation Plan lists Snyder County as having a moderate incidence of landslides but high susceptibility. Snyder County landowners and real estate developers must know the magnitude of susceptibility within the county prior to the start of development.

4.3.7.3 Past Occurrence

No comprehensive list of landslide incidents in Snyder County is available, and there is no formal reporting system in place. PennDOT and municipal departments are responsible for slides that inhibit the flow of traffic or damage roads and bridges, but they generally only repair the road and the adjacent right-of-way areas.

4.3.7.4 Future Occurrence

Historically, significant landslide events are likely to occur on average once every two to four years in Snyder County. Mismanaged development in steeply sloped areas could increase the frequency of occurrence. Road cuts are the most common development that puts an area at an increased probability of a slide. The Pennsylvania Department of Environmental Protection (PA DEP) has an Erosion and Sediment (E & S) program that sets requirements intended to mitigate erosion associated with development projects of a certain scale. The guidelines offered in this program are similar to landslides prevention practices.

Climate change has the potential to increase the frequency of landslides in Snyder County. Climate change could result in more intense rainfall from more frequent hurricanes and tropical storms. This increase in rainfall could cause an increase in soil runoff, therefore weakening slopes that are steep and considered to be a hazard. More frequent landslides could occur from this weakening of the slopes because soil movement will likely increase with a higher volume of precipitation.

4.3.7.5 Vulnerability Assessment

Landslides are often precipitated by other natural hazards such as earthquakes or floods. A significant landslide can cause millions of dollars in damage. Continued enforcement of floodplain management and proper road and building construction can mitigate the vulnerability to landslides. Floodplain management is important where mining has occurred within proximity to watercourses and associated flat-lying areas. Surface water may permeate into areas that still have open fractures and the build-up of surface water in those fractures could lead to unexpected flood events and landslide events.

Land use and development has the potential to increase the vulnerability of Snyder County to landslides. Development of major infrastructure and commercial or residential areas near areas of steep slope, or areas where slopes are over 23° could create conditions in the future where landslides are more likely to occur. Also, the development of roadways, and the grading of roadway berms could also increase the potential for landslides. This is common in steeply sloped areas or areas where roads are built below a slope or embankment. The removal of forested areas or trees could cause landslides along slopes and embankments. Trees and tree root systems create hill stability, and the removal of those root systems could result in weakened slopes. This practice can be remediated and fixed with protection netting and gabion baskets or gabion walls.

A comprehensive database of land highly prone to erosion and landslides is difficult to produce. The potential for erosion and landslides should be considered when planning construction projects in Snyder County. There are several general factors that can be indicators of landslide prone areas including:

- Locations on or close to steep hills.
- Areas of steep road cuts or excavations.
- Steep areas where surface run-off is channeled.
- Fan shaped areas of sediment and rock accumulations.
- Evidence of past sliding such as tilted utility line, tilted trees, cracks in the ground and irregularly, surfaced ground.

All the municipalities in Snyder County are vulnerable to landslides. *Table 37 – Structure Vulnerability Data* illustrates the number of site structure address points per municipality and the number of structures in high slope areas. Landslide events are most likely to occur in steeply sloped areas and in places where landforms have been altered for purposes of highway construction or other development. This is especially true if development is located at the base or crest of cliffs or near large highway cut-outs. These areas should be considered vulnerable to landslides, particularly if mitigation measures have not been implemented.

Table 37 - Structure Vulnerability Data

Structure Vulnerability Data		
Municipality	**Number of Addressable Structures Per Municipality**	**Number of Structures in Slope Area**
Adams Township	453	0
Beaver Township	299	0
Beavertown Borough	514	0
Center Township	1,094	0
Chapman Township	593	0
Franklin Township	1,115	0
Freeburg Borough	295	0
Jackson Township	687	0
McClure Borough	499	0
Middleburg Borough	806	0
Middlecreek Township	1,005	0
Monroe Township	2,442	0
Penn Township	1,906	0
Perry Township	1,046	0
Selinsgrove Borough	1,986	0
Shamokin Dam Borough	860	0
Spring Township	887	3
Union Township	667	0
Washington Township	791	0
West Beaver Township	552	0
West Perry Township	577	0
Totals:	**19,074**	**3**

There are no historic or cultural properties in Snyder County that are registered with the National Register of Historic Places and within a slope area of greater than 23°. No other cultural or historic properties are at an increased risk of landslides due to their location and area of construction.

Municipalities with an increased risk to landslide (slope areas over 23°):

- Adams Township

- Beaver Township
- Center Township
- Chapman Township
- Franklin Township
- Jackson Township
- McClure Borough
- Middleburg Borough
- Middlecreek Township
- Monroe Township
- Penn Township
- Perry Township
- Selinsgrove Borough
- Shamokin Dam Borough
- Spring Township
- Union Township
- Washington Township
- West Beaver Township
- West Perry Township

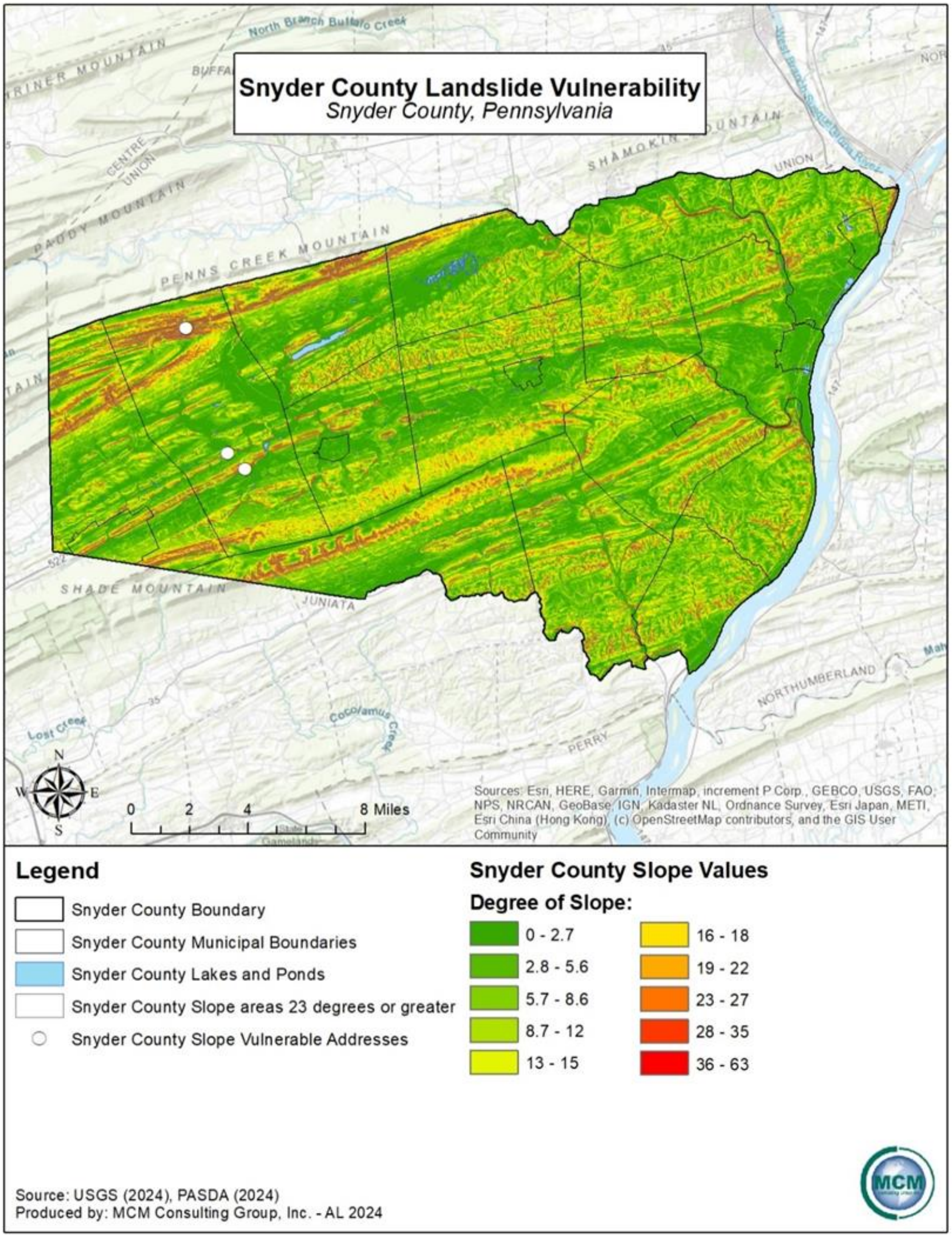
The socially vulnerable populations and communities in Snyder County, including the homeless and unsheltered populations, are at an increased vulnerability to landslides. Those socially vulnerable populations can be found in the higher population density areas of the county.

As seen in *Table 3 – Population Change in Snyder County*, the eleven municipalities have seen a net population increase from the 2010 decennial census to the 2020 decennial census. Based on this information, it can be speculated that these municipalities may have an increased/equivalent risk to landslides, since 2010, due to the increase in population and construction.

When a landslide occurs, the resulting ground instability can lead to telephone pole collapse, disruption of fiber or copper cables systems, and in severe cases, cellular tower failure. The disruption to these networks, if the landslide event is significant, can also result in a loss of communication capabilities, hindering response coordination, and leaving communities impacted by the landslide vulnerable to other natural or human-caused hazards. Landslide events can also cause above ground localized transportation issues if an event were to occur along a transportation route through Snyder County. This can cause a delay in daily transportation and may require alternate transportation routes to be established for an extended period of time.

Natural areas and resources in Snyder County could be adversely impacted from landslides. Landslides typically occur in areas of steep slope, or areas of slope instability. Specific natural areas or parks that have the potential for landslides due to steep slopes include state game land 188, state game land 194, state game land 212, Bald Eagle State Forest, C.F. Walker Lake, and the Middle Creek Lake Public Recreation area. Landslides occur in natural areas on a regular basis and are often only reported substantially after occurrence. Natural resources that are utilized by the residents and businesses of Snyder County could be damaged by landslides. This could include any farming, land cultivation, lumbering, or development of natural products.

Figure 28 - Landslide Hazard Areas



4.3.8. Pandemic, Epidemic, Endemic, and Infectious Disease

4.3.8.1 Location and Extent

Epidemic

An epidemic occurs when an infectious disease spreads more quickly than expected by medical and healthcare authorities. It is characterized by widespread growth or extent that spreads quickly and incurs a greater rate of novel or endemic cases than baseline estimates would initially project. When an epidemic occurs, it typically impacts a larger area than a localized outbreak. Epidemics often include multiple countries, although they do not always spread to different continents. In short, epidemics are regional.

Pandemic

A pandemic is a disease outbreak that spreads across countries or continents, which affects the population of a vast area. When a pandemic occurs, the event usually affects more people and takes more lives than an epidemic. Pandemics are described as an extensive epidemic. Generally, pandemic diseases cause sudden illness in all age groups on a global scale. Pandemics are continuous events in third-world countries but do not frequently affect the United States. A pandemic is measured and defined by the spreading of a disease rather than the fatalities with which it is associated. The characteristics of a pandemic outbreak include large and rapid scale spread, overload of healthcare systems, inadequate medical supplies, disruption of economy/society, and medical supply shortages. While a pandemic may be characterized as a type of epidemic, an epidemic is not a type of pandemic. Additionally, pandemics travel more efficiently than epidemics. In the event that a pandemic occurs in the eastern United States, the entirety of Snyder County would likely be impacted.

Endemic

An endemic is described as a disease that is present in a community at all times but occurs in a relatively low frequency and is not spreading at a rapid rate. An endemic can be a previous pandemic such as influenza, or coronavirus (COVID-19), or a more regionalized virus such as Ebola virus in Africa. An endemic can become a pandemic if the disease mutates into a more virulent strain.

Infectious Disease

Infectious diseases are illnesses caused by pathogenic organisms such bacteria, viruses, fungi, or parasites. Organisms become harmful and cause disease under certain conditions. The sources of infectious disease may originate from contaminated food or waterways, infected animals/livestock, or infection from biological vectors such as mosquitoes, etc. Infectious diseases include influenza, rabies, Middle East Respiratory Syndrome (MERS), West Nile virus, Lyme Disease, Zika virus, and Ebola virus.

Pandemic and infectious disease events cover a wide geographical area and can affect large populations, potentially including the entire population of the Commonwealth of Pennsylvania. 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 more populated and urban areas where there are large concentrations of people. The transmission rate of infectious disease will depend on the mode of transmission of a given illness. Pandemic events can also occur after other natural disasters, particularly floods, when there is the potential for bacteria to grow in, and contaminate, standing water.

4.3.8.2 Range of Magnitude

Public health emergencies typically occur on a regional basis. The magnitude of pandemic or infectious disease threat in the Commonwealth will range significantly depending on the aggressiveness of the virus in question, factors within the community that are impacted (medical care access, population density, etc.), and the ease of transmission. For example, the West Nile virus produces clinically asymptomatic cases less than 80% of the time. Therefore, approximately 20% of the cases result in mild infection, also known as West Nile fever. However, there is a small percentage of cases that could result in severe neurological disease and even death.

Pandemic influenza has a higher transmission rate from person-to-person compared to the West Nile virus. Advances in medical technologies have greatly reduced the number of deaths caused by influenza over time. In the early 1900s, flu pandemics historically caused tens of millions of deaths, while the 2009 Novel H1N1, known as swine flu, caused fewer than 20,000 deaths world-wide. Many people infected with swine flu in 2009 recovered without needing medical treatment. Without recent medical inventions and technologies, modern influenza would be associated with higher morbidity rates. About 70% of those who were hospitalized during the 2009 H1N1 flu virus in the United States belonged to a high-risk group. However, with the COVID-19 pandemic, the transmission rates were much higher than any previous outbreaks related to other members of the coronavirus family such as SARS-CoV and MERS-CoV.

In the past 100 years, humanity did not face a microbial pandemic similar in scale to the COVID-19 pandemic. The worldwide transmission rate of COVID-19 from human to human rapidly advanced in 2020 and 2021. Of the six global outbreaks of viral infections, three were caused by coronaviruses (SARS, MERS, and COVID-19).

While there are limited secondary hazards related to public health emergencies, an outbreak can cause a variety of cascading hazards. Civil disorder due to supply shortages is the most common cascading hazard to result from pandemic, epidemic, or infectious disease. Additional potential effects could include: a shortage of medical supplies and personnel, hoarding of household paper and cleaning supplies, school and business disruption, government closings, government restrictions on travel, low attendance at places of employment, slowed productivity, and widespread economic instability.

The World Health Organization (WHO) developed an alert system to help inform the world about the seriousness of a pandemic. The alert system has six phases, with Phase 1 being the lowest risk and Phase 6 being the greatest risk of pandemic. The phases were developed in 1999, but then revised in 2005 and 2009 to provide a global framework and aid countries in pandemic preparedness and response planning. These phases of alert systems were used during the COVID-19 pandemic. These phases are listed below in *Table 38 - Pandemic Influenza Phases*.

Table 38 - Pandemic Influenza Phases

Pandemic Influenza Phases	
Phase	**Characteristics**
Phase 1	No animal influenza virus circulating among animals has been reported to cause infection in humans.
Phase 2	An animal influenza virus circulating in domesticated or wild animals is known to have caused infection in humans and is therefore considered a specific potential pandemic threat.
Phase 3	An animal or human-animal influenza reassortant virus has caused sporadic cases or small clusters of disease in people but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks.
Phase 4	Human-to-human transmission (H2H) of an animal or human-animal influenza virus able to sustain community-level outbreaks has been verified.
Phase 5	The same identified virus has caused sustained community level outbreaks in two or more countries in one WHO region.

Pandemic Influenza Phases	
Phase	**Characteristics**
Phase 6	The pandemic phase is characterized by community level outbreaks in at least one other country in a different WHO region in addition to the criteria defined in Phase 5. Designation of this phase will indicate that a global pandemic is under way.
Post-Peak Period	Levels of pandemic influenza in most countries with adequate surveillance have dropped below peak levels.
Possible New Wave	Level of pandemic influenza activity in most countries with adequate surveillance rising again.
Post-Pandemic Period	Levels of influenza activity have returned to the levels seen for seasonal influenza in most countries with adequate surveillance.
Source: WHO, 2009	

4.3.8.3 Past Occurrence

Pandemic & Epidemic

Several pandemic influenza outbreaks have occurred over the past 100 years that not only affected Snyder County but the United States as a whole. *Table 39 - Past Pandemic Events in the United States* illustrates the various past pandemic events that have occurred since the late 1800's. Prior to COVID-19, the worst recorded pandemic was the Spanish Flu, due to the amount of infection spread that was present in the world. The two most recent pandemics that have occurred in Snyder County and the United States are the swine flu/Novel H1N1 and COVID-19 pandemics, with COVID-19 being the most current and having the highest transmission rates.

Spanish Flu

An estimated 1/3 of the world's population was infected and had clinically apparent illnesses during the 1918 - 1919 influenza pandemic. Pennsylvania experienced severe effects from the Spanish Flu. It claimed 500,000 lives in the United States, which included individuals in Snyder County. There is a lack of data which provides exact numbers of deaths that occurred in Snyder

County from the Spanish Flu, however there were a total of 60,000 deaths in Pennsylvania. Deaths occurring in Snyder County are included in this number. There were approximately 47,000 reported cases and 12,000 deaths in Philadelphia in just over four weeks. In the first six months, there were about half a million cases and 16,000 deaths of the Spanish Flu in Philadelphia. The factors of high population density including crowded and unhygienic conditions contributed to higher numbers of cases and death rates across Pennsylvania.

Swine Flu/Avian Flu/H1N1

Each year, different strains of influenza are labeled as potential pandemic threats. Strains of influenza, or the flu, are highly contagious as they commonly attack the respiratory tract in humans. Influenza pandemic planning began in response to the H5N1 (avian) flu outbreak in Asia, Africa, Europe, the Pacific, and the Near East in the late 1990s and early 2000s. Avian flu did not reach pandemic proportions in the United States, but the country began planning for flu outbreaks.

Snyder County was impacted by the H1N1 virus during 2009. The Pennsylvania Department of Health (PA DOH) set up clinics throughout the county to administer vaccines to at-risk populations. A total 10,940 cases and seventy-eight deaths occurred in Pennsylvania from this pandemic but there is insufficient data to determine the exact number of cases and deaths from swine flu in Snyder County.

COVID-19

Snyder County was directly impacted by the COVID-19 pandemic. As of June 2023, Pennsylvania had an estimated 3,527,854 million total cases and 50,398 deaths related to the COVID-19 pandemic. The first cases in Pennsylvania were reported on March 6, 2020, in Delaware and Wayne counties. The first confirmed case of COVID-19 in Snyder County was in March 2020. Beginning in December of 2020, there was a large-scale vaccination effort to combat COVID-19. Municipalities in Snyder County indicated a decrease in the pandemic and infectious disease section of the risk factor assessment municipal comparison.

Table 39 - Past Pandemic Events in the United States

Past Pandemic Events in the United States	
Year(s)	**Common Name**
1889	Russian Flu
1918	Spanish Flu/H1N1
1957	Asian Flu/H2N2
1968	Hong Kong Flu/H3N2

Past Pandemic Events in the United States	
Year(s)	**Common Name**
2009	Swine flu/Novel H1NI
2020	COVID-19
Sources: WHO & CDC, 2020	

Infectious Disease

Not only has Snyder County experienced pandemic events, but the county has also experienced infectious disease events. The two major infectious disease events experienced across Snyder County and Pennsylvania as a whole are the West Nile Virus and Lyme Disease. Due to the climatic traits of Pennsylvania these infectious diseases thrive in Snyder County. Both diseases are transmitted by the biological vector of an insect which is found throughout the county.

West Nile Virus

West Nile virus reached the United States in 1999 and a year later was detected in Pennsylvania when mosquito pools, dead birds, and/or horses in nineteen counties tested positive for the virus. By 2003, all counties in the Commonwealth had confirmed cases. A comprehensive network has been developed in Pennsylvania that includes trapping mosquitoes, collecting dead birds, and monitoring horses, people and, in past years, sentinel chickens. Although West Nile Virus positive cases are few in Snyder County, 2018 had the most positive cases in Snyder County since 2010. Over the past five years, one human has tested positive for West Nile Virus in Snyder County. *Table 40 - West Nile Virus Control Program in Snyder County since 2018* outlines the West Nile Virus within Snyder County from 2010 to 2020.

Table 40 - West Nile Virus Control Program in Snyder County since 2018

West Nile Virus Control Program in Snyder County Since 2010				
Year	**Total Positives**	**Human Positives**	**Mosquito Positives**	**Bird Positives**
2010	5	0	5	0
2011	8	0	8	0
2012	19	0	19	0
2013	3	0	3	0
2014	14	0	13	1
2015	9	0	9	0
2016	4	0	4	0
2017	17	0	14	3

West Nile Virus Control Program in Snyder County Since 2010				
Year	Total Positives	Human Positives	Mosquito Positives	Bird Positives
2010	5	0	5	0
2018	22	0	20	2
2019	4	0	2	2
2020	0	0	0	0
2021	4	0	4	0
2022	4	0	3	1
2023	8	1	7	0
Source: PA Department of Environmental Protection, 2024				

Lyme Disease

Lyme Disease has been present in the United States and Snyder County for many years. More wooded areas have higher cases due to ticks being the main biological vector. Lyme disease is found in all sixty-seven counties within Pennsylvania. Snyder County has an overall approximately 362 confirmed cases of Lyme disease from 2000 until 2020, although actual totals may be significantly higher due to under reporting. Snyder County as a whole has a moderately high positive total for Lyme Disease in the county, especially over the past several years. It is possible that numbers have risen dramatically due to lack of testing in previous years. Snyder County experienced the highest number of positive cases in 2016 and 2017. Lyme disease case counts have been consistently rising over the past several years. It should be noted that information represented for each county may vary due to reporting practices. Hence these figures represent a rough estimate of the Lyme disease burden in Snyder County. *Table 41 - Lyme Disease Data for Snyder County* outlines the total positive cases of Lyme Disease within Snyder County since 2000 to 2020. Data after 2020 was not available for this report.

Table 41 - Lyme Disease Data for Snyder County

Lyme Disease Data for Snyder County	
Year	Total Positives
2000	0
2001	1
2002	6
2003	2
2004	7
2005	5

Lyme Disease Data for Snyder County	
Year	**Total Positives**
2006	8
2007	7
2008	5
2009	12
2010	11
2011	27
2012	21
2013	26
2014	40
2015	28
2016	42
2017	47
2018	35
2019	29
2020	3
Source: PA Tick Check, 2024	

Zika Virus

The Zika virus is another infectious disease that is spread by mosquito bites, and it is related to West Nile virus. Zika virus can also be spread through sexual intercourse, blood transfusion, or passed from mother to child in the womb. The virus was first identified in 1947, but largely came to the attention of the United States in 2015 when there was an outbreak of Zika in Brazil. The direct illness caused by Zika can include fever, red eyes, joint pain, headache, and a rash, or sometimes no symptoms at all. Zika is problematic for pregnant mothers as the virus can result in microcephaly or cause other problems for brain development. For adults, the virus can be linked to increased incidence of Guillain-Barré syndrome.

4.3.8.4 Future Occurrence

Pandemic & Epidemic

The probability of a widespread public health emergency effecting Snyder County is approximately once every ten years. Minor outbreaks of less serious communicable disease, such as influenza, will occur much more frequently. The occurrence of pandemic influenza outbreaks is unpredictable, and complete avoidance of the events is unlikely. Therefore, future occurrences of pandemics and infectious disease events are very likely. Pandemics may also emerge from other diseases, especially invasive pathogens for which Snyder County and Pennsylvania as a whole lack natural immunity.

Influenza

It is estimated that 5% to 25% of Pennsylvanians get the flu each year, and 120 to 2,000 individuals die from complications of influenza. The CDC recommends that everyone six months and older get a flu vaccine every season to prevent future cases from rising. People who are at a high risk of serious flu illness should take flu antiviral drugs as soon as they get sick.

Infectious Disease

Infectious diseases such as West Nile Virus and Lyme Disease have been present in Snyder County for many years and are expected to perpetuate. The best way to prevent infectious disease outbreaks, including West Nile Virus and Lyme Disease, is to actively address the causes of the diseases. West Nile Virus occurrence can be reduced by removing mosquito breeding locations in stagnant water sources and Lyme Disease occurrence can be reduced by utilizing insect repellant, removing ticks promptly, applying pesticides, and reducing tick habitats. Occurrence of Zika Virus can also be reduced by removing mosquito breeding areas and areas of stagnant water. Both West Nile Virus and Lyme Disease are expected to continue occurring in Snyder County in the future.

Climate change can result in a wider range of pandemic, epidemics, and infectious diseases that can impact larger areas of the globe. As climate change continues, more populations have the potential to come into contact with vectors for diseases. The migration of animals could also increase vulnerability to this hazard for populations in Snyder County. Climate change is discussed below in Section 4.3.8.5.

4.3.8.5 Vulnerability Assessment

Snyder County is considered to be a moderate vulnerability county in regard to the pandemic events. It is extremely difficult to predict the occurrence and the magnitude of a pandemic or epidemic event. The COVID-19 pandemic disproportionately affected populations over the age of sixty-five, especially those in nursing homes. It has had disparate effect on socially vulnerable populations, including unsheltered and homeless individuals.

Elderly individuals, children and immune deficient individuals are the most vulnerable to disease. Nursing facilities, personal care facilities, daycares, schools, and hospitals are considered more vulnerable since there are often groups of these socially vulnerable individuals present at these community lifelines. Congregate living facilities, including correctional institutions and dormitories would also be at an increased risk due to the difficulties in adhering to the social distancing required to help stop the spread of a pandemic. During the COVID-19 pandemic, nursing homes and personal care homes in Pennsylvania reported high numbers of cases and deaths, and several county jails and state correctional institutions reported wide community spread.

Health-care workers and those working in direct-care (such as correctional institutions or those who cannot social distance due to their jobs) are more likely to be exposed to a pandemic disease. Those who work outdoors for extended periods of time in warm months may be more vulnerable to West Nile Virus, Lyme Disease, or the Zika virus.

The number of hospitals within the county, and availability of beds within the hospitals, determine the amount of care vulnerable and sick patients will receive. It is important for hospitals to review and exercise emergency response plans and continuity of operations plans (COOP) to ensure that there is an effective public health response.

All critical infrastructure facilities and community lifeline facilities are vulnerable to pandemic, epidemic, and infectious disease. The people working and operating these facilities are at an increased vulnerability based on location and dispersion of disease vectors. This includes all of the critical infrastructure in the county and the community lifelines, a total of seventy-nine locations. This includes, but is not limited to, eight EMS stations, five medical clinics, four police stations, and eleven fire stations. These locations are spaced evenly throughout the county but are clustered primarily in the boroughs of the county.

A pandemic can vastly impact historic resources by disrupting routine maintenance, leading to physical deterioration of structures and artifacts. The closure of cultural institutions, including museums and archives, hinders public access and educational activities. Economic downturns may reduce funding for preservation efforts, while a decline in tourism threatens the financial sustainability of historic sites. Community engagement may suffer if events and traditional practices are disrupted, affecting the transmission of cultural knowledge.

Municipalities with high risk due to pandemic, epidemic, and infectious disease:

- Adams Township
- Beaver Township
- Beavertown Borough
- Center Township
- Chapman Township
- Franklin Township

- Jackson Township
- McClure Borough
- Middleburg Borough
- Middlecreek Township
- Monroe Township
- Penn Township
- Perry Township
- Selinsgrove Borough
- Shamokin Dam Borough
- Spring Township
- Union Township
- Washington Township
- West Beaver Township
- West Perry Township

During a public health emergency, the PA DOH may open emergency medicine centers called points of dispensing (PODs) to ensure that medicine, supplies, vaccines, and information reach Pennsylvania residents during a public health emergency. An open POD is where the general public goes to receive free emergency medicine and supplies from public health officials, while a closed POD provides free emergency medicine and supplies to a specific community, like a university, including faculty, staff, and students. Dispensing of medications/vaccines is a core function of the Strategic National Stockpile's Mass Dispensing of Medical Countermeasures Plan.

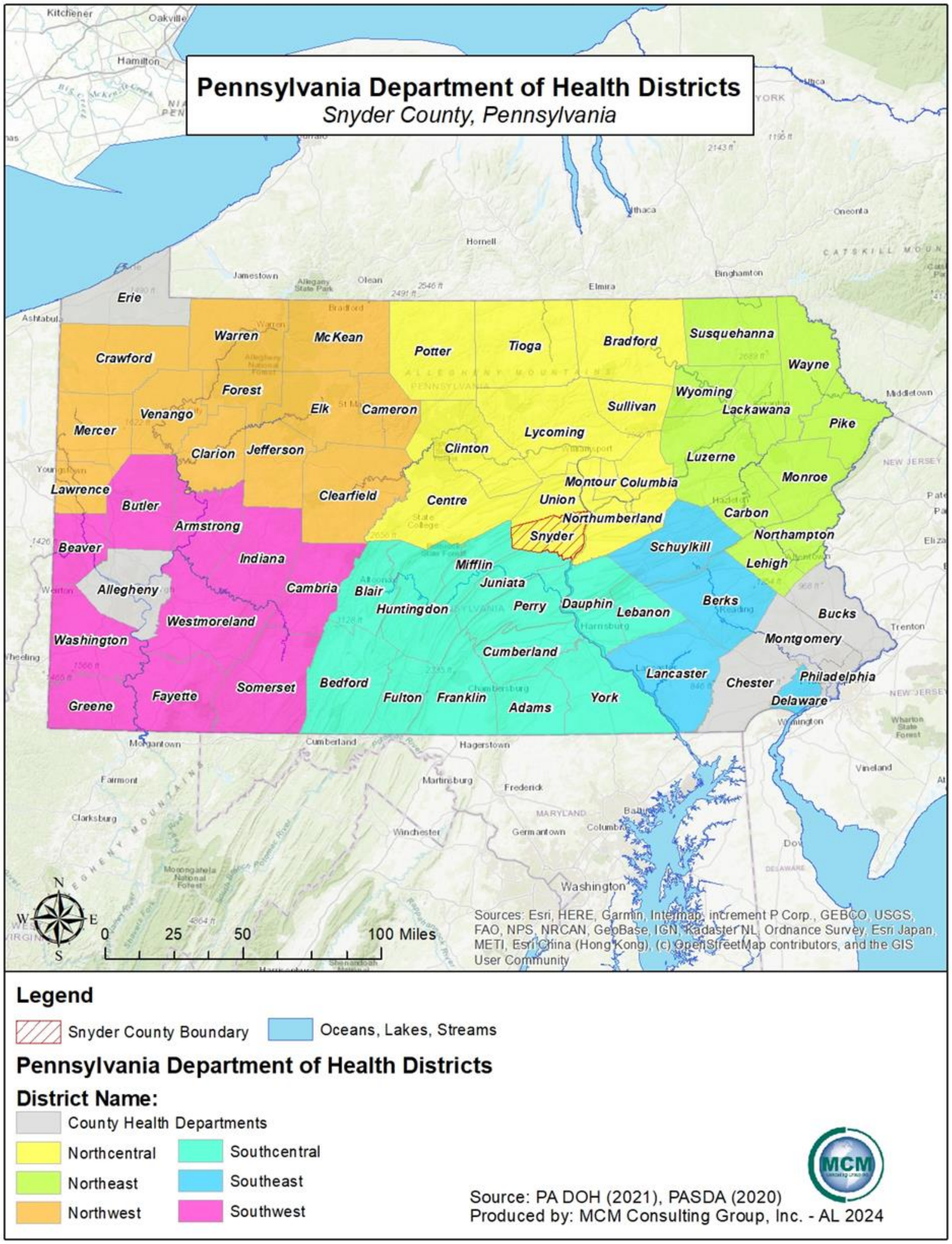
PODs are coordinated with county emergency managers by the PA DOH with the six regional healthcare districts (see *Figure 29 - Pennsylvania Department of Health Districts*). Snyder County is in the Northcentral Health District.

Land use and land development could directly impact the vulnerability of Snyder County to pandemic, epidemic, and infectious disease. Development of forested and rural areas could result in populations coming into direct contact with vectors for infectious disease including, most prominently, Lyme Disease and West Nile Virus. When areas that are rural and natural habitats for wildlife are developed, those vectors that live along and with wildlife have the potential to come into contact with the individuals developing the properties and the populations that will occupy or live in those areas. An increase in development could also lead to an increase in the number of individuals living in Snyder County, increasing the county's vulnerability to pandemic events, like COVID-19.

Climate change can significantly impact the dynamics of pandemics, epidemics, and infectious diseases. Rising temperatures and altered precipitation patterns can expand the geographic range of disease vectors, such as mosquitoes carrying diseases like malaria and dengue fever. Changes in climate can also affect the behavior and distribution of animal hosts, potentially facilitating the transmission of zoonotic diseases to humans. Extreme weather events, intensified by climate change, can also disrupt healthcare systems and infrastructure, hindering the response to outbreaks. Additionally, shifts in temperature and humidity can influence the survival and spread of pathogens, potentially leading to the emergence of new infectious diseases. Overall, climate change exacerbates the complexity and challenges of managing and preventing pandemics and epidemics, making it crucial to address both environmental and public health concerns in a coordinated manner to mitigate the impact on global health.

Population changes can directly impact the vulnerability of Snyder County to pandemic events, like COVID-19. With increased populations there is a greater risk of the spread of communicable diseases, especially in areas where the population density is high. There are Franklin Township, Freeburg Township, Jackson Township, McClure Borough, Monroe Township, Penn Township, Perry Township, Selinsgrove Dam Borough, Washington Township and West Perry Township. in Snyder County that have seen an increase in population between 2010 and 2020. This information is shown in *Table 3 – Population Change in Snyder County*. Snyder County should monitor population growth in the boroughs and cities of the county. The socially vulnerable populations in Snyder County are at a higher vulnerability of pandemic, epidemic, and infectious diseases than lesser vulnerable populations. This is due to lack of health care services for homeless, unsheltered, and transient populations in Snyder County and the difficulty in receiving treatment for health issues stemming from pandemics, epidemics, and infectious diseases. The national social vulnerability index for Snyder County from CDC/ATSDR (Center for Disease Control and Prevention/Agency for Toxic Substances and Disease Registry) is 0.2438% which represents a low level of vulnerability.

Figure 29 - Pennsylvania Department of Health Districts



4.3.9. Radon Exposure

4.3.9.1 Location and Extent

Airborne radon gas is radioactive and is a step in the radioactive decay of uranium to radium. Radon is a noble gas, cannot be seen, and has no odor. Like other noble gasses, radon gas is very stable, so it does not easily combine with other chemicals. Two isotopes of radon are commonly found: 222Rn and 220Rn. The 220Rn isotope has a very short half-life, so it often only exists for fifty-five seconds, not long enough to pose a hazard to humans. The 222Rn isotope has a half-life of 3.8 days which is long enough to pose a threat to humans. Still, due to the relatively short half-life of 222Rn, it only exists in relative proximity to its radioactive parent, usually within tens of feet away. Radon is a carcinogen and when inhaled, it can lead to the development of lung cancer.

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. Radon was discovered as a significant source of natural radiation for humans in 1984 in the Reading Prong geologic province in Eastern Pennsylvania, when routine monitoring of employees leaving the not yet active Limerick nuclear power plant showed readings that a construction worker working on the plant frequently exceeded expected radiation levels despite the fact that the plant was not active. The Environmental Protection Agency (EPA) guidelines state that mitigation actions should be taken if levels exceed 4pCi/L in a home, and most uranium miners have a maximum exposure of 67 pCi/L. Subsequent testing of the Limerick power plant worker's home showed high radon levels of 2,500 pCi/L (pico Curies per Liter), triggering the Reading Prong to become the focus of the first large-scale radon scare.

Radon gas is considered ubiquitous and can be found in indoor and outdoor environments. There is no known safe level of exposure to radon. For most people in Pennsylvania, the greatest risk of radon exposure is from within their home in rooms that are below, directly in contact with, or immediately above the ground. Sources of radon include radon in the air from soil and rock beneath homes, radon dissolved in water from private wells and exsolved during water use (rare in Pennsylvania), and radon emanating from uranium-rich building materials such as concrete blocks or gypsum wallboard (also rare in Pennsylvania). Key factors in radon concentration in homes are the rates of air flow into and out of the house, the location of air inflow, and the radon content of air in the surrounding soil. Because of the flow dynamics of air inside of most houses, even a small rate of soil radon gas inflow can lead to elevated radon concentrations.

There are several factors that contribute to higher radon levels in soil gas:

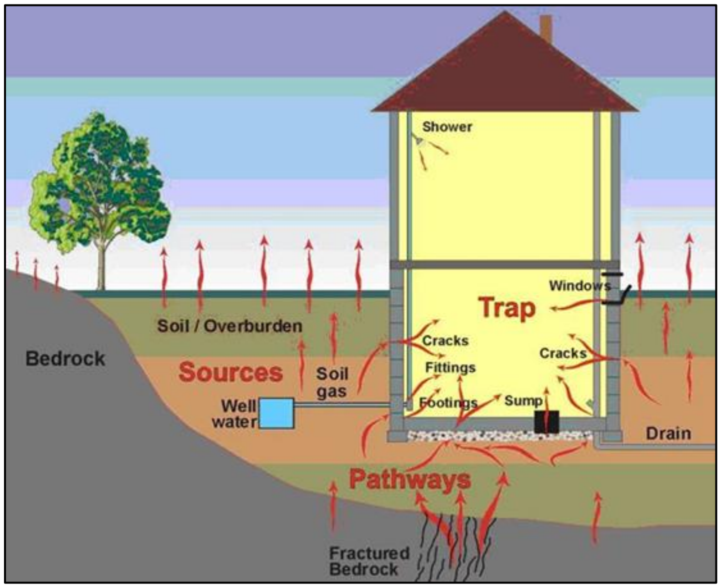
- Proximity to elevated uranium rich deposits (>50ppm). Areas within a few hundred feet of such deposits are most at risk. Such deposits are rare in Pennsylvania.
- Some more common rocks have higher than average uranium content (5 to 50 ppm), and proximity to such rocks also increases the risk of radon exposure. These rock types include black shales as well as granitic and felsic alkali igneous rocks. This is the most common source of high radon levels in Pennsylvania. The Reading Prong elevated radon levels come from Precambrian granitic gneisses.
- Other soil and bedrock properties that facilitate radon mobility. The amount of pore space in the soil and its permeability – more porous soils will allow radon to travel more easily. Limestone-dolomite soils can also be predisposed to collect radon from radium resultant from weathering of iron oxide or clay surfaces. In some cases (like State College in Centre County, PA) even with underlying bedrock having normal uranium concentrations (.5 to 5 ppm), the vast majority of locations built on limestone-dolomite soils exceed radon concentrations of 4pCi/L, and many exceeded 20 pCi/L.

The following three sources of radon in houses are now recognized (see *Figure 30 - Sketch of Radon Entry Points into a House* below):

- 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.

High radon levels were initially thought to be exacerbated in houses that are tightly sealed, but it is now recognized that rates of airflow into and out of houses, plus the location of air inflow and the radon content of air in the surrounding soil, are key factors 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 (where radon concentration is 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. 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.

Figure 30 - Sketch of Radon Entry Points into 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, 10% to 50% of newly formed radon atoms escape the host mineral of their parent radium and gain access to the air-filled pore space. The radon content of soil gas clearly tends to be higher in soils containing higher levels of radium and uranium, especially if the radium occupies a site on or near the surface of a grain from which the radon can easily escape. The amount of pore space in the soil and its permeability for airflow, including cracks and channels, are important factors determining radon concentration in soil gas and its rate of flow into a house. Soil depth and moisture content, mineral host and form for radium, and other soil properties may also be important. For houses built on bedrock, fractured zones may supply air having radon concentrations similar to those in deep soil.

The second factor listed above is most likely the cause of high radon levels in Snyder County. The data show that most reported zip codes in the county have high basement radon level test results. The areas and test results are shown in more detail in the past occurrence section.

4.3.9.2 Range of Magnitude

According to the EPA, about 21,000 lung cancer deaths each year in the U.S. are related to radon. It is the second leading cause of lung cancer after smoking and the number one cause of lung cancer among nonsmokers. Radon causes lung cancer by continuing to radioactive decay after being inhaled, and turning into a daughter product (218Po, 214Pb, 214Bi) which may become attached to lung tissue and induce lung cancer due to the continued radioactive decay.

The EPA reports that the national average radon concentration of indoor air of homes is about 1.3 pCi/L, and they recommend that homes be fixed if the radon level is 4pCi/L or more. There is, however, no safe level of radon exposure, so the EPA also recommends considering fixing a home if the radon level is between 2 pCi/L and 4 pCi/L.

Table 42 - Radon Risk for Smokers and Nonsmokers shows the relationship between various radon levels, probability of lung cancer, comparable risks from other hazards, and action thresholds. As seen in *Table 42 - Radon Risk for Smokers and Nonsmokers* below, a smoker exposed to radon has a much higher risk of lung cancer.

Table 42 - Radon Risk for Smokers and Nonsmokers

Radon Risk for Smokers and Nonsmokers			
Radon Level (pCi/L)	**If 1,000 People Were Exposed to this level over a lifetime…***	**Risk of cancer from radon exposure compares to...*** **	**Action Threshold**
SMOKERS			
20	About 260 people could get lung cancer	250 times the risk of drowning	Fix Structure
10	About 150 people could get lung cancer	200 times the risk of dying in a home fire	
8	About 120 people could get lung cancer	30 times the risk of dying in a fall	
4	About 62 people could get lung cancer	5 times the risk of dying in a car crash	
2	About 32 people could get lung cancer	6 times the risk of dying from poison	Consider fixing structure between 2 and 4 pCi/L
1.3	About 20 people could get lung cancer	(Average indoor radon level)	Reducing radon levels below 2pCi/L is difficult
0.4	About 3 people could get lung cancer	(Average outdoor radon level)	
NON-SMOKERS			
20	About 36 people could get lung cancer	35 times the risk of drowning	Fix Structure

Radon Risk for Smokers and Nonsmokers			
Radon Level (pCi/L)	**If 1,000 People Were Exposed to this level over a lifetime…***	**Risk of cancer from radon exposure compares to...*****	**Action Threshold**
10	About 18 people could get lung cancer	20 times the risk of dying in a home fire	
8	About 15 people could get lung cancer	4 times the risk of dying in a fall	
4	About 7 people could get lung cancer	The risk of dying in a car crash	
2	About 4 people could get lung cancer	The risk of dying from poison	Consider fixing structure between 2 and 4 pCi/L
1.3	About 2 people could get lung cancer	(Average indoor radon level)	Reducing radon levels below 2pCi/L is difficult
0.4	-	(Average outdoor radon level)	

Note: Risk may be lower for former smokers
* Lifetime risk of lung cancer deaths from EPA Assessment of Risks from Radon in Homes (EPA 402-R-03-003).
** Comparison data calculated using the Centers for Disease Control and Prevention's 1999-2001 National Center for Injury Prevention and Control Reports.

4.3.9.3 Past Occurrence

In 1984, the Pennsylvania Radon Bureau responded to the newly detected high radon levels with a massive radon monitoring, educational, and remediation effort. In the start of November 1986, over 18,000 homes had been screened for radon and approximately 59% were found to have radon daughter levels in excess of the 0.020 Working Level (WL) guideline. Radon daughter levels ranged up to 13 WL or 2600 pCi/L or radon gas.

The Pennsylvania Department of Environmental Protection (PA DEP) provides information for homeowners about how to test for radon in their homes, and when they receive a test result over 4 pCi/L, the PA DEP Bureau of Radiation Protection works to help homeowners repair the home and mitigate the hazard. The DEP 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. The PA DEP records all the tests they receive and categorize them in a searchable database by zip code. There are currently 2,174 zip codes in Pennsylvania, but the zip code radon test data only covers for 986 zip codes. The missing zip codes that report in the database as "N/A" for insufficient data either had fewer than thirty test results or no test results at all.

Figure 43 – Radon Test Results in Snyder County shows a total of ten zip codes in Snyder County where tests were reported to the PA DEP to report their findings; those with no available data were not included in the table. The highest average radon level was reported from the 17864 zip code, which is in the south of the county, with an average reading of 18.2 pCi/L within location of the basement. Most reporting zip codes in Snyder County have average basement Radon levels significantly above the suggested EPA action level of 4 pCi/L. The average basement reading for reporting zip codes in the county is 11.07 pCi/L, and the average first floor reading is 6.0 pCi/L.

Table 43 - Radon Test Results in Snyder County

Radon Level Test Results					
Zip Code	**Postal Community**	**Location**	**Number of Tests**	**Max Result pCi/L**	**Average Result pCi/L**
17812	Beaver Springs	Basement	54	38.1	6.7
17813	Beavertown	Basement	129	119.0	7.9
17827	Freeburg	Basement	44	48.3	7.7
17833	Kreamer	Basement	31	46.3	5.6
17841	McClure	Basement	147	326.2	14.2
17842	Middleburg	Basement	565	248.0	14.2
		First Floor	52	140.0	7.3
17853	Mount Pleasant Mills	Basement	89	172.0	15.4
17864	Port Trevorton	Basement	92	154.4	18.2
17870	Selinsgrove	Basement	2290	383.6	9.7
		First Floor	351	140.0	4.7
17876	Shamokin Dam	Basement	274	303.0	11.1
Source: PA DEP, 2024					

4.3.9.4 Future Occurrence

Radon exposure is likely given the geologic and geomorphic conditions in Snyder County. The EPA and USGS have mapped radon potential in the US to help target resources and assist local governments in determining if radon-resistant features are applicable for new construction. The designations are broken down in three zones and are assigned by county, as shown in *Figure 31 – Pennsylvania Radon Levels*. Each zone reflects the average short-term measurement of radon that can be expected in a building without radon controls. Snyder County is located within Zone three with counties of high risk potential for radon which indicate an intermediate likelihood of occurrence in the future.

1. Zone 1 has the highest potential and readings can be expected to exceed the 4 pCi/L recommended limit.
2. Zone 2 has a moderate potential for radon with levels expected to be between 2 and 4 pCi/L and
3. Zone 3 has a low potential with levels expected to be less than 2 pCi/L.

Due to the moderate likelihood of future occurrence, the level of radon daughters should be monitored. Radon daughters are the concentration of decay products of radon in the uranium chain. Fortunately, the presence of radon daughters can be monitored through the means as radon gas. *Table 44 - Suggested Actions and Time Frame for Exposure to Radon Daughters* provides suggested actions and time frames for varying levels of exposure to radon daughters.

Table 44 - Suggested Actions and Time Frame for Exposure to Radon Daughters

Suggested Actions and Timeframe for Exposure to Radon Daughters		
Exposure Level*	Suggested Action**	Timeframe For Plan
more than 5.0 WL***	Residents should either promptly relocate or undertake temporary remedial action to lower levels as far below 5.0 WL as possible. Smoking in high areas discouraged.	Within 2-3 days
1.0 to 5.0 WL	Residents should undertake temporary remedial action to lower levels as far below 1.0 WL as possible. Smoking in high areas discouraged.	Within 1 week
0.5 to 1.0 WL	Residents should undertake temporary remedial action to lower levels as far below 0.5 WL as possible.	Within 2 weeks

Suggested Actions and Timeframe for Exposure to Radon Daughters		
Exposure Level*	Suggested Action**	Timeframe For Plan
0.1 to 0.5 WL	Residents should undertake temporary remedial action to lower levels as far below 0.1 WL as possible. Higher exposure levels require action to be taken in a shorter	3 weeks to 3 months
0.02 to 0.1 WL	Residents should undertake temporary and/or permanent remedial action to lower levels below 0.02 WL. Higher exposure levels require action to be taken in a shorter	4 to 15 months

Climate change will have minor impacts on radon exposure in Snyder County, if any. Climate change will have an increased impact on the vulnerability of individuals to radon if those individuals live in an area where permafrost is a feature of the climate. With rising global temperatures, permafrost can melt, resulting in increased soil and bedrock erosion. This can result in higher rates of radon exposure. This is of primary concern to those areas located in the northern latitudes and will not have a significant impact on the bedrock or soils of Snyder County. It is possible that climate change could impact soil and bedrock erosion rates in Snyder County, but these impacts would be minor or unknown, at this time.

4.3.9.5 Vulnerability Assessment

Proper testing for radon levels should be conducted across Snyder County, especially in the areas of higher incidence levels, and for those individuals and households that are susceptible to the contributing risks. This testing will determine the level of vulnerability that residents face in their homes, as well as in their businesses and schools.

Snyder County is in the EPA Radon Hazard Zone three, meaning there is a high risk of radon exposure. Smokers can be up to ten times more vulnerable to lung cancer from high levels of radon depending on the level of radon to which they are exposed. Additionally, older homes that have crawl spaces or unfinished basements are more vulnerable to high radon levels. Average basement radon levels for homes that reported their results to the PA DEP are often found to be above the EPA action level of 4 piC/L. *Figure 32 – Radon Levels by Zip Code* shows the best available data from the EPA about the percentage of homes with radon levels at, or above, the EPA action level. The EPA estimates that an average radon mitigation system costs approximately $1,200.00. The PA DEP Bureau of Radiation Protection provides short- and long-term tests to determine radon levels, as well as information on how to mitigate high levels of radon in buildings. The 2023 PA state HMP estimates that there are 14,487 vulnerable buildings in Snyder County that are in areas with high radon test results, and the cost to mitigate the most impacted of those buildings (an estimated 20% of them or 2,897 buildings) would be $3,476,880.00.

The historic properties in Snyder County are at a moderate level of risk to radon levels. Those historic properties are at an increased risk of radon exposure if they have not already been mitigated for radon levels. The 17870 zip codes, where those properties are located is in an area that has had at least an average of 7.91 pCi/L based on tests reported to the state of Pennsylvania. There are three historic properties listed with the National Register of Historic Places that are located in areas that have had at least an average of between 7.91 pCi/L and 9.71 pCi/Lof measured radon levels. Those properties are listed below.

- Seibert Hall, Susquehanna University
- Selinsgrove Hall, Susquehanna University
- Governor Simon Snyder Mansion

The cultural resources in Snyder County could be adversely impacted by radon exposure. The areas that underlay in Snyder County have previous average radon levels between 5.6 pCi/L and 19.8 pCi/L. If these locations have not been properly mitigated, the visitors to these locations could be at risk of radon exposure, even for a short time.

The direct hazard to radon exposure at these locations is not related to the buildings, but to the individuals who live, work, visit, and maintain these structures.

The vulnerability of natural areas to radon exposure is negligible. Since radon exposure typically is a natural hazard to humans when in enclosed spaces, and over a large portion of time, natural areas are at a lower risk. Most individuals are doing activities when outdoors and are usually not stationary for hours and days. The local parks, state game lands, state forests, and state parks are at low risk and low vulnerability.

Municipalities with an increased risk of radon exposure (with areas with a basement pCi/L over 13):

- Adams Township
- Beaver Township
- Center Township
- Chapman Township
- Franklin Township
- Freeburg Borough
- Jackson Township

- McClure Borough
- Middleburg Borough
- Middlecreek Township
- Monroe Township
- Penn Township
- Perry Township
- Spring Township
- Union Township
- Washington Township
- West Beaver Township
- West Perry Township

Municipalities without an increased risk of radon exposure (with areas with a basement pCi/L under 13):

- Beavertown Borough
- Selinsgrove Borough
- Shamokin Dam Borough

Socially vulnerable populations in Snyder County are at an increased vulnerability to radon exposure than other groups in Snyder County. Approximately 9.8% of the population of Snyder County is in poverty, and those individuals may be located in areas of high radon risk. Those individuals may also be unable to purchase or install radon remediation kits and systems due to economic factors. Information from the Pennsylvania Department of Environmental Protection states that installing a radon reduction system can cost between $500.00 to $2,000.00 with the average costing $1,000.00 (PA DEP, 2023). Radon exposure may also impact the health of those considered to be socially vulnerable. With unequal access or opportunity to health care, potential health effects related to radon exposure can go unreported and unaddressed in socially vulnerable populations.

Population changes, especially any increase in population, in Snyder County pose an increased risk to vulnerability of radon exposure to individuals in each municipality. Between the 2010 and the 2020 US Census, ten municipalities in Snyder County experienced population growth. Franklin Township, Freeburg Borough, Jackson Township, McClure Borough, Monroe Township, Penn Township, Perry Township, Perry Township, Selinsgrove Borough, Washington Township and West Perry Township. These increases can be seen in *Table 3 – Population Change in Snyder County*. Another risk to radon exposure due to population changes could occur from people moving into structures with basements that have been empty for extended periods of time or converting camps into homesteads. Education about the dangers of radon exposure should occur at the municipal level when existing homes are purchased. New construction can be built with radon prevention systems in place costing between $500.00 to $2,000.00 per building.

Land use could result in more rapid radon exposure if the areas being used for different land uses are over areas of high radon levels. If new land use results in exposure of the bedrock to weathering, increased radon exposure and leakage will occur. This could include the development of new or commercial properties in an area. New development may be built and constructed with radon reduction systems already in place, reducing the vulnerability for each new location with these systems. New development may have clean aggregate in construction, piping below the foundation slab, sealing of openings in foundations, or electric boxes in the attic for radon reduction system fans (PA DEP, 2023).

Radon can impact Snyder County infrastructure systems by accelerating corrosion in metal components of buildings such as steel reinforcements in concrete, leading to weakening of structural elements over time. This corrosion can compromise the stability of bridges, tunnels, and other critical infrastructure. Additionally, radon-induced degradation of building materials like concrete can cause cracks, spalling, and overall degradation of structural integrity. Radon can infiltrate underground utility tunnels that can corrode pipes, conduits and electrical wiring which can lead to the potential of leaks and electric failures. Radon has the ability to compromise both structural and operational functions of infrastructure system.

Figure 31 - Pennsylvania Radon Levels

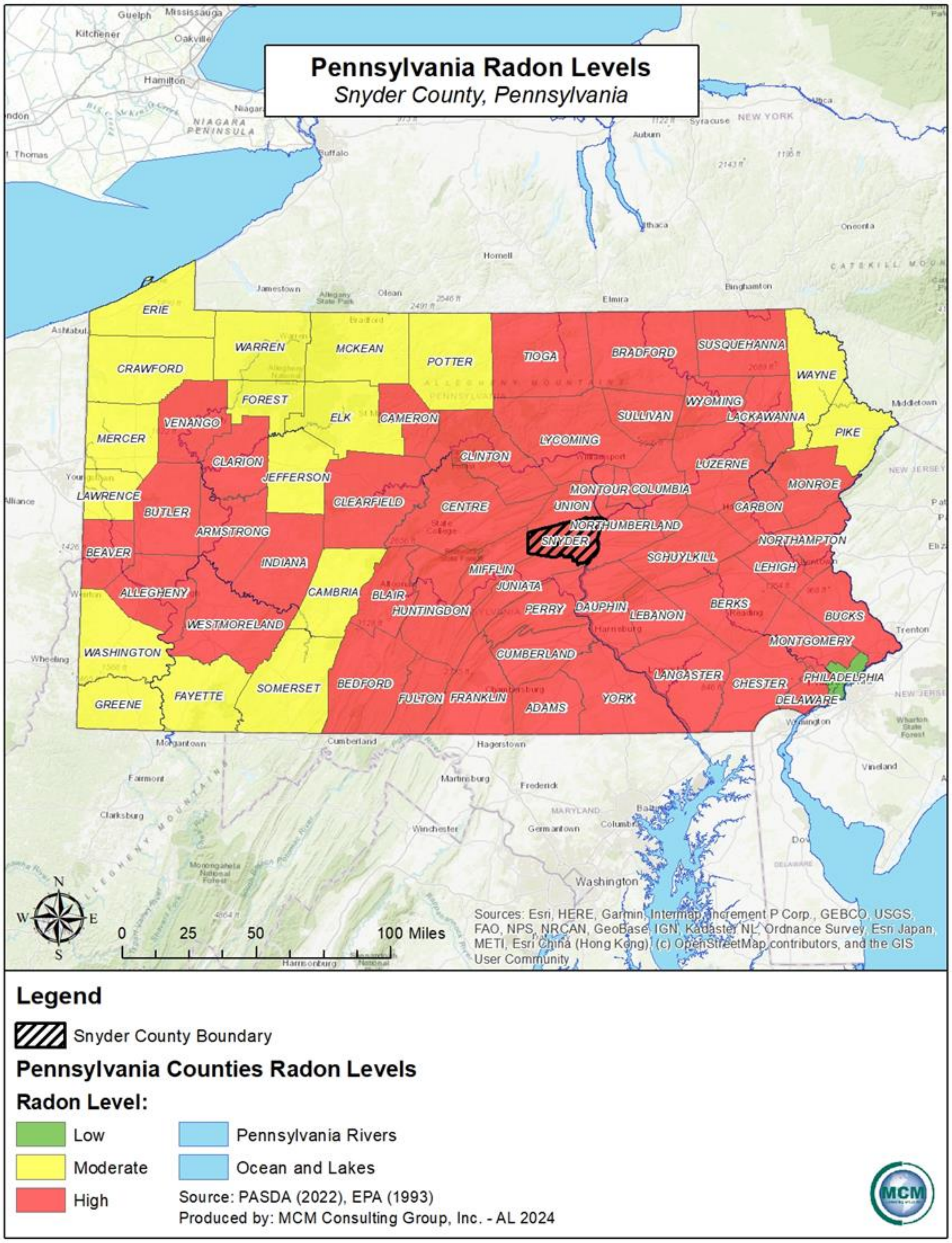
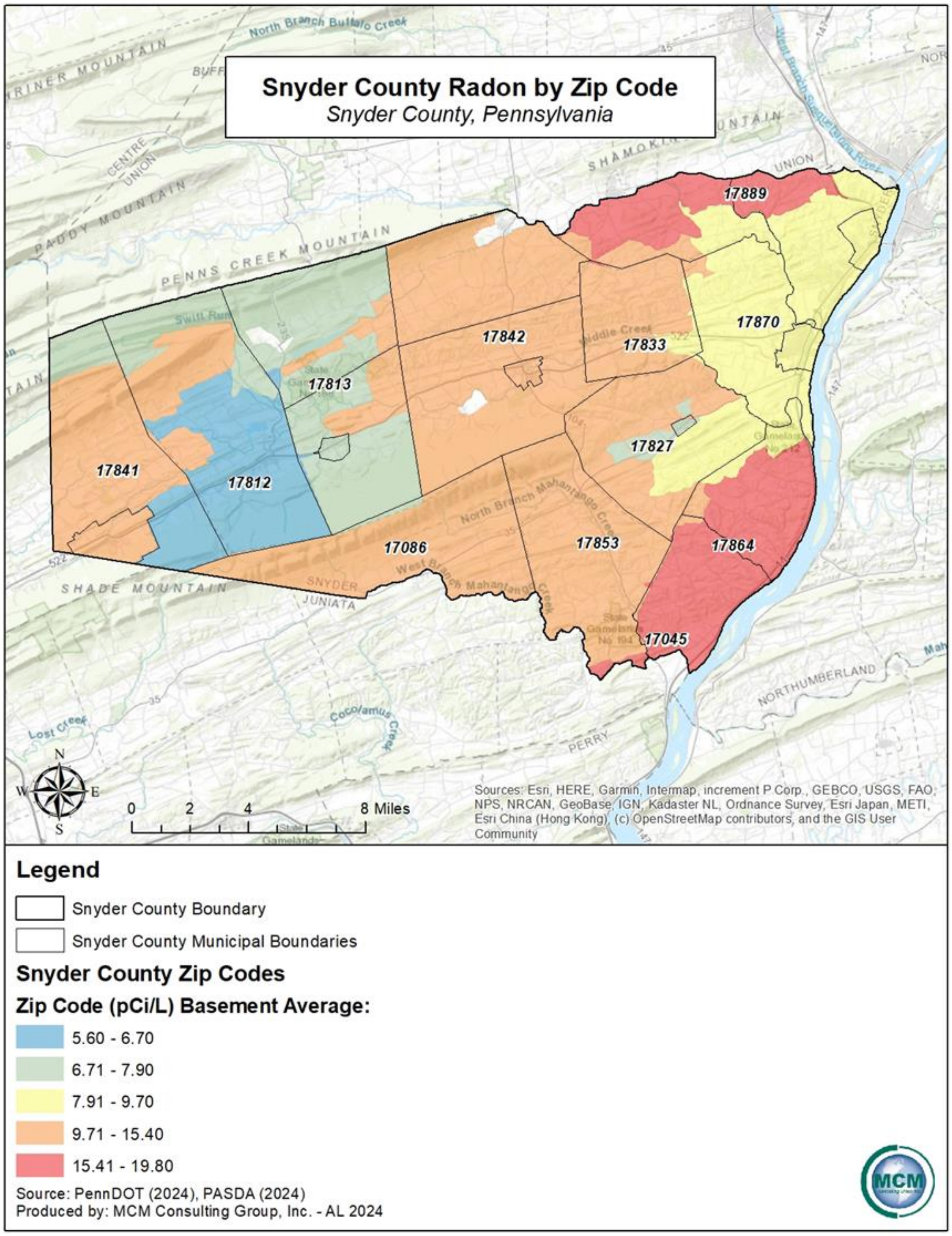


Figure 32 - Radon Levels by Zip Code



4.3.10. Subsidence and Sinkhole

4.3.10.1 Location and Extent

Subsidence is the sinking movement of the earth's surface; the result of this movement is commonly referred to as a sinkhole. There are two common causes of subsidence in Pennsylvania: 1) dissolution of carbonate rock such as limestone or dolomite and 2) mining activity. In the first case, water passing through naturally occurring fractures and bedding planes dissolves bedrock leaving voids below the surface. Eventually, overburden on top of those voids collapses, leaving surface depressions resulting in what is known as karst topography. Characteristic structures associated with karst topography include sinkholes, linear depressions, and cases. Often, sub-surface solution of limestone will not result in the immediate formation of karst features. Collapse sometimes occur only after a large amount of activity, or when a heavy burden is placed on overlying material. The bedrock geology is found mostly in the south-central and eastern portions of the Commonwealth of Pennsylvania, and Snyder County is located in a karst vulnerable area. Subsidence in Snyder County is primarily due to karst topography and also as a result of mining activity. This plan will focus on both carbonate rock / karst topography and mining activity. Snyder County has a history of subsidence due to carbonate rock and mining activity.

Mining activity is concentrated in the southwestern region of the state. The majority of sub-surface (i.e., underground) extraction of materials such as oil, gas, coal, metal ores (i.e., copper, iron, and zinc), clay, shale, limestone, or water can result in slow-moving or abrupt shifts in the ground surface and these areas have a higher potential to be impacted by sinkholes and subsidence. Sinkholes often develop where the cover above a mine is thin. Sinkhole development normally occurs where the interval to the ground surface is less than three to five times the thickness of the extracted seam and the maximum interval is up to ten times the thickness of the extracted seam. In western Pennsylvania, most sinkholes develop where the soil and rock above a mine are less than fifty feet thick.

Human activity can also result in subsidence or sinkhole events. Leaking water pipes or structures that convey storm-water runoff may result in areas of subsidence as the water dissolves substantial amounts of rock over time. Poorly managed stormwater can be an exacerbating factor is subsidence events. In some cases, construction, land grading, or earthmoving activities that cause changes in stormwater flow can trigger sinkhole events.

4.3.10.2 Range and Magnitude

No two subsidence areas or sinkholes are exactly alike. Variations in size and shape, time period under which they occur (i.e., gradually, or abruptly), and the proximity to development ultimately determine the magnitude of damage incurred. Events could result in minor elevation changes or deep, gaping holes in the surface. Subsidence and sinkhole 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. Isolated incidents of subsidence throughout the coal regions over the past years have affected houses, garages, and trees that have been swallowed up by subsidence holes. Lengths of local streets and highways, and countless building foundations have been damaged.

If long-term subsident or sinkhole formation is not recognized and mitigation measures are not implemented, fractures or complete collapse of building foundations and roadways may result. The worst-case scenario of a mine subsidence event for Snyder County would be similar to an event in Allegheny County in 2013, when sixty-nine homes in Hyde Park sustained mine subsidence damage. The Pennsylvania Department of Environmental Protection responded to the subsidence by filling the mine voids at a cost of $3.7 million. If mitigation measures are not taken, the cost to fill in and stabilize sinkholes can be significant although sinkholes are limited in range of magnitude.

Voids in the earth's subsurface are created where coal was previously mined and removed. The condition removes a significant portion of the support of the overlying rock strata that usually causes the rock strata to fall or subside into the voids that may damage dwellings or other surface structures above the affected areas. Mining locations across the county should be carefully noted and avoided as sites for new construction unless the proper measures are taken to ensure the mine's soundness.

The Snyder County local planning team assigned a risk factor assessment score of 1.3 to subsidence and sinkhole formation. This places the hazard at a low risk factor. *Figure 33 – Sinkhole Susceptibility in Pennsylvania* illustrates the portions of the Commonwealth of Pennsylvania where sinkholes and subsidence are common. The hazard for subsidence and sinkholes in these regions is very high. Snyder County has a large portion of mining areas and is therefore one of these regions.

4.3.10.3 Past Occurrence

There is no comprehensive list of mine subsidence in Snyder County. The Pennsylvania Department of Conservation and Natural Resources (PA DCNR) provides an online sinkhole inventory database, which lists a total of 3,619 identified sinkholes in Pennsylvania as of 2024. Of these sinkholes none of them fall within Snyder County. The fact that no sinkholes were identified does not, necessarily, mean there are no sinkholes in Snyder County. Additionally, the Pennsylvania Department of Environmental Protection indicates that some small incidences of sinkholes occur several times per week and cause limited damage and that many of these are related to failing infrastructure like water main breaks or collapsed pipes.

4.3.10.4 Future Occurrence

There is currently no reliable information regarding the probability of future occurrence of subsidence or sinkholes in Pennsylvania. One way of estimating the probability of future occurrences would be to project the historical trends into the future, but there is no comprehensive documentation of previous events in Snyder County. The PA DEP has noted that mine subsidence events are constant though they vary in intensity and damage. Based on geological conditions and mining activities in Snyder County, the annual occurrence of subsidence and sinkholes near karst topography and where mining occurs is considered likely. Although precise locations of future occurrences is difficult to predict due to site-specific conditions that contribute to sinkhole development, there are several signs that can signal potential development.

The signs include:

- Slumping or falling fence posts, trees, or foundations.
- Sudden formation of small ponds.
- Wilting vegetation.
- Discolored well water.
- Structural cracks in walls and/or floors.

Based on geological conditions and mining activity, subsidence events are likely to occur in Snyder County. If land development and mining were to occur in an area that is unstable or unsafe, a subsidence event or sinkhole is likely to form. *Figure 34 – Unsuitable Areas for Mining in Pennsylvania* illustrates the areas of Pennsylvania where mining could potentially cause a subsidence event or a sinkhole. A significant number of these areas that are unsuitable for mining are located in and around Snyder County.

Climate change may increase the frequency of subsidence in Snyder County. Climate change could result in more intense rainfall from more frequent hurricanes and tropical storms, or it could result in hot, dry areas becoming increasingly dry. The increase in precipitation could result in ground swelling, due to soils that contain clay minerals absorbing the rainfall. This swelling is seen as an increase in vertical land motion, while shrinking is the decrease in vertical land motion. Shrinking occurs when there are high temperatures that cause the land to dry out, resulting in more movement in the soil, which can be seen as a gradual settling or sudden sinking of Earth's surface. The combination of shrinking and swelling could increase with climate change and ultimately increase the frequency of subsidence and sinkholes in Snyder County.

4.3.10.5 Vulnerability Assessment

Areas of the county where commercial mining operations take place are the most vulnerable to subsidence and sinkhole hazards. Natural subsidence and sinkholes have never been reported in Snyder County. A mined area may be differentially prone to subsidence based on its geology and depth of mineral seam, but reliable information about the different locations of varying depths of seams are not available. Geologists agree that all areas that are mined are prone to subsidence; therefore, coal mined areas are shown as vulnerable to mine subsidence.

Subsidence cannot be ruled out as a potential hazard for Snyder County. There are no state or county critical infrastructure facilities at risk in the county due to sinkholes.

Within Snyder County there are no assets that are vulnerable to subsidence and sinkhole impacts including historical and cultural resources, critical infrastructure, and community lifelines.

Municipalities with the highest risk of subsidence or sinkholes (abandoned mine areas and areas unsuitable for mining):

- None

Municipalities with an increased risk of subsidence or sinkholes (abandoned mine areas):

- None

Municipalities without an increased risk of subsidence or sinkholes (no abandoned mine areas):

- Adams Township
- Beaver Township
- Beavertown Borough
- Center Township

- Chapman Township
- Franklin Township
- Freeburg Borough
- Jackson Township
- McClure Borough
- Middleburg Borough
- Middlecreek Township
- Monroe Township
- Penn Township
- Perry Township
- Selinsgrove Borough
- Shamokin Dam Borough
- Spring Township
- Union Township
- Washington Township
- West Beaver Township
- West Perry Township

Underserved, unserved, and socially vulnerable populations face heightened impacts from subsidence and sinkholes. Limited resources often result in substandard infrastructure, exacerbating susceptibility to ground collapse. Housing in these areas is prone to structural damage, posing threats to lives and livelihoods. Displacement becomes a critical concern as sinkholes disrupt communities, challenging access to safe shelter. Vulnerable populations may lack the financial means for adequate recovery, perpetuating economic hardships.

Population change can increase the impacts of subsidence or sinkholes in Snyder County. Snyder County has eleven out of twenty-one municipalities that had a population increase between the 2010 and the 2020 US Census. This population change can also be seen in *Table 3 – Population Change in Snyder County*. Based on this information, it can be speculated that these municipalities may have an increased/equivalent risk to subsidence and sinkholes since 2010, due to the increase in population and construction.

Current land use in Snyder County can affect the vulnerability of the county to subsidence and sinkholes. Impervious surfaces allow pollutants from aerial and terrestrial sources to accumulate. During stormwater runoff, these pollutants will run into stormwater drains and directly to local waterbodies. When impervious surfaces increase, so does the quantity, speed, temperature, and pollutant load of the storm water runoff.

Subsidence and sinkholes present dual threats to both natural and cultural areas. Ecologically, these alter landscapes, compromising soil stability and disrupting ecosystems. Sinkholes can swallow habitats, impacting land use for the county. Culturally, the collapse of terrain endangers heritage sites, structures, and artifacts, erasing historical landscapes. Subsidence may threaten traditional agricultural practices linked to specific terrains.

Subsidence and sinkhole events can also pose a threat to systems within Snyder County. Some systems that may be affected by subsidence and sinkhole events are natural gas, water, and the numerous other materials and chemicals transported through underground water systems in Snyder County. During significant subsidence and sinkhole events, underground pipelines may crack, causing the transported material to leak into the ground and contaminating water sources in the county. Even in more contained scenarios, a small leak can have profound impact if the transported material is toxic or hazardous in nature, leading to degradation of the natural resources in the impacted communities. Subsidence and sinkhole events can also cause above ground localized transportation issues if an event were to occur along a transportation route through Snyder County. This can cause a delay in daily transportation and may require alternate transportation routes to be established for an extended period of time.

Figure 33 - Sinkhole Susceptibility in Pennsylvania

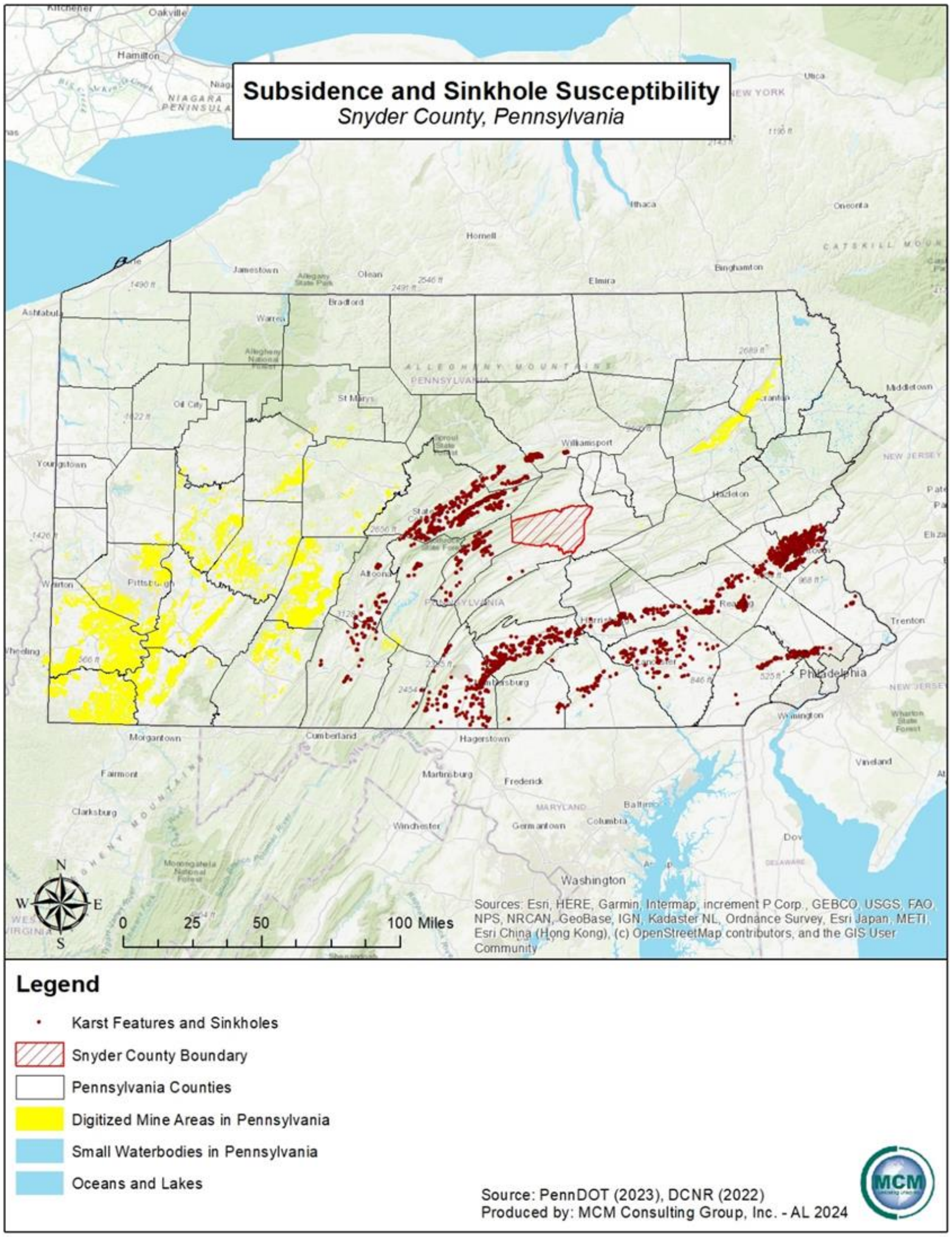
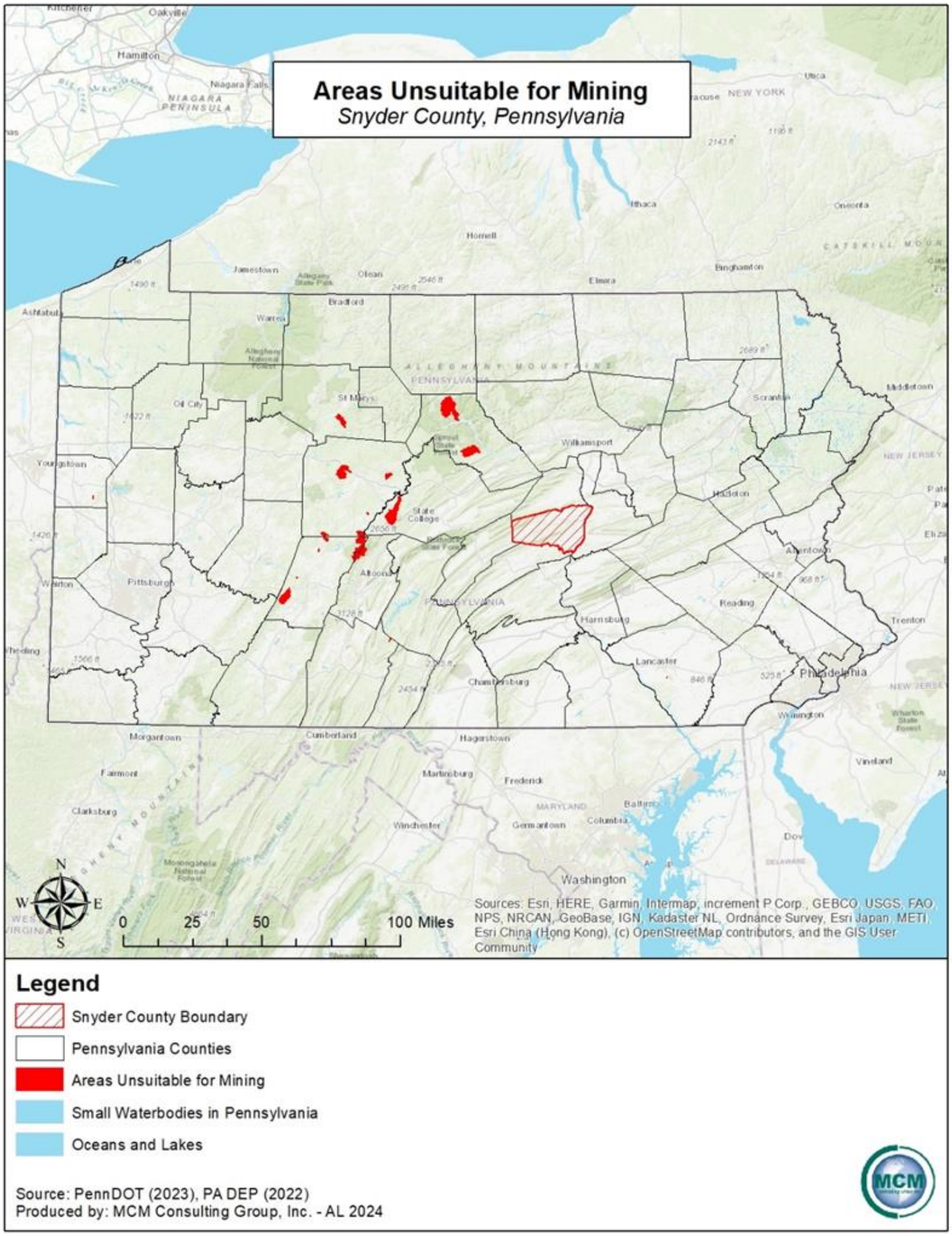


Figure 34 - Unsuitable Areas for Mining in Pennsylvania



4.3.11. Tornado and Windstorm

4.3.11.1 Location and Extent

Tornadoes and windstorms can occur throughout Snyder County and are usually localized in their location and extent. Severe thunderstorms may result in conditions favorable for the formation of windstorms, including tornadoes. Tornadoes are nature's most violent storms and can cause fatalities and devastation to neighborhoods and municipalities within the county and region. Tornadoes can occur at any time during the day or night but are most frequent during the later afternoon and early evening, which are typically the warmest hours of the day. Tornadoes are most likely to occur in the spring and summer.

Tornadoes

There are two main types of tornadoes: supercell and non-supercell. Supercell tornadoes are the most common and often the most dangerous type of tornado. A rotating updraft is key to the development of a supercell and, eventually, a tornado. Once the updraft is rotating and being fed by warm air, a tornado is formed. The other type of tornado is categorized as non-supercell, which is not as common as a supercell tornado. One type of non-supercell tornado is the "Quasi-Linear Convective Systems" (QLCS). The QLCS tornadoes typically arise during the late night or early morning hours and are typically weaker and more short-lived than supercell tornadoes. However, QLCS are more difficult to detect effectively. Another type of non-supercell tornado is a landspout. These tornadoes are narrow, rope-like funnels that form when a thundercloud grows without a rotating updraft, which causes the spinning motion common with tornadoes to appear near the ground.

Windstorms

Windstorms are experienced on a region-wide scale. The most frequent cause of windstorms in Pennsylvania are thunderstorms, although they may also be caused by hurricanes and winter storms. Windstorms are defined as sustained wind speeds of 40 mph or greater, lasting for at least one hour, or winds of 58 mph or greater lasting for any duration. There are a wide variety of windstorm events that can take place in Snyder County.

4.3.11.2 Range of Magnitude

Tornadoes

Each year tornadoes account for $1.1 billion in damages and cause over eighty deaths nationally. Thus far, 2011 was the second worst year on record for deadly tornadoes behind 1936. The number of tornado reports has increased since 1950. 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 windblown debris, also accompanied by lightning or large hail. The most violent tornadoes have rotating winds of 250 mph or more and are capable of causing extreme destruction and turning normally harmless objects into deadly projectiles.

Tornado movement is characterized in two ways: direction/speed of spinning winds and the forward movement of the tornado, also known as the storm track. The rotational wind speeds can range from 65 to more than 200 miles per hour (mph). The speed of forward motion can range from 0 mph to 50 mph. Forward motion of a tornado path can be a few to several hundred miles in length. Widths of tornadoes vary from less than 100 feet in diameter to more than a mile wide in regard to the largest tornadoes on record. The National Centers for Environmental Information (NCEI) reports that, "the maximum winds in tornadoes are often confined to extremely small areas and vary tremendously over short distance," which explains why one house in a tornado's path may be completely demolished while a neighboring house could remain untouched. Some tornadoes never touch the ground and remain short lived, while others may touch the ground or "jump" along its path.

The destruction from tornadoes can range from minor to severe depending on the intensity, size, and duration of the storm. Typically, tornadoes cause the greatest damage to structures of light-weight construction, such as mobile homes. The Enhanced Fujita Scale, also known as the "EF-Scale", measures tornado strength and associated damages. The EF-Scale is an update to the earlier Fujita Scale, also known as the "F-Scale", that was published in 1971. These scales classify U.S. tornadoes into six intensity categories based upon the estimated maximum winds occurring within the wind vortex. This scale can be seen in *Table 45 – Enhanced Fujita Scale*. The EF-Scale became effective on February 1, 2007. Since its implementation by the National Weather Service in 2007, the EF-Scale has become the definitive metric for estimating wind speeds within tornadoes based upon damage to buildings and structures. Previously recorded tornadoes are reported with the older F-Scale values, but *Table 45 – Enhanced Fujita Scale* shows F-Scale categories with corresponding EF-Scale wind speeds.

Figure 35 – Pennsylvania Wind Zones identifies wind speeds that could occur across the state, which may be used as the basis for design and evaluation of the structural integrity of shelters and critical facilities. The majority of Pennsylvania falls within Zone III, meaning that the design of shelters and critical facilities should be able to withstand a three-second gust of up to 200 mph, regardless of whether the gust is a result of a tornado, hurricane, tropical storm, or

windstorm incident. The western portion of the state falls within Zone IV, which indicates shelters can withstand up to 250 mph winds, while the eastern side falls within Zone II where shelters should be designed to withstand up to 160 mph.

Since Snyder County falls within Zone II, shelters and critical facilities should be designed to withstand up to 200 mph winds, regardless of whether the gust is the result of a tornado, coastal storm, or windstorm event. While it is difficult to pinpoint the exact locations at the greatest risk of a tornado, the southeast, southwest, and northwest sectors of the commonwealth are more prone to tornadoes.

Tornadoes/windstorms of all types have caused the following problems in Snyder County:

- Power failures lasting four hours or longer.
- Loss of communications networks lasting four hours or more.
- Residents requiring evacuation or provision of supplies or temporary shelter.
- Severe crop loss or damage.
- Trees down or snapped off high above the ground/tree debris-fire fuel.
- Toppled high profile vehicles, including those containing hazardous materials.

Table 45 - Enhanced Fujita Scale

Enhanced Fujita Scale			
EF-Scale Number	**Wind Speed (MPH)**	**F-Scale Number**	**Description of Potential Damage**
EF0	65–85	F0-F1	**Minor damage**: Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e., those that remain in open fields) are always rated EF0.
EF1	86-110	F1	**Moderate damage**: Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.

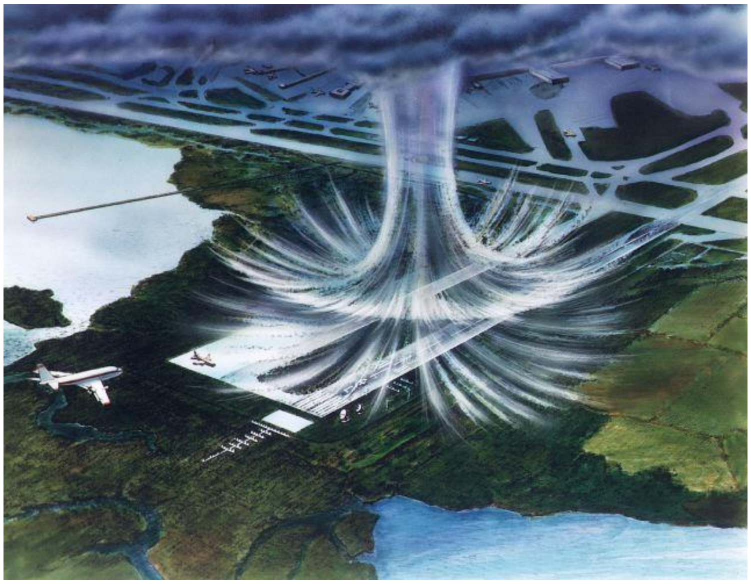
Enhanced Fujita Scale			
EF-Scale Number	**Wind Speed (MPH)**	**F-Scale Number**	**Description of Potential Damage**
EF2	111–135	F1-F2	**Considerable damage**: Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136–165	F2-F3	**Severe damage**: Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166–200	F3	**Devastating damage**: Well-constructed houses and whole frame houses completely leveled; cars thrown, and small projectiles generated.
EF5	>200	F3-F6	**Extreme damage**: Strong frame houses leveled off foundations and swept away; automobile-sized projectiles fly through the air in excess of 100 m (300 ft.); steel reinforced concrete structure badly damaged; high-rise buildings have significant structural deformation.
Source: NWS, 2007			

Most of the tornadoes that have struck Snyder County have occurred countywide. In 1985, a total of twenty-three confirmed tornadoes touched down across Eastern Ohio, Southwestern New York, and Central/Western Pennsylvania. This outbreak remains the worst in recorded history for this area. Of these twenty-three tornadoes, eight were of violent intensity (F4 or F5) with estimated wind speeds over 200 mph. Snyder County was not impacted by the 1985 outbreak.

Windstorms

Windstorms can be broken down into multiple categories. Straight-line winds are the most common wind event and are different from tornadic winds. It is a ground level, non-rotational, wind that comes out of a thunderstorm. Downdrafts are columns of air that rapidly sinks toward the ground and are classified as either a microburst or microburst. A macroburst is the outward burst of strong winds that are near or at the surface with horizontal dimensions greater than 2 ½ miles. Macrobursts winds may begin over a smaller area and then spread out to a wider area, sometimes producing damage similar to a tornado. On the other hand, microbursts are smaller outward bursts of strong winds near or at the surface. Microbursts are less than 2 ½ miles in horizontal dimension and are typically short-lived winds that last a maximum of ten minutes, with windspeeds reaching up to 100 mph. Microburst events can be wet or dry events. Wet microbursts are typically associated with heavy precipitation at the surface. Dry microbursts do not have precipitation associated with them and are commonly found in the western portion of the United States.

A gust front is characterized by wind shift, temperature drop, and gusty winds out ahead of a thunderstorm. Derecho is a long-lived windstorm that is associated with a band of rapidly moving showers or thunderstorms. A typical derecho contains various downbursts and microbursts. If the wind damage is more than 240 miles and includes wind gusts of at least 58 mph, the event would then be classified as a derecho.



4.3.11.3 Past Occurrence

Snyder County has experienced ten tornados events since 1957, and ten high wind incidents between 1997 and winter of 2019 as seen in *Table 46 – Snyder County Tornado History* and *Table 47 – Snyder County High Wind History*. Numerous sources provide information in regard to past occurrences and losses associated with tornadoes/windstorms in Snyder County and the commonwealth as a whole. Due to the number of sources available with information, specific number of events and losses could vary slightly between sources. Tornado data was only present through 2021, while windstorm data was only available through 2019, even though more recent events could have possibly occurred. Historically, the county has experienced both severe windstorms and tornadoes.

The most recent tornado impacted Verdilla in Union Township on September 8, 2021.

Table 46 - Snyder County Tornado History

Snyder County Tornado History					
Location	**Date**	**Magnitude (F/EF Scale)**	**Deaths**	**Injuries**	**Property Damage**
Snyder County	09/15/1957	F0	0	2	$25,000.00*
Snyder County	08/28/1978	F2	0	1	$25,000.00*
Snyder County	04/09/1980	F2	0	0	$250,000.00*
Snyder County	07/17/1992	F1	0	4	$250,000.00*
Troxelville	04/16/1993	F0	0	0	$50,000.00*
Kantz	06/06/1994	F1	0	0	$5,000,000.00*
Selinsgrove	07/09/2015	EF0	0	0	$20,000.00*
Kreamer	08/18/2021	EF0	0	0	$4,000.00*
Middleburg	09/08/2021	EF1	0	0	$0.00*
Verdilla	09/08/2021	EF0	0	0	$20,000.00*
Source: NOAA NCEI, 2024 Estimated Values are marked*					

Table 47 - Snyder County High Wind History

Snyder County High Wind History				
Location	**Date**	**Magnitude (knots)**	**Injuries**	**Property Damage**
Snyder County	03/01/1997	50 kts.	0	$0.00*
Snyder County	09/16/1999	60 kts.	0	$0.00*
Snyder County	09/29/1999	60 kts.	0	$0.00*
Snyder County	12/12/2000	Unknown	0	$13,900.00*
Snyder County	03/09/2002	50 kts.	0	$0.00*
Snyder County	11/13/2003	60 kts.	0	$0.00*
Snyder County	12/01/2006	45 kts.	0	$0.00*
Snyder County	10/29/2012	50 kts.	0	$0.00*

Snyder County High Wind History				
Location	**Date**	**Magnitude (knots)**	**Injuries**	**Property Damage**
Snyder County	04/04/2018	52 kts.	0	$0.00*
Snyder County	02/24/2019	52 kts.	0	$0.00*
Source: NOAA NCEI, 2023 Estimated Values are marked*				

4.3.11.4 Future Occurrence

In the United States, tornado activity has increased in variability, with a general decrease in the number of days a year on which activity occurs, but an increase in the number of tornadoes on those days. This indicates an increase in tornado outbreaks. The future probability of a disastrous tornado occurring in Snyder County is ranked as possible, but not highly likely. While the chance of being hit by a tornado in Snyder County is small, the damage that results when the tornado arrives can be devastating. An EF-5 tornado, with a 0.019% annual probability of occurring, can carry wind velocities of 200 mph, resulting in a force of more than 100 pounds per square foot of surface area. This is a “wind load” that exceeds the design limits of most buildings in Pennsylvania. As jurisdictions within the county grow, and as residential and commercial construction continues, the number of people and properties will be greatly affected by tornadoes and windstorms as they increase accordingly.

Based on historic patterns, tornadoes are unlikely to remain on the ground for long distances, especially in areas of the country with hilly terrain, such as the majority of Pennsylvania. However, the high historical number of windstorms with winds at or over 50 knots indicates that the annual chance of a windstorm in the county is uniquely high. The annual tornado season has begun to lengthen, with the season starting earlier than it has historically and ending later. Pennsylvania had, for example, a record number of tornadoes in April and May of 2019 compared to any other April and May on record. Climate change is causing temperatures and air moisture to increase, increasing the frequency and intensity of tornadoes and windstorms. There remains some uncertainty regarding the recurrence of tornadoes. Therefore, the number of future tornadoes and windstorm events could potentially increase due to known and unknown factors.

Based on historical incidents, there are three zones in Pennsylvania that can either experience less than one, one to four, or five to ten of EF-2 or above tornadoes per 3,700 square miles. Communities in Snyder County, as shown in *Figure 36 – Tornado Activity in Snyder County* below, are expected to have one to four tornadoes annually as a future occurrence. *Figure 37 – Tornado Activity in Pennsylvania* illustrates tornado impacts for the entire commonwealth. The approximation of one to four tornadoes annually assists with determining the rate of future tornado occurrences within Snyder County. Future tornadoes will be similar to those that affected the county in past events.

Windstorm events occur on a more frequent basis compared to tornadoes. Snyder County, specifically, experiences windstorm events more commonly than tornadoes, which causes power failure, loss of communication networks, and residents requiring temporary shelters and provision of supplies. Therefore, unlike tornadoes, this hazardous event has a highly likely probability for future events to occur within the county.

Climate change and its relationship with tornado outbreaks is hard to identify. Some recent studies suggest that as average temperatures begin to rise, so will the intense storms that often lead to the creation of tornadoes. Warm, moist air is the most important aspect for developing strong tornadoes. Climate change can exacerbate this, and it could potentially lead to an increase in frequency and the severity of the events. Although not yet proven, this is one of the most prevalent theories on how climate change can impact tornado frequency and intensity.

4.3.11.5 Vulnerability Assessment

The frequency of windstorms and minor tornadoes is expected to remain relatively constant; vulnerability increases in more densely developed areas. Factors that impact the amount of damage caused by a tornado include the strength of the tornado, the time of day, and the area of impact. Usually, such distinct funnel clouds are localized phenomena impacting a small area. However, the high winds of tornadoes make them one of the most destructive natural hazards. There can be many cascading impacts of tornadoes and windstorms including, but not limited to, transportation accidents, hazardous material spills, flooding, and power outages. A proper warning system is vital for the public to be informed of what to do and where to go during such events.

Additional dangers that accompany tornado-associated thunderstorms, and which increase the vulnerability of Snyder County, include:

- Flash floods – 146 deaths annually nationwide.
- Lightning – 75 to 100 deaths annually nationwide.
- Damaging straight-line winds – reaching 140 mph wind speed.
- Large hail – can reach the size of a grapefruit and can cause several million in damages annually to property and crops.

The economy of Snyder County is highly vulnerable to tornadoes. While there may be severe impact on financial and commercial systems of the economy, these storms, and the damage they cause, can disrupt business long-term. The local economy is vulnerable due to the possibility of being crippled by tornadoes and windstorms and their cascading effects when buildings and supporting infrastructure are destroyed in a storm. Power outages can create work stoppages, while transportation accidents and road closures can limit transportation of goods and services. Additionally, flooding cannot be discounted as it can destroy physical structures, merchandise, and equipment essential for business operation.

Snyder County environment is also vulnerable to tornado events. However, since tornado events are typically localized, environmental impacts are rarely widespread. The impact of windstorms on the environment typically takes place over a large 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. Most notably, hazardous material spills can pollute ground water systems and vegetation. In the case of hazardous material spills, the local environment can be negatively impact and can cause extensive cleanup and mitigation efforts. Snyder County is considered a rural county that has a large amount of tourism that occurs in the surrounding hills, mountains, and state parks. Not only is the environment at risk from tornadoes and windstorms, but hikers, tourists, and hunters are also at risk when exposed in the environment. Consequently, in the event of a tornado or severe storm, these tourists would have limited emergency notification measures which would result in high vulnerability. A storm has the ability, potentially, to destroy structures, damage private and public property, and injure citizens and tourists in the area. People with disabilities, the elderly, functional needs, and non-English speaking residents are more vulnerable to tornadoes, windstorms, and their cascading effects. Without assistance to evacuate and/or seek shelter, and with potential difficulty understanding information, these at-risk populations may be unable to prepare themselves, or their homes and other possessions, to safely endure the storm.

Tornado, windstorm, and cascading events may affect a small portion, or the entirety, of the county. Therefore, it is important to identify specific critical facilities and assets that are most vulnerable to this hazard. Critical facilities are highly vulnerable to windstorms and tornado events. While many severe storms can cause exterior damage to structures, tornadoes can destroy structures, along with their surrounding infrastructure, immediately halting their function. Tornadoes are often accompanied by severe storms which can be threatening to critical facilities within the county. Many secondary effects from these disasters can jeopardize the operation of these critical facilities as well. Critical facilities are particularly vulnerable to power outages which can leave facilities functionless, potentially crippling infrastructure supporting the population of the county. Due to Pennsylvania Uniform Construction Code Act 45, trailers and mobile homes built before 2004, because of their lightweight construction and often unanchored design, are more vulnerable to high winds/tornadoes and will generally sustain more damage than will mobile homes built after 2004.

As seen in *Table 3 – Population Change in Snyder County*, the eleven municipalities in Snyder County have seen a net population increase from the 2010 decennial census to the 2020 decennial census. Based on this information, it can be speculated that these municipalities may have an increased/equivalent vulnerability to tornado and windstorms, since 2010, due to the increase in population and construction.

Tornadoes and windstorm events may disproportionately affect underserved, unserved, and socially vulnerable populations, amplifying existing hardships. Fragile infrastructure in these areas is more prone to damage, which can hinder evacuation and rescue efforts. Limited access to resources exacerbates challenges during and after the storms, from securing safe shelter to obtaining essential supplies. Vulnerable communities often lack financial resilience, facing prolonged economic setbacks as local businesses may suffer.

Land use, in the form of a built environment, such as residential expansion, can cause tornado impact severity to increase. Impact severity increases when built environment expansion provides an influx of people, infrastructure, and critical infrastructure in harm's way. Since the population in Snyder County had a minor overall increase between 2010 and 2020, it can be speculated that the built environment did not increase significantly.

There are no properties that are listed with the National Register of Historic Places that are at an increased risk of tornadoes in Snyder County. This analysis was run off of the previous tornado paths in the county and 500 feet vulnerability zones.

Tornadoes and windstorms exert profound impacts on both natural and cultural areas. Ecologically, these intense weather events can result in habitat destruction, altering landscapes, and threatening biodiversity. Culturally, these storms endanger heritage sites, historic structures, and artifacts, eroding tangible, and intangible cultural elements. Sustainable recovery efforts must embrace an integrated approach, recognizing the interconnected vulnerability of natural, historical, and cultural landscapes to the formidable forces of tornadoes and windstorms.

All of the critical infrastructure and community lifeline facilities are vulnerable to tornado events. Some of the critical infrastructure can be considered at a higher risk due to the life safety missions that they serve. Facilities that are within 500 feet of previous tornado tracks can be considered at high risk of tornados.

Critical infrastructure and community lifelines at high risk (within 500 ft of previous tracks):

- Selinsgrove – Five Loaves and Two Fish Pantry

Municipalities with an increased risk of tornadoes (previously impacted):

- Beaver Township
- Franklin Township
- McClure Borough
- Monroe Township
- Penn Township
- Selinsgrove Borough
- Spring Township
- Washington Township
- West Beaver Township

Municipalities without an increased risk of tornadoes (not previously impacted):

- Adams Township
- Beavertown Borough
- Center Township
- Chapman Township
- Freeburg Borough
- Jackson Township
- Middleburg Borough
- Middlecreek Township
- Perry Township
- Shamokin Dam Borough
- Union Township
- West Perry Township

Figure 35 - Pennsylvania Wind Zones

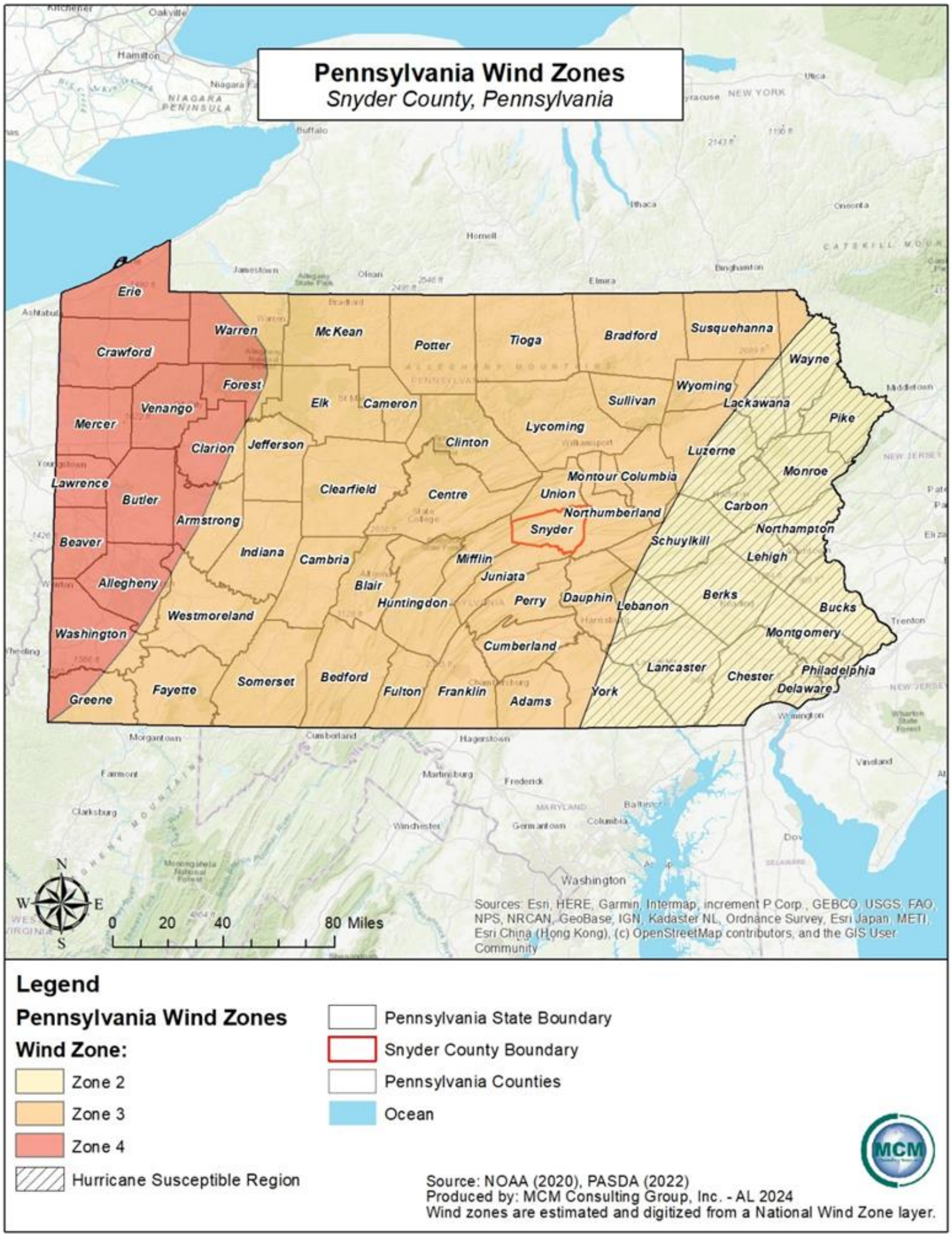


Figure 36 - Tornado Activity in Snyder County

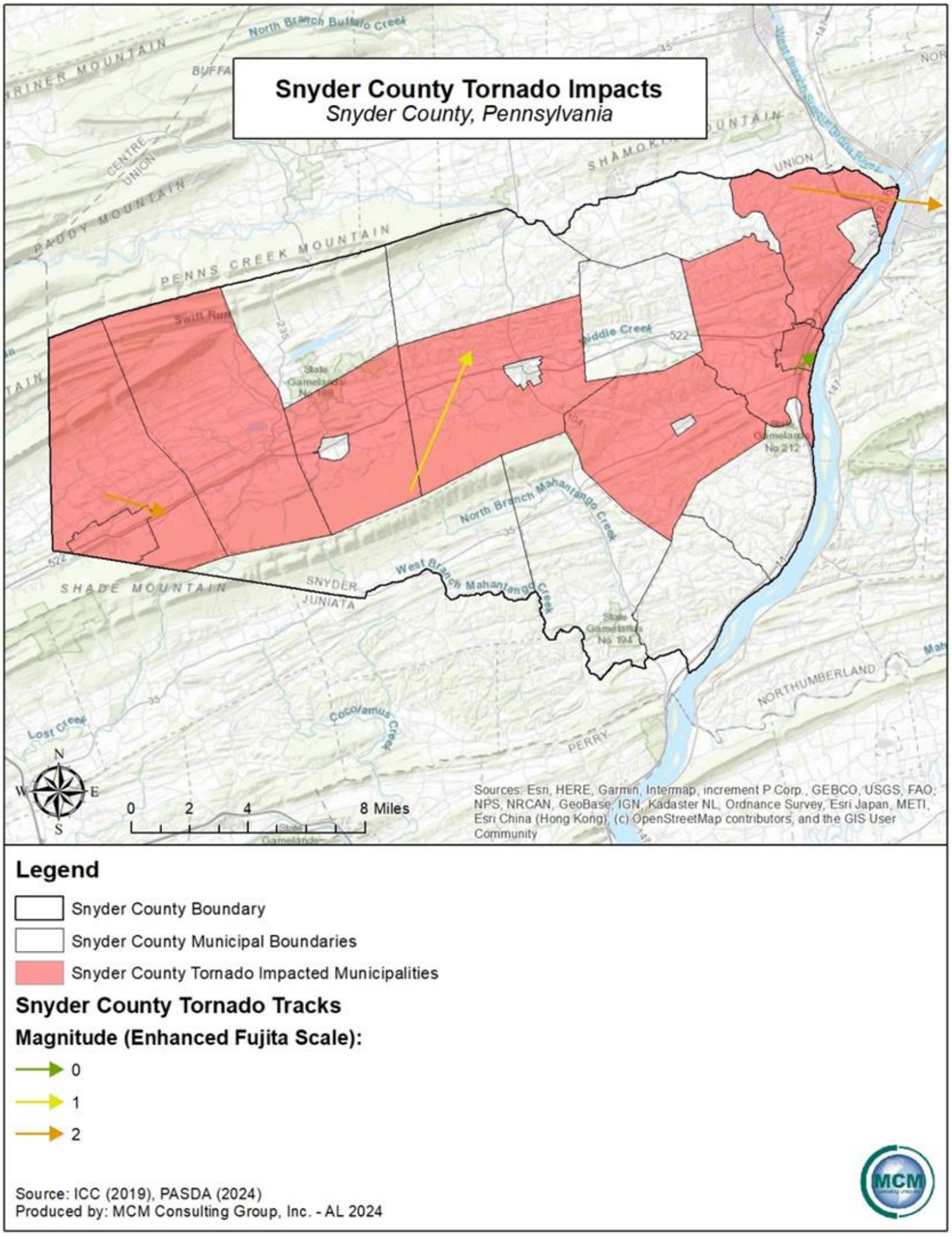
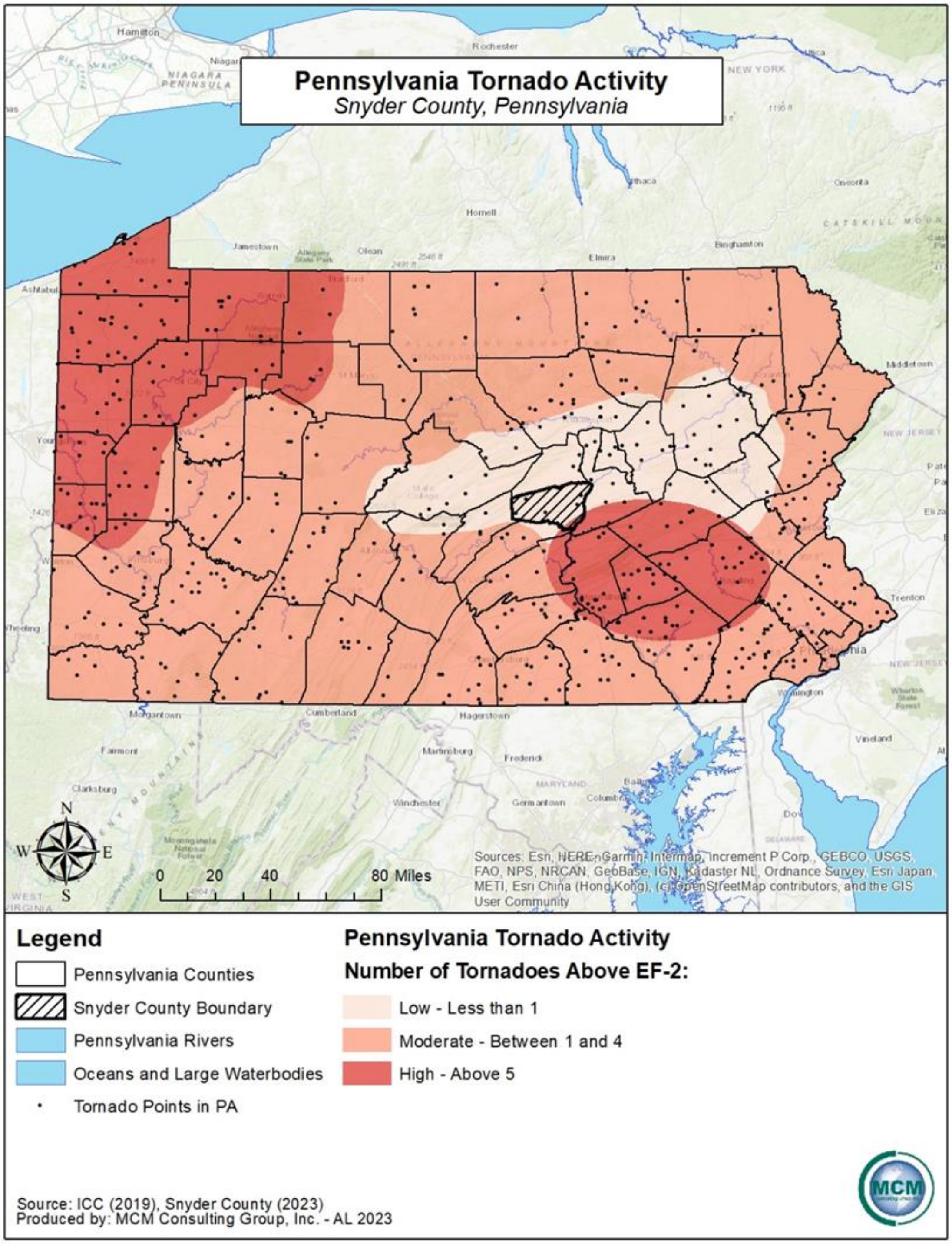


Figure 37 - Tornado Activity in Pennsylvania



4.3.12. Wildfire

4.3.12.1 Location and Extent

The most prevalent causes of devastating wildfires are droughts, lighting strikes, arson, human carelessness, and in rare circumstances, spontaneous combustion. Most fires in Pennsylvania are caused by anthropogenic fires such as debris burns that spread and get out of control. A fire, started in somebody's backyard, could travel through dead grasses and weeds into bordering woodlands starting a wildfire. Major urban fires can cause significant property damage, loss of life, and residential or business displacement. While wildfires are a natural and essential part of many native Pennsylvania ecosystems (e.g., pitch pine and scrub oak woodlands), wildfires can also cause devastating damage if they are undetected and allowed to propagate unfettered. Wildfires most often occur in less developed areas such as open fields, grass, dense brush, or forests where they can spread rapidly by feeding off of vegetation and combustible fuels. Wildfires are most prevalent under prolonged dry and hot spells, or general drought conditions.

A large portion of Snyder County is covered by either farmland or forested areas, increasing the geographic extent of wildfire vulnerability in the county. Under dry conditions or droughts, wildfires have the potential to burn forests as well as croplands. For recreational enjoyment, the county boasts several local parks and natural areas that include a series of trail systems – all of which are at risk for wildfires.

4.3.12.2 Range of Magnitude

Forested areas, croplands and properties that are at the interface between wild lands and human development are most at risk for being impacted by and causing wildfires. If an urban fire or wildfire is not contained, secondary impacts including power outages may result. Other negative impacts of wildfires can include death of people, livestock, fish, and wildlife, and destruction of valuable property, timber, forage, recreational and scenic values. Wildfires can also cause severe erosion, silting of stream beds and reservoirs, and flooding due to a loss of ground cover.

Almost all of the wildfires in the county occur in remote areas or areas away from residential structures. Unlike the wildland fires that occur in other parts of the country and affect vast areas of land and residential communities, most fires in Snyder County are contained before they cause damage or extensive property loss. However, the county recognizes that wildfires of some magnitude will continue to occur in Snyder County and will have more detrimental effects if development in and/or around the natural areas increases.

The United States Forest Service utilizes the Forest Fire Assessment System to classify the dangers of wildfire. *Table 48 – Wildland Fire Assessment System* identifies each threat classification and provides a description of the level.

Table 48 - Wildland Fire Assessment System

Wildland Fire Assessment System *(U.S. Forest Service)*	
Rank	**Description**
Low (L)	Fuels do not ignite readily from small firebrands although a more intense heat source, such as lightning, may start fires in duff or punky wood. Fires in open cured grasslands may burn freely a few hours after rain, but woods fires spread slowly by creeping or smoldering and burn in irregular fingers. There is little danger of spotting.
Moderate (M)	Fires can start from most accidental causes, but with the exception of lightning fires in some areas, the number of starts is generally low. Fires in open cured grasslands will burn briskly and spread rapidly on windy days. Timber fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel, especially draped fuel, may burn hot. Short-distance spotting may occur but is not persistent. Fires are not likely to become serious and control is relatively easy.
High (H)	All fine dead fuels ignite readily, and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly and short-distance spotting is common. High intensity burning may develop on slopes or in concentrations of fine fuels. Fires may become serious and their control difficult unless they are attacked successfully while small.
Very High (VH)	Fires start easily from all causes and, immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high intensity characteristics such as long-distance spotting and fire whirlwinds when they burn into heavier fuels.
Extreme (E)	Fires start quickly, spread furiously, and burn intensely. All fires are potentially serious. Development into high intensity burning will usually be faster and occur from smaller fires than in the very high fire danger class. Direct attack is rarely possible and may be dangerous except immediately after ignition. Fires that develop headway in heavy slash or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions the only effective and safe control action is on the flanks until the weather changes, or the fuel supply lessens.

4.3.12.3 Past Occurrences

The Pennsylvania Department of Conservation and Natural Resources (DCNR) has an extensive history of reported wildfires in its state forestry system and districts. Historically, Snyder County experiences a minimal amount of these types of fires annually with all fires being relatively small. However, due to the many acres of farmland, forested areas, and open space in the county, under the right conditions the potential exists for a significant wildfire. Snyder County lies entirely in the Bald Eagle Forest District (District 7) of the DCNR's Bureau of Forestry. This district encompasses Snyder, Union, Centre, Mifflin and Clinton counties. In 2023, there were a total of forty-one fires in District 7 that were responsible for destroying 244.4 acres.

District 7 reports the following twenty-three-year wildfire summary based on observed and reported wildfires. *Table 49 – Annual Summary of Wildfire Events* illustrates the number of acres burned in a certain number of fires for District 7 from the year 2000 to the year 2023.

Table 49 - Annual Summary of Wildfire Events

Annual Summary of Wildfire Events in District 7				
Year	**Number of Fires**	**Frequency Increase or Decrease**	**Acres**	**Severity Increase or Decrease**
2000	14	-	149	-
2001	15	⇧	12.9	⇩
2002	11	⇩	13.5	⇧
2003	8	⇩	55.5	⇧
2004	7	⇩	18.5	⇩
2005	43	⇧	70.4	⇧
2006	25	⇩	118.9	⇧
2007	15	⇩	21.7	⇩
2008	14	⇩	100.6	⇧
2009	7	⇩	6.2	⇩
2010	13	⇧	20.5	⇧
2011	2	⇩	2.6	⇩
2012	6	⇧	15.0	⇧
2013	9	⇧	5.5	⇩
2014	28	⇧	189.2	⇧
2015	28	=	44.2	⇩
2016	20	⇩	27.6	⇩
2017	14	⇩	18.7	⇩
2018	20	⇧	38.1	⇧
2019	15	⇩	12.6	⇩
2020	42	⇧	75.8	⇧

Annual Summary of Wildfire Events in District 7				
Year	**Number of Fires**	**Frequency Increase or Decrease**	**Acres**	**Severity Increase or Decrease**
2021	32	⇩	74.9	⇩
2022	20	⇩	38.2	⇩
2023	41	⇧	244.4	⇧
Source: PA DCNR, 2024				

In recent years, the number of prescribed burns in Pennsylvania has been increasing. This corresponds to an understanding of the need for fire in many natural ecosystems and management strategies for reducing vulnerability to wildfire; it also improves hunting opportunities. In 2022, there were sixty-three prescribed burns that were carried out by the Pennsylvania Department of Conservation and Natural Resources (DCNR). This number is up by seventeen prescribed burns from the total number of reported DCNR prescribed burns in 2021, with a total of forty-six. At the time of writing this plan, data on 2023 prescribed burns by DCNR was unavailable.

4.3.12.4 Future Occurrence

Annual occurrence of urban fires and wildfires in Snyder County are expected. Urban fires are most often the result of human errors, outdated wiring and occasionally, malintent (arson). The occurrence of large scale and intense wildfires is somewhat unpredictable and highly dependent on environmental conditions and human response. Weather conditions play a major role in the occurrence of wildfires, so in the event of drought conditions, wildfire caution should be heightened. Any fire without the quick response or attention of firefighters, forestry personnel, or visitors to the forest, has the potential to become a wildfire.

Climate change is expected to bring an elongated wildfire season and more intense and long-burning fires (Pechony & Shindell, 2010). In some regions of the United States, this is a very real concern. Northern California has experienced unprecedented devastating wildfires and continues to experience these events in a yearly fashion. The fires that have been occurring in California are thought to be burning faster and hotter due to worsening drought conditions caused by increased climate change (Cvijanovic et al., 2017). Wildfire conditions in Pennsylvania are not nearly as severe as in Northern California, but the intensification is a signal that the changes brought by climate change are relevant to wildfires. In Pennsylvania, higher air temperatures and earlier warming in the spring are expected to continue, resulting in more wildfire prone conditions in the summer and fall (Shortle et al., 2015).

Climate change significantly influences wildfires by altering environmental conditions. Rising temperatures, prolonged droughts, and changes in precipitation patterns create drier landscapes, fostering the ignition and rapid spread of wildfires. Elevated temperatures contribute to increased evaporation, drying out vegetation and creating more fuel for fires. Altered precipitation patterns can lead to extended periods of drought, further desiccating ecosystems. Climate change also affects the timing and intensity of seasons, extending the fire-prone period. Additionally, warming temperatures facilitate the expansion of pests and diseases that weaken trees, making forests more susceptible to ignition.

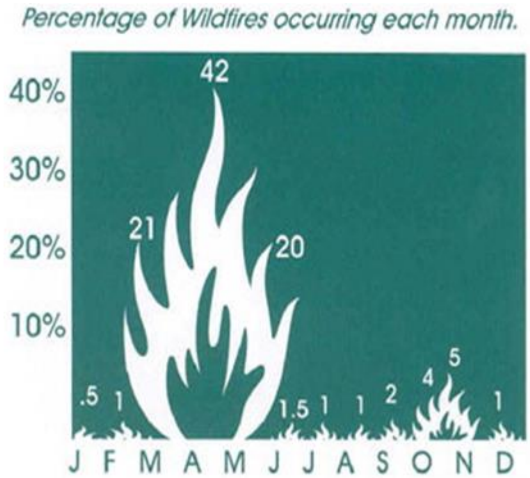
4.3.12.5 Vulnerability Assessment

The size and impact of a wildfire depends on its location, climate conditions, and the response of firefighters. If the right conditions exist, these factors may often mitigate the effects of wildfires; however, during a drought, wildfires can be devastating. The highest risk for wildfires in Pennsylvania occurs during the spring (March to May) and the fall (October to November) months and 99% of all wildfires in Pennsylvania are caused by people. Approximately 83% of all Pennsylvania wildfires occur in the months outlined above. In the spring, bare trees allow sunlight to reach the forest floor, drying fallen leaves and other ground debris and increasing wildfire vulnerability. In the fall, the surplus of dried leaves is fuel for fires. *Figure 38 – Seasonal Wildfire Percentage* shows the wildfire percentage occurrence during each month in Pennsylvania.

Firefighters and other first responders can encounter life-threatening situations due to forest and wildfires. Traffic accidents during a response and the impacts of fighting the fire once on scene are examples of first responder vulnerabilities.

The Wildland Urban Interface (WUI) was nationally mapped by a United States Department of Agriculture Forest Service effort in 2015 that used data from 1990-2010 to develop a robust dataset that related housing density and vegetative density. The dataset provides a way to identify locations where larger numbers of people are living in or near natural areas that could be at risk in the event of a wildfire. The WUI defines two types of communities – interface and intermix. Intermix refers to areas where housing and wildland vegetation intermingle, and interface refers to areas where housing is in the vicinity of a large area of dense wildland vegetation. The WUI was the fastest-growing land use type in the United States between 1990 and 2010. Factors behind the growth include population shifts, expansion of cities into the wildlands, and the expansion of new vegetation growth. The primary cause has been the migration of people, not vegetation growth.

Figure 38 - Seasonal Wildfire Percentage



Pennsylvania is among the states with the largest WUI and the most housing units in a WUI designated area. Pennsylvanians desire the proximity of natural beauty in their daily lives, and the growth in WUI housing noted above illustrates this. *Figure 39 – Wildland Urban Interface* shows the extent of Snyder County and the critical infrastructure facilities, functional needs facilities, and fire stations. Wildfire hazard is defined by conditions that affect wildfire ignition and/or behavior such as fuel, topography, and local weather. The many addressable structures in the Wildland Urban Interface and Intermix zones are broken up by assessed parcel use codes.

There are fifteen fire departments that serve Snyder County, a list of which can be seen in *Table 64* of the emergency services profile. Each fire department conducts its own schedule of in-house training sessions for its members.

The response of firefighters is integral to the containment of wildfires in the county. There is a potential for fire stations and services to close, which affects response to a wildfire in Snyder County. *Figure 40 – Fire Stations Locations* illustrates the position of fire stations and the location of state game lands, state forests, and natural areas within Snyder County. It is recommended that each municipality assess vulnerabilities to department closures by building a relationship with their local providers and planning accordingly for if a local service were to close.

As seen above in Section 4.3.12.4 climate change may increase the frequency of wildfires. With this potential increase in wildfires comes disruption of systems that humans rely upon for daily activities. The systems wildfires most heavily impact include, but are not limited to transportation, water supply, power, and communications. Wildfires can block off transportation routes directly or can impact visibility of transportation routes due to the intense smoke that can be produced and settle over roadways.

As seen in *Table 3 – Population Change in Snyder County*, ten have seen a net population increase from the 2010 decennial census to the 2020 decennial census. The municipalities that have experienced an increase in population are Franklin Township, Freeburg Borough, Jackson Township, McClure Borough, Monroe Township, Penn Township, Perry Township, Selinsgrove Borough, Washington Township, and West Perry Township. Based on this information, it can be speculated that these municipalities may have an increased vulnerability to wildfires, since 2010, due to the increase in population. Unserved, underserved, and socially vulnerable populations within Snyder County may be at an increased vulnerability to wildfires. This is because these populations may not have access to or the ability to relocate during wildfire events. Those that are unsheltered within Snyder County have an increased vulnerability to wildfire events due to being openly exposed to the elements, such as bad air quality from the smoke that wildfires produce.

Snyder County promotes fishing, hunting, camping, hiking, canoeing, and other outdoor activities. These land use events can increase the risk of wildfires starting. Approximately 55% of Snyder County is forest areas, including deciduous, evergreen, mixed deciduous and evergreen, forested wetlands, and emergent wetlands. Natural areas can be extremely vulnerable to wildfires within Snyder County. Ecologically, these alter landscapes, compromising soil stability and disrupting ecosystems. Conditions of drought or invasive species that could damage forested areas can lead to wildfires. Wildfires can lead to devastation which can foster landslides and flash flood events. These events can destroy the forested terrain within the county and consume acres of traditional agricultural practices in a short amount of time. In addition to widespread burning that wildfires cause, these events also pollute the air within the county and surrounding areas, as well as waterways due to run off and the settling of the air pollution to ground level.

Some of the historic and cultural properties that are located in Snyder County are at an increased vulnerability to wildfire events. Each property is of a different construction type, and some would be more vulnerable to wildfires than others. The Governor Simon Snyder Mansion is made out of stone, Selinsgrove Hall is comprised of brick construction with a part of the roof being of wood construction, and Seibert Hall is also made of brick construction. Those with wood construction are of higher vulnerability to wildfires than those made of stone and brick construction. Also, all three historic places are within two miles of a fire station in Snyder County. These fire stations are Dauntless Hook & Ladder and Northstar Search & Rescue.

Municipalities with high risk due to wildfires (with areas of high-density interface or intermix):

- Adams Township
- Beavertown Borough
- Center Township
- Franklin Township
- Freeburg Borough
- McClure Borough
- Middleburg Borough
- Middlecreek Township
- Monroe Township
- Perry Township
- Spring Township
- Washington Township
- West Beaver Township

Municipalities with lower risk due to wildfires (no areas of high-density interface or intermix):

- Beaver Township
- Chapman Township
- Jackson Township
- Penn Township
- Selinsgrove Borough
- Shamokin Dam Borough
- Union Township
- West Perry Township

Figure 39 - Wildland Urban Interface

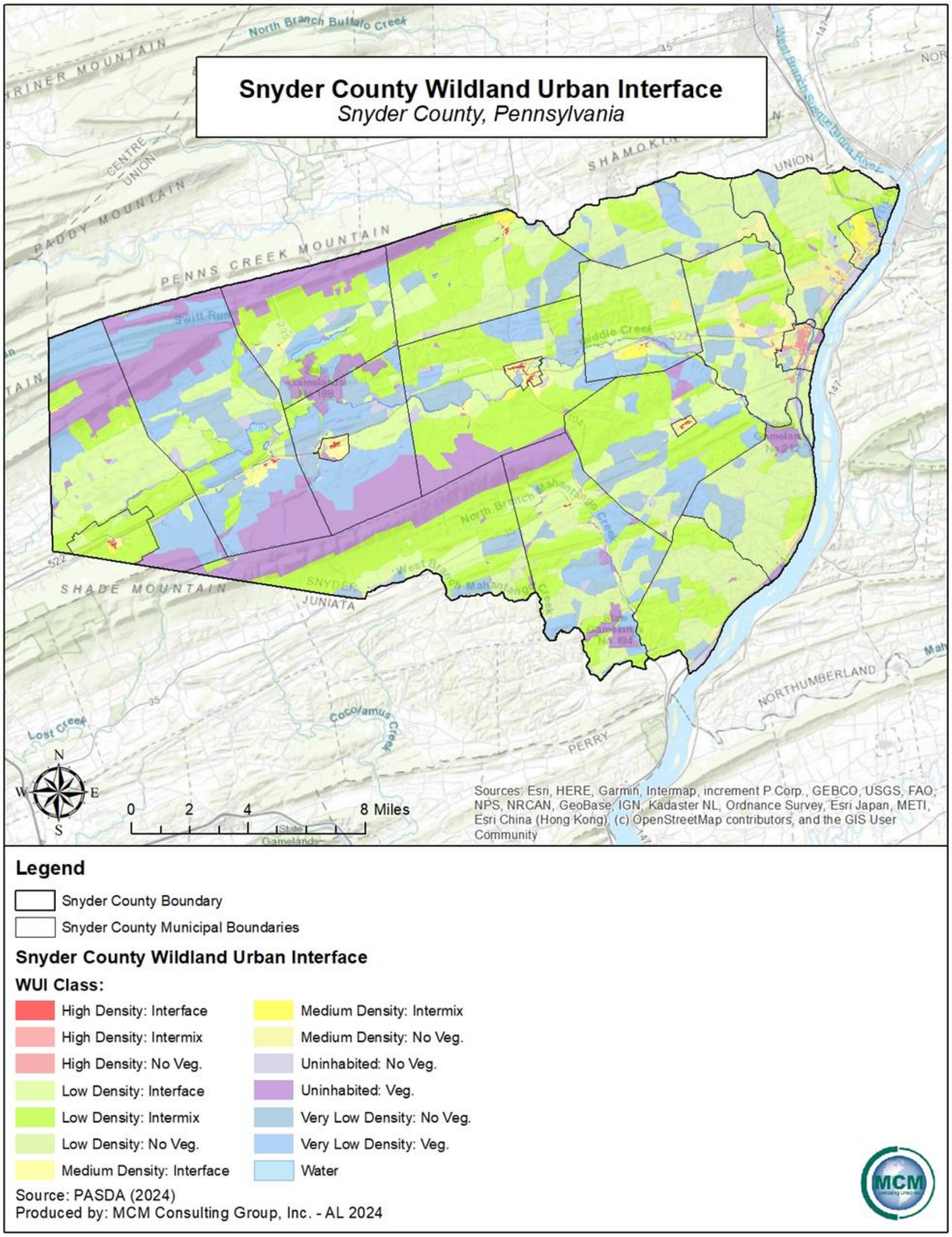
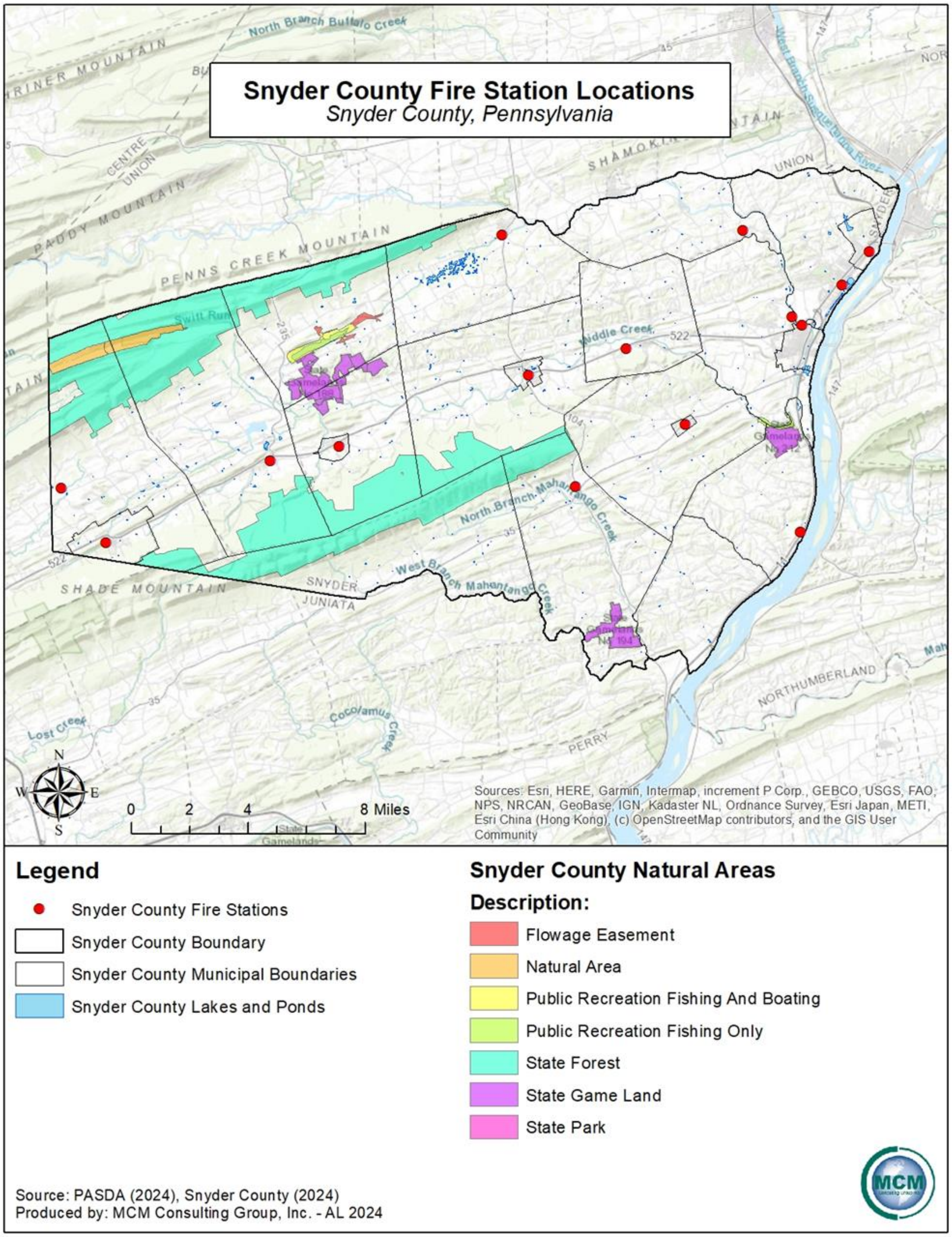


Figure 40 - Fire Stations Locations



4.3.13. Winter Storm

4.3.13.1 Location and Extent

Most severe winter storm hazards include heavy snow (snowstorms), blizzards, sleet, freezing rain, and ice storms. Since most extra-tropical cyclones (mid-Atlantic cyclones locally known as Northeasters or Nor'easters), generally take place during the winter weather months, these hazards have also been grouped as a type of severe winter weather storm. According to the Pennsylvania State Hazard Mitigation Plan (PA HMP), winter storms are frequent events for the Commonwealth and occur from late October until mid-April. These types of winter events or conditions are further defined below.

- **Heavy Snow:** According to the National Weather Service (NWS), heavy snow is generally snowfall accumulating to four inches or more in depth in twelve hours or less; or snowfall accumulating to six inches or more in depth in twenty-four hours or less. A snow squall is an intense but limited duration, period of moderate to heavy snowfall, also known as a snowstorm, accompanied by strong, gusty surface winds and possibly lightning.
- **Blizzard:** Blizzards are characterized by low temperatures, wind gusts of thirty-five miles per hour (mph) or more and falling and/or blowing snow that reduces visibility to 1/4-mile or less for an extended period of time (three or more hours).
- **Sleet of Freezing Rainstorm:** Sleet is defined as pellets of ice composed of frozen or mostly frozen raindrops or refrozen partially melted snowflakes. These pellets of ice usually bounce after hitting the ground and other hard surfaces. Freezing rain is rain that falls as a liquid but freezes into glaze upon contact with the ground.
- **Ice Storm:** An ice storm is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice pull down trees and utility lines resulting in loss of power and communication. These accumulations of ice make walking and driving extremely dangerous and can create extreme hazards to motorists and pedestrians.
- **Extra-Tropical Cyclone:** Sometimes called mid-latitude cyclones, are a group of cyclones defined as synoptic scale, low pressure, weather systems that occur in the middle latitudes of the Earth. These storms have neither tropical nor polar characteristics and are connected with fronts and horizontal gradients in temperature and dew point otherwise known as "baroclinic zones". Extra-tropical cyclones are everyday weather phenomena which, along with anticyclones, drive the weather over much of the Earth. These cyclones produce impacts ranging from cloudiness and mild showers to heavy

gales and thunderstorms. Tropical cyclones often transform into extra-tropical cyclones at the end of their tropical existence, usually between 30˚ and 40˚ latitude, where there is insufficient force from upper-level shortwave troughs riding the westerlies (weather systems moving west to east) for the process of extra-tropical transition to begin. A shortwave trough is a disturbance in the mid or upper part of the atmosphere which induces upward motion ahead of it. During an extra-tropical transition, a cyclone begins to tilt back into the colder air mass with height, and the cyclone's primary energy source converts from the release of latent heat from condensation to baroclinic processes.

4.3.13.2 Range of Magnitude

The magnitude or severity of a severe winter storm depends on several factors including a region's susceptibility to snowstorms, snowfall amounts, snowfall rates, wind speeds, temperatures, visibility, storm duration, topography, and time of occurrence during the day (e.g., weekday versus weekend), and time of season. The extent of a severe winter storm can be classified by meteorological measurements, such as those above, and by evaluating its societal impacts.

The Northeast Snowfall Impact Scale (NESIS) categorizes snowstorms in this manner. Unlike the Fujita Scale (tornado) and Saffir Simpson Scale (hurricanes), there is no widely used scale to classify snowstorms. NESIS was developed by Paul Kocin of The Weather Channel and Louis Uccellini of the National Weather Service and rank high impact, northeast snowstorms. These storms have large areas of ten-inch snowfall accumulations and greater. NESIS has five ranking categories: Notable (1), Significant (2), Major (3), Crippling (4), and Extreme (5). These ranking can be seen in *Table 50 – NESIS Winter Storm Rankings*. The index differs from other meteorological indices in that it uses population information in addition to meteorological measurements. Thus, NESIS gives an indication of a storm's societal impacts. This scale was developed because of the impact of northeast snowstorms can have on the rest of the country in terms of transportation and economic impact.

Table 50 - NESIS Winter Storm Rankings

NESIS Winter Storm Rankings			
Category	**Description**	**NESIS Range**	**Definition**
1	Notable	1.0 – 2.49	These storms are notable for their large areas of 4-inch accumulations and small areas of 10-inch snowfall.

NESIS Winter Storm Rankings			
Category	**Description**	**NESIS Range**	**Definition**
2	Significant	2.5 – 3.99	Includes storms that produce significant areas of greater than 10-inch snows while some include small areas of 20-inch snowfalls. A few cases may even include relatively small areas of very heavy snowfall accumulations (greater than 30 inches).
3	Major	4.0 – 5.99	This category encompasses the typical major Northeast snowstorm, with large areas of 10-inch snows (generally between 50 and 150 x 103 mi^2 – roughly one to three times the size of New York State with significant areas of 20-inch accumulations.
4	Crippling	6.0 – 9.99	These storms consist of some of the most widespread, heavy snows of the sample and can be best described as crippling to the northeast U.S, with the impact to transportation and the economy felt throughout the United States. These storms encompass huge areas of 10-inch snowfalls, and each case is marked by large areas of 20-inch and greater snowfall.
5	Extreme	10+	The storms represent those with the most extreme snowfall distributions, blanketing large areas and populations with snowfalls greater than 10, 20, and 30 inches. These are only storms in which the 10-inch accumulations exceed 200 X 103 mi^2 and affect more than 60 million people.
Source: Kocin and Uccellini, 2004			

The climate of Pennsylvania is marked by abundant snowfall. Winter weather can reach Pennsylvania as early as October and is usually in full force by late November with average winter temperatures between 20- and 40-degrees Fahrenheit. Snyder County receives an average of about 29.0 inches of snowfall a year. Most areas of Snyder County experience the effects of winter storms frequently. The general indication of the average annual snowfall map shows areas that are subject to a consistent risk for large quantities of snow. *Figure 42 - Pennsylvania Annual Snowfall 1981 – 2010* illustrates the long-term trends for snowfall accumulation in Pennsylvania over three decades.

4.3.13.3 Past Occurrence

Figure 41 – Winter Storm Events by County in Pennsylvania shows the number of winter storm events from 1950 – 2013 for the Commonwealth of Pennsylvania. Snyder County had twenty-six winter storm events, one blizzard, nine ice storm events, and two winter weather events between 1950 and 2023. *Table 51 – Recent Annual Snowfall Estimates* shows recent annual snowfall measurements as stated by NOAA. Overall, Snyder County has experienced a decrease of the annual estimated average of snowfall. On average, the annual snowfall totals have decreased in the time periods from 2020 to the time of writing this plan. A list of additional Snyder County winter storms, and other related events is outlined in *Table 52 – Snyder County Winter Storm History*.

Table 51 - Recent Annual Snowfall Estimates

Recent Annual Snowfall Estimates	
Time Span	**Snowfall Estimates (inches)**
1999-2000	24.7
2000-2001	27.4
2001-2002	14.0
2002-2003	45.4
2003-2004	36.1
2004-2005	25.7
2005-2006	13.9
2006-2007	20.5
2007-2008	17.1
2008-2009	15.2
2009-2010	33.7
2010-2011	29.2
2011-2012	9.7
2012-2013	23.6
2013-2014	34.8
2014-2015	38.6
2015-2016	17.7
2016-2017	32.0
2017-2018	27.5
2018-2019	28.4
2019-2020	5.1
2020-2021	38.9
2021-2022	14.4

Recent Annual Snowfall Estimates	
Time Span	**Snowfall Estimates (inches)**
2022-2023	12.9
Source: NOAA, 2024	

Table 52 - Snyder County Winter Weather History

Snyder County Winter Weather History		
Location	**Date**	**Event Type**
Snyder County	01/07/1996	Blizzard
Snyder County	02/13/1997	Winter Storm
Snyder County	01/15/1998	Ice Storm
Snyder County	01/22/1998	Ice Storm
Snyder County	01/02/1999	Winter Storm
Snyder County	01/08/1999	Winter Storm
Snyder County	01/14/1999	Winter Storm
Snyder County	02/13/2000	Ice Storm
Snyder County	02/18/2000	Winter Storm
Snyder County	12/13/2000	Winter Storm
Snyder County	12/10/2002	Ice Storm
Snyder County	02/06/2004	Ice Storm
Snyder County	01/05/2005	Winter Storm
Snyder County	12/16/2005	Winter Storm
Snyder County	02/13/2007	Winter Storm
Snyder County	02/01/2008	Winter Storm
Snyder County	02/12/2008	Ice Storm
Snyder County	12/19/2008	Winter Storm
Snyder County	01/06/2009	Ice Storm
Snyder County	02/05/2010	Winter Storm
Snyder County	02/09/2010	Winter Storm
Snyder County	02/01/2011	Winter Storm
Snyder County	12/14/2013	Winter Storm
Snyder County	02/04/2014	Winter Storm
Snyder County	01/22/2016	Winter Storm
Snyder County	02/08/2017	Winter Storm
Snyder County	03/13/2017	Winter Storm
Snyder County	11/15/2018	Winter Storm
Snyder County	02/20/2019	Winter Storm

Snyder County Winter Weather History		
Location	**Date**	**Event Type**
Snyder County	12/16/2020	Winter Storm
Snyder County	01/31/2021	Winter Storm
Snyder County	02/01/2021	Winter Storm
Snyder County	02/15/2021	Ice Storm
Snyder County	02/22/2021	Winter Weather
Snyder County	01/09/2022	Ice Storm
Snyder County	03/12/2022	Winter Storm
Snyder County	03/28/2022	Winter Weather
Snyder County	12/15/2022	Winter Storm
Source: NOAA NCEI, 2024		

4.3.13.4 Future Occurrence

Winter storm hazards in Pennsylvania are guaranteed yearly since the state is located at a relatively high latitudes resulting in winter temperatures that range between 0- and 32-degrees Fahrenheit for a good deal of the fall through early spring season (later October until mid-April). In addition, the state is exposed to large quantities of moisture from both the Great Lakes and the Atlantic Ocean. While it is almost certain that a number of significant winter storms will occur during the winter and fall season, what is not easily determined is how many such storms will occur during that time frame. Based on historical snow related disaster declaration occurrences, the Commonwealth of Pennsylvania can expect a snowstorm of disaster declaration proportions, on average, once every three to five years. Similarly, for ice storms, based on historical disaster declarations, it is expected that on average, ice storms of disaster proportions will occur once every seven to ten years within the state.

Climate change could increase the intensity of winter storms in the northeastern United States and Snyder County, Pennsylvania. With warmer air temperatures, more moisture will be held in the air, and if the temperatures on the ground are below freezing, this could result in more snow falling during a weather event like a winter storm. These events may become less frequent as the climate warms, but they could be more intense.

4.3.13.5 Vulnerability Assessment

Severe winter storms are of significant concern to Snyder County because of their frequency and magnitude in the region. Additionally, they are of significant concern due to the direct and indirect costs associated with these events; delays caused by the storms and impacts on the people and facilities of the region related to snow and ice removal, health problems, cascade effects such as utility failure and traffic accidents, and stress on community resources.

Every year, winter weather indirectly and deceptively kills hundreds of people in the United States, primarily from automobile accidents, over exertion, and exposure. Winter storms are often accompanied by strong winds creating blizzard conditions with blinding win-drive snow, drifting snow, extreme cold temperatures, and dangerous wind chill. They are considered deceptive killers because most deaths and other impacts or losses are indirectly related to the storm. Heavy accumulations of ice can bring down trees and powerlines, disabling electrical power and communications for days or weeks. Heavy snow can immobilize a region and paralyze a city, shutting down all air and rail transportation and disrupting medical and emergency services. The economic impact of winter weather each year is quite large, with costs for snow removal, damage, and loss of business in the millions each year. Heavy snow can immobilize and strand commuters as well as stopping the flow of supplies through an area or transportation corridor. In rural areas, homes and farms may be isolated for days and unprotected livestock may be lost. Bridge and overpasses are particularly dangerous because they freeze before other transportation surfaces. For the purposes of this Hazard Mitigation Plan, the entire population of Snyder County (39,736 as of the 2020 Decennial Census) is exposed to severe winter storm events. The elderly are considered the most susceptible to this hazard due to their increased risk of injury and death from falls, overexertion, and or attempts to clear ice and snow. The elderly population is also more vulnerable to utility outages in winter, especially when they are paired with winter storm events. *Table 54 – Power Outages in Snyder County* shows the number of power outages that have occurred in the county between 2020 and 2024. Vulnerable populations within Snyder County may not have access to housing or their housing may be less able to withstand cold temperatures (e.g., homes with poor insulation and heating supply). The unsheltered populations of an area are at most risk to winter storm events.

The table below illustrates the number of citizens per municipality under the age of five or over the age of sixty-five years of age who are at an increased vulnerability to winter storms, and cascading hazards from winter storms:

Table 53 - Population per Municipality under 5 Years or 65 Years or Older

Population per Municipality under 5 Years or 65 Years or Older				
Municipality	**Number of People under 5 years of age**	**Percent of Population (%)**	**Number of People 65 years or older**	**Percent of Population (%)**
Adams Township	75	7.00	175	16.40

Population per Municipality under 5 Years or 65 Years or Older				
Municipality	**Number of People under 5 years of age**	**Percent of Population (%)**	**Number of People 65 years or older**	**Percent of Population (%)**
Beaver Township	18	3.60	132	26.60
Beavertown Borough	34	4.10	189	22.60
Center Township	136	5.50	309	12.60
Chapman Township	201	11.80	215	12.60
Franklin Township	149	7.20	535	25.90
Freeburg Borough	24	3.00	224	28.00
Jackson Township	58	4.00	246	16.80
McClure Borough	44	3.80	245	20.90
Middleburg Borough	69	5.20	255	19.20
Middlecreek Township	55	2.80	458	23.60
Monroe Township	201	4.90	849	20.50
Penn Township	278	6.80	941	23.10
Perry Township	98	4.40	324	14.70
Selinsgrove Borough	114	2.00	1,015	17.80
Shamokin Dam Borough	58	3.20	486	26.60
Spring Township	166	10.60	307	19.60
Union Township	70	5.10	246	17.80
Washington Township	95	5.90	273	16.90
West Beaver Township	84	8.70	220	22.90
West Perry Township	60	6.10	247	25.10
Source: United States Census Bureau (USCB), American Community Survey (ACS), 2022				

Approximately 5.2% of the total population of Snyder County is under the age of five years old and approximately 19.8% of the total population is sixty-years old or older. In total, 25.0% of the population is at an increased risk from exposure to winter storm events and cascading hazards.

Table 54 - Power Outages in Snyder County

Power Outages in Snyder County	
Municipality	**Number of Events Between 2020 and 2024**
Adams Township	0
Beaver Township	0
Beavertown Borough	1
Center Township	2
Chapman Township	0

Power Outages in Snyder County	
Municipality	**Number of Events Between 2020 and 2024**
Franklin Township	0
Freeburg Borough	0
Jackson Township	0
McClure Borough	0
Middleburg Borough	1
Middlecreek Township	0
Monroe Township	0
Penn Township	0
Perry Township	0
Selinsgrove Borough	2
Shamokin Dam Borough	1
Spring Township	0
Union Township	1
Washington Township	2
West Beaver Township	0
West Perry Township	0
Total:	**10**
Source: Snyder County EMA, 2024	

The entire general building stock inventory in Snyder County is exposed and vulnerable to the severe winter storm hazard. In general, structural impacts include damage to roof and building frames, rather than building content. There was no historic information available that identified property damages within Snyder County due to a single severe winter storm event. Current modeling tools are not available to estimate specific losses for this hazard. All of the historic and cultural properties in Snyder County are at similar vulnerability to severe winter storms. The properties include, but are not limited to, the Governor Simon Snyder Mansion, Selinsgrove Hall, and Siebert Hall. The cultural aspects of Snyder County, including all three museums, are also at an increased vulnerability to winter storms. These three museums are the Old Herman School, the Lore Degenstein Gallery, and the Snyder County Historical Society. The Old Herman School is located in Selinsgrove Borough and the Snyder County Historical Society is located in Middleburg Borough. The Lore Degenstein Gallery is located on the campus of Susquehanna University, on the upper level in the Degenstein Campus Center.

A specific area that is vulnerable to the severe winter storm hazard is the floodplain. At risk general building stock and infrastructure in floodplains are present in the flood profile due to snow and ice melt. Generally, losses from flooding associated with severe winter storms should be less than those associated with a 100-year or 500-year flood.

Full functionality of critical facilities such as police, fire, and medical facilities is essential for response during and after a severe winter storm event. These critical facility structures are largely constructed of concrete and masonry; therefore, they should only suffer minimal structural damage from severe winter storm events. Backup power is recommended critical infrastructure and facilities due to the potential for power interruption. Infrastructure at risk for this hazard includes roadways that could be damaged due to the application of salt and intermittent freezing and warming conditions that can damage roads over time. Severe snowfall requires infrastructure to clear roadways and alert citizens to dangerous conditions. In spring, this type of roadway damage must be repaired. Additionally, freezing rain and ice storms impact utilities (i.e., power lines and overhead utility wires) causing power outages for hundreds to thousands of residents.

The cost of snow and ice removal and repair of roads from the freeze/thaw process can drain local financial resources. However, because severe winter storms are a regular occurrence in this area, Snyder County is generally well-prepared for snow and ice removal each season.

Winter storm vulnerability is going to increase in Snyder County when climate change is considered. As mentioned above in Section 4.3.13.4, climate change is expected to increase the intensity of winter storms. With warmer air temperatures, more moisture will be held in the air, and if temperatures on the ground rapidly decrease, or fall below freezing, this could result in more snow falling during a weather event like a winter storm. These events may become less frequent as the global temperatures increase, but they could become more intense.

As seen in *Table 3 – Population Change in Snyder County*, Franklin Township, Freeburg Borough, Jackson Township, McClure Borough, Monroe Township, Penn Township, Perry Township, Selinsgrove Borough, Washington Township, and West Perry Township have seen a net population increase from the 2010 decennial census to the 2020 decennial census. The impact that a winter storm can have on these municipalities will vary. Municipalities with an increase in population could have more resources available as well as personnel to mitigate the impacts that a winter storm can bring to one’s community. A municipality that experienced a population decrease may not have these resources or personnel available to prepare for and mitigate against an impending winter storm. Adversely, municipalities with an increase in population could experience a more significant impact simply because they have more individuals being impacted compared to a smaller municipality. All municipalities within Snyder County are at the same level of risk to winter storms, but the direct and indirect impacts and vulnerability will vary by municipality.

Vulnerable, or underserved, populations within Snyder County may not have access to housing or their housing may be less able to withstand cold temperatures (e.g., homes with poor insulation and heating supply). The unsheltered populations of an area are at the highest vulnerability to winter storm events. Individuals who are also in poverty, based on information provided in the United States Census are more likely to have issues meeting economic requirements for utility bills in the winter as well. All of these populations can be considered socially vulnerable or communities that have unmet needs.

Land use and major developments will have negligible impacts on the vulnerability of Snyder County to winter storm events. Land use may impact the response capabilities of Snyder County in a winter storm event, but changes in that land use will not increase the vulnerability. Snyder County has significant capabilities to respond to winter storm events. Major development in the county will need to be planned to allow for winter storm response, including size and makeup of transportation routes, and location of snow removal areas.

Winter storms may also negatively impact the natural resources in Snyder County. According to the Pennsylvania Department of Transportation, 446,991 tons of salt were used in the commonwealth, including Snyder County, during the 2022 through 2023 winter storm weather season. Although the use of salt and other anti-skid materials protects life safety by improving roadway conditions, there can also be unintended consequences. When salt used on roadways permeates the surrounding soil, it can infiltrate groundwater and contaminate wells. Hence, any groundwater sources near roadways, in Snyder County, may be vulnerable to degradation.

Roadway salt can also pose a risk to freshwater aquatic life near to the routes of transportation treated with the minerals. Salt that makes its way into soil or freshwater becomes a persistent hazard, damaging plants and wildlife that are not adapted to coexist with high salinity. Its persistent nature is due to a lack of any known biological system that can remove it from the environment in which it exists. Although it may be diluted with water, such a treatment would not be sufficient in isolation, and some intervention would likely be necessary to extract the salt from the environment which it pollutes.

Figure 41 - Winter Storm Events by County in Pennsylvania

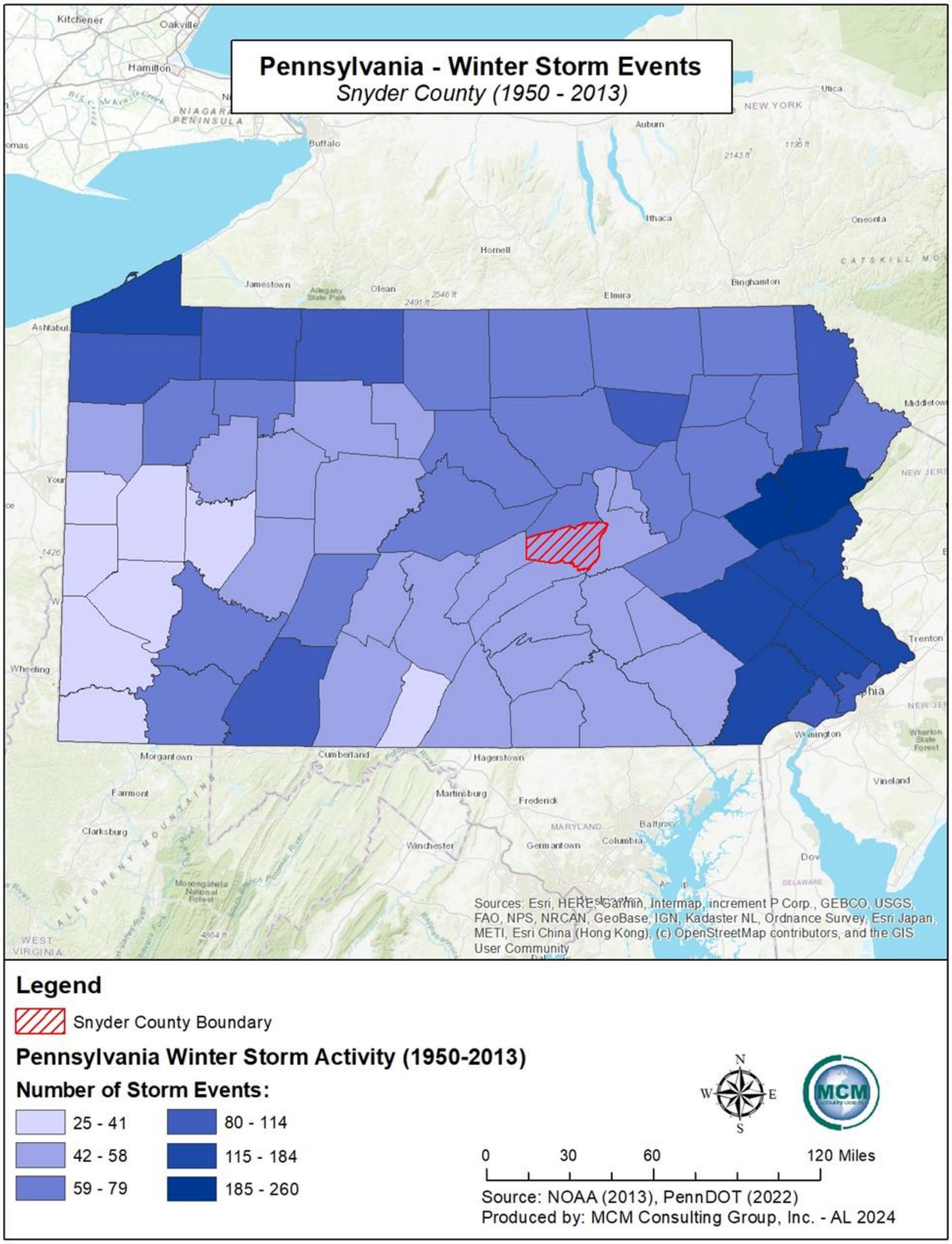
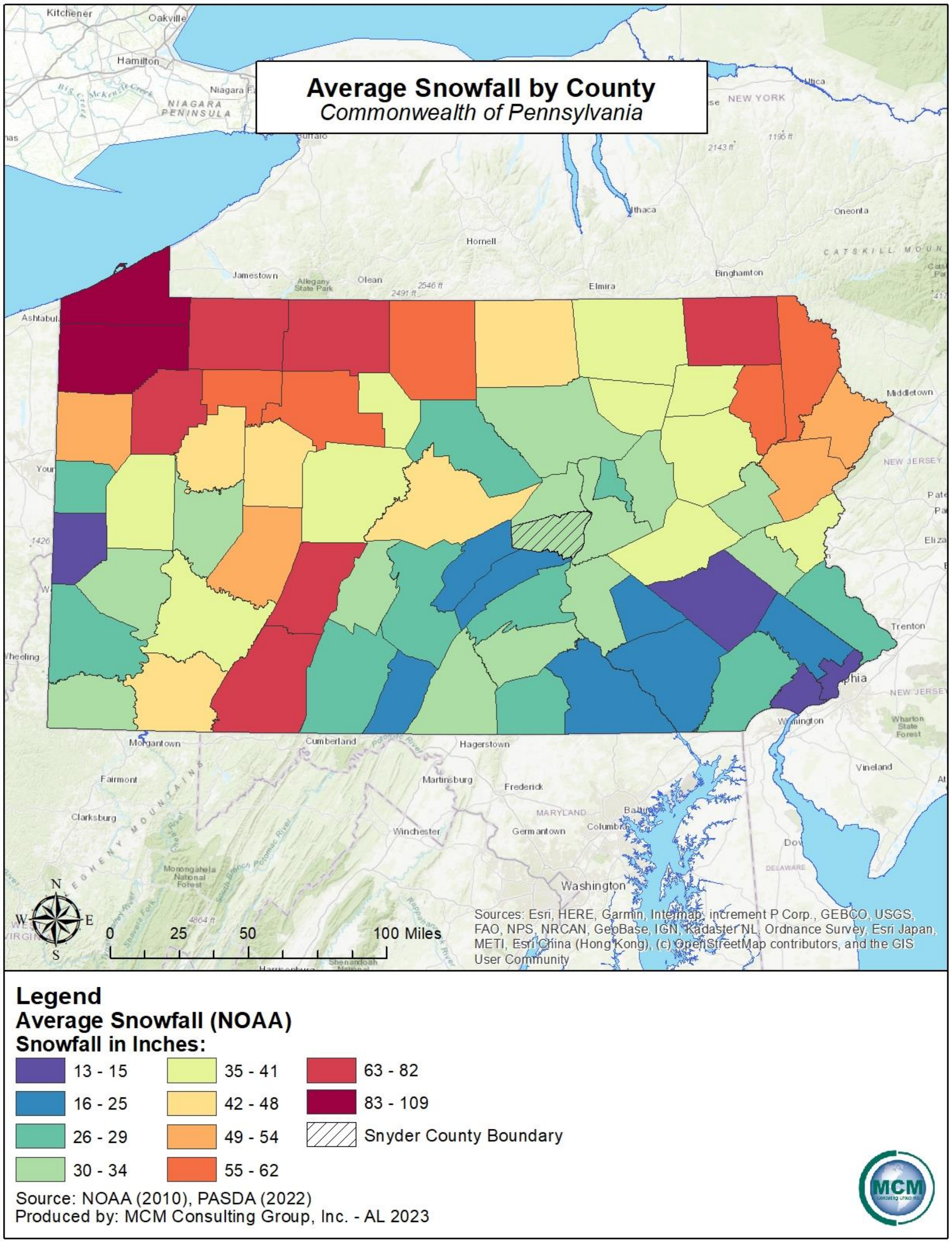


Figure 42 - Pennsylvania Annual Snowfall 1981 – 2010



4.3.14. Blighted Properties

4.3.14.1 Location and Extent

The presence of blighted properties in Snyder County is a nuisance for both residents and visitors to the county on a year-round basis. Blighted properties include areas of the county where the infrastructure is damaged and aging beyond occupation, habitation, and/or commercial use.

Blighted properties are described by the Pennsylvania State Statute 1945 Act 385 as:

1. Any premises which because of physical condition or use is regarded as a public nuisance at common law or has been declared a public in accordance with the local housing, building, plumbing, fire, and related codes.
2. Any premises which because of physical condition, use, or occupancy is considered an attractive nuisance to children, including but not limited to abandoned wells, shafts, basements, excavations, and unsafe fences or structures.
3. Any dwelling which because it is dilapidated, unsanitary, unsafe, vermin-infested, or lacking in the facilities and equipment required by the housing code of the municipality, has been designated by the department responsible for enforcement of the code as unfit for human habitation.
4. Any structure which is a fire hazard or is otherwise dangerous to the safety of persons or property.
5. Any structure from which the utilities, plumbing, heating, sewage, or other facilities have been disconnected, destroyed, removed, or rendered ineffective so that the property is unfit for its intended use.
6. Any vacant or unimproved lot or parcel of ground in a predominantly built-up neighborhood, which by reason neglect or lack of maintenance has become a place for the accumulation of trash or debris, or a haven for rodents or other vermin.
7. Any unoccupied property which has been tax delinquent for a period of two years prior to the effective date of Pennsylvania State Statute 1945 Act 385 or local municipality regulations and those in the future having a two-year tax delinquency.
8. Any property which is vacant but not tax delinquent, which has not been rehabilitated within one year of the receipt of notice to rehabilitate from the appropriate code enforcement agency.
9. Any abandoned property.

4.3.14.2 Range of Magnitude

Snyder County has a large number of blighted properties that are located in urban environments, including the Selinsgrove and Shamokin Dam. Most of the blighted properties in Snyder County are unsecured and highly unsafe due to one or more of the following issues: structure rot, infestation from vermin including but not limited to rats, mice, and insects, and occupation by squatters. These properties can create a risk for the county because they are unsafe for occupation and future construction.

4.3.14.3 Past Occurrence

The number of blighted properties in Snyder County has increased in recent years. Although some properties that are considered to be blighted in Snyder County have been demolished by the county itself. With recent market trends in real estate, a large number of vacant buildings in Snyder County are sold prior to them being blighted.

4.3.14.4 Future Occurrence

Blighted properties in Snyder County will continue to increase unless blighted property procedures are put into practice at the county and local levels. With the requisite policies put into place the number of blighted properties in Snyder County is liable to decrease.

4.3.14.5 Vulnerability Assessment

Blighted properties are a significant concern when the health and safety of the citizens of Snyder County are impacted. Blighted properties, while being an eye sore, are also a threat to the health and safety of individuals. Buildings that are blighted often can be unsafe due to building materials exposed to the environment or to unintentional consumption by humans. Buildings that have utilized asbestos in construction can become a major health hazard if the building is not maintained, the asbestos exposed, and people breath in those particles because the property has become abandoned and blighted. Another large health issue is mold in blighted properties and buildings. After a property becomes blighted, the functional systems that prevent mold from growing and spreading are often rendered useless, thus facilitating the growth of harmful mold and fungi that pose a threat to human health.

Just as blighted properties can adversely affect the health and safety of humans, it can also hurt the environment of an area. The leaching of building materials from an open or fallen property into water features, such as streams and creeks, can damage the wildlife in a water feature and hurt the public supply of drinking water. As mentioned above, asbestos is a large concern if the blighted property is of older construction. Also, potential chemicals from a blighted property, like paints and oils, can make their way into water tables, streams, and creeks, thus polluting the water features.

Blighted properties also offer shelter for animals and vermin that may not be able to find a home, and an area for breeding in the wild. This can result in the spread of rats and other pests in an area with a large concentration of blighted properties. Along with the accumulation of pests like rats, there is also a high chance of that area also attracting vermin like cockroaches. The increase in vermin can also pose a threat to human health, as vermin and pests can carry diseases which can be contracted due to close contact.

Blight can also adversely affect the infrastructure and its ability to function if the blighted properties in Snyder County are adjacent to or near critical facilities and functional needs facilities. If a blighted property abuts a critical facility, it may be best for that structure to be torn down so that potential negative effects from the blighted property do not cause damage or limit the function of the critical facility.

Finally, blighted properties can be a problem for tourism and attracting new residents to Snyder County. If blighted properties flourish in the county, people who travel to Snyder County for pleasure, whether that be for summer vacations or seasonal hunting, might reconsider that travel due to the presence of blighted properties.

4.3.15. Dam Failure

4.3.15.1 Location and Extent

Dams

A dam restricts the flow of water or underground streams and often creates reservoirs for water storage. The reservoirs created by these barriers not only suppress floods but also provide water for activities such as irrigation, human consumption, industrial use aquaculture, and navigability.

Dam failures occur usually as a secondary effect of massive amounts of rainfall and flooding, causing too much water to enter the spillway system. This type of failure occurs with little to no warning. Spring thaws, severe thunderstorms, and heavy rainfall are also contributing factors to potential dam failures. Depending on the size of the body of water where the dam is constructed, additional water may come from distant upstream locations. Water contributions may also come from dam failures in adjoining counties that are along the same riverine or water features.

FEMA considers the following to be the most frequent causes of dam failures:

- Overtopping caused by floods that exceed the capacity of the dam
- Deliberate acts of sabotage
- Structural failure of materials used in dam construction
- Movement and/or failure of the foundation supporting the dam
- Settlement and cracking of concrete or embankment dams
- Piping and internal erosion of soil in embankment dams
- Inadequate maintenance and upkeep

Poor engineering or poor maintenance may also cause dam failure. The Pennsylvania Department of Environmental Protection (PA DEP) and the United States Army Corps of Engineers (USACE) awards permits for dams and also share inspection responsibilities. Inspection results are characterized as either safe or unsafe.

The National Inventory of Dams (NID) is a registry that captures information about structures that are greater than or equal to 25 feet in height or impound 50-acre-feet or more of water (an acre-foot is equal to 325,851 gallons of water); it includes structures above 6 feet in height where failure would potentially cause damage downstream. The dams are classified in terms of hazard potential as “High”, “Significant”, or “Low”, with high-hazard dams requiring emergency action plans (EAPS) There are six high-hazard dams in Snyder County that are both publicly and privately owned and are registered with the USACE in the NID. There are no dams with a hazard classification of low hazard or significant hazard. All of the dams within the county are high-hazard and require an emergency action plan. *Table 56 – Snyder County Dam Inventory* illustrates the dams located in Snyder County. *Table 55 – High-Hazard Dams Municipal Summary* summarizes the high-hazard dams in Snyder County by municipality. The municipalities not listed do not have high-hazard dams.

Table 55 - High-Hazard Dams Municipality Summary

High-Hazard Dams – Municipal Summary	
Municipality	**Number of High-Hazard Dams**
Adams Township	1
Beaver Township	1
Monroe Township	2
Shamokin Dam Borough	1
Spring Township	1
Total:	**6**
Source: PA DEP	

Table 56 - Snyder County Dam Inventory

Snyder County Dams							
Dam Name	**River**	**Owner Name**	**Year Completed**	**Dam Height (feet)**	**Drainage Area (acres)**	**Hazard**	**EAP**
Ash Basin No. 1	Watershed Susquehanna River	Sunbury Generation, LP	1949	22	0.097	High	Y
Ash Basin No. 2	Tributary Susquehanna River	Montour, LLC.	1955	136	0.23	High	Y
Ash Basin No. 3	Tributary Susquehanna River	Montour, LLC.	1971	117	0.55	High	Y
Clarence F. Walker Lake	North Branch Middle Creek	PA Fish and Boat Commission	1970	53	17.6	High	Y
Faylor Lake	Middle Creek	Commissioners of Snyder County	1983	43	33.2	High	Y
Kern Run	Kern Run	Spring Township	1983	61	5.3	High	Y

Snyder County Dams							
Dam Name	**River**	**Owner Name**	**Year Completed**	**Dam Height (feet)**	**Drainage Area (acres)**	**Hazard**	**EAP**
		Municipal Authority					
Source: NID, 2024							

The Pennsylvania Department of Environmental Protection defines a high-hazard dam as "Any dam so located as to endanger populated areas downstream by its failure". High-hazard dams receive two inspections each year, once by a professional engineer on behalf of the owner and once by a PA DEP inspector (DEP, 2008).

Levees

Levee failures have the potential to place large numbers of people and property at risk. Unlike dams, levees are built parallel to a river or another body of water to protect the population and structures behind it from risks of damage during a flooding event. Levees do not serve a purpose beyond flood protection, unlike dams, which can serve to store water or generate energy in addition to protecting areas from flooding. The National Levee Database (NLD), like its counterpart of the National Inventory of Dams (NID), is maintained by the USACE and tracks levees across the United States. Snyder County is home to one levee section, which is detailed in *Table 57 – Snyder County Levee Inventory*.

Table 57 - Snyder County Levee Inventory

Snyder County Levee Inventory				
Levee Name	**Flood Source**	**Levee Type**	**Levee Bank Side**	**Levee Length (miles)**
Poloron Homes Levee	Middle Creek	N/A	Left	0.643
Source: National Levee Database, 2024				

4.3.15.2 Range of Magnitude

Dams

Dam failures can pose a serious threat to communities located downstream from major dams. The impact of a dam failure is dependent on the volume of water impounded by the dam and the amount of population or assets located downstream. Catastrophic failures are characterized by the sudden, rapid, and uncontrolled release of impounded water from a dammed impoundment or water body. *Figure 43 – Snyder County Dams* shows the location of dams within Snyder County as well as their hazard designation.

Levees

Levee failure can be caused by a number of factors, and they can also cause catastrophic effects. Damage to the area beyond a levee, if it fails, could be more significant than if the levee was not present. Levees are designed to provide a specific level of protection, so flooding events could overtop the levees if these events exceeded the levee specifications. Additionally, levees can also fail if they are allowed to deteriorate or decay. Regular maintenance of levees is critical. *Figure 44 – Snyder County Levee Locations* illustrates areas protected by the Snyder County levee systems. *Figure 45 – Snyder County Levee Locations - Middleburg* illustrate areas around Middleburg Borough that are heavily protected by levees.

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 structure is designed and the amount of landward development present. Large volumes of water may be moving at high velocities, potentially causing severe damage to buildings, infrastructure, trees, and other large objects. Levee failures are generally worse when they occur abruptly with little warning and result in deep, fast moving water through highly developed areas.

4.3.15.3 Past Occurrence

Dams

There have been no past occurrences of dam failure or major incidence occurring at the locations of dams within Snyder County. Smaller incidents have occurred but have not had significant impacts in the county.

There have been a few historically destructive dam failures in Pennsylvania over the course of the past two hundred years. The most destructive dam failure in United States history took place in Johnstown, Pennsylvania (Cambria County) in 1889, claiming 2,209 lives. Another significant dam failure took place in Austin, Pennsylvania (Potter County) in 1911, claiming seventy-eight lives. Similarly, a dam failure in West Taylor Township, Pennsylvania (Cambria County) claimed the lives of forty people when the Laurel Run Dam, No. 2 failed during the Johnstown Flood in the early morning hours of July 20th, 1977.

Levees

The National Levee Database (NLD) lists no occurrence of levee failures or major incidents occurring in Snyder County.

Some of the worst levee failures in the history of the United States have occurred in the American South, along parts of the Mississippi River delta. Levee failures in New Orleans, Louisiana during Hurricane Katrina from August 23 to August 31, 2005 resulted in an enormous amount of property damage and loss of lives. There were approximately fifty-three levee failures in constructed levees around the City of New Orleans. Hurricane Katrina precipitated the creation of more strict levee requirements for inspection and construction on the local, state, and federal level.

4.3.15.4 Future Occurrence

Dams

Although dam failures can occur at any time, given the right circumstances, the likelihood of a dam failure in Snyder County is considered to be unlikely.

The presence of structural integrity and inspection programs significantly reduces the potential for major dam failure events to occur. The PA DEP inventories and regulates all the dams that meet or exceed the following criteria (PA, DEP, 2008):

- Impound water from a drainage area of greater than 100 acres
- Have a maximum water depth greater than 15 feet
- Have a maximum storage capacity of 50 acre-feet or greater

The construction, operation, maintenance, and abandonment of dams is reviewed and monitored by the PA DEP Division of Dam Safety. Dams are evaluated based on those categories such as slope stability, undermining seepage, and spillway adequacy. With more strict construction and design procedures in place, the future occurrence of a dam failure is increasingly small. The new procedures and rules protect public safety and both public and private property. Newly constructed dams are thoroughly examined by professional engineers to prevent future dam failure events.

Levees

Although levee failures can occur at any time, given the right circumstances, the future occurrence of levee failures in Snyder County can be considered unlikely. Most levees are designed to meet a specified level 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 both smaller and larger floods.

4.3.15.5 Vulnerability Assessment

Dams

Property and populations located downstream from any dams are vulnerable to dam failures. The Pennsylvania Code (§105.91 Classification of dams and reservoirs) classifies doth dams by size and the amount of loss of life and economic loss expected in a failure event. *Table 58 – Dam Classification* displays the dam classification guide for the Commonwealth of Pennsylvania. Although the size of a dam may result in varying impacts, the hazard potential classification of category one dams is a more important indicator, since that will indicate the level of potential substantial loss of life and excessive economic loss.

Table 58 - Dam Classification

Dam Classification		
Dam Size Classification		
Class	**Impoundment Storage (Acre-Feet)**	**Dam Height (Feet)**
A	Equal to or greater than 50,000	Equal to or greater than 100
B	Less than 50,000 but greater than 1,000	Less than 100 but greater than 40
C	Equal to or less than 1,000	Equal to or less than 40
Dam Damage Classification		
Category	**Loss of Life**	**Economic Loss**
1	Substantial	Excessive
2	Few	Appreciable
3	None Expected	Minimal
Source: PA Code, 1980		

Dam failures can cause significant environmental effects, as the resulting flood from a dam failure is likely to disperse debris and hazardous materials downstream that can damage local ecosystems. Debris carried downstream can block roads, cause traffic accidents, disrupt traffic patterns, and delay the delivery of essential services along major traffic corridors. Debris flow can also cause landslides along steep slopes and embankments with low slope stability. The economic and financial impact from damage and recovery ranges from minimal to severe, depending on the magnitude of damage and scale of failure event.

Emergency action plans are developed by the owners of high-hazard dams. These plans are then disseminated to first responders and other planning partners within the county. Vulnerable populations are those residents and businesses located downstream from a high-hazard dam within the inundation area. The emergency action plan identifies a call list to notify downstream at-risk populations. Emergency action plan exercises are held every five to seven years depending on local policy.

The characteristics of the six high-hazard dams in Snyder County vary greatly. The Clarence F. Walker Lake Dam, located in Adams Township, has the largest drainage area with a total of 17.6 acres. The dams that were constructed most recently are the Faylor Lake, located in Spring Township, which was constructed in 1983, and the Kern Run Dam in Beaver Township, which were constructed in 1983. The dam that is the oldest in the county is Ash Basin No. 1 Dam, which was constructed in 1949. The Ash Basin No. 2 Dam is the tallest in the county with a height of 136 feet. Montour, LLC. owns the most dams in Snyder County with a total of two. These dams are the Ash Basin No. 2 Dam and the Ash Basin No. 3 Dam. The dams in Snyder County are owned by a mix of public and private owners and vary in almost every aspect. The county dams are distributed relatively evenly throughout the county and municipalities, with an even mix of high and low hazard dams in the municipalities.

The failure or partial failure of a High-Hazard Potential Dam can have impacts that affect many different jurisdictions across Snyder County and counties adjacent to Snyder County. A failure at any of the dams in Snyder County would result in some inundation in at least those municipalities adjacent to the dam in question. A more comprehensive examination of risk inundation areas from High-Hazard Potential Dams can be conducted in future iterations of the Snyder County Hazard Mitigation Plan. This dataset was not readily accessible at the time of this writing. However, each of this municipalities that could be affected by the failure of a High-Hazard Potential Dam could result in the inundation of police stations and fire departments, critical infrastructure facilities, and community lifeline locations like medical facilities, power and energy facilities, and schools, nursing homes, and senior care and long term care facilities.

Snyder County is at risk when high-hazard potential dams are considered. There are three types of risk related to high-hazard potential dams and they are listed below in *Table 59 – High-Hazard Potential Dams Risk Type*:

Table 59 - High-Hazard Potential Dams Risk Type

High-Hazard Potential Dams Risk Types	
Type of Risk	**Description**
Incremental Risk	The risk (likelihood and consequences) to the pool area and downstream floodplain occupants that can be attributed to the presence of the dam should the dam breach prior or subsequent to overtopping, or undergo component malfunction or incorrect operation, where the consequences considered are over and above those that would occur without dam breach. The consequences typically are due to downstream inundation, but loss of the pool can result in significant consequences in the pool area upstream of the dam.
Non-Breach Risk	The risk in the reservoir pool area and affected downstream floodplain due to 'normal' dam operation of the dam (e.g., large spillway flows within the design capacity that exceed channel capacity) or 'overtopping of the dam without breaching' scenarios.
Residual Risk	The risk that remains after all mitigation actions and risk reduction actions have been completed. With respect to dams, FEMA defines residual risk as "risk remaining at any time" (FEMA, 2015, p A-2). It is the risk that remains after decisions related to a specific dam safety issue are made and prudent actions have been taken to address the risk. It is the remote risk associated with a condition that was judged to not be a credible dam safety issue.
Source: "Rehabilitation of High Hazard Potential Dams Grant Program Guidance," June 2020	

At this time, insufficient information is available to conduct a substantive analysis of incremental, non-breach and residual risk relative to Snyder County's high hazard potential dams. However, it is acknowledged that incremental risk is "the risk (likelihood and consequences) to the pool area and downstream floodplain occupants that can be attributed to the presence of the dam should the dam breach prior or subsequent to overtopping, or undergo component malfunction or incorrect operation, where the consequences considered are over and above those that would occur without dam breach;" non-breach risk is "the risk in the reservoir pool area and affected downstream floodplain due to 'normal' dam operation of the dam (e.g., large spillway flows within the design capacity that exceed channel capacity) or 'overtopping of the dam without breaching' scenarios;" and residual risk) is "the risk that remains after decisions related to a specific dam safety issue are made and prudent actions have been taken to address the risk. It is the remote risk associated with a condition that was judged to not be a credible dam safety issue" (FEMA, 2020 Rehabilitation of High Hazard Potential Dams Grant Program Guidance)

The risk of high-hazard potential dams in Snyder County is present but at the time of this writing, there is insufficient data to identify in exact detail the vulnerable populations and assets in inundation areas for the high-hazard potential dams. The areas downstream from the high-hazard potential dams are more vulnerable to inundation than areas that are upstream from said dams. There are current datasets to address high-hazard potential dam impacts in greater detail, but these datasets are still in development from the Pennsylvania Department of Environmental Protection, Pennsylvania Emergency Management Agency, the United States Army Corp of Engineers, and the Federal Emergency Management Agency.

Specifically, vector GIS boundary data for dam inundation areas would allow for more comprehensive damage overlays and damage analysis. Vector GIS information would allow for inundation areas to be mapped along with community lifelines and critical facilities to see what specific facilities could be impacted by a failure at a high-hazard potential dam, including type and use of those facilities impacted. This inundation data could also lead to greater analysis on the construction type of the buildings impacted, including what materials are used for building and what the physical characteristics of the buildings are made of that may be impacted. While useful for vulnerability assessment, these datasets would have to be carefully regulated in regard to access to ensure that no unauthorized individuals or organizations have the ability to see or use the data. Dam inundation maps could also be used if GIS boundary data is not available or able to be released.

Once these datasets have been published and inundation data is easier to acquire, this information will be used to develop more detailed risk assessments and vulnerability assessments for dam failure at the high-hazard potential dams. Continued collaboration with state and federal partners will occur to ensure that any data created or made available is utilized for vulnerability assessment for high-hazard potential dams.

Although there are data limitations to take into account in regard to high-hazard potential dams in Snyder County, some open source, nationally available data can be integrated into this vulnerability assessment. One of those tools is the Resilience Analysis and Planning Tool (RAPT), administered by FEMA. This tool can overlay areas of interest around certain features to determine what types of populations are within certain distances of those features. In the table below, a 2-mile distance was calculated around each high-hazard dam in Snyder County. Those locations were then used to determine how many people or households are vulnerable to a dam failure based strictly on distance. Some of the indicators used for this analysis were total population, households with vehicles, households with limited English and housing units that are mobile homes. This can be seen in the table below, *Table 60 – High-Hazard Dam Vulnerability Data*.

Table 60 - High-Hazard Dam Vulnerability Data

High-Hazard Dam Vulnerability Data				
Dam	**Total Population**	**Households without a vehicle**	**Households with limited English**	**Housing units that are mobile homes**
Ash Basin No. 1	3,373	191	6	108
Ash Basin No. 2	4,037	163	5	139
Ash Basin No. 3	5,883	741	60	180
Clarence F. Walker Lake	730	27	4	49
Faylor Lake	686	39	10	57
Kern Run	722	31	5	52
Total	**15,431**	**1,192**	**90**	**585**
Source: RAPT, ACS, 2017-2021, Table B08201, Table S1602, and Table DP04				

An analysis was also conducted for high priority infrastructure within 2-miles of high-hazard dams in Snyder County. There were no law enforcement locations within 2 miles of the dams. The information in the table (*Table 61 – High-Hazard Dam Vulnerability Data – Infrastructure*) below illustrates which infrastructure was located in that vulnerability zone.

Table 61 - High-Hazard Dam Vulnerability Data – Infrastructure

High-Hazard Dam Vulnerability Data – Infrastructure				
Dam	**Hospitals**	**Nursing Homes**	**Fire Stations**	**Public Schools**
Ash Basin No. 1	0	0	3	0
Ash Basin No. 2	0	0	2	0
Ash Basin No. 3	0	0	4	0
Clarence F. Walker Lake	0	0	0	0
Faylor Lake	0	0	1	1
Kern Run	0	0	2	0
Source: RAPT, Homeland Infrastructure Foundation-Level Data, 2024				

The table (*Table 62 – High-Hazard Dam Vulnerability – Infrastructure Additional Information*) below provides more information on infrastructure within 2 miles of high-hazard dams.

Table 62 - High-Hazard Dam Vulnerability – Infrastructure Additional Information

High-Hazard Dam Vulnerability Data – Infrastructure Names	
Dam	**Infrastructure Details**
Ash Basin No. 1	Fire Stations: 1. Hummels Wharf Fire Company 2. Shamokin Dam Fire Company 3. Dauntless Hook and Ladder
Ash Basin No. 2	Fire Stations: 1. Shamokin Dam Fire Company 2. Hummels Wharf Fire Company
Ash Basin No. 3	Fire Stations: 1. Shamokin Dam Fire Company 2. Americus Hose Company Fire 3. Hummels Wharf Fire Company 4. Sunbury Steam Fire Engine
Clarence F. Walker Lake	N/A
Faylor Lake	Fire Stations: 1. Beaver Springs Fire Company Public School: 1. West Snyder Elementary School
Kern Run	Fire Stations: 1. Beavertown Rescue Hose Company 2. Beaver Springs Fire Company
Source: RAPT, Homeland Infrastructure Foundation-Level Data, 2024	

Levees

The only levee feature in Snyder County is the Poloron Homes Levee, and as such it is also the longest levee in the county at 0.63 miles in length.

The entire leveed area for Snyder County protects a total of eight addressable structures within the county. Also protected is one facility point that includes community lifeline facilities (municipal buildings, hospitals, police/fire/EMS, schools, childcare centers, and nursing/care homes) facilities. Each levee in Snyder County is a mainline levee and protects along a variety land features. A failure of levee in the urban areas in Snyder County would be catastrophic to life and property.

There are a large number of community lifeline facilities within the levee protection areas for the levees around Snyder County. *Table 63 – Number of Vulnerable Structures within Leveed Areas* shows the number of addressable structures and facility type points in the largest levee protection areas within Snyder County based on NLD information from 2024. The features included in the table are particularly vulnerable to levee failure because they are protected by the system. Should the levee systems fail, the structures would be at an increased risk by their flood sources.

Table 63 - Number of Vulnerable Structures within Leveed Areas

Number of Vulnerable Structures within Leveed Areas		
Leveed Area Name	**Addressable Structures in Leveed Area**	**Facility Type Points in Leveed Area**
Poloron Homes Levee	8	1
Totals:	**8**	**1**

Figure 43 - Snyder County Dams

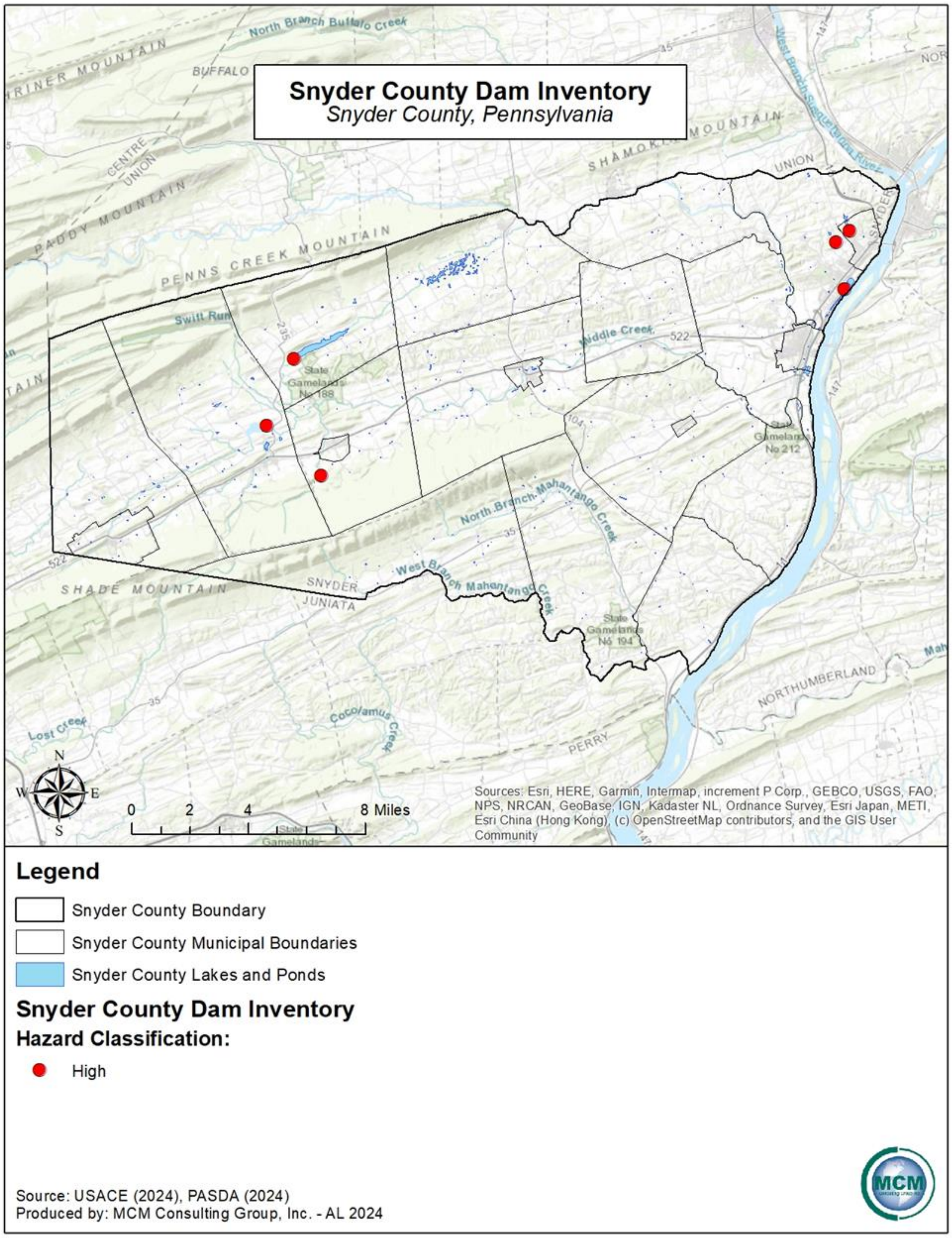


Figure 44 - Snyder County Levee Locations

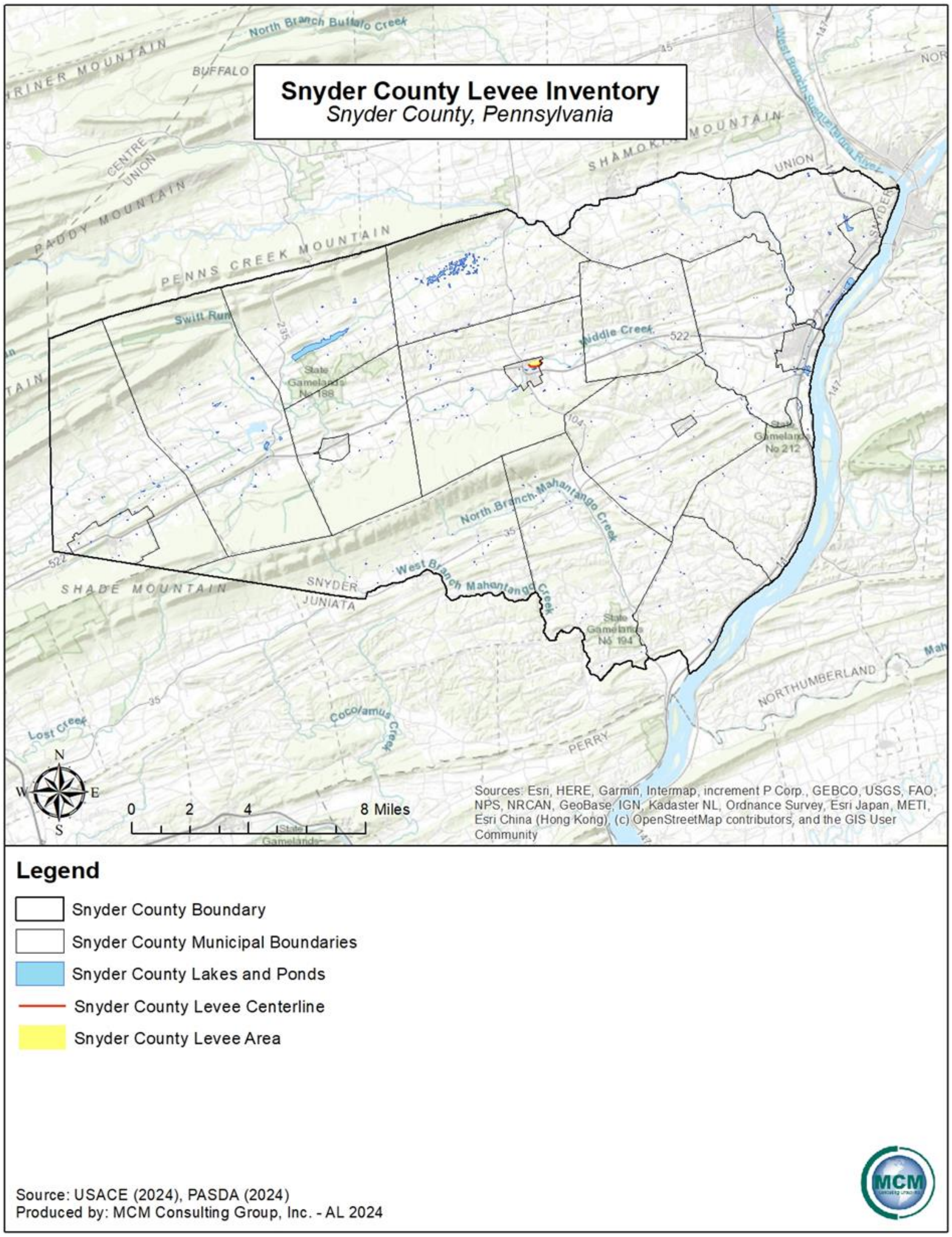
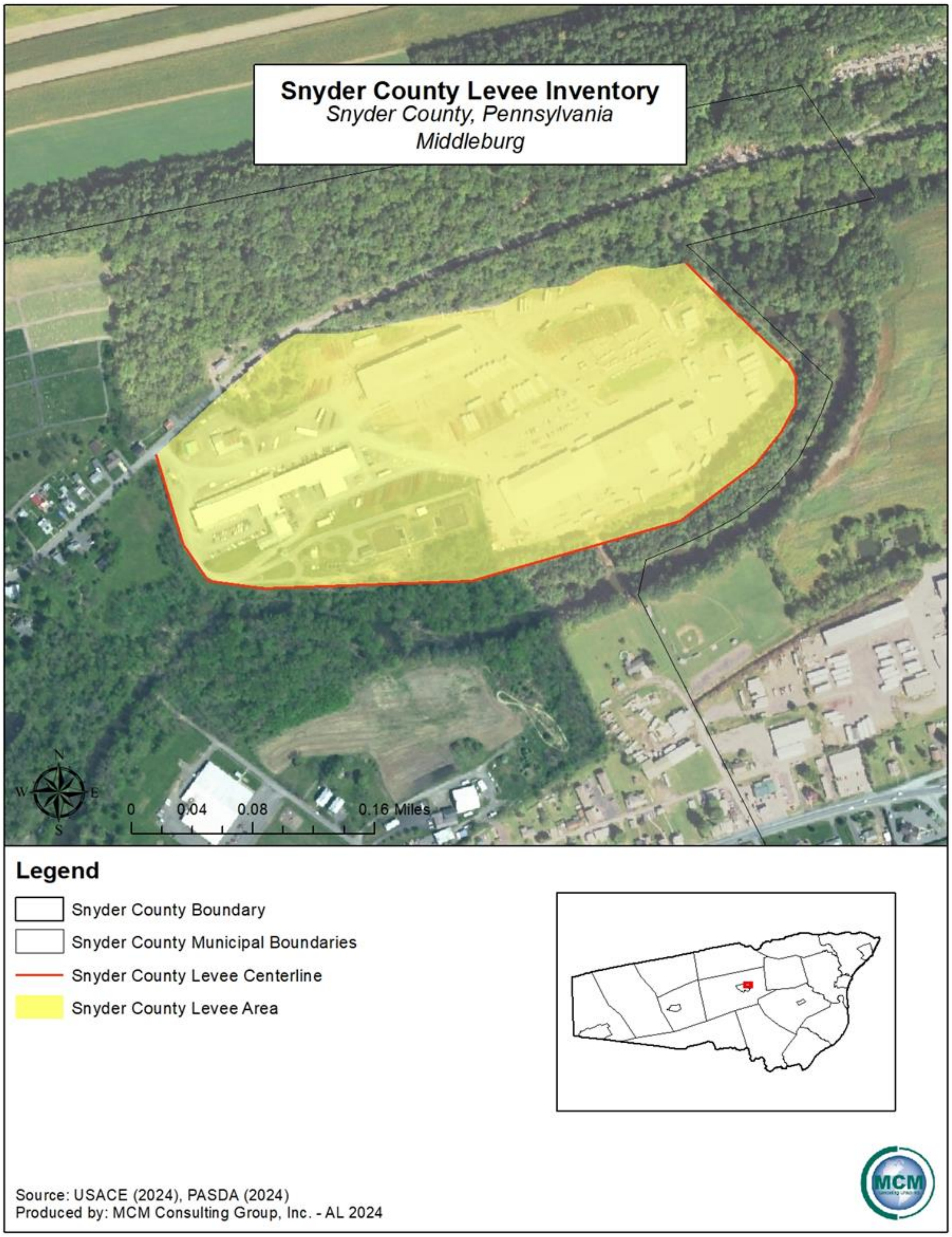


Figure 45 - Snyder County Levee Locations – Middleburg



4.3.16. Emergency Services

4.3.16.1 Location and Extent

Fire, emergency medical services (EMS), local emergency management coordinators (LEMC), and law enforcement service agencies are defined per municipality in Snyder County. In addition to the local services, the county hosts numerous special teams. Regional and state-wide services are also available.

With the exception of law enforcement, most areas are served by volunteers instead of career personnel, which increases response time due to volunteer availability. Volunteers provide emergency services above separately from their regular careers. Often agencies struggle with the availability of skilled personnel and resources at certain times of the day. The number of responders in general has decreased, in part due to issues including funding and retention of personnel.

Additionally, the time and expense obligations of required training are a factor in the decrease in number of responders. The initial training time for fire, EMS, and law enforcement can take several months to complete. Emergency medical services requires a regular schedule of continued education to maintain certification. In the fire service, after the initial training, there are specialty courses offered, which are recommended, but not required. For law enforcement, skills such as firearms proficiency must be maintained, and updates to new laws and regulations continues throughout the officer’s career.

4.3.16.2 Range of Magnitude

Finances, changing political climates, leadership, or a significant high-profile event can trigger a system to be declared as “success” or “failure”. In some cases, a combination of these factors can create a perfect storm. Unfortunately, many “failed” systems are measured by recent events, no matter how successful they may have been in the past. Although financial problems are often blamed on poor leadership, they may have many root causes. Labor rates, benefits, poor productivity, operational design, insurance reimbursements, and market regulation all have a significant direct impact on the financial viability of an organization.

Two fundamental, yet misunderstood, topics are the financial and economic variables that drive emergency service systems. These systems typically generate revenue through tax subsidies, memberships, direct sales, diversification into other lines of business, grants, or fundraising. They spend most of these revenues on direct and indirect labor, and benefits. The remaining dollars go into infrastructure, fuel, medical supplies, insurances, fleet maintenance, dispatch, and other essential items, with hopefully, some left over for recapitalization or fund balance development. The range of the issues related to emergency service shortages are felt across the entire United States of America and the Commonwealth of Pennsylvania. Snyder County has felt emergency shortages, and these shortages have had adverse effects on emergency response in the county.

4.3.16.3 Past Occurrence

There have been no official records kept on shortages to emergency services. However, there has been a decrease in the number of new volunteers in the fire service for several years. Most agencies are private organizations that lack local funding and exist based on tax dollars, fund raising, and donations received from their community. The need for fund raising adds to availability issues of volunteers. Most services past practices are not sustaining the current needs for funding and manpower. Without financial support from the communities, services may not be able to remain in operation to serve those same communities. Recruitment and personnel retention are a key to success.

Snyder County has had multiple events that were caused by emergency service shortages, most significantly from 2020 to 2022, exacerbated by the COVID-19 pandemic. However, this shortage has not been caused exclusively by the COVID-19 pandemic and was occurring before the pandemic across Snyder County and the Commonwealth of Pennsylvania.

4.3.16.4 Future Occurrence

Historically, it has been difficult for small communities to have a paid fire or EMS service, therefore requiring volunteers. Fewer volunteers to perform the tasks associated with fire, medical, and rescue operations, can negatively affect a service's ability to respond to emergencies. Additionally, operational needs are impacted if there are fewer volunteers to raise funds. Without fundraising and community support these fire departments and volunteer EMS agencies will experience broader challenges. Municipalities can help offset some of the financial burdens to their local fire company with a fire tax.

There are also challenges for individuals who volunteer, including dedicating time beyond their current employment, family, and community commitments to dedicate to training, responding, and fundraising. Training is essential to provide for the general knowledge and safety of volunteers. Becoming certified as a volunteer firefighter requires hundreds of hours of training. With a decrease in the numbers of new volunteers, many current volunteers are aging and unable to perform at the same levels they once were.

Fire departments and EMS agencies, often are tasked with responding to a variety of emergencies, including not only fire and medical emergencies, but also incidents requiring rescue, containment of hazardous materials, or assistance to law enforcement. Volunteers need to be well trained and able to respond to different scenarios as needed.

The future occurrence of emergency service shortages is likely to continue in Snyder County and across the Commonwealth of Pennsylvania. With a lack of new recruits and officers for emergency services, response will continue to be hindered, and response times will continue to be high. Institutional change is the most efficient way to decrease the likelihood of emergency service shortages in Snyder County, but that type of change is slow and often long-term.

4.3.16.5 Vulnerability Assessment

The possibility that EMS agencies and fire services could fail creates a vulnerability to all Snyder County communities. Occasionally, residents of communities mistakenly think that their local fire department is a paid service. Most municipal fire departments are volunteer agencies and need the support of their communities to maintain their departments.

Personnel shortages have been occurring in law enforcements for several reasons. More students are pursuing other professional careers instead of becoming public safety professionals than previously. This trend could be an effect of the recent changes in the social climate toward law enforcement, the increased number of college students pursuing graduate school degrees, or many other factors. As with any profession, becoming a law enforcement officer requires a commitment of time and money for training at local, state, or federal levels. The selection of law enforcement officers includes not only physical and mental aptitudes, but also a comprehensive physiological screening.

If any current public service agency fails to provide enough personnel to perform their required duties, then those duties must be provided for by another service agency that may be many miles away, creating an increased response time. An increased response time could lead to additional or greater severity in injury or property damage. Many communities in Pennsylvania have already experienced the closure of emergency response agencies.

It is recommended that each municipality assess their own vulnerabilities by maintaining and building relationships with their local providers and working with them to make to plan accordingly for if a local service were to close its operations. Consolidation of services is a possible solution for agencies that are struggling to maintain operations. Statistics, response times, and all times associated with units dispatched are easily obtainable from the county 911 center. Municipalities should research all of the factors which would be part of a consolidation of emergency services with neighboring communities.

The emergency services departments in Snyder County need to be supported to create and or discover new ways to not only recruit but to retain volunteers. If left unattended, the issue will continue and the lack of response will grow, leaving communities more vulnerable to loss of life and loss of property. Community education is a key factor in the maintenance of emergency response agencies. In addition, continued support, and efforts to inform legislature could all prove to be important in assuring that these services remain in operation into the future. At the time of the writing of this plan, a number of bills has been introduced in both the House of Representative and the Senate as a result of a two-year study initiated by Senate Resolution 6 (SR6). The final report can be found here: http://pehsc.org/wp-content/uploads/2014/05/SR-6-REPORT-FINAL.pdf.

Emergency response agencies that currently provide services within Snyder County are identified in the following tables, *Table 64 – Snyder County Fire Departments* identifies the municipalities served. Almost all fire departments in Snyder County are volunteer. *Table 65 – Snyder County EMS Agencies* identifies each emergency medical service agency, and the municipalities served. *Table 66 – Snyder County Law Enforcement Agencies* identifies each police department to include the Pennsylvania State Police (PSP) and the municipalities served. *Table 67 – Snyder County Specialty Teams* lists the teams and their specialty. This information was provided by the Snyder County Emergency Services.

Table 64 - Snyder County Fire Departments

Snyder County Fire Departments	
Department Name	**Municipalities Covered**
Company 10- Beaver Springs Fire Company	Spring Township, Adams Township
Company 20- Beavertown Fire Company	Beavertown Borough, Beaver Township
Company 30- Freeburg Fire Company	Freeburg Borough, Washington Township
Company 40- McClure Fire Company	McClure Borough
Company 50- Middleburg Fire Company	Middleburg Borough, Franklin Township
Company 60- Port Trevorton Fire Company	Union Township, Chapman Township
Company 70- Hummels Wharf Fire Company	Monroe Township
Company 80- Selinsgrove Fire Company	Selinsgrove Borough, Penn Township
Company 90- Shamokin Dam Fire Company	Shamokin Dam Borough
Company 100- Fremont Fire Company	Perry Township, West Perry Township, Washington Township

Snyder County Fire Departments	
Department Name	**Municipalities Covered**
Company 110- Penns Creek Fire Company	Center Township
Company 120- Kreamer Fire Company	Middlecreek Township
Company 130- Kratzerville Fire Company	Jackson Township
Company 140- Bannerville Fire Company	West Beaver Township

Table 65 - Snyder County EMS Agencies

Snyder County EMS Agencies		
Station Name	**Service Provided**	**Municipalities Covered**
Beaver Springs Ambulance	BLS	West Beaver Township, McClure Borough, Spring Township, Adams Township
Beavertown Ambulance	BLS	Beavertown Borough, Beaver Township
Middleburg Ambulance	BLS/ALS	Middleburg Borough, Franklin Township, Beaver Township, Beavertown Borough, Spring Township, Adams Township, Washington Township, Perry Township, West Perry Township, Middlecreek Township
Ambulance 1-4 (ERMMS) Port Trevorton	BLS	Union Township, Chapman Township
Kreamer Ambulance	BLS	Middlecreek Township
Penns Creek Ambulance	BLS	Center Township
Selinsgrove Ambulance	BLS/ALS	Selinsgrove Borough, Penn Township, Middlecreek Township, Freeburg Borough, Union Township, Chapman Township, Jackson Township
MICU 1-3 (ERMMS) Hummels Wharf	ALS	Monroe Township

Table 66 - Snyder County Law Enforcement Agencies

Snyder County Police Departments	
Station Name	**Municipalities Covered**
Middleburg Police Department	Middleburg Borough, Middlecreek Township, Beavertown Borough, McClure Borough
Pennsylvania State Police – Selinsgrove Station	All municipalities
Selinsgrove Police Department	Selinsgrove Borough
Shamokin Dam Borough Police Department	Shamokin Dam Borough
Snyder County Sheriff's Office	All municipalities

Table 67 - Snyder County Specialty Teams

Snyder County Specialty Teams	
Team Name	**Specialty**
Snyder County Sheriff's Department K-9	K-9 Drug Detection and Tracking
Snyder County EMA	Drone Response, Mobile Command Center, Central Region Search and Rescue Team

4.3.17. Environmental Hazards

4.3.17.1 Location and Extent

Transportation

Environmental hazards are most commonly due to hazardous materials incidents occurring when such materials are manufactured, used, stored, or transported. Most hazardous materials incidents are unintentional, however hazardous materials could also be released in a criminal or terrorist act. A release, whether it is intentional or accidental, can result in injury or death and may contaminate air, water and/or soils. Hazardous materials incidents can be generally broken down into the subcategories of transportation and fixed facility. This section will focus on environmental hazards and how they relate to transportation of hazardous materials.

Tanker trucks, tractor trailers, and rail cars often are used to transport hazardous materials. When there are transportation incidents involving these types of vehicles, hazardous materials can be released in significant quantities. *Figure 48 – Environmental Hazard Transportation Vulnerability* shows major transportation routes through Snyder County, including United States Route 11, United States Route 15, State Route 35, and United States Route 522.

Fixed Facility

Hazardous materials incidents can be broken down into the subcategories of transportation and fixed facility. This section of the report focuses on environmental hazardous materials at fixed facilities.

In Pennsylvania, facilities that use, manufacture, or store hazardous materials must comply with Title III of the federal Superfund Amendments and Reauthorization Act (SARA), and the Commonwealth's reporting requirements under the Hazardous Materials Emergency Planning and Response Act (1990-165), as amended. There are eight SARA facilities in Snyder County. These facilities listed as SARA sites should not be considered an exhaustive and comprehensive list of all locations where hazardous materials reside in the county. *Figure 47 – Hazardous Waste Locations* identifies SARA Title III facilities as well as several other locations that consume, store, or release potentially hazardous materials and wastes.

Fixed facilities are also monitored by the Environmental Protection Agency (EPA). The EPA has identified hazardous materials sites, not regulated by SARA Title III, and are known as Toxic Releases Inventory (TRI) sites. Facilities which employ ten or more full time employees, and which manufacture or process more than 25,000 pounds (or use more than 10,000 pounds) of any SARA Section 313-listed toxic chemical in the course of a calendar year are required to report

TRI information to the EPA. The EPA is the federal enforcement agency responsible for SARA Title III and PEMA classifications.

Oil and gas extraction facilities can also be sources of hazardous material release. Most wells in the county are active, but there are also many inactive and abandoned wells. *Figure 46 – Oil & Gas Well Locations* shows the location of all oil and gas wells in the county along with their proximity to surface waters.

4.3.17.2 Range of Magnitude

Transportation

While often accidental, releases can occur because of human carelessness, intentional acts, or natural hazards. When caused by natural hazards, environmental hazards are known as secondary events. Hazardous materials can include toxic chemicals, radioactive materials, infectious substances, or hazardous wastes. Such releases can affect nearby populations and contaminate critical or sensitive environmental areas.

Hazardous material release can contaminate air, water, and soil, and can possibly cause injuries, poisonings, or deaths. Hazardous materials fall into nine hazards classes. These hazard classes are as follows:

- Class #1: Explosives
- Class #2: Gases (flammable, non-flammable, non-toxic, and toxic)
- Class #3: Flammable and Combustible Liquids
- Class #4: Flammable Solids (spontaneously combustible and dangerous when wet materials/water reactive substances)
- Class #5: Oxidizing substances and organic peroxides
- Class #6: Toxic Substances and Infectious Substances
- Class #7: Radioactive Materials
- Class #8: Corrosive Substances
- Class #9: Miscellaneous Hazardous Materials / Substances

All nine hazard classes can be found in transportation incidences.

Fixed Facility

All nine hazard classes can be found at fixed facilities. Certain conditions can exacerbate release incidents and these events include fixed facilities:

- Micrometeorological effects of buildings and terrain which alters the dispersion of hazardous materials.
- Proximity to surface water and ground water resources.
- 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 type of material released, distance, and related response time of emergency responders also significantly impact severity and scope of hazardous material releases and clean-up efforts. Areas most proximal to the release are usually at the greatest level of risk, but depending on the material, a release can travel great distances or remain present in the environment for long periods of time (centuries or millennia for some radioactive materials) resulting in chronic and extensive impacts on people and the environment.

Oil and gas well drilling can have a variety of effects on the environment. Abandoned oil and gas wells, not properly plugged can contaminate groundwater and consequently drinking water wells. Surface waters and soil are sometimes polluted by brine, a salty wastewater product of oil and gas well drilling, and from oil spills occurring at the drilling site or from a pipeline breach. A pipeline breach or an accidental dispersal can spoil public drinking water supplies and can be particularly detrimental to vegetation and aquatic animals, making water safety an important factor in oil and gas extraction. In some cases, associated with hydraulic fracturing (fracking), methane has been found contaminating drinking water in surrounding areas.

Natural gas fires occur when natural gas is ignited at the well site. Often, these fires erupt during drilling when a spark from machinery or equipment ignites the gas. The initial explosion and resulting flames have the potential to seriously injure or kill individuals in the immediate area. These fires are often difficult to extinguish due to the intensity of the flame and the abundant fuel source.

4.3.17.3 Past Occurrence

Transportation

Recent transportation and fixed facility events are recorded in the WebEOC and county reporting software and are summarized in *Table 68 – Hazardous Material Incidents*. Transportation accidents that involved hazardous materials were included in the table below.

Table 68 - Hazardous Material Incidents

Hazardous Material Incidents		
Municipality	**Date**	**Event**
Monroe Township	07/15/2022	Anhydrous Ammonia Leak
Franklin Township	n/a	Outside HazMat Incident
Franklin Township	n/a	Outside HazMat Incident
Monroe Township	n/a	Outside HazMat Incident
Monroe Township	n/a	Outside HazMat Incident
Monroe Township	n/a	Outside HazMat Incident
Monroe Township	n/a	Outside HazMat Incident
Perry Township	n/a	Outside HazMat Incident
Selinsgrove Borough	n/a	Inside HazMat Incident
Selinsgrove Borough	n/a	Outside HazMat Incident
Union Township	n/a	Inside HazMat Incident
Union Township	n/a	Outside HazMat Incident
Washington Township	n/a	Inside HazMat Incident
West Perry Township	n/a	Outside HazMat Incident
Source: WebEOC, County Reporting System, 2024		

Hazardous materials can be transported by air, sea, and land (over the road or through pipelines). Transportation accidents along roadways is a regular occurrence and a large number of hazardous materials are transported by roadway every day. Based on information provided by the Snyder County Office of Emergency Services and the 911 center, there were ten exterior or outside HazMat events between 2020 and 2024.

Fixed Facility

There have been a number of hazardous material incidents in Snyder County in the past but few of those events have been related to fixed facilities in the county. There are approximately three transportation related HazMat events recorded by Snyder County from 2020 to 2024.

The EPA tracks the management of hazardous materials in facilities that handle significant amounts of hazardous materials. The three Toxic Release Inventory (TRI) facilities in Snyder County as of 2024 are summarized in *Table 69 – TRI Facilities*. Production-related waste managed is a collective term to refer to how much of a chemical is recycled, combusted for energy recovery, treated for destruction, or disposed of, or otherwise released on and off site.

Table 69 - TRI Facilities

Toxic Release Inventory (TRI) Facilities				
Name	**Municipality**	**Industry Sector**	**Chemical**	**Production-related Waste Managed (lbs)**
Kerrico Corporation	Penn Township	Plastics and Rubber	Styrene, Methyl methacrylate	17,369
Lozier Corporation	McClure Borough	Furniture	Manganese, Lead, Chromium, Nickel	3
Wood-Mode, LLC.	Middlecreek Township	Furniture	Xylene, Methanol, Toluene	34,760
Source: EPA, 2024				

As of 2024, Snyder County is home to no active natural gas wells. There are two abandoned wells, and one plugged well. The two abandoned wells are in Adams Township and the plugged well is in Franklin Township.

4.3.17.4 Future Occurrence

Transportation

While many incidents involving hazardous material releases have occurred in Snyder County in the past, they are generally difficult to predict. The nature of traffic accidents is that there is little to no warning for their occurrence, and they can have disastrous results. An occurrence is largely dependent upon the accidental or intentional actions of a person or group.

Fixed Facility

Hazardous material release incidents are generally difficult to predict, but the presence of such dangerous materials warrants preparation for accidental or intentional release events. Emergency response agencies in Snyder County should be prepared to handle the types of hazardous materials housed and used the SARA Title III facilities, TRI facilities, and oil and gas wells that are located within the county. The Federal Superfund Amendments and Reauthorization Act (SARA) is also known as the Emergency Planning and Community Right-to-Know Act (EPCRA), and the Local Emergency Planning Committees (LEPCs) are designed by EPCRA to ensure that state and local communities are prepared to respond to potential chemical accidents.

4.3.17.5 Vulnerability Assessment

Transportation

Quick response to transportation accidents involving hazardous materials minimizes the volume and concentration of hazardous materials that are transported and dispersed through the air, water, and soil. Every municipality within Snyder County is vulnerable to a hazardous materials incident caused along a transportation route. These incidents can occur along highways, railways, and pipelines. *Figure 48 – Environmental Hazard Transportation Vulnerability Map* identified the 2,000-foot hazard corridor for all major highways in Snyder County. *Figure 49 – Annual Truck Traffic Percentages* identifies the annual truck traffic percentages for all of the roadways in Snyder County.

Fixed Facility

Populations, critical infrastructure, and natural habitats within 1.5 miles of SARA Title III and Toxic Release Inventory sites are vulnerable to hazardous material incidents.

Private water suppliers 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 and explosive hazard. Ideally, vulnerability of private drinking well owners would be established by comparing the distance of drinking water wells to known oil and gas well locations, but this extensive detailed data is not readily available. Private drinking water is largely unregulated and information on these wells is voluntarily submitted to the Pennsylvania Topographic and Geologic Survey by water well drillers, and the existing data is largely incomplete and/or not completely accurate. Adams Township contains the most oil and gas wells, and Center Township contains the most drinking water wells, meaning that Adams and Center Townships are the most vulnerable to oil and gas events. *Table 70 – Oil and Gas Wells & Drinking Water Wells* illustrates the type of well and the local domestic drinking water wells for each municipality.

Table 70 - Oil and Gas Wells & Drinking Water Wells

Oil & Gas Wells in Snyder County					
Municipality	Type of Well				Domestic Drinking Water Wells
	Active	Abandoned	Inactive	Proposed	
Adams Township	0	2	0	0	53
Beaver Township	0	0	0	0	26

Oil & Gas Wells in Snyder County					
Municipality	Type of Well				Domestic Drinking Water Wells
	Active	Abandoned	Inactive	Proposed	
Beavertown Borough	0	0	0	0	1
Center Township	0	0	0	0	148
Chapman Township	0	0	0	0	58
Franklin Township	1	0	0	0	121
Freeburg Borough	0	0	0	0	1
Jackson Township	0	0	0	0	85
McClure Borough	0	0	0	0	4
Middleburg Borough	0	0	0	0	6
Middlecreek Township	0	0	0	0	95
Monroe Township	0	0	0	0	119
Penn Township	0	0	0	0	124
Perry Township	0	0	0	0	124
Selinsgrove Borough	0	0	0	0	3
Shamokin Dam Borough	0	0	0	0	3
Spring Township	0	0	0	0	57
Union Township	0	0	0	0	73
Washington Township	0	0	0	0	111
West Beaver Township	0	0	0	0	56
West Perry Township	0	0	0	0	56
Total:	**1**	**2**	**0**	**0**	**1,324**
Source: PA DEP, 2024					

Figure 46 - Oil and Gas Well Locations

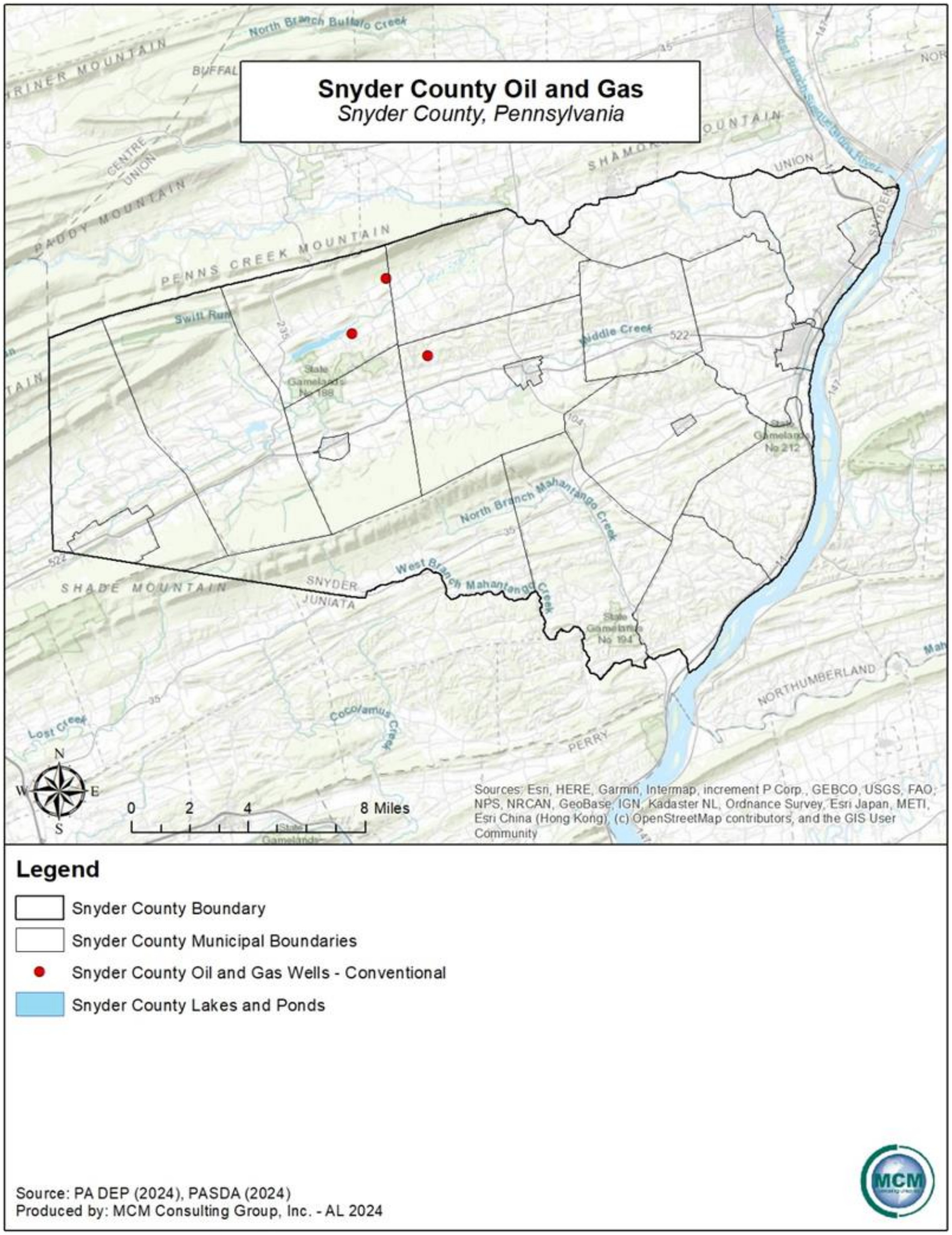


Figure 47 - Hazardous Waste Locations

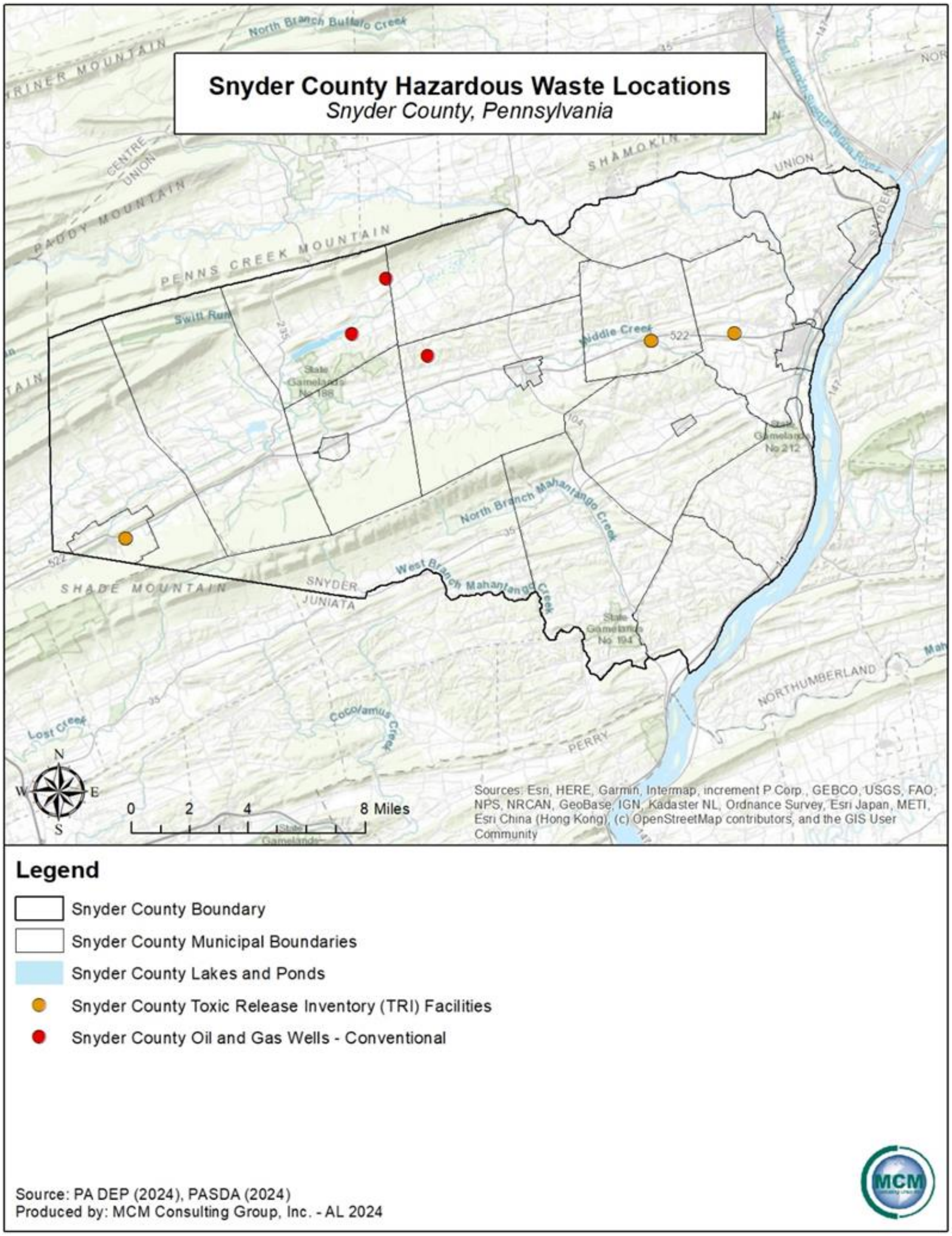


Figure 48 - Environmental Hazard Transportation Vulnerability

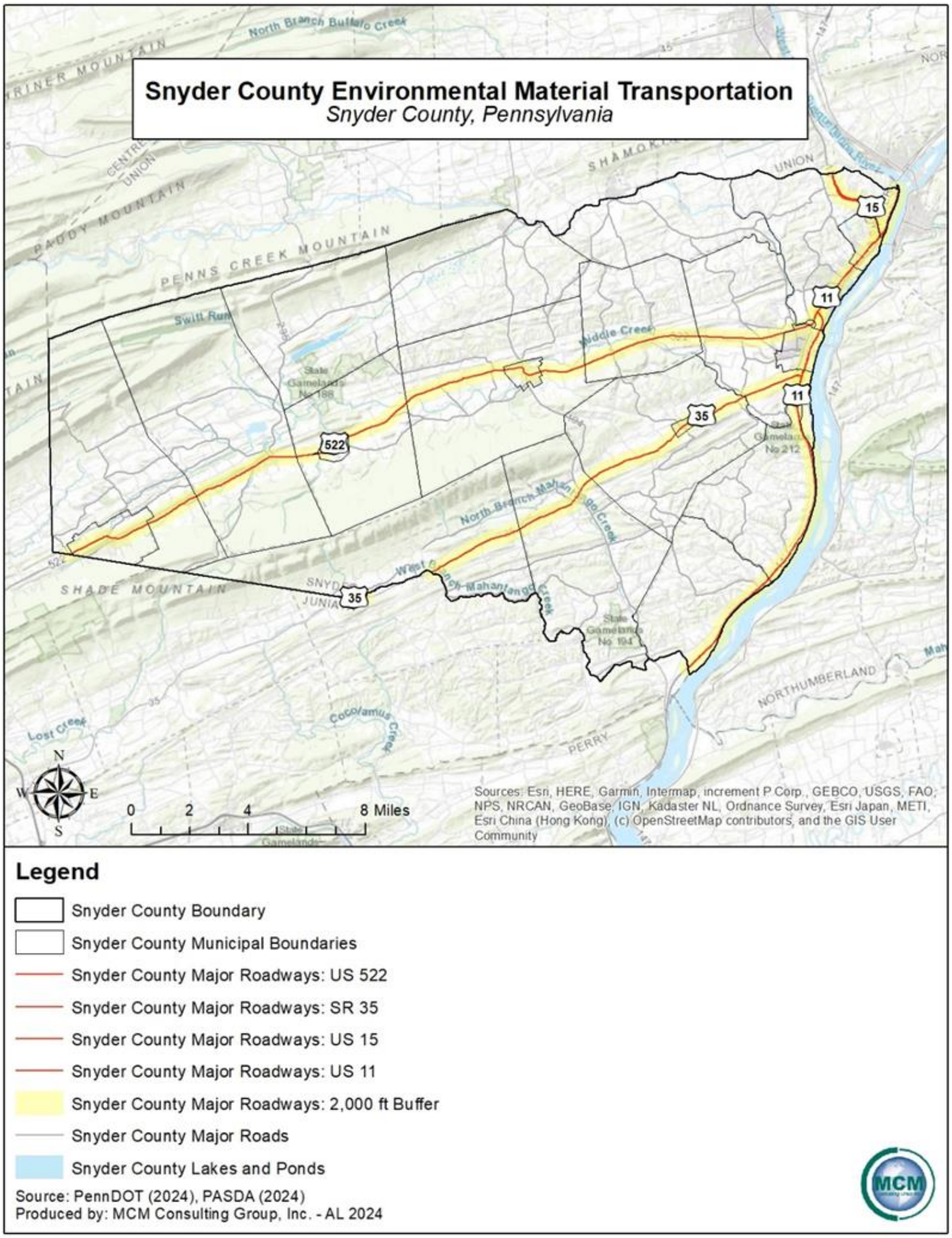
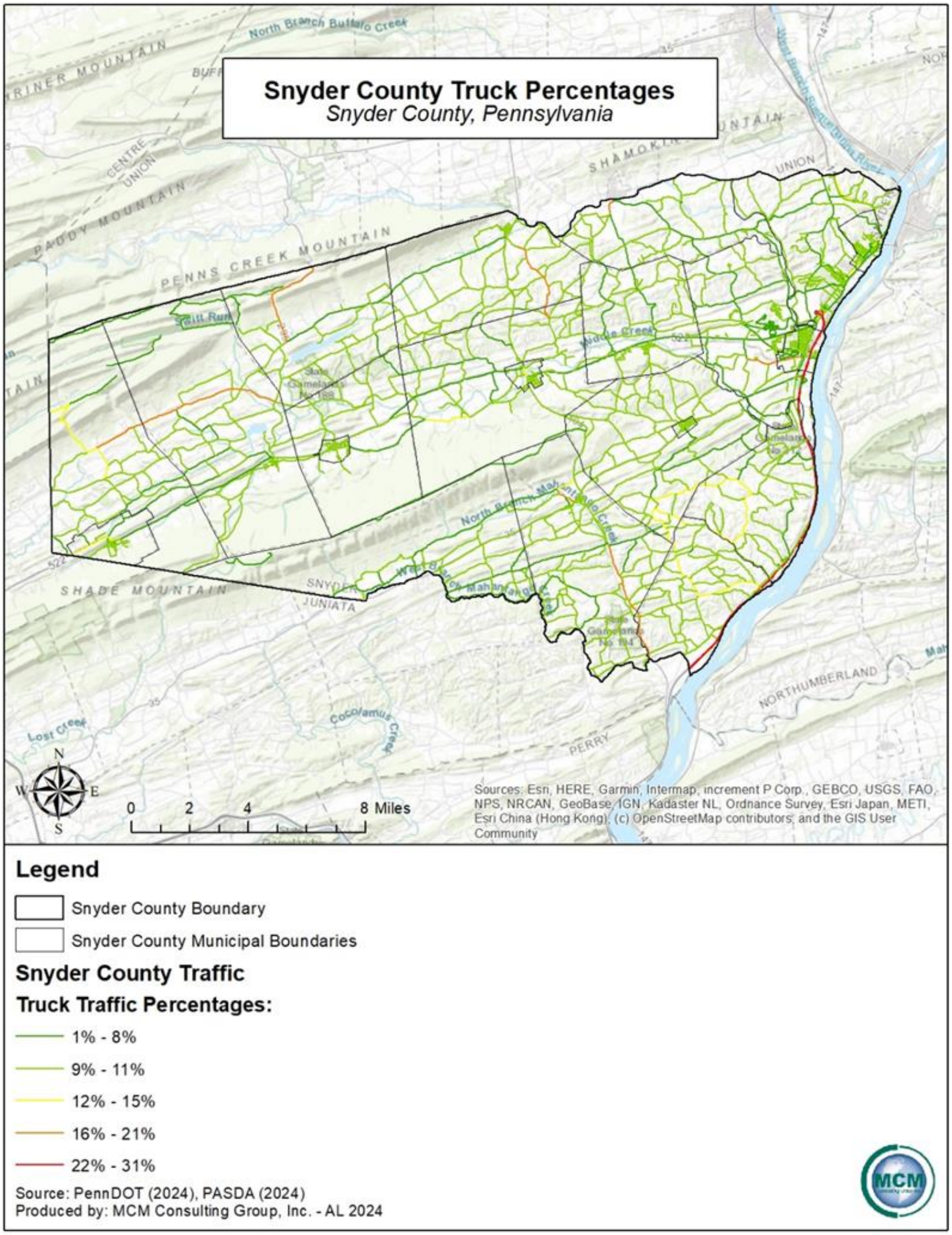


Figure 49 - Annual Truck Traffic Percentages



4.3.18. Substance Use Disorder

4.3.18.1 Location and Extent

Substance Use Disorder (SUD) is a chronic condition characterized by compulsive drug or alcohol use despite the harmful consequences. According to the American Addiction Centers substance use disorder affects brain function and behavior, leading to an inability to control substance intake.(Fuller 2023). Symptoms include intense cravings, tolerance, withdrawal symptoms, and continued use despite negative effects on health, relationships, and responsibilities. Substance use disorder can impact anyone regardless of age, gender, or background, and often requires comprehensive treatment involving therapy, medication, and support to achieve recovery.

Substance use disorder escalates into opioid addiction through a progression that often starts with the legitimate medical use of prescription opioids for pain relief. Over time, individuals may develop a tolerance, requiring larger doses for the same effect. This can evolve into physical dependence, where the body experiences withdrawal symptoms without the drug. Psychological factors, such as seeking relief from stress, trauma, or co-occurring mental health disorders, may compel individuals to continue using opioids despite negative consequences. Eventually, the compulsive need to use opioids takes over, characterized by addiction, where obtaining and using the drug becomes a central focus of life.

According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) ten classes of substance use disorder exist. These substances use related mental illnesses are alcohol use disorder, cannabis use disorder, phencyclidine use disorder, other hallucinogen use disorder that differ from phencyclidine, inhalant use disorder, opioid use disorder, sedative, hypnotic or anxiolytic use disorder and lastly stimulant use disorder which accompanies cocaine or methamphetamine.

Pennsylvania and the United States at large have been experiencing a substance use disorder epidemic which can lead to opioid drug abuse. According to the Pennsylvania Department of Health, the opioid overdose epidemic is the worst public health crisis in Pennsylvania. It affects Pennsylvanians across the state, from big cities to rural communities. Substance use disorder and opioid addiction has increased drastically over the last year due to the hardships faced from the COVID-19 pandemic. Opioid use has increased since the beginning of the COVID-19 pandemic which some attribute to social isolation and disconnection related to social distancing policies and recommendations.

Opioids, mainly synthetic opioids (other than methadone), are currently the main driver of drug overdose deaths. According to the Center for Disease Control and Prevention (CDC), 72.9% of opioid-involved overdose deaths involved synthetic opioids. Opioid addiction occurs when an individual becomes physically dependent on opioids. Opioids are a class of drug that reduces pain by interacting with receptors on nerve cells in the body and brain. The use of opioids is a broad term and includes opiates, which are drugs naturally extracted from certain types of poppy plants, and narcotics. Opioids can also be synthetically made to emulate opium. Opioid drugs are highly addictive and typically result in increasing numbers of overdose deaths both prescribed (e.g. fentanyl) and illicit (e.g. heroin) opioids. Overdose deaths from opioids occur when a large dose slows breathing, which can occur when opioids are combined with alcohol or antianxiety drugs. While generally prescribed with good intentions, opioids can be over-prescribed, resulting in addiction.

According to the Drug Enforcement Administration (DEA), opioids come in various forms such as tablets, capsules, skin patches, powder, chunks in various colors from white to brown/black, liquid form for oral or injection use, syrups, suppositories, and lollipops. The Centers for Disease Control and Prevention (CDC) defines the following as the three most common types of opioids:

- **Prescription Opioids**: Opioid medication prescribed by doctors for pain treatment. These can be synthetic oxycodone (OxyContin), hydrocodone (Vicodin), or natural (morphine).
- **Fentanyl**: A powerful synthetic opioid that is 50 to 100 times more powerful than morphine and used for treating severe pain; illegally made and distributed fentanyl is becoming more prevalent.
- **Heroin**: An illegal natural opioid processed from morphine which is becoming more commonly used in the United States.

Opioids are highly addictive. They block the body's ability to feel pain and can create a sense of euphoria. Additionally, individuals often build a tolerance to opioids, which can lead to misuse and overdose.

While substance use disorders include many addictive substances, this profile focuses on opioid drugs. The opioid crisis was declared to be a public health emergency on October 26, 2017. While the declaration provides validation for the scope and severity of the problem, it was not accompanied by any release of funding for mitigating actions. On January 10, 2018, Governor Tom Wolf declared the opioid epidemic to be a statewide public health disaster emergency for Pennsylvania. The declaration is intended to enhance response and increase access to treatment.

4.3.18.2 Range of Magnitude

Substance use disorder may lead to a narcotic addiction which could lead to an overdose and can sometimes be fatal. The most dangerous side effect of an overdose can include depressed breathing. Lack of oxygen to the brain causes permanent brain damage, leading to organ failure, and eventually death. Signs and symptoms include respiratory depression, drowsiness, disorientation, pinpoint pupils, and clammy skin. Substance use dependency can also be passed from mother to child in the womb. This condition, known as neonatal abstinence syndrome, has increased five-fold, according to the National Institute on Drug Abuse (NIDA). This results in an annual estimate of 22,000 babies born in the United States with this condition.

4.3.18.3 Past Occurrence

In 2023, there was an estimated total of 109,000 drug-related overdose deaths in the United States. This is the second highest number of overdose deaths ever recorded in a 12-month period, according to the recent provisional date from the CDC. *Table 71 – Drug Overdose Mortality In Snyder County* shows death rates and deaths per year in Snyder County from 2014 to 2023. From the year 2014 to 2023, Snyder County has experienced an increase in death rates from drug overdose. The most common age group for opioid abuse in Snyder County is the eighteen to forty-five years of age demographic. In Snyder County the overdose rate of males is greater than the overdose rate of females. Whites have the highest total rate of overdose deaths in Snyder County, while Blacks have the highest per capita rate of overdose deaths when adjusted for population size. The most used opioid in Snyder County are fentanyl, heroin, cocaine, benzodiazepines, and Rx opioids. Data sets for 2024 were not available at the time of writing this plan.

Table 71 - Drug Overdose Mortality In Snyder County

Drug Overdose Mortality in Snyder County	
Year	**Deaths Per Year**
2014	5
2015	5
2016	0
2017	0
2018	10
2019	13
2020	16
2021	16

Drug Overdose Mortality in Snyder County	
Year	**Deaths Per Year**
2022	16
2023	16

Table 72 - Drugs Present in 2020 Pennsylvania Overdose Deaths

Drugs Present in 2020 PA Overdose Deaths (DEA, 2020)	
Drug Category	**Percent Reported Among 2020 Decedents**
Cannabis	25%
Cocaine	20%
Heroin	15%
Fentanyl	14%
Methamphetamine	10%
Prescription Opioids	5.5%
Cathinones	5.5%
Benzodiazepines	5%

4.3.18.4 Future Occurrence

Both Snyder County, and Pennsylvania as a whole, have seen a steady rise in substance use disorder and the use of opioids over the last several years, with drug-related death rates increasing at a high percentage. Substance use disorder is a pressing issue in Pennsylvania, with far-reaching implications for public health, safety, and the well-being of individuals. Future occurrences of substance use and opioid addiction are unclear as the state moves forward with overdose prevention initiatives through the use of Naloxone, alternative pain treatments, improvement of tools for families and first responders, and expansion of treatment access. The Pennsylvania government has taken various approaches to help with the prevention of mass future occurrences across the Commonwealth. To help prevent future drug abuse and protect individual health among communities in Pennsylvania, the Pennsylvania's Prescription Drug Monitoring Program (PA DMP) collects information on all filled prescriptions for controlled substances. This information helps health care providers safely prescribe controlled substances and helps patients get correct treatment. The PA DMP also has drug take-back boxes located in the counties for an easy, convenient location where anyone can dispose of their unused, expired, or unwanted prescriptions to help lower potential drug overuse. In Snyder County, there are five drug take-back boxes located throughout the county. The drug take-back box locations include

Selinsgrove Police Department, State Police Troop F-Selinsgrove, Shamokin Dam Police Department, Snyder County Sheriff's Department, Sunbury Police Department.

In the event of an opioid overdose, death can sometimes be prevented with the use of the drug naloxone. The former Pennsylvania Secretary of Health, Dr. Rachel Levine, in 2020, signed updated standing order prescriptions of naloxone, which is available upon request to the general public. Naloxone is a medication that can reverse an overdose that is caused by an opioid drug (i.e., prescription pain medication or heroin). Naloxone is used to block the effects of opioids and is sold under the brand name of Narcan. When administered during an overdose, naloxone blocks the effects of opioids on the brain and restores breathing within two to eight minutes. Naloxone has been used safely by medical professionals for more than forty years and its only function is to reverse the effects of opioids on the brain and respiratory system in order to prevent death. Also, with the January 10, 2018 disaster declaration, emergency medical technicians (EMTs) are now allowed to leave naloxone behind at a scene of a recent overdose further increasing the distribution and accessibility of the lifesaving medication. According to a study published in September 2018, drug users reported that users often have multiple overdoses in the course of their drug use, and availability of naloxone has saved many lives. While the introduction of naloxone has been a significant benefit to the fight against opioid abuse, efforts to prevent future overdoses are still underway. Naloxone is another way to reduce future occurrences of the opioid epidemic from occurring in Snyder County. According to the National Library of Medicines, supervised injection sites can provide disordered substance users with a secure location to reduce the risk of overdose, while also weaning them off of addictive substances.

Opioid drugs have been a problematic and addictive method for patients to deal with pain. Employing alternative approaches to pain management could prevent patients from ever being introduced to addictive opioids, especially considering the most common overdose drugs in Snyder County have been prescription opioids. A possible alternative pain treatment comes from hemp extracted cannabidiol, or CBD. Unlike THC (the psychoactive constituent of cannabis), CBD is non-psychoactive and does not have the same intoxicating effect as THC; however, CBD can provide relief from pain, inflammation, anxiety, and even psychosis. CBD is legal without a prescription throughout the United States of America.

4.3.18.5 Vulnerability Assessment

Opioid overdoses have resulted in many tragic deaths in Pennsylvania and many people have been affected by the epidemic through the loss of either a family member, a close friend, or member of their community. Substance use disorder is a direct detriment to the personal wellbeing of addicts, a burden to their families and communities, and a strain to the emergency response system that cares for overdose victims. In general, jurisdictions that are more densely populated are more vulnerable to opioid addiction threats as access to the drugs increases. However, rural communities in general experience larger per-capita opioid-related deaths. Jurisdictional losses in the opioid addiction crisis stem from lost wages, productivity, and resources rather than losses to buildings or land. Many counties across the Commonwealth, including Snyder County, have seen an increase of time and resources devoted to the opioid epidemic as overdose and response increase.

While Substance use disorder and opioid addiction is often viewed as a criminal problem, it can also be viewed as a chronic disease. This paradigm shift moves away from faulting the abuser and incentivizing quick cures, to viewing the abuser as a patient and working towards long-term management of the disease. In general, it is important to consider alternative approaches to pain treatment.

According to the National Institute of Mental Health, substance use disorder often stems from underlying mental health issues such as depression, anxiety, trauma, or unresolved psychological struggles. Individuals may turn to substances as a coping mechanism to alleviate emotional pain or distress. However, prolonged substance abuse can exacerbate mental health symptoms and lead to a vicious cycle of dependency. Additionally, genetic predispositions and environmental factors can also contribute to the development of both substances use disorders and mental health disorders (National Institute of Mental Health, 2023).

The vulnerability in the county depends on the number of additional risk factors on the vulnerable population such as genetic, psychological, and environmental factors that play a role in addiction. Some known risk factors of substance use disorder and addiction include poverty, unemployment, family and/or personal history of substance abuse, history of criminal activity, history of severe depression or anxiety, and prior drug/alcohol rehabilitation. In addition, women have a unique set of risk factors for opioid addiction. Women are more likely than men to have diagnosed chronic pain. Compared with men, women are also more likely to be prescribed opioid medications, to be given higher doses, and to use opioids for longer periods of time. Women may also have biological tendencies to become dependent on prescription pain relievers more quickly than men. Therefore, if the county were to have a population with a great amount of these risk factors, the county would be very vulnerable to the opioid epidemic.

The COVID-19 pandemic and its periods of quarantine caused vulnerability in opioid users throughout Snyder County. It is likely that the emergence of COVID-19 and subsequent disruptions in health care and social safety nets combined with social and economic stressors has fueled the opioid epidemic. The COVID-19 pandemic challenged vulnerable populations, including those with opioid use disorders. The opioid epidemic and COVID-19 pandemic intersected and presented unprecedented challenges for families and communities. Opioid use affects respiratory and pulmonary health which may make those with opioid use disorders more susceptible to COVID-19. In addition, chronic respiratory disease is already known to increase overdose mortality risk among people taking opioids, and decreased lung capacity from COVID-19 could lead to similar health effects. Secondary impacts from the COVID-19 pandemic included disruption of treatment and recovery services, limited access to mental health services and peer support, disrupted routines, loss of work, and increased stress which led to increased opioid use and risk of relapse for those in recovery. Additionally, the pandemic took away the attention from the media, from legislators, and from public health agencies that was being focused on the opioid crisis. The opioid epidemic in Pennsylvania increased 30% since the end of the pandemic.

Risk factors may arise from indirect factors including housing instability and incarceration. Those with substance use disorder and opioid use disorders are potentially at a higher risk for housing insecurity, homelessness, and incarceration. Congregate living facilities such as homeless shelters, jails, and prisons are high-risk environments for virus transmission, and there are challenges in implementing recommendations from the CDC such as social distancing and quarantine.

Additionally, first responders and medical personnel are also a vulnerable population when dealing with the substance use disorder and opioid epidemic. First responders face exposure risk due to an increase in emergency calls due to an increase in the crisis, particularly to synthetic fentanyl. Fentanyl and related substances are hazardous materials, which cause the environment and the people around the substance to be vulnerable. Unintentional fentanyl contact can impact first responders and others that are in close proximity to the opioid user. Depending on the potency of the drug, it can take as little as a few milligrams of fentanyl to cause fatal health complications, the equivalent of a few grains of sand. There have been several reports nationally of first responders accidentally overdosing on fentanyl through brief skin contact or the drug becoming airborne. It is best for first responders to remain wary to avoid any potential exposure. The American College of Medical Toxicology (ACMT) and the American Academy of Clinical Toxicology (AACT) suggest that nitrile gloves provide sufficient protection for handling fentanyl, and for “exceptional circumstances where the drug particles or droplets suspended in the air, an N95 respirator provides sufficient protection”. Other environmental structures such as streams, rivers, and lakes have been known to contain traces of opioids and other drugs within them. These traces come from excreted human urine and feces, or improper disposal of medications. The Environmental Protection Agency (EPA) suggests that while the risks of pharmaceuticals found in wastewater, ambient water, and drinking water are low, further research is needed. A worst-case scenario with substance use disorder in Snyder County would be a high number of overdoses among residents and insufficient first responder personnel and material resources.

Figure 50 – Opioid Overdose Deaths in Pennsylvania 2021 and *Figure 51 – Opioid Overdose Deaths in Pennsylvania 2022* illustrate the number of deaths per county in the Commonwealth of Pennsylvania.

Figure 50 - Opioid Overdose Deaths in Pennsylvania 2021

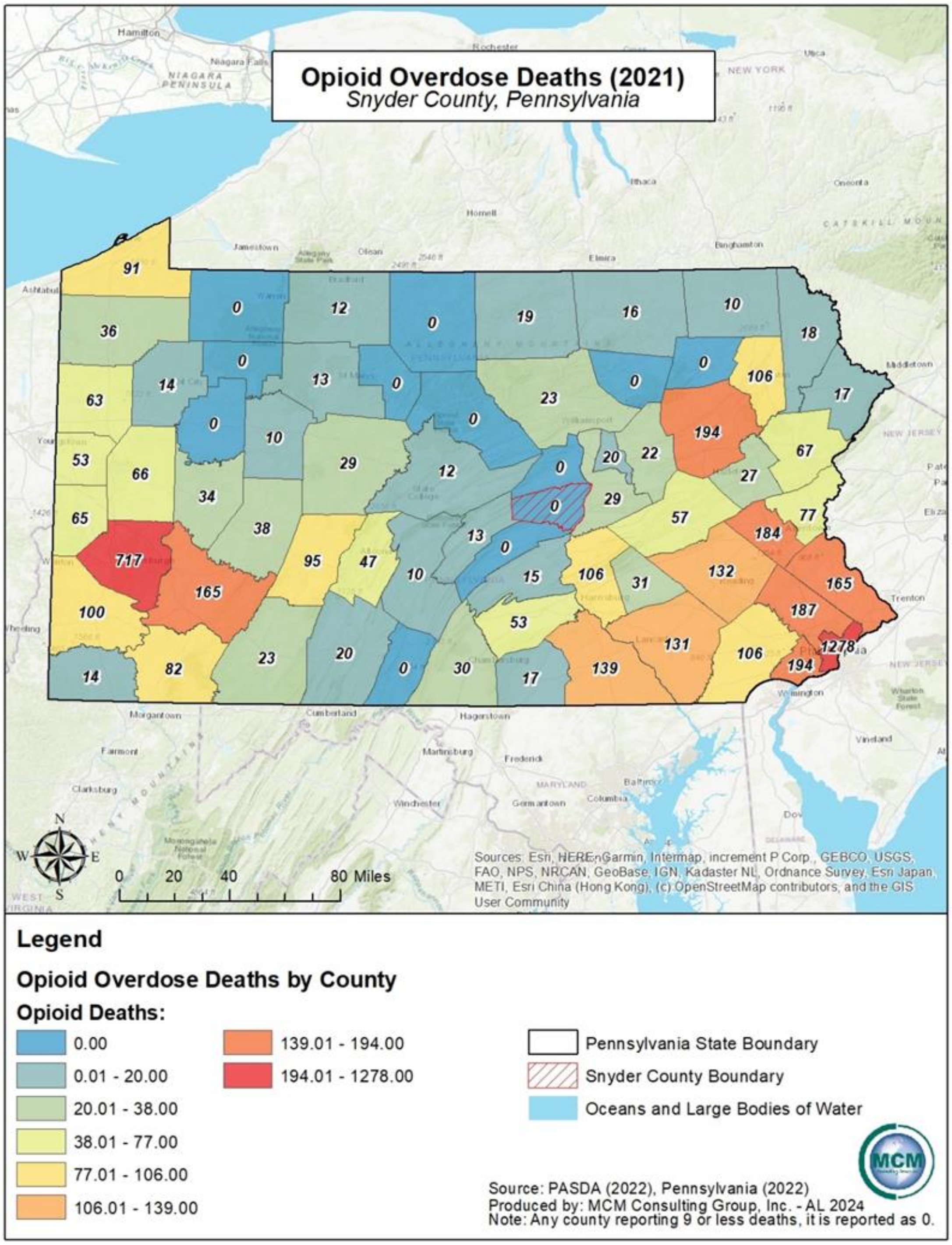
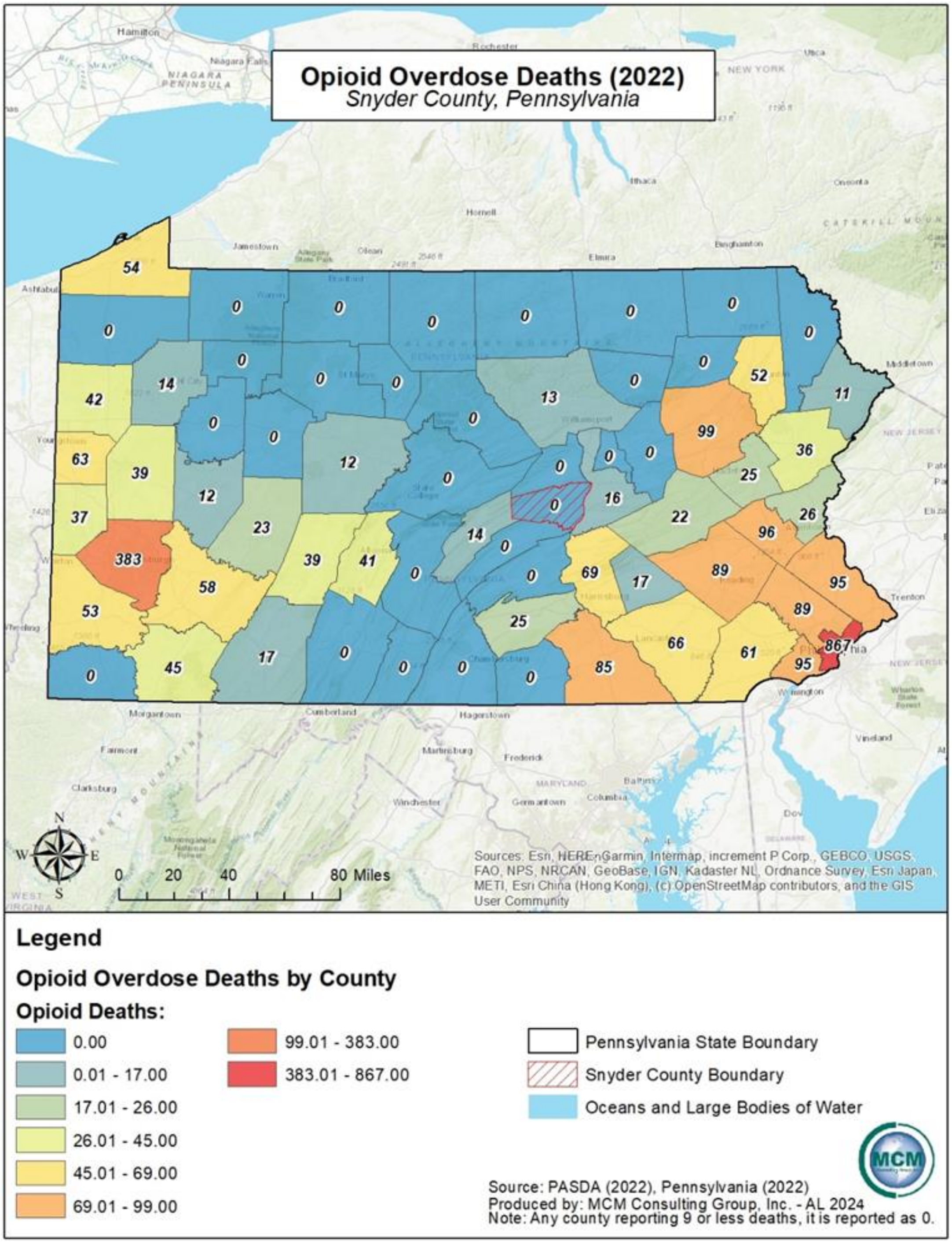


Figure 51 - Opioid Overdose Deaths in Pennsylvania 2022



4.3.19. Terrorism and Cyberterrorism

4.3.19.1 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. 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)

Cyber-terrorism is the unlawful use of force and violence over technological methods to cause harm to financial security, identity information, personal information, and attacking personal computers, mobile phones, gaming systems, and other Bluetooth or wirelessly connected devices. Cyber-terrorism can be just as damaging to infrastructure as conventional terrorism, due to the large amount of business that is carried out over the internet, through wirelessly connected devices, or from employees of companies working remotely.

The Federal Bureau of Investigations (FBI) further characterizes terrorism as either domestic or international, depending on the origin, base, and objectives of the terrorist organization. Often, the origin of the terrorist or person causing the hazard is far less relevant to mitigation planning than the hazard itself and the consequences. However, it is important to consider that the prevalence of homegrown violent extremists (HVEs) has increased in recent years, with individuals able to become radicalized on the internet. In a speech on August 29, 2018, addressed to the 11th annual Utah National Security and Anti-Terrorism Conference, FBI Director Christopher Wray describes HVEs as "the primary terrorist threat to the homeland here today, without question."

Community lifeline facilities are either in the public or private sector that provide essential products and/or services to the general public. Community lifeline facilities are often necessary to preserve the welfare and quality of life in the county, or fulfill important public safety, emergency response, and/or disaster recovery functions. Community lifeline facilities identified in the county are hospitals and health care facilities, schools, childcare centers, fire stations, police departments, municipal buildings, and hazardous waste facilities. In addition to critical facilities, the county contains at risk populations that should be factored into a vulnerability assessment. These populations include not only the residents and workforce in the county, but also the tourists that visit the area on a daily basis, those that are traveling through the county on any major highway and marginalized groups such as LGBTQ persons and racial, religious, or other minorities.

Potential targets include:

- Commercial facilities
- Family planning clinics/organizations associated with controversial issues
- Education facilities
- Events attracting large amounts of people
- Places of worship
- Industrial facilities, especially those utilizing large quantities of hazardous materials
- Transportation infrastructure
- Historical sites
- Cultural sites
- Government facilities

4.3.19.2 Range of Magnitude

Terrorism may include use of Weapons of Mass Destruction (WMD) (including chemical, biological, radiological, nuclear, and explosive weapons) which include arson, incendiary, explosive, armed attacks, industrial sabotage, intentional release of hazardous materials, and cyber-terrorism. Within these general categories, there are many variations. There is a wide variety of agents and ways for them to be disseminated, particularly in the case of biological and chemical weapons.

Terrorist methods can take many forms including:

- Active assailant
- Agri-terrorism
- Arson/incendiary attack
- Armed attack
- Assassination
- Biological agent
- Chemical agent
- Cyber-terrorism
- Conventional bomb or bomb threat
- Hijackings
- Release of hazardous materials
- Kidnapping

- Nuclear bomb
- Radiological agent

Active assailant incidents and threats can disrupt the learning atmosphere in schools, interfere with worship services, cause traffic to be re-routed, and use taxpayer assets by deploying police, EMS and/or fire units. Snyder County has two school districts (public schools K through 12th grade) that include eight primary, secondary, and high schools. There are two post-secondary schools located in Snyder County.

The areas along major transportation routes can be susceptible to forms of public transit terrorist attacks. More populated areas of the county, including the county seat of Middleburg Borough, can be susceptible to chemical, biological, radiological, nuclear, or explosive (CBRNE) events due to the concentration and density of residential communities and government activity and buildings. Secondary effects from CBRNE incidents can be damaging as well. Mass evacuations could result in congestion of roadways and possibly result in breakdown of civil order, further exacerbating the situation. Government operations may be disrupted due to the need to displace or operate under reduced capacity. Radiation fallout, hazardous chemical introduction into the groundwater or biologic/germ agents can cause long-term environmental damage.

Cyber terrorism is becoming increasingly prevalent. Cyber terrorism can be defined as activities intended to damage or disrupt vital computer systems. These acts can range from taking control of a host website to using networked resources to directly cause destruction and harm. Protection of databases and infrastructure are the main goals for a safe cyber environment. Cyber terrorists can be difficult to identify because the internet provides a meeting place for individuals from various parts of the world. Individuals or groups planning a cyber-attack are not organized in a traditional manner, as they are able to effectively communicate over long distances without delay. The largest cyber terrorism threat to institutions comes from any processes that are networked or controlled via computers.

Ransomware continues to be the leading threat, with Maze ransomware accounting for nearly half of all known cases in 2020. Cybercriminals have increasingly begun to steal proprietary – and sometimes embarrassing – data before encrypting it. The cybercriminal will then threaten to publicly release the stolen files if the victims do not provide financial transactions.

4.3.19.3 Past Occurrence

In February of 2024, Pennsylvania was hit with a statewide court agency cyberattack that resulted in the online systems being disabled. The federal government, though the U.S. Department of Homeland Security and the F.B.I., investigated the attack and it was ruled a "denial of service attack". Cyber terrorism events are becoming more common in areas of local government, and these include counties near Snyder County, PA.

Significant international terrorism incidents in the United States include the World Trade Center bombing in 1993, the bombing of the Murrow Building in Oklahoma City in 1995, and the September 11th, 2001, attacks on the World Trade Center and the Pentagon. One of the aircrafts hijacked in the September 11th attacks crash landed in Somerset County, Pennsylvania before it reached its intended target. While fatalities and destruction at the intended target were avoided, all passengers on the flight perished.

While the largest scale terrorist incidents have often had international stimuli, many other incidents are caused by home grown actors who may have become radicalized through hate groups either in person or via the internet, and who may struggle with mental health issues. Hate groups such as the Ku Klux Klan (KKK), Aryan Nation, the New Black Panther Party, and more recently, the Alt-Right, Antifa, anarcho-communists, Proud Boys, plus conspiracy theorist believers/promoters such as QAnon, have been part of domestic terrorism in different forms. During the May 2020 George Floyd protests, anti-police individuals associated with one or more of the groups created incendiary devices to burn down the Minneapolis Third Precinct. On January 6, 2021, individuals associated with one or more of the groups, stormed the United States Capitol to disrupt the certification of the 2020 presidential election, resulting in five deaths and evacuation of Congress.

<u>Active Shooters</u>

An active assailant (shooter), as defined by the U.S. Department of Homeland Security, is an individual actively engaged in killing or attempting to kill people in a confined area, in most cases, active shooters use firearms and there is not necessarily a pattern or method to their selection of victims. Throughout the year in 2023, there were a total of at least 656 mass shooting incidents in the United States according to the Gun Violence Archive. Often these shooters are HVEs. Two significant events have occurred in Pennsylvania in recent history: one occurred on October 27, 2018, when eleven people were killed by a gunman in the Pittsburgh neighborhood of Squirrel Hill; the gunman was a homegrown violent extremist and attacked the congregation of the Tree of Life Synagogue in a shooting that targeted the Jewish population and was fueled by the gunman's anti-Semitic, anti-immigrant, and anti-refugee sentiments. Another event occurred in January of 2019, where a gunman killed two people and permanently injured one inside P.J. Harrigan's bar in State College and later killed a homeowner and himself. One of the most tragic recent active shooters occurred in Uvalde, Texas, where an armored and masked gunman entered the Robb Elementary School on May 24, 2022, and killed nineteen students and two teachers. Another active shooter event occurred on November 22, 2022, when an employee at a Walmart in Chesapeake, Virginia entered the breakroom of the Chesapeake Walmart and killed six individuals before taking his own life.

Other active shooter events in the United States in recent years include Virginia Tech (April 2007), Sandy Hook Elementary School (December 2012), San Bernardino, California (December 2015), an Aurora, Colorado movie theater (July 2012) a church in Charleston, South Carolina (June 2015). An *Active Shooter Incidents 20-Year Review* by the FBI concluded that there has been a significant recent increase in frequency of active shooter incidents, and that most shooters were male. The report documents data from all the incidents, including location, commercial environments, educational environments, open spaces, military and other government properties, residential locations, houses of worship, and health care facilities (FBI, 2021). *Figure 52 – Active Shooter Incidents – 20 Year Active Shooter Summary* is one page from the report that illustrates a numerical breakdown of shooting events for those twenty years. *Figure 53 – Education Environments* and *Figure 54 – Education Environments Continued* shows two more summary pages from the report that detail active shooter statistics in educational environments.

The complete report may be found here: https://www.fbi.gov/file-repository/active-shooter-incidents-20-year-review-2000-2019-060121.pdf/view.

Cyber-Threats

While Snyder County has not been the target of any critical cyber terrorist events, the county has seen multiple security breaches due to online phishing and other scams.

One hack attack took down the largest fuel pipeline in the U.S. and led to massive gasoline shortages; it was the result of a single compromised password. Hackers gained entry into the networks of Colonial Pipeline Company on April 29, 2021 through a virtual private network account, which allowed employees to remotely access the company's computer network. On May 7, 2021, a ransom of $4.4 million was demanded by the hackers, causing Colonial to shut down the entire supply line, immediately prompting temporary gasoline shortages and panic buying up and down the East Coast. The hackers, who were an affiliate of a Russian-linked cybercrime group known as *DarkSide*, were paid the ransom. The hackers also stole nearly 100 gigabytes of data from Colonial Pipeline and threatened to leak it if the ransom was not paid, according to Bloomberg News.

Then, in early June 2021, JBS, the world's largest meat company by sales, paid an $11 million ransom to cybercriminals who temporarily knocked out plants that process roughly one-fifth of the nation's meat supply. The ransom payment, in bitcoin, was made to shield JBS meat plants from further disruption and to limit the potential impact on restaurants, grocery stores and farmers that rely on JBS, according to the company.

The attack on JBS was part of a wave of incursions using ransomware, in which companies are hit with demands for multimillion-dollar payments to regain control of their operating systems. The attacks show how hackers have shifted from targeting data-rich companies such as retailers, banks and insurers to essential-service providers such as hospitals, transport operators and food companies.

4.3.19.4 Future Occurrence

The likelihood of Snyder County being a primary target for a major international terrorist attack is small and unlikely. More likely terrorist activity in Snyder County includes bomb threats or other incidents at schools. Snyder County has two school districts consisting of eight public schools. Several private schools and colleges/universities are also located in Snyder County. These locations are considered soft targets and may be vulnerable, especially to domestic incidents.

4.3.19.5 Vulnerability Assessment

Snyder County should stay prepared for terroristic events. The existence of industrial commerce, interstate highways and freight railroad activity create soft targets that could be used to interfere with the focus of day-to-day life that the county experiences. It is important to note that the use of and exposure to biological agents can remain unknown for several days until the infected person(s), livestock, or crops begin to experience symptoms or show damages. Often such agents are contagious, and the infected person(s) must be quarantined, livestock culled, and/or crops destroyed.

Although previous events have not resulted in what are considered to be significant terrorist attacks, the severity of a future incident cannot be predicted with a total level of certainty. One of the major concerns with agroterrorism is that acts can be carried out with minimal planning, effort, or expense.

Acronis, a global technology company that develops on-premises and cloud software for backup, disaster recovery, and secure file sync and share and data access, issues an annual threat scape report on cybercrime. Entitled *The Acronis Cyberthreats Report*, it contains an in-depth review of the current threat landscape and projections for the coming year. Based on the protection and security challenges that were amplified by the shift to remote work during the

COVID-19 pandemic, Acronis warns aggressive cybercrime activities will continue as criminals pivot their attacks from data encryption to data exfiltration.

The major points illustrated in the report are as follows:

- Attacks against remote workers will increase due to the movement of workers to less secure working areas.
- Ransomware will look for new victims and will become more automated.
- Legacy IT and technical solutions will struggle to keep pace with ransomware and cybercrime attacks.

According to a study carried out on the data sourced from the Federal Bureau of Investigation, Pennsylvania is ranked second worst among states when it comes to handling cyber-attacks. The study made by Information Network Associates – an international security consulting company – says an increase of 25% was witnessed in cyber-attacks between 2016 and 2017. This illustrates the amount of preparation that must occur in the commonwealth so that it can better respond to potential cybercrime attacks.

The probability of terrorist activity is more difficult to quantify than some other hazards. Instead of considering the likelihood of occurrence, vulnerability is assessed in terms of specific assets. By identifying potentially at-risk terrorist targets in communities, planning efforts can be put in place to reduce the risk of attack. Planning should work towards identifying potentially at-risk critical infrastructure and functional needs facilities in the community, prioritizing those assets and locations, and identifying their vulnerabilities relative to known potential threats.

All communities in Snyder County are vulnerable on some level, directly or indirectly, to a terrorist attack. However, communities with schools and government infrastructure like the county seat, should be considered more likely to attract terrorist activity.

Figure 52 - Active Shooter Incidents – 20 Year Active Shooter Summary

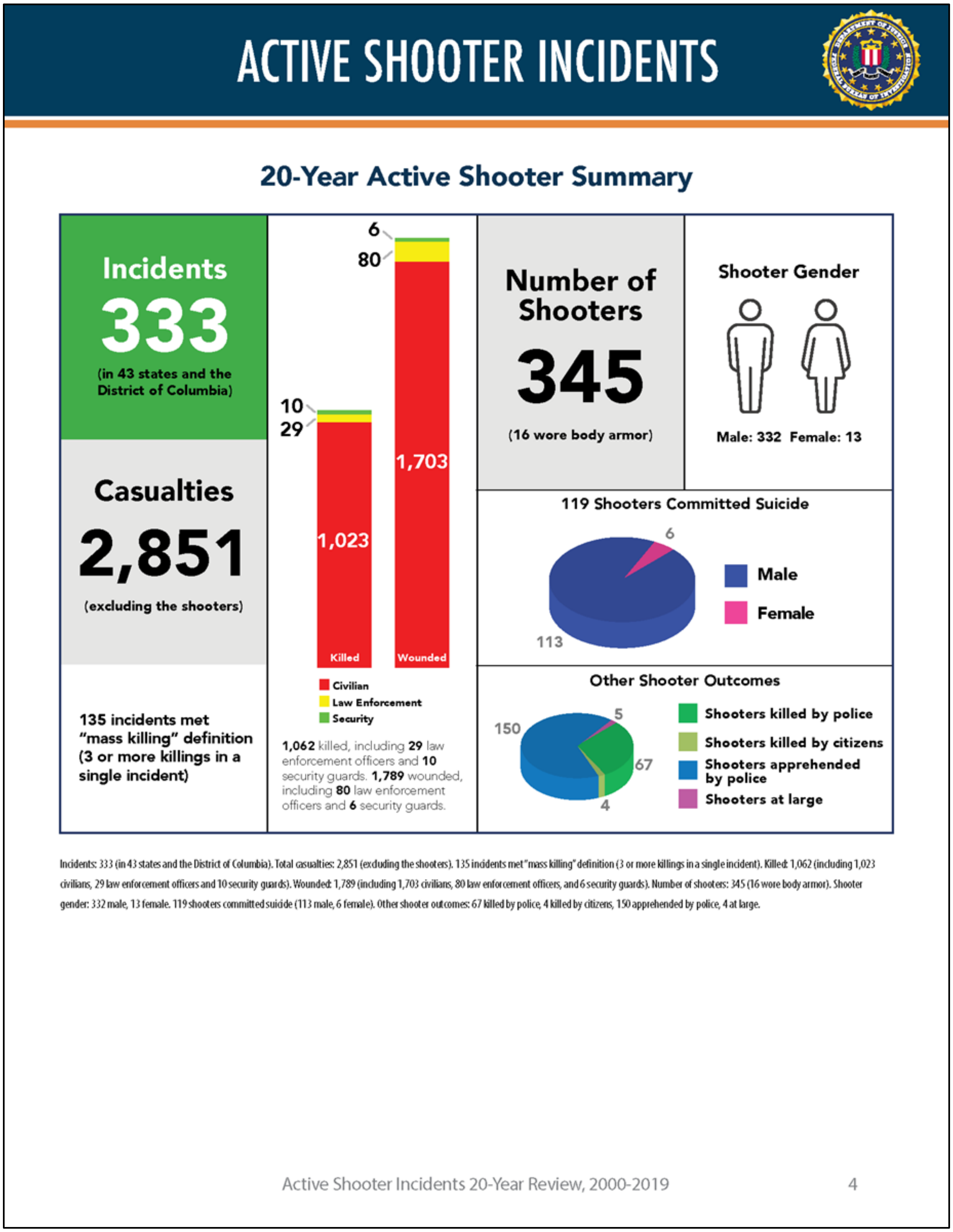


Figure 53 - Education Environments

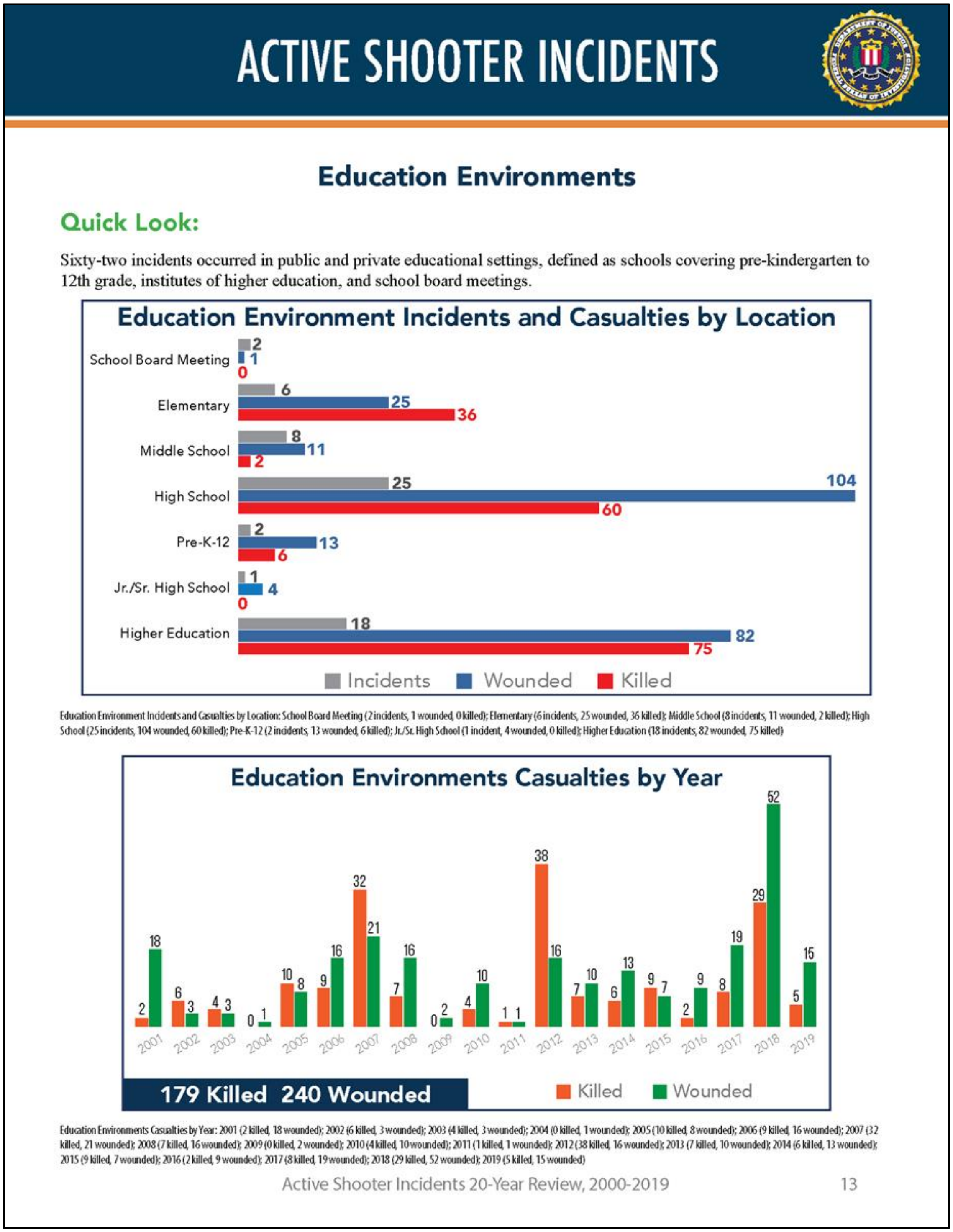
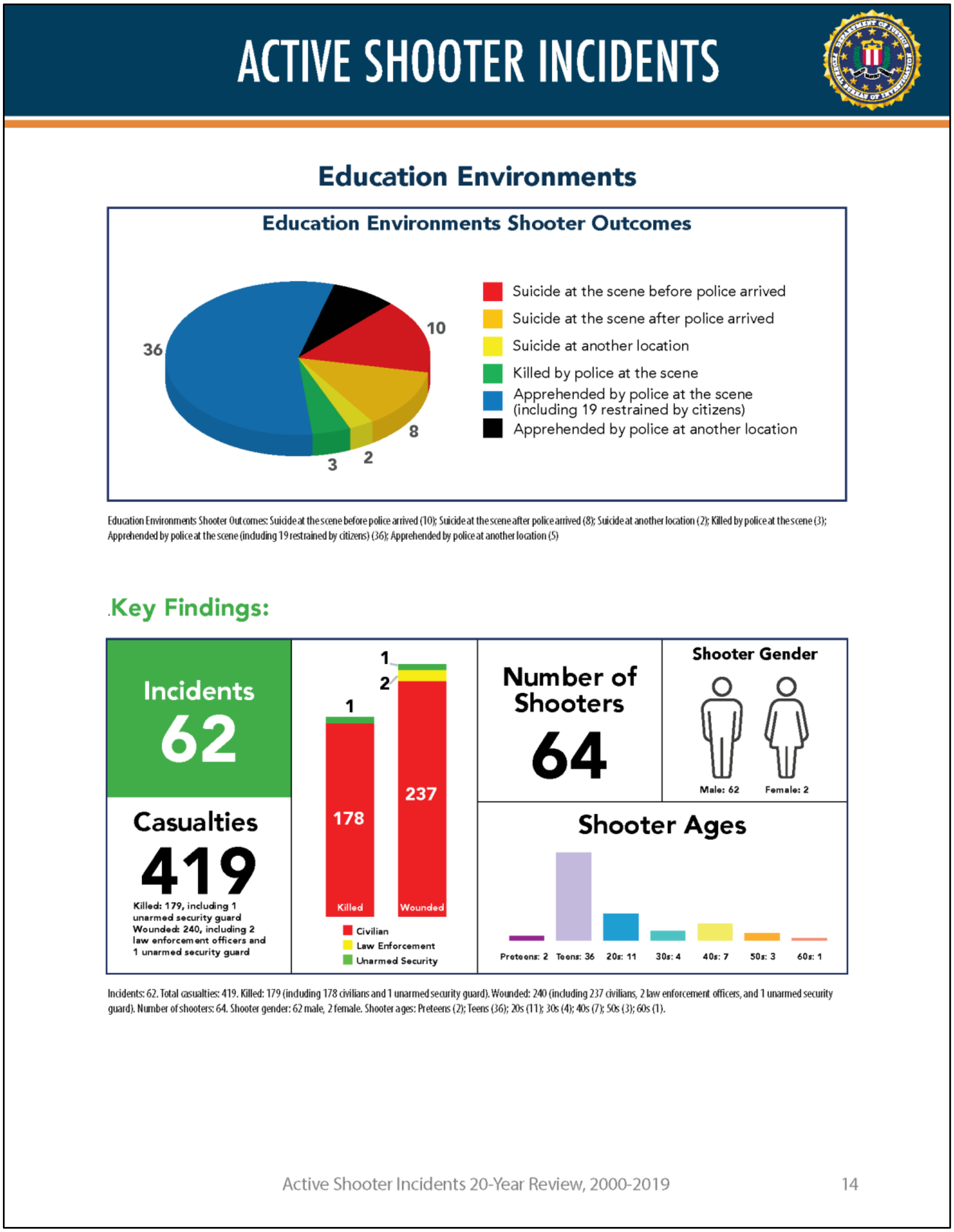


Figure 54 - Education Environments Continued



4.3.20. Transportation Accidents

4.3.20.1 Location and Extent

Transportation accidents are defined as accidents involving highway, air, and rail travel. These incidents are collectively the costliest of all hazards in the Commonwealth in terms of lives lost, injuries, and economic losses. The sheer number of roadways, coupled with the high volume of traffic, creates the potential for serious accidents along the roads and bridges. In Snyder County there are 242 state-maintained and thirty-two locally maintained bridges, according to PennDOT. Major transportation routes in Snyder County include U.S. Route 15 and U.S. Route 522. Other state routes are also present in the county including State Route 104, State Route 204, and State Route 235. *Figure 55 – Major Transportation Routes* shows the major transportation systems in Snyder County.

Snyder County has one public airport; Penn Valley Airport that has one runway with no air traffic control on site. There exists a potential for air transportation accidents to occur due to the number of commercial air traffic that flyovers the county every day. However, a five-mile radius around each airport can be considered a high-risk area since most aviation incidents occur near take-off and landing sites. *Figure 56 – Airports and Vulnerability Zones.*

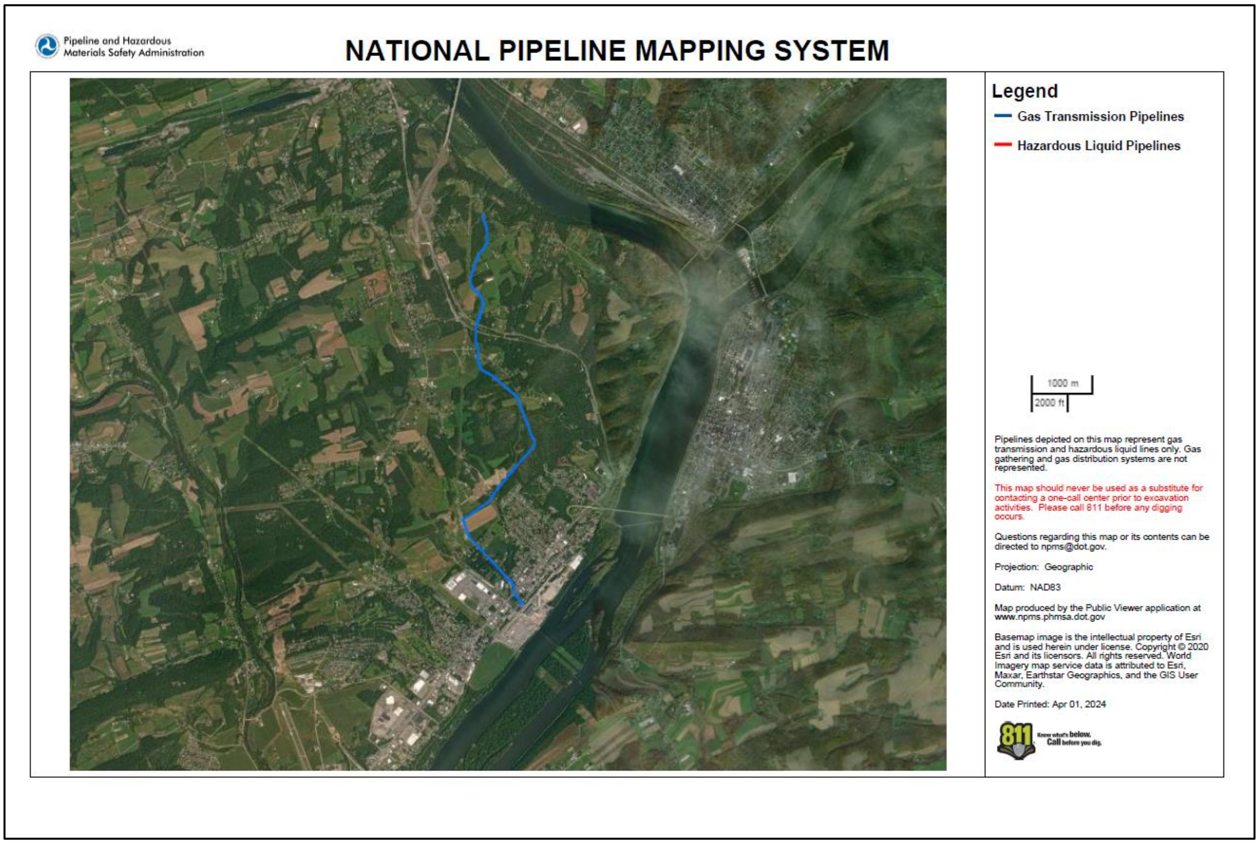
There are several freight and passenger rail lines in Snyder County. The railroad companies that operate within Snyder County include Norfolk Southern Railway Company, the Pennsylvania Power and Light Susquehanna LLC, and a privately owned company that runs to Hummel Station. Rail transportation accidents are generally classified as one of these three types:

- Derailment – an accident on a railway in which a train leaves the rails.
- Collision – an accident in which a train strikes something such as another train or highway motor vehicle.
- Other – accidents caused by other circumstances like obstructions on rails, fire, or explosion.

Rail transportation is divided into two major categories: freight and passenger. Each category can be subdivided according to carrier type: major carrier and local/regional carriers. Rail accidents can occur anywhere along the miles of rail located in Snyder County.

There are no oil and gas wells located in Snyder County. Pipeline infrastructure is seen in the northeast corner of the county. UGI Energy Services and UGI Utilities Inc. are the pipeline companies that transport hazardous materials in and through Snyder County. UGI Energy Services transport natural gas and propane, while UGI Utilities transports natural gas and hydrogen sulfide.

Natural gas pipelines in Snyder County include one located near the northeastern side of Snyder County and that pipeline has the potential to impact new construction along the Central Susquehanna Valley Transportation (CSVT) Project. This information can be found in the map below:



4.3.20.2 Range of Magnitude

Significant passenger vehicle, air, and rail transportation accidents can result in a wide range of outcomes, from damage solely to property, to serious injury or even death. Most motor vehicle crashes in Pennsylvania are non-fatal, but PennDOT estimates that every hour nine people are injured in a car crash, and every seven hours someone dies because of a car crash. Most fatal crashes occur in May and June, but the highest number of crashes overall occurs in October, November, and December. Inclement weather, high traffic volumes, and high speeds increase the risk for automobile accidents.

Railway and roadway accidents have the potential to result in hazardous materials release. Railroad accidents occur with less frequency than highway accidents. However, when these types of incidents occur, they often cause extensive property damage and have the potential to cause serious injuries or deaths.

A worst-case scenario for a transportation accident impacting the county would occur if a road or rail accident resulted in a hazardous material spill in Selinsgrove Borough, which is the most populous municipality in Snyder County with 5,923 residents recorded during the 2020 U.S. Census. Penns Creek and the Susquehanna River run along the eastern edge of Selinsgrove Borough and could likely be contaminated by any hazardous material spill that occurs within the municipality. Selinsgrove Borough is also home to Susquehanna University which has an undergraduate student population of approximately 2,300. Such an event would constitute an immediate health hazard to the population and require evacuation.

4.3.20.3 Past Occurrence

Table 73 – PennDOT Crash Report for Snyder County shows crash statistics recorded by the Pennsylvania Department of Transportation between 2010 and 2022. Reports for 2023 were not available at the time of this report. The year 2019 had the most total crashes with 431 total crashes in Snyder County while 2020 had the fewest total crashes with 288 total crashes. The number of total crashes has increased between 2020 and 2022 in the county. No crashes involving both trains and vehicles have occurred in Snyder County at the time of writing this plan.

The majority of municipalities noted on the municipality hazard identification and risk evaluation worksheet that there was no change in the frequency of transportation accidents and no increase in the impact or geographic extent that transportation accidents affect in Snyder County. While the majority noted that there was no change in transportation accidents from their previous planning period, some municipalities noted an increase in transportation accidents and the impact it can have in Snyder County. Those municipalities that noted an increase in transportation accidents frequency and impact contributed it to an increase in speeding and distracted driving and hazardous road conditions such as blind turns. Respondents identified the completion of the Central Susquehanna Valley Transportation (CSVT) project as an event that may cause a future increase in the number of accidents in Snyder County.

Table 73 - PennDOT Crash Report for Snyder County

PennDOT Crash Report for Snyder County								
Year	Vehicle accidents for Snyder County				Vehicle Accident Deaths for Snyder County			Train/Trolley with Motor Vehicle Crashes/ Fatalities
	Total	Fatal Accidents	Injury Crashes	Property Damage Only	Total Vehicle Accident Fatalities	Alcohol-Related Fatalities	Pedestrian Fatalities	
2010	386	8	203	175	9	3	0	0
2011	408	5	194	209	5	1	0	0
2012	366	8	183	175	8	0	2	0
2013	382	4	184	194	4	2	1	0
2014	333	7	146	180	7	0	0	0
2015	398	8	170	220	9	4	1	0
2016	384	4	169	211	4	2	0	0
2017	393	4	169	220	4	1	0	0
2018	392	5	170	217	5	2	0	0
2019	431	3	183	245	3	0	0	0
2020	288	8	129	151	8	2	0	0
2021	344	4	147	193	4	0	1	0
2022	350	5	136	209	5	1	0	0

4.3.20.4 Future Occurrence

Snyder County's population has increased over the last decade, so it can be assumed that local traffic has increased slightly as well. However, with the increasing volume of goods and trucking through the county, transportation accidents will continue to occur routinely. Hazardous material release through transportation accidents is difficult to predict but can be assumed to happen in future events as well. The U.S. Census Bureau reports the mean travel time to work for those aged 16 plus is approximately twenty-four minutes. Automobile accidents occur frequently, and typically occur more frequently than rail or aviation accidents. In the case of highway accidents, PennDOT has enacted measures to reduce the number of highway transportation accidents through programs such as the Pennsylvania Highway Safety Corridor. In this program, PennDOT designates sections of highway where traffic citation fines are doubled in the hopes that higher fines will deter unsafe driving and reduce accidents. Transportation accidents are impossible to predict accurately; however, areas prone to these hazards can be located, quantified through analysis of historical records, and plotted on countywide and municipal base maps.

In the coming years transportation accident occurrence may increase or decrease. The Central Susquehanna Valley Transportation (CSVT) Project is going to expand into Shamokin Dam Borough and the surrounding area in Snyder County. The CSVT has already been implemented in neighboring counties such as Union and Northumberland counties. The goal of this project is to improve traffic patterns in the region. The portions of the CSVT that have already been implemented in neighboring counties have substantially separated thru traffic from local traffic. This project gives motorists an alternate route to take rather than travelling directly through local boroughs and townships (PennDOT, 2024). The impact this project will have on the future of traffic accidents in Snyder County is unknown and will need to be examined further once it is complete and implemented.

4.3.20.5 Vulnerability Assessment

A transportation accident can occur anywhere in Snyder County. However, severe accidents are more likely to occur on the county's major highways due to the heavier traffic volumes which make highways extremely vulnerable. The vulnerability for accidents on either highway, railway, or aviation, are directly related to the population and traffic density within the county. The vulnerability increases if there are hazardous materials involved. Hazards associated with causing transportation accidents can include natural hazards that affect the environment, such as winter storms or heavy rains that cause slippery roadways or mud slides, to windstorms or tornadoes that cause high-profile vehicles or train cars to topple over. Loss of roadway use, and public transportation services would affect commuters, employment, delivery of critical municipal and emergency services, and day-to-day operations within the county.

With highway accidents, there is an added vulnerability that stems from the age and upkeep of bridges throughout the county. Unrepaired, deficient bridges may be more likely to break, thus leading to highway transportation damages or deaths. 4.4 % of Snyder County bridges are in poor condition, indicating an decreased vulnerability to transportation accidents, while 50.4% remain in fair condition, and 45.3% remain in good condition.

Studying traffic and potential transportation accident patterns could provide information on vulnerability of specific road segments and nearby populations. Increased understanding of the types of hazardous materials transported through the county will also support mitigation efforts. Maintaining a record of these frequently transported materials can facilitate development of preparatory measures for response to a release. *Figure 57– Average Daily Traffic on Major Highway Vulnerability* identifies all major highways and railroads within Snyder County.

Figure 55 - Major Transportation Routes

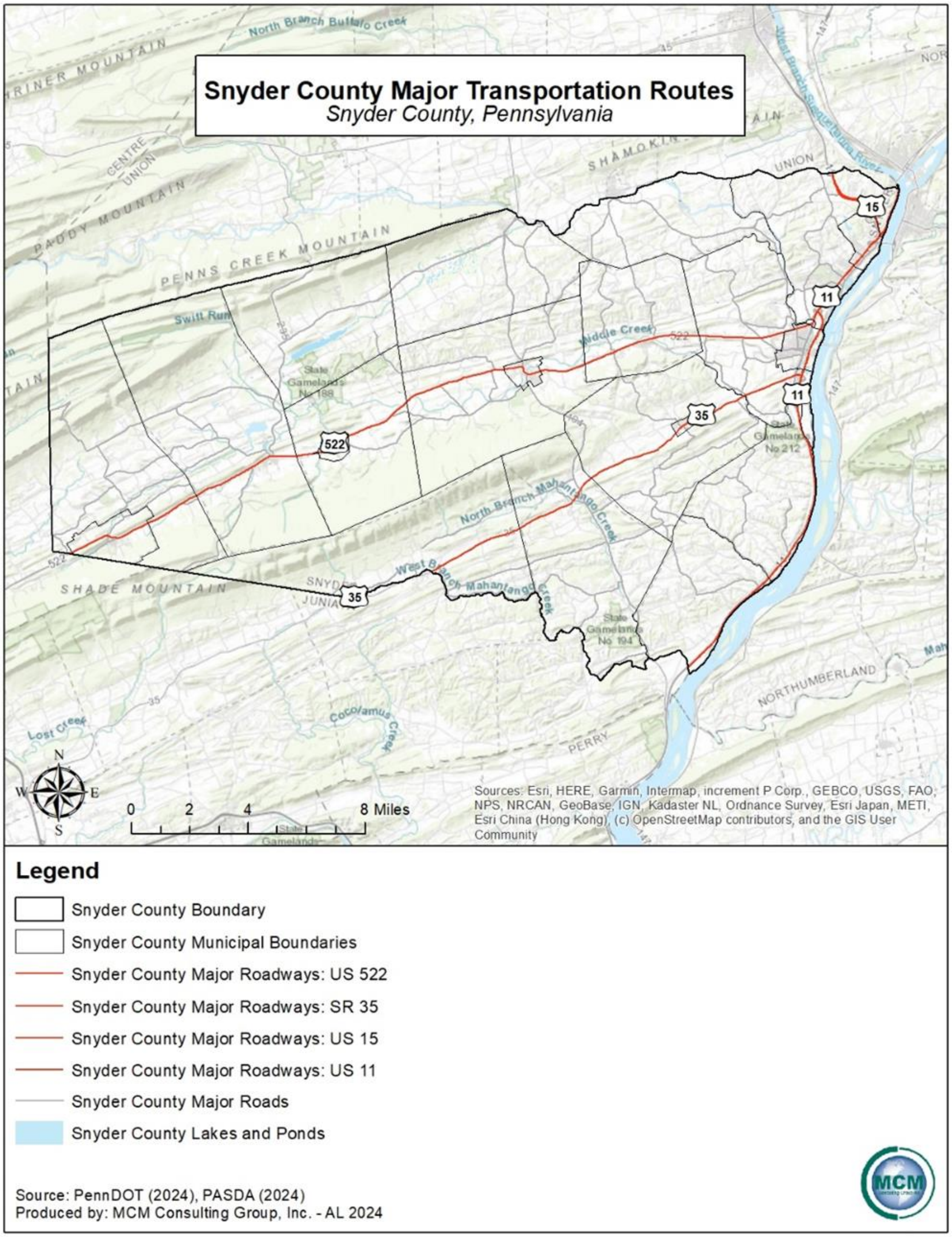


Figure 56 - Airports and Vulnerability Zones

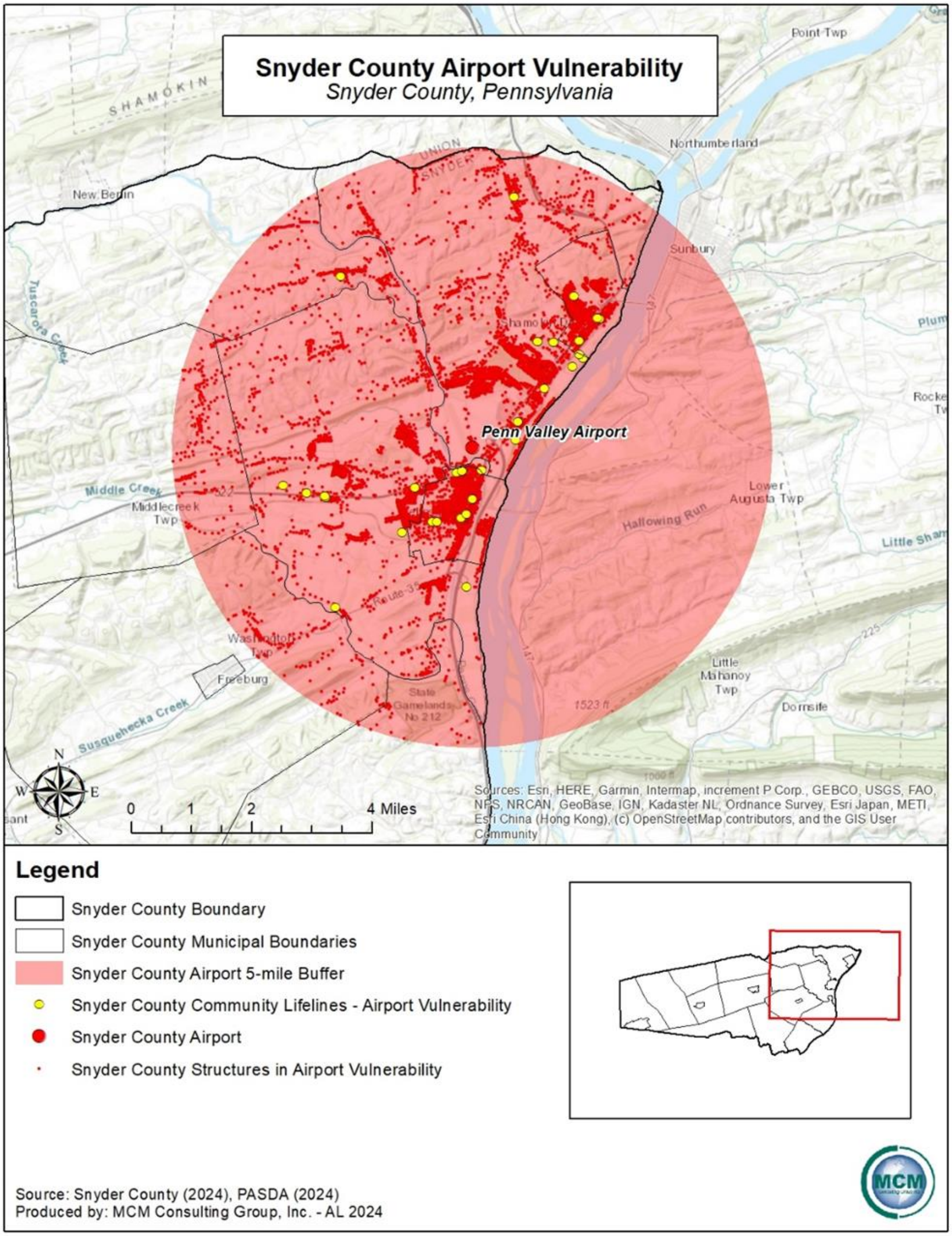
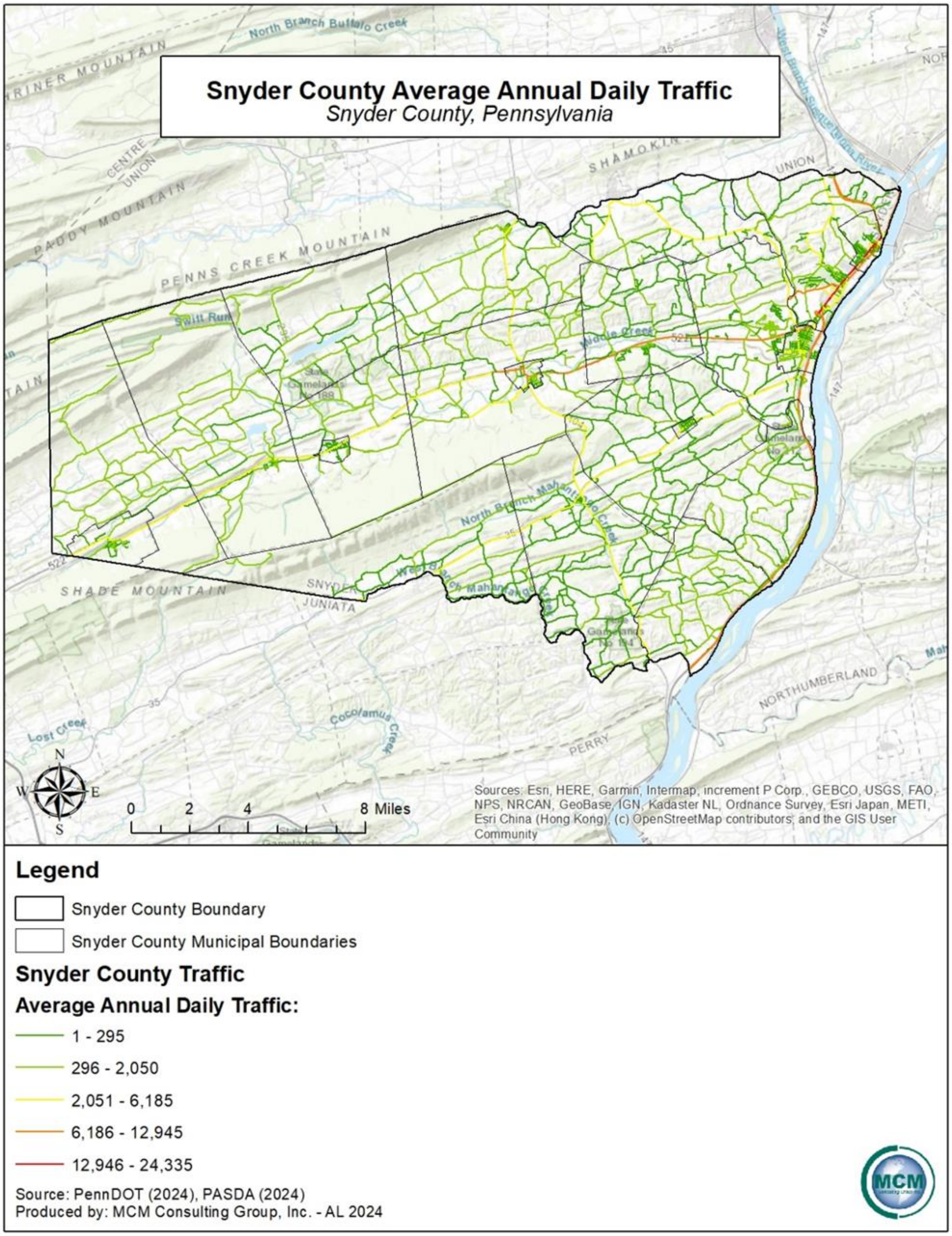


Figure 57 - Average Daily Traffic on Major Highway Vulnerability



4.3.21. Utility Interruptions

4.3.21.1 Location and Extent

Utility interruptions can occur from an internal system failure or as a secondary impact of another hazard, such as windstorm, winter storm, extreme temperatures, or a traffic accident. Strong adverse weather conditions and storms can cause widespread disruptions in electric and telecommunications service due to power lines being brought down by falling tree branches across a region. Strong heat waves may result in rolling blackouts where power may not be available for an extended period, impacting air conditioning across a region. Space weather, specifically solar flares, can also pose a threat to utility service across the globe. Although uncommon, the northeastern seaboard and the north central regions of the United States are particularly susceptible to this hazard.

The age of utility infrastructure also plays a role in interruptions, causing longer periods of outages in a larger area. Natural gas, water, telecommunications, and electric capabilities can all experience disruptions. Worker strikes at power generation facilities have also been known to cause minor and temporary power outages and failures. Other causes for minor power outages include but are not limited to vehicle accidents and wire destruction due to animals or wildlife. Outages can also be caused by blown transformers or tripped circuit breakers in the electric system. Major power outages typically occur on a regional scale and can last both short term and long term.

The list of utility providers in Snyder County is shown in *Table 74 – Snyder County Utility Providers*.

Table 74 - Snyder County Utility Providers

Snyder County Utility Providers	
Utility Type	**Name of Utility Provider**
Electricity	PP&L, Citizens' Electric Company, UGI
Telephone/9-1-1/Wireless	Century Link, Verizon, Windstream
Natural Gas	UGI Energy Services, UGI Utilities, Inc.
Water	Adams Township Municipal Authority, Beavertown Municipal Authority, Penns Creek Municipal Authority, Middleburg Municipal Authority, Freeburg Municipal Authority, AQUA of Pennsylvania, McClure Municipal Authority, Kreamer Municipal Authority, Penn Township Municipal Water and Sewer Authority,

Snyder County Utility Providers	
Utility Type	**Name of Utility Provider**
	Pennsview Water Company, Mt. Pleasant Mills Municipal Authority, Selinsgrove Borough Municipal Authority, Shamokin Dam Borough, Spring Township Municipal Authority, Richfield Area Joint Authority, Private Well Water
Source: PA Public Utility Commission, 2024	

4.3.21.2 Range of Magnitude

Utility interruptions do not typically lead to large-scale problems by themselves. Typically, human casualties are not a direct result from outages. Many utility interruptions occur during storms or other severe weather events, and they can have secondary consequences. Typical secondary effects from a power outage can include a delay in emergency response and those services arriving in a timely manner. A lack of potable drinking water can also become a major issue for areas impacted by utility interruptions.

Electricity:

Interruptions or power failures could have the following impacts:

- Public safety concerns
- Food spoilage
- Loss of heating or air conditioning
- Basement flooding due to sump pump failure
- Loss of indoor lighting
- Loss of internet service
- Stopped and stalled elevators
- Direct economic impact from retail settings

Of all the above-listed impacts, the loss of heating or air conditioning poses the greatest risk to the elderly and very young populations during times of extreme temperature. Prolonged power outages also pose a risk to residents that rely on home-based medical equipment such as home-supply oxygen units. Some of the issues that are listed above can be considered more of a nuisance than a hazard, such as food spoilage due to long-term electrical outages. However, significant damage or harm can occur depending on the population affected, the duration, and the severity of the outage.

A worst-case scenario for the utility interruptions would be a county-wide power outage during winter months, forcing the evacuation of vulnerable populations to facilities outside of the county or to warming shelters within the county.

Fuel:

Interruptions of the transportation of gas and other products used for fuel can lead to a loss of heating and manufacturing capabilities. This can adversely affect the economic stability of a region and the production of needed products for consumption.

Telecommunications:

Interruptions to telecommunications systems include impacts to the 9-1-1 capabilities of a region, telephone, and internet service. The greatest risk in losing this utility to interruption is the risk of an emergency not being able to be reported to a public safety answering point (PSAP). Extensive loss of telephone and internet service can be detrimental to government, businesses, and to residents. With much of the country now dependent on wireless networks, signal interruptions can cause a large issue for people who are utilizing wireless telecommunications for work. There are also many concerns regarding safety and internet security due to the increase in people working over wireless networks that occurred during the COVID-19 pandemic. These interruptions and issues can be detrimental for the Snyder County workforce.

4.3.21.3 Past Occurrence

Minor utility interruptions occur annually in Snyder County and occur most often in conjunction with winter weather and/or windstorms. *Table 75 – Power Outages in Snyder County* illustrates the number of power outages between 2020 and 2024.

Table 75 - Power Outages in Snyder County

Power Outages in Snyder County	
Municipality	**Number of Events Between 2020 and 2024**
Adams Township	0
Beaver Township	0
Beavertown Borough	1
Center Township	2
Chapman Township	0
Franklin Township	0
Freeburg Borough	0
Jackson Township	0

Power Outages in Snyder County	
Municipality	**Number of Events Between 2020 and 2024**
McClure Borough	0
Middleburg Borough	1
Middlecreek Township	0
Monroe Township	0
Penn Township	0
Perry Township	0
Selinsgrove Borough	2
Shamokin Dam Borough	1
Spring Township	0
Union Township	1
Washington Township	2
West Beaver Township	0
West Perry Township	0
Total:	**10**
Source: Snyder County EMA, 2024	

The Pennsylvania Public Utility Commission tracks the reliability of electric distribution companies (EDC) and outages. *Table 76 – 2018 Winter Storms Riley and Quinn Power Outages* by EDC compares the customers affected by power outage in Pennsylvania during these storm events and compares the to statistics from Nika from 2014 and Sandy from 2012. Some of the EDCs were not impacted by Winter Storm Quinn. PP&L customers experienced power outages for a duration of eight days with Winter Storm Quinn and Winter Storm Riley, whereas during Sandy in 2012, the duration was nine days. Nika in 2014 had a duration of just over three days.

Table 76 - 2018 Winter Storms Riley and Quinn Power Outages

2018 Winter Storms Riley and Quinn Power Outages			
Electric Distribution Company	**Customers affected by storms Riley and Quinn 2018 (Percentage of total customers)**	**Customers affected by Nika 2014 (Percentage of total customer)**	**Customers affected by Sandy 2012 (Percentage of total customers)**
Met-Ed	272,928 (49.22%)	144,000 (26.00%)	298,300 (54.00%)
PECO	794,969 (46.76%)	723,681 (42.00%)	845,703 (54.20%)
Penelec	90,856 (15.61%)	N/A	96,847 (16.40%)
PCLP	2,101 (47.44%)	N/A	4,487 (100.00%)
PP&L	261,341 (18.67%)	92,283 (7.00%)	523, 936 (37.50%)

2018 Winter Storms Riley and Quinn Power Outages			
Electric Distribution Company	**Customers affected by storms Riley and Quinn 2018 (Percentage of total customers)**	**Customers affected by Nika 2014 (Percentage of total customer)**	**Customers affected by Sandy 2012 (Percentage of total customers)**
Total:	**1,422,195**	**959,964**	**1,769,273**
Source: Winter Storm Riley and Quinn Report 2019			

Other past significant events of utility interruptions in the United States occur on a regional basis and can have varied effects related to number of impacted customers. A large water treatment plant failure occurred in Jackson, Mississippi in August of 2022 after flooding impacted the treatment facility. The city of Jackson was left without safe drinking water for close to two months until the water was deemed safe and potable in October of 2022. This event stood out as a large scale failure of community lifelines and utilities. This event also opened discussions related to equity in infrastructure repairs, as the repairs took a significant amount of time in a vulnerable socio-economic area. An attack on an electrical grid and power substations in North Carolina in December of 2022 left almost 45,000 people without power and reliant heat during the cold temperatures of January.

4.3.21.4 Future Occurrence

Utility interruptions are difficult to predict, and minor interruptions may occur several times a year to all utilities. Even so, utility interruptions occur more frequently as a secondary factor to severe weather events or transportation accidents.

Space weather is getting more attention as an infrastructure risk due in part to a March 2020 report by the United States Geological Survey (USGS). The report noted that geomagnetic storms caused by the dynamic action of the Sun and solar wind on the space environment surrounding the Earth can generate electric fields in the Earth’s crust and mantle. These electric fields can interfere with the operation of grounded electric power-grid systems. Geomagnetic storms occur only occasionally, but when sufficiently energetic they can produce blackouts on a large scale.

As utility infrastructure ages, interruption events could occur more frequently if the maintenance of the infrastructure is not maintained. Utility providers can reduce Snyder County’s vulnerability to power outages by implementing improvement plans for utility infrastructure. Total replacement is not a feasible solution to the issue, but compromises can be reached to ensure that the new and old equipment along a utility line can work together efficiently.

Utility interruptions could see direct impacts based on climate change in Snyder County. Prolonged heat waves caused by climate change could stress a power grid that was not specifically designed for increased heat exposure. Increased intensity of winter storms is of particular concern for the Commonwealth of Pennsylvania, as power outages can occur from lines being brought down by ice and snow.

4.3.21.5 Vulnerability Assessment

Resources such as electricity, communications, gas, and water supply are critical to ensure the health, safety, and general welfare of the citizenry. *Figure 58 – Snyder County Utilities* illustrates the approximate locations of service lines and pipelines throughout Snyder County.

Power outages can cause even greater detriment to at-risk and vulnerable populations, such as elderly (e.g., supplemental oxygen power needs) or those with functional and access needs to consider. All critical infrastructure is vulnerable to the effects of a power surge. The probability of a large-scale, extended utility failure is low; however, small-scale failures lasting short periods of time occur annually.

Long-term care facilities, senior centers, hospitals, and emergency medical facilities are all vulnerable to utility interruptions. Often back-up power generators are used at these facilities to offset electrical needs during extreme hot or cold temperature events. However, these back-up power generators must be maintained, and fuel supplies must be secured in advance of the utility interruption to ensure a seamless transition from the everyday grid power source to the emergency generator. When officials consider maintenance and supplies for a facility, long-term use of back-up generators should be planned.

Electricity:

Severe weather is one of the largest causes of power loss. The electric power grid infrastructure can be damaged by snow, ice, high winds, lightning, flooding, falling tree limbs, and vehicle accidents involving utility poles. Small animals can also cause minor power outages by climbing along the lines and shorting out the system.

Causes of a regional scale power outage or failure could be from infrastructure failure, sabotage, human error, or worker strikes. Community lifeline facilities are vulnerable to utility interruptions, especially the loss of power. The establishment of reliable backup power at these facilities is extremely important to provide continued support for the health, safety, and well-being of Snyder County residents and visitors.

The occurrence of severe weather-related utility interruptions will increase due to climate change in the Commonwealth of Pennsylvania and the United States as a whole. Climate change will cause weather to become more severe on a more frequent basis.

Water:

Water distribution can be affected in three ways.

- The amount of water available (depends on nature)
- The quality of the water (depends on human responsibility)
- The viability of the physical components of the distribution system

Well contamination or water shortages due to drought could pose a high vulnerability to local water distribution. Drought events will continue to occur more frequently as climate change alters that available amount of ground water for consumption. This will result in greater well shortages and water utility interruptions for citizens that have well water.

Water contamination can occur naturally, by human error, or intentionally. Releases of manure and milk into the water supply can cause contamination. Overflows from sewage systems and lagoons on farms can also cause contamination of groundwater and drinking water. There are times when accidental spills and releases of hazardous materials contaminate water supplies, thereby, water supplies along transportation routes may be affected.

Gas and Liquid Pipelines:

Interruptions to natural gas distribution lines could be affected by:

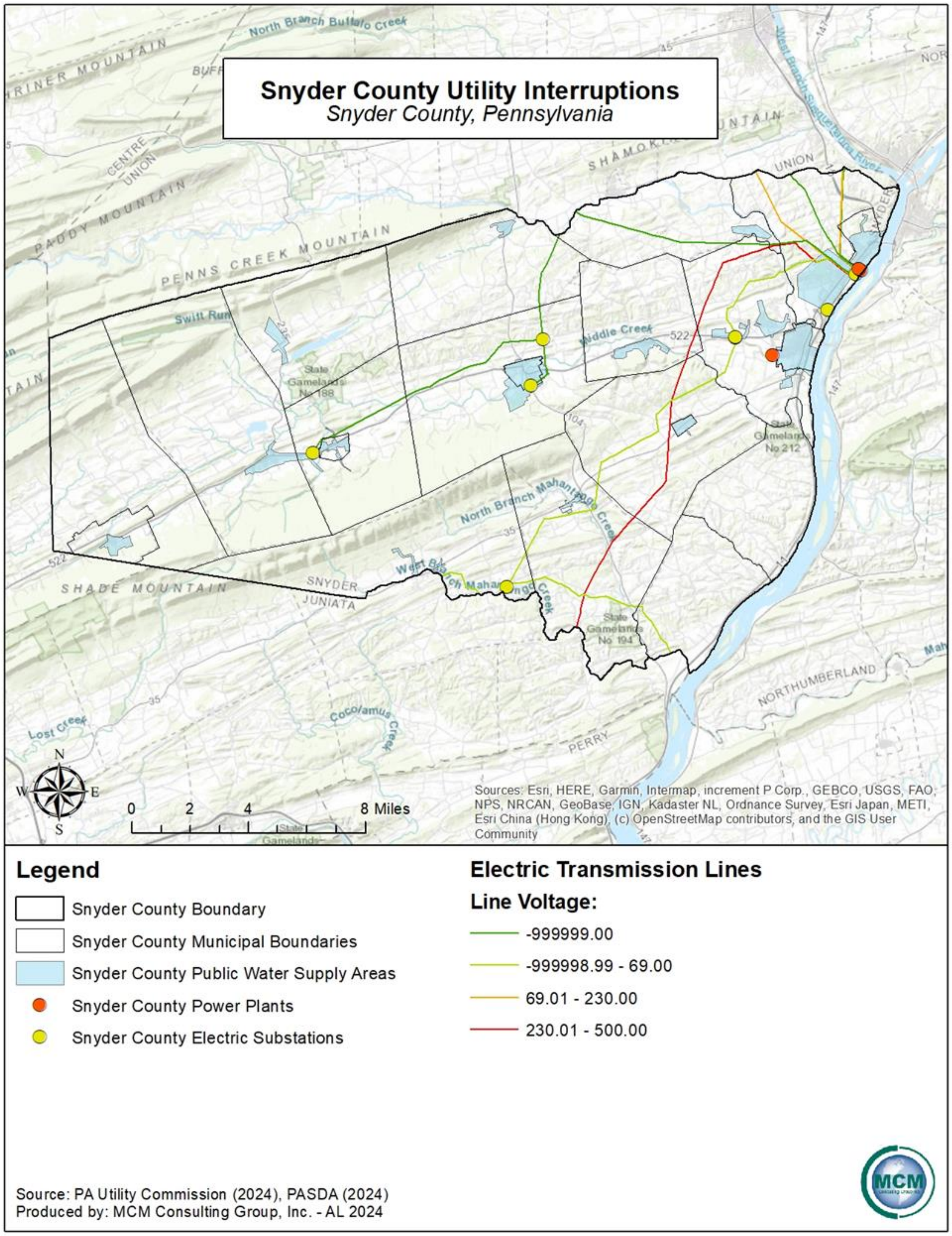
- Deterioration of line and facilities
- Puncturing the distribution lines by humans (either intentional or accidental)
- Coastal or winter storms
- Extreme heat or cold events
- Transportation accidents

Communications:

Interruptions in communications could be caused as a secondary effect of storms or high winds, infrastructure failure, or by humans (intentional or accidental). A loss of communications by emergency services would be devastating to the population of Snyder County if 9-1-1 calls could not be received, or if emergency units could not be dispatched properly and/or timely.

No data regarding economic impacts from utility interruptions in Snyder County is available. However, utility interruptions can cause economic impacts stemming from lost income, spoiled food and other goods, costs to the owners or operators of the utility facilities, and costs to government and community service groups.

Figure 58 - Snyder County Utilities



4.4. Hazard Vulnerability Summary

4.4.1. Methodology

Ranking hazards helps communities set goals and priorities for mitigation based on their vulnerabilities. A risk factor (RF) is a tool used to measure the degree of risk for identified hazards in a particular planning area. The RF can also assist local community officials in ranking and prioritizing hazards that pose the most significant threat to a planning 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, general 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 hazards profiled in the HMP update. Those categories include *probability*, *impact*, *spatial extent*, *warning time and duration*. Each degree of risk was assigned a value ranging from one to four. The weighting factor agreed upon by the planning team is shown in *Table 77 – Risk Factor Approach Summary Equation.* 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 following example equation:

Table 77 - Risk Factor Approach Summary Equation

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

Table 78 – Risk Factor Approach Summary 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.

Table 78 - Risk Factor Approach Summary

<table>
<tr><th colspan="5">Summary of Risk Factor Approach Used to Rank Hazard Risk.</th></tr>
<tr><th rowspan="2">RISK ASSESSMENT CATEGORY</th><th colspan="3">DEGREE OF RISK</th><th rowspan="2">WEIGHT VALUE</th></tr>
<tr><th>LEVEL</th><th>CRITERIA</th><th>INDEX</th></tr>
<tr><td rowspan="4">PROBABILITY
What is the likelihood of a hazard event occurring in a given year?</td><td>UNLIKELY</td><td>LESS THAN 1% ANNUAL PROBABILITY</td><td>1</td><td rowspan="4">30%</td></tr>
<tr><td>POSSIBLE</td><td>BETWEEN 1 & 10% ANNUAL PROBABILITY</td><td>2</td></tr>
<tr><td>LIKELY</td><td>BETWEEN 10 &100% ANNUAL PROBABILITY</td><td>3</td></tr>
<tr><td>HIGHLY LIKELY</td><td>100% ANNUAL PROBABILTY</td><td>4</td></tr>
<tr><td rowspan="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?</td><td>MINOR</td><td>VERY FEW INJURIES, IF ANY. ONLY MINOR PROPERTY DAMAGE & MINIMAL DISRUPTION ON QUALITY OF LIFE. TEMPORARY SHUTDOWN OF CRITICAL FACILITIES.</td><td>1</td><td rowspan="4">30%</td></tr>
<tr><td>LIMITED</td><td>MINOR INJURIES ONLY. MORE THAN 10% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE DAY.</td><td>2</td></tr>
<tr><td>CRITICAL</td><td>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.</td><td>3</td></tr>
<tr><td>CATASTROPHIC</td><td>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.</td><td>4</td></tr>
<tr><td rowspan="4">SPATIAL EXTENT
How large of an area could be impacted by a hazard event? Are impacts localized or regional?</td><td>NEGLIGIBLE</td><td>LESS THAN 1% OF AREA AFFECTED</td><td>1</td><td rowspan="4">20%</td></tr>
<tr><td>SMALL</td><td>BETWEEN 1 & 10% OF AREA AFFECTED</td><td>2</td></tr>
<tr><td>MODERATE</td><td>BETWEEN 10 & 50% OF AREA AFFECTED</td><td>3</td></tr>
<tr><td>LARGE</td><td>BETWEEN 50 & 100% OF AREA AFFECTED</td><td>4</td></tr>
<tr><td rowspan="4">WARNING TIME
Is there usually some lead time associated with the hazard event? Have warning measures been implemented?</td><td>MORE THAN 24 HRS</td><td>SELF-DEFINED
(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)</td><td>1</td><td rowspan="4">10%</td></tr>
<tr><td>12 TO 24 HRS</td><td>SELF-DEFINED</td><td>2</td></tr>
<tr><td>6 TO 12 HRS</td><td>SELF-DEFINED</td><td>3</td></tr>
<tr><td>LESS THAN 6 HRS</td><td>SELF-DEFINED</td><td>4</td></tr>
<tr><td rowspan="4">DURATION
How long does the hazard event usually last?</td><td>LESS THAN 6 HRS</td><td>SELF-DEFINED
(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)</td><td>1</td><td rowspan="4">10%</td></tr>
<tr><td>LESS THAN 24 HRS</td><td>SELF-DEFINED</td><td>2</td></tr>
<tr><td>LESS THAN 1 WEEK</td><td>SELF-DEFINED</td><td>3</td></tr>
<tr><td>MORE THAN 1 WEEK</td><td>SELF-DEFINED</td><td>4</td></tr>
</table>

4.4.2. Ranking Results

Using the methodology described in Section 4.4.1, *Table 79 – Risk Factor Assessment* lists the risk factor calculated for each of twenty-three potential hazards identified in the 2025 HMP. Hazards identified as *high* risk have risk factors greater than 2.5. 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.

Table 79 - Risk Factor Assessment

Snyder County Hazard Ranking Based on Risk Factor Assessment Methodology							
Hazard Risk	Hazard Natural (N) or Human Caused (H)	RISK ASSESSMENT CATEGORY					RISK FACTOR (RF)
		Probability	Impact	Spatial Extent	Warning Time	Duration	
HIGH	Terrorism/Cyberterrorism	3	3	2	4	4	**3.0**
	Winter Storm	3	3	4	1	2	**2.9**
	Emergency Services Shortage	3	3	3	1	4	**2.9**
	Substance Use Disorder	3	3	3	1	4	**2.9**
	Drought	3	2	4	1	4	**2.8**
	Flood	3	3	3	1	3	**2.8**
	Invasive Species	3	2	4	1	4	**2.8**
	Transportation Accidents	4	2	2	4	1	**2.7**
	Hurricane and Tropical Storm	3	2	4	1	2	**2.6**
	Utility Interruptions	3	2	2	4	3	**2.6**
	Dam Failure	2	3	3	2	2	**2.5**
MODERATE	Extreme Temperature	2	2	4	1	3	**2.4**
	Tornado and Windstorm	3	2	2	4	1	**2.4**
	Environmental Hazards	3	2	1	4	2	**2.3**
	Wildfire	3	1	2	4	2	**2.2**
	Flash Flood	3	1	2	4	1	**2.1**
	Radon Exposure	3	1	2	1	4	**2.1**
LOW	Pandemic and Infectious Disease	2	2	1	1	4	**1.9**
	Landslide	1	2	1	4	1	**1.6**
	Earthquake	1	1	2	4	1	**1.5**

Snyder County Hazard Ranking Based on Risk Factor Assessment Methodology							
Hazard Risk	Hazard Natural (N) or Human Caused (H)	RISK ASSESSMENT CATEGORY					RISK FACTOR (RF)
		Probability	Impact	Spatial Extent	Warning Time	Duration	
	Subsidence and Sinkhole	1	1	1	4	1	**1.3**
	Blighted Properties	1	1	1	1	4	**1.3**
	Ice Jam	1	1	1	1	3	**1.2**

Based on these results, there are eleven high risk hazards, six moderate risk hazards, and six low risk hazards in Snyder County. Mitigation actions were developed for all high, moderate, and low risk hazards (see section 6.4). The threat posed to life and property for moderate and high-risk hazards is considered significant enough to warrant the need for establishing hazard-specific mitigation actions. Mitigation actions related to future public outreach and emergency service activities are identified to address low risk hazard events.

A risk assessment result for the entire county does not mean that each municipality is at the same amount of risk to each hazard. *Table 80 – Countywide Risk Factor Assessment* shows the different municipalities in Snyder County and their risk factor assessment scores. This table was developed by the consultant based on the findings in the hazard profiles located in sections 4.3.1 through 4.3.21.

Table 80 - Countywide Risk Factor Assessment

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk									
IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR									
JURISDICTION	Terrorism/Cyberterrorism	Winter Storm	Emergency Services Shortages	Substance Use Disorder	Drought	Flood	Invasive Species	Transportation Accidents	Hurricane and Tropical Storms
	3.0	2.9	2.9	2.9	2.8	2.8	2.8	2.7	2.6
Adams Township									
Beaver Township									
Beavertown Borough									
Center Township									
Chapman Township									
Franklin Township	3.0	3.0	2.9	2.9	2.8	2.8	2.8	2.7	2.6
Freeburg Borough									
Jackson Township	2.4	2.9	3.2	2.6	2.5	2.8	2.6	2.1	2.4
McClure Borough									
Middleburg Borough	2.9	2.4	2.7	2.9	2.1	2.5	1.9	2.6	2.4
Middlecreek Township	3.0	2.9	2.9	2.9	3.1	2.8	2.8	2.7	2.7
Monroe Township	3.2	2.1	2.9	2.9	2.8	2.8	2.8	3.2	2.4
Penn Township	3.2	2.7	2.9	2.9	2.6	2.8	2.8	2.9	2.6
Perry Township	1.8	2.5	2.4	1.9	2.7	1.7	2.1	2.2	2.1
Selinsgrove Borough									
Shamokin Dam Borough	3.0	2.6	2.9	2.7	2.1	2.5	2.5	2.2	2.6
Spring Township									
Union Township									
Washington Township	1.8	2.5	2.4	1.9	2.7	1.7	2.1	2.2	2.1

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk									
IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR									
JURISDICTION	Terrorism/Cyberterrorism	Winter Storm	Emergency Services Shortages	Substance Use Disorder	Drought	Flood	Invasive Species	Transportation Accidents	Hurricane and Tropical Storms
	3.0	2.9	2.9	2.9	2.8	2.8	2.8	2.7	2.6
West Beaver Township									
West Perry Township									

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk									
IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR									
JURISDICTION	Utility Interruptions	Dam Failure	Extreme Temperatures	Tornado and Windstorms	Environmental Hazards	Wildfire	Flash Flood	Radon Exposure	Pandemic and Infectious Disease
	2.6	2.5	2.4	2.4	2.3	2.2	2.1	2.1	1.9
Adams Township									
Beaver Township									

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk									
IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR									
JURISDICTION	Utility Interruptions	Dam Failure	Extreme Temperatures	Tornado and Windstorms	Environmental Hazards	Wildfire	Flash Flood	Radon Exposure	Pandemic and Infectious Disease
	2.6	2.5	2.4	2.4	2.3	2.2	2.1	2.1	1.9
Beavertown Borough									
Center Township									
Chapman Township									
Franklin Township	2.6	2.5	2.4	2.4	2.3	2.4	2.1	2.1	1.9
Freeburg Borough									
Jackson Township	2.8	1.5	2.4	2.3	2.1	2.7	2.4	1.3	2.1
McClure Borough									
Middleburg Borough	1.9	1.3	2.4	2.1	2.4	2.1	2.4	1.9	1.6
Middlecreek Township	2.6	2.5	2.4	2.4	2.3	2.5	1.9	2.1	1.9
Monroe Township	2.2	2.0	2.4	2.1	2.6	1.9	1.9	2.1	2.1
Penn Township	2.8	2.5	2.4	2.4	2.5	2.2	2.4	2.3	1.9
Perry Township	2.2	1.0	3.2	2.6	1.9	2.4	2.5	1.9	2.3
Selinsgrove Borough									
Shamokin Dam Borough	2.8	1.3	2.4	2.4	1.9	1.4	2.4	1.8	1.9
Spring Township									
Union Township									
Washington Township	2.2	1.0	3.2	2.6	1.9	2.4	2.5	1.9	2.3
West Beaver Township									
West Perry Township									

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk									
IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR									
JURISDICTION	Landslide	Earthquake	Subsidence and Sinkhole	Blighted Properties	Ice Jam				
	1.6	1.5	1.3	1.3	1.2				
Adams Township									
Beaver Township									
Beavertown Borough									
Center Township									
Chapman Township									
Franklin Township	1.8	1.5	1.3	1.3	1.4				
Freeburg Borough									
Jackson Township	1.8	1.5	1.3	1.3	2.0				
McClure Borough									
Middleburg Borough	1.3	1.5	1.5	1.3	1.7				
Middlecreek Township	1.6	1.5	1.3	1.3	1.2				
Monroe Township	1.3	1.5	1.3	1.3	1.2				
Penn Township	1.3	1.5	1.3	1.3	2.1				
Perry Township	1.0	1.6	1.9	1.3	1.0				
Selinsgrove Borough									
Shamokin Dam Borough	1.3	1.5	1.3	1.6	1.3				
Spring Township									
Union Township									
Washington Township	1.0	1.6	1.9	1.3	1.0				
West Beaver Township									

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk									
IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR									
JURISDICTION	Landslide	Earthquake	Subsidence and Sinkhole	Blighted Properties	Ice Jam				
	1.6	1.5	1.3	1.3	1.2				
West Perry Township									

4.4.3. Potential Loss Estimates

Based on various kinds of available data, potential loss estimates were established for flooding. Estimates provided in this section are based on HAZUS-MH, version MR4, 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.

Flooding Loss Estimation:

Flooding is a high-risk natural hazard in Snyder County. The estimation of potential loss in this assessment focuses on the monetary damage that could result from flooding. The potential property loss was determined for each municipality and for the entire county. The quantity of commercial and residential structures in each Snyder County municipality is outlined in section 4.3.4 of the flooding hazard profile.

4.4.4. Future Development and Vulnerability

The 2020 census population for Snyder County is 40,452, which is 1,052 greater than the 2010 census. There was an overall increase of 2.67% in population based on the data. Ten municipalities have seen population increases while the remaining eleven had decreases in the period between 2010 and the 2020 as identified in *Table 81 – 2010 – 2020 Population Change.*

Table 81 - 2010 – 2020 Population Change

Population Change in Snyder County from 2010-2020			
Municipality	**2010 Census**	**2020 Census**	**Percent of Change 2010-2020 (%)**
Adams Township	943	892	-5.4
Beaver Township	499	437	-12.4
Beavertown Borough	1,357	1080	-20.4
Center Township	1,890	2,110	-11.6
Chapman Township	1,715	1,593	-7.1
Franklin Township	1,894	2,115	11.7
Freeburg Borough	621	793	27.7
Jackson Township	1,333	1,630	22.3
McClure Borough	872	1,205	38.2
Middleburg Borough	1,757	1,615	-8.1
Middlecreek Township	2,282	2,082	-8.8
Monroe Township	3,877	4,126	6.4
Penn Township	4,239	4,388	3.5
Perry Township	1,787	2,138	19.6
Selinsgrove Borough	5,621	5,923	5.4
Shamokin Dam Borough	1,931	1,812	-6.2
Spring Township	1,568	1,479	-5.7
Union Township	1,381	1,449	-4.9
Washington Township	1,665	1,672	0.4
West Beaver Township	1,289	1,022	-20.7

Population Change in Snyder County from 2010-2020			
Municipality	**2010 Census**	**2020 Census**	**Percent of Change 2010-2020 (%)**
West Perry Township	879	891	1.4
Source: United States Census Bureau (2024), 2020 Census Data			

The 2022 American Community Survey estimates indicates that there are approximately 16,003 housing units in Snyder County, Pennsylvania. Of those, 90.2% of the structures are occupied-housing units. The county-wide population changes indicate a potential alteration to overall hazard vulnerability. Municipalities that undergo widespread population reductions may have more difficulty meeting personnel demands than expanding jurisdictions. However, certain municipalities experienced significant resident increases and, thus, may be more vulnerable to certain hazards due to development and residential growth. Although expanding population zones may be especially vulnerable to hazards outlined in section 4.3 of this hazard mitigation plan update, natural and human caused hazards could potentially occur at any time regardless of population change. The Snyder County Hazard Mitigation Local Planning Team will conduct annual reviews of this plan and the impacts all hazards have on the county and new development every year and within a time frame after a disaster or major emergency.

5. Capability Assessment

5.1. Update Process Summary

The capability assessment is an evaluation of Snyder County's governmental structure, political framework, legal jurisdiction, fiscal status, policies and programs, regulations, ordinances, and resource availability. Each category is evaluated for its strengths and weaknesses in responding to, preparing for, and mitigating the effects of the profiled hazards. A capability assessment is an integral part of the hazard mitigation planning process. Here, the county and municipalities identify, review, and analyze what they are currently doing to reduce losses and identify the framework necessary to implement new mitigation actions. This information will help the county and municipalities evaluate alternative mitigation actions and address shortfalls in the mitigation plan.

A capabilities assessment survey was provided to the municipalities during the planning process at meetings held with Snyder County officials. These meetings were designed to seek input from the key county and municipal stakeholders on legal, fiscal, technical, and administrative capabilities of all jurisdictions. As such, the capabilities assessment helps guide the implementation of mitigation projects and will help evaluate the effectiveness of existing mitigation measures, policies, plans, practices, and programs.

Throughout the planning process, the mitigation local planning team considered the county's twenty-one municipalities. Pennsylvania municipalities have their own governing bodies, pass, and enforce their own ordinances and regulations, purchase equipment and manage their own resources, including critical infrastructure. Therefore, these capability assessments consider the various characteristics and capabilities of municipalities under study.

The evaluation of the following categories – political framework, legal jurisdictions, fiscal status, policies and programs and regulations and ordinances – allows the mitigation planning team to determine the viability of certain mitigation actions. The capability assessment analyzes what Snyder County, and its municipalities have the capacity to do and provides an understanding of what must be changed to mitigate loss.

Snyder 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 hazardous event. While the capability assessment serves as a good instrument for identifying local capabilities, it also provides a means for recognizing gaps and weaknesses that can be resolved through future mitigation actions. The results of this assessment lend critical information for developing an effective mitigation strategy.

5.2. Capability Assessment Findings

Eighteen of the twenty-one municipalities in Snyder County completed and submitted a capability assessment survey. The results of the survey were collected, aggregated, and analyzed.

Each plan participant has some ability to expand and improve upon their administrative and technical capabilities following this plan update and during an update process. The municipalities of Snyder County could improve upon these capabilities by first reviewing the capability assessment forms submitted during this update process and identifying areas of growth based off of these forms. A comprehensive review is within the power of each municipality of Snyder County to see what departments, commissions, boards, and staff they have available to assist in each aspect of capability assessments. Each municipality, as a plan participant, should assess if they have the ability to improve in these areas during an annual review process or during the next hazard mitigation plan update. The plan participants should also review their ability to improve the financial capabilities by reviewing funding and funding sources, and researching other funding sources for hazard mitigation processes. Each plan participant can improve their education and outreach capabilities by increasing public event participation and education events that they attend in the county.

5.2.1. Planning and Regulatory Capability

Municipalities have the authority to govern more restrictively than state and county minimum requirements as long as they are compliant with all criteria established in the Pennsylvania Municipalities Planning Code (MPC) and their respective municipal codes. Municipalities can develop their own policies and programs and implement their own rules and regulations to protect and serve their residents. Local policies and programs are typically identified in a comprehensive plan, implemented through a local ordinance, and enforced by the governmental body or its appointee.

Municipalities regulate land use via the adoption and enforcement of zoning, subdivision, land development, building codes, building permits, floodplain management and/or stormwater management ordinances. When effectively prepared and administered, these regulations can lead to an opportunity for hazard mitigation. For example, the National Flood Insurance Program (NFIP) established minimum floodplain management criteria, and adoption of the Pennsylvania Floodplain Management Act (Act 166 of 1978) established even higher floodplain management standards. A municipality must adopt and enforce these minimum criteria to be eligible for participation in the NFIP. Municipalities have the option of adopting a single-purpose or incorporating these provisions into their zoning, subdivision, and land development, or building codes; thereby mitigating the potential impacts of local flooding. This capability assessment details the existing Snyder County and municipal legal capabilities to mitigate the profiled hazards. It identifies the county and the municipal existing planning documents and their hazard mitigation potential. Hazard mitigation recommendations are, in part, based on the information contained in the assessment.

Building Codes

Building codes are important in mitigation because they are developed for a region of the country in respect to the hazards that exist in that area. Consequently, structures that are built according to applicable codes are inherently resistant to many hazards, such as intense winds, floods, and earthquakes; and can help mitigate regional hazards, such as wildfires. In 2003, Pennsylvania implemented the Uniform Construction Code (UCC) (Act 45), a comprehensive building code that establishes minimum regulations for most new construction, including additions and renovations to existing structures.

The code applies to almost all buildings, excluding manufactured and industrialized housing (which are covered by other laws), agricultural buildings, and certain utility and miscellaneous buildings. The UCC requires builders to use materials and methods that have been professionally evaluated for quality and safety, as well as inspections to ensure compliance.

The initial election period, during which all of Pennsylvania's 2,565 municipalities were allowed to decide whether the UCC would be administered and enforced locally, officially closed on August 7, 2004. The codes adopted for use under the UCC are the 2003 International Codes issued by the International Code Council (ICC). Supplements to the 2003 codes have been adopted for use over the years since.

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 Pennsylvania Department of Labor and Industry is responsible for all commercial code enforcement in that municipality; and all residential construction is inspected by independent third-party agencies selected by the owner. The department also has sole jurisdiction for all state-owned buildings no matter where they are located. Historical buildings may be exempt from such inspections and Act 45 provides quasi-exclusion from UCC requirements.

The municipalities in Snyder County adhere to the standards of the Pennsylvania Uniform Code (Act 45). All twenty-one of the municipalities in Snyder County have adopted the PA ACT 45 Building Code.

Zoning Ordinance

Article VI of the Municipalities Planning Code (MPC) authorizes municipalities to prepare and enact zoning to regulate land use. Its regulations can apply to the permitted use of land, the height and bulk of structures, the percentage of a lot that may be occupied by buildings and other impervious surfaces, yard setbacks, the density of development, the height and size of signs, and the parking regulations. A zoning ordinance has two parts, including the zoning map that delineates zoning districts and the text that sets forth the regulations that apply to each district.

Subdivision Ordinance

Subdivision and land development ordinances include regulations to control the layout of streets, the planning lots and the provision of utilities and other site improvements. The objectives of subdivision and land development ordinance are to coordinate street patterns, to assure adequate utilities and other improvements are provided in a manner that will not pollute streams, wells and/or soils, to reduce traffic congestions, and to provide sound design standards as a guide to developers, the elected officials, planning commissions, and other municipal officials. Article V of the Municipality Planning Code authorizes municipalities to prepare and enact a subdivision and land development ordinance. Subdivision and land development ordinances provide for the division and improvement of land. Of the twenty-one municipalities in Snyder County, thirteen have zoning regulations and eight do not have zoning regulations. Some municipalities have adopted their own subdivision and land development ordinance. Those municipalities are Beavertown Borough, Freeburg Borough, McClure Borough, Monroe Township, Penn Township, Selinsgrove Borough, Shamokin Dam Borough, Spring Township, and Union Township. Of the twenty-one municipalities thirteen have signed on, adopted, or are a part of the Snyder County SALDO. Beavertown Borough and Union Township have adopted the Snyder County SALDO but retain the right to approve the plan (Snyder County Planning Commission, September 2024).

Stormwater Management Plan/Stormwater Ordinance

The proper management of storm water runoff can improve conditions and decrease the chance of flooding. Pennsylvania’s Storm Water Management Act (Act 167) confers on counties the responsibility for development of watershed plans. The Act specifies that counties must complete their watershed storm water plans within two years following the promulgation of these guidelines by the Pennsylvania Department of Environmental Protection (PA DEP), which may grant an extension of time for any county for the preparation and adoption of plans. Counties must prepare the watershed plans in consultation with municipalities and residents. This is to be accomplished through the establishment of a watershed plan advisory committee. The counties must also establish a mechanism to periodically review and revise watershed plans. Plan revisions must be done every five years or sooner, if necessary.

Municipalities have an obligation to implement the criteria and standards developed in each watershed storm water management plan by amending or adopting laws and regulation for land use and development. The implementation of storm water management criteria and standards at the local level are necessary since municipalities are responsible for local land use decisions and planning. The degree of detail in the ordinance depends on the extent of existing and projected land development. The watershed storm water management plan is designed to aid the municipality in setting standards for the land uses it has proposed. Municipalities within rapidly developing watersheds will benefit from the watershed storm water management plan and will use the information for sound land use considerations. 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. During the update of this hazard mitigation plan, no stormwater management plan was discussed or reviewed for Snyder County. All municipalities should regulate the stormwater management processes in place in each municipality.

Comprehensive Plan

A comprehensive plan is a policy document that states objectives and guides the future growth and physical development of a municipality. The comprehensive plan is a blueprint for housing, transportation, community facilities, utilities, and land use. It examines how the past led to the present and charts the community’s future path. The Pennsylvania Municipalities Code (MPC Act 247 of 1968, as reauthorized and amended) requires counties to prepare and maintain a county comprehensive plan. In addition, the MPC requires counties to update the comprehensive plan every ten years.

Regarding hazard mitigation planning, Section 301.a(2) of the Municipality Planning Code 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 that recommends storm drainage and floodplain management.

Snyder County last updated its comprehensive plan in 2001.

Article III of the MPC enables municipalities to prepare a comprehensive plan: however, development of a comprehensive plan is voluntary. Seven of the twenty-one municipalities in Snyder County have adopted their own comprehensive plans. The municipalities that have adopted their own plan are Monroe Township, Penn Township, Selinsgrove Borough, Shamokin Dam Borough, and Spring Township. Chapman Township and Union Township have a joint comprehensive plan.

Capital Improvements Plan

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

Participation in the National Flood Insurance Program (NFIP)

Floodplain management is the operation of programs or activities that may consist of both corrective and preventative measures for reducing flood damage, including but not limited to such things as emergency preparedness plans, flood control works, and flood plain management regulations. The Pennsylvania Floodplain Management Act (Act 166) require every municipality identified by the Federal Emergency Management Agency (FEMA) to participate in the National Flood Insurance Program and permits all municipalities to adopt floodplain management regulations. It is in the interest of all property owners in the floodplain to keep development and land usage within the scope of the floodplain regulations for their community. This helps keep insurance rates low and ensures that the risk of flood damage is not increased by property development.

The Pennsylvania Emergency Management Agency (PEMA) was appointed by legislation in September 2021 to coordinate the Commonwealth NFIP and employ the State NFIP Coordinator. For many years prior, these roles were held by the Pennsylvania Department of Community and Economic Development (DCED), which still offers support to communities through its Floodplain Mitigation Program. PEMA provides communities, based on CFR Title 44, Section 60.3 level of regulations, with a suggested ordinance document to assist municipalities in meeting the minimum requirements of the NFIP along with the Pennsylvania Flood Plain Management Act (Act 166). These suggested or model ordinances contain provisions that are more restrictive than state and federal requirements. Suggested provisions include, but are not limited to, the below.

1. Prohibiting manufactured homes in the floodway
2. Prohibiting manufactured homes within the area measured fifty feet landward from the top-of-bank of any watercourse within a special flood hazard area
3. Special requirements for recreational vehicles within the special flood hazard area
4. Special requirement for accessory structure
5. Prohibiting new construction and development within the area measured fifty feet landward from the top-of-bank of any watercourse within a special flood hazard area
6. Providing the county conservation district an opportunity to review and comment on all applications and plans for any proposed construction or development in any identified floodplain area

Act 166 mandates municipal participation in, and compliance with, the NFIP. It also establishes higher regulatory standards for new or substantially improved structures which are used for the production or storage of dangerous materials (as defined by Act 166) by prohibiting them in the floodway. Additionally, Act 166 established the requirement that a special permit be obtained prior to any construction or expansion of any manufactured home park, hospital, nursing home, jail and prison if said structure is located within a special flood hazard area.

The NFIP's Community Rating System (CRS) provides discounts on flood insurance premiums in those communities that establish floodplain management programs that go beyond NFIP minimum requirements. Under the CRS, communities receive credit for more restrictive regulations, acquisition, relocation, or flood-proofing of flood prone buildings, preservation of open space, and other measures that reduce flood damages 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 Community Rating System in the NFIP. The section also expands the CRS goals to specifically include incentives to reduce the risk of flood-related erosion and to encourage measures that protect natural and beneficial floodplain functions. These goals have been incorporated into the CRS and communities now receive credit toward premium reductions for activities that contribute to them.

Under the Community Rating System, 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.

1. Reduce flood losses
2. Protect public health and safety
3. Reduce damage to property
4. Prevent increases in flood damage from new construction
5. Reduce the risk of erosion damage
6. Protect natural and beneficial floodplain functions
7. Facilitate accurate insurance rating
8. Promote the awareness of flood insurance

There are ten Community Rating System classes. 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% for Class 9 communities up to 45% for Class 1 communities. The CRS recognizes eighteen credible activities, organized under four categories: Public Information, Mapping and Regulations, Flood Damage Reduction, and Flood Preparedness.

FEMA Region III makes available to communities an ordinance review checklist which lists required provisions for floodplain management ordinances. This checklist helps communities develop an effective floodplain management ordinance that meets federal requirements for participation in the NFIP. PEMA provides communities, based on their 44 CFR 60.3 level of regulations, with a suggested ordinance document to assist municipalities in meeting the minimum requirements of the NFIP and the Pennsylvania Flood Plain Management Act (Act 166). Act 166 mandates municipal participation in and compliance with the NFIP. It also established higher regulatory standards for hazardous materials and high-risk land uses. As new Digital Flood Insurance Rate Maps (DFIRMs) are published, the Pennsylvania State NFIP Coordinator at DCED works with communities to ensure the timely and successful adoption of an updated floodplain management ordinance by reviewing and providing feedback on existing and draft ordinances.

According to the State NFIP Coordinator, all of Snyder County’s twenty-one municipalities have floodplain regulations in place that meet requirements set forth by the NFIP. Currently, three municipalities have completed or started to complete the CRS program. The municipalities participating in the CRS program are Monroe Township, Penn Township, and Selinsgrove Borough. Selinsgrove Borough first entered the CRS program on 10/01/2007 and currently maintains a Class 7 rating. Monroe Township obtained a Class 8 rating in October of 2023 and first entered the program on 10/01/2007. Penn Township first entered the program on 10/01/2007 and is currently a Class 8 rating. Additional research will be conducted on the CRS program and mitigation actions will be developed in support of the CRS.

To spread awareness as well as capture participation levels, all municipalities were instructed to complete an NFIP survey provided by the Federal Emergency Management Agency. In total, fifteen municipalities submitted an NFIP survey. These surveys can be found in Appendix C of this plan.

The following information outlines floodplain ordinances from jurisdictions in Snyder County that have not submitted NFIP surveys during this hazard mitigation planning process.

Additional National Flood Insurance Program and Floodplain Management Information:

Adams Township:

The floodplain management ordinance for Adams Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Beavertown Borough:

The floodplain management ordinance for Beavertown Borough was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Freeburg Borough:

The floodplain management ordinance for Freeburg Borough was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Spring Township:

The floodplain management ordinance for Spring Township is Ordinance Number 391. This floodplain ordinance was adopted in 2012 and is the most up to date ordinance for the township. There is significant discussion on floodplain ordinances in Section 3.03 identifying information on the development and building of construction near the floodplain. Also discussed in that section are items related to substantially damaged and substantially improved structures. Section 3.04 discusses specific information on design and construction standards. Section 4.02 outlines restrictions for structures located and constructed in floodplain. Local commitments and requirements of the National Flood Insurance Program will be managed by a municipal flood plain manager, a flood plain management coordinator, or the designee for the township. Specific information on more items for Spring Township can be found with the Snyder County Planning Commission.

Union Township:

The floodplain management ordinance for Union Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

5.2.2. Administrative and Technical Capability

There are six boroughs and fifteen townships within Snyder County. Each of these municipalities conducts it daily operations and provides various community services according to local needs and limitations. Some of these municipalities have formed cooperative agreements and work jointly with their neighboring municipalities to provide services such as police protection, fire and emergency response, infrastructure maintenance, and water supply management. Other municipalities choose to operate independently and provide such services internally. Municipalities vary in staff size, resource availability, fiscal status, service provision, constituent population, overall size, and vulnerability to the profile hazards. Technical capability relates to an adequacy of knowledge and technical expertise of local government employees or the ability to contract resources for this expertise in order to effectively execute mitigation activities. Common examples of skill sets, and technical personnel needed for hazard mitigation include: planners with knowledge of land development and management practices, engineers or professionals trained in construction practices related to buildings and/or infrastructure (e.g. building inspectors), planners or engineers with an understanding of natural and/or human caused hazards, emergency managers, floodplain managers, land surveyors, scientists familiar with hazards in the community, staff with education of 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.

County Planning Commission

In Pennsylvania, planning responsibilities traditionally have been delegated to each county and local municipality through the Municipalities Planning Code (MPC). A planning agency acts as an advisor to the governing body on matters of community growth and development. A governing body may appoint individuals to serve as legal or 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 what form an agency will possess. A governing body can create a planning commission, a planning department, or both. The Snyder County Planning Commission assists all municipalities in the county as needed.

Municipal Engineer

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 prepares plans, specifications and estimates of the work undertaken by the township. Most municipalities in Snyder County have a municipal engineer under contract to perform these duties.

Personnel Skilled in GIS or FEMA HAZUS Software

A geographic information system (GIS) is an integrated, computer-based system designed to capture, store, edit, analyze, and display geographic information. Some examples of uses for GIS technology in local government are land records management, land use planning, infrastructure management, and natural resources planning. A GIS automates existing operations such as map production and maintenance, saving a great deal of time and money. The GIS also includes information about map features such as the capacity of a municipal water supply or the acres of public land. GIS data is managed, maintained, and developed for Snyder County by Union County's GIS Department, which is available to assist all the county's municipalities. GIS data is an important tool to use in hazard mitigation planning and is instrumental in assessing the risk of municipalities to various hazards.

Emergency Management Coordinator

Emergency management is a comprehensive, integrated program of mitigation, preparedness, response, and recovery for emergencies/disasters of any kind. No public or private entity is immune to disasters and no single segment of society can meet the complex needs of a major emergency or disaster on its own. Hence, the National Preparedness Goal of 2011 also defines what it means for the whole community to be prepared for all types of disasters and emergencies and lists five mission areas which support preparedness: prevention, protection, mitigation, response, and recovery – doubling the emphasis on mitigation activities in an emergency management program.

The Pennsylvania Emergency Management Services Code (PA Title 35) requires Snyder County and its municipalities to have an emergency management coordinator.

The Snyder County Emergency Management Agency coordinates countywide emergency management efforts. Each municipality has a designated local emergency management coordinator who possesses a unique knowledge of the impact hazardous events have on their community.

A municipal emergency management coordinator is responsible for emergency management – preparedness, response, recovery, and mitigation within his/her respective authority having jurisdiction (AHJ). The responsibilities of the emergency management coordinator are outlined in PA Title 35 §7633.

- Prepare and maintain a current disaster emergency management plan
- Establish, equip, and staff an emergency operations center
- 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 agency or by the federal government

PA Title 35 requires that all municipalities in the Commonwealth have a local emergency operations plan (EOP) which is updated every two years. All twenty-one of the Snyder County municipalities have adopted the county EOP. The notification and resource section of the plan was developed individually by each municipality.

Federal Agency Assistance

There are many federal agencies that can provide technical assistance for mitigation activities, and these include, but are not limited to:

- United States Army Corps of Engineers (USACE)
- Department of Housing and Urban Development (HUD)
- Department of Agriculture (DOA)
- Economic Development Administration
- Emergency Management Institute (EMI)

- Environmental Protection Agency (EPA)
- Federal Emergency Management Agency (FEMA)
- Small Business Administration (SBA)

State Agency Assistance

There are many commonwealth agencies that can provide technical assistance for mitigation activities, and these include but are not limited to:

- Pennsylvania Emergency Management Agency (PEMA)
- Pennsylvania Department of Community and Economic Development
- Pennsylvania Department of Conservation and Natural Resources
- Pennsylvania Department of Environmental Protection

Existing Limitations

Funding has been identified as the largest limitation for a municipality to complete mitigation activities. The acquisition of grants is the best way to augment this process the municipalities. The county and municipality representatives will need to rely on regional, state, and federal partnerships for future financial assistance. Development of intra-county regional partnerships and intra-municipality regional partnerships will bolster this process.

5.2.3. Financial Capability

Fiscal capability is significant to the implementation of hazard mitigation activities. Every jurisdiction must operate within the constraints of limited financial resources. The decision and capacity to implement mitigation-related activities is often strongly dependent on the presence of 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 take advantage of state or federal mitigation grant funding opportunities that require local-match contributions. The following information pertains to various financial assistance programs relevant to hazard mitigation.

State and Federal Grants

During the 1960s and 1970s state and federal grants-in-aid were available to finance many municipal programs, including streets, water and sewer facilities, airports, parks, and playgrounds. During the early 1980s, there was a significant change in federal policy, based on rising deficits and a political philosophy that encouraged states and local governments to raise their own revenues for capital programs. The result has been a growing interest in "creative financing".

Grant programs that may be utilized to accomplish hazard mitigation objectives include the: Pennsylvania Department of Community and Economic Development Community Development Block Grant (CDBG); Land Use Planning and Technical Assistance (LUPTAP); Shared Municipal Services (SMS); Community Revitalization (CR) and Floodplain Land Use Assistance Programs; the PA DEP's Growing Greener; Act 167 Stormwater Management; Source Water Protection; and Flood Protection Programs. The Flood Protection Programs include the PA DCNR's Community Conservation Partnership Program, PEMA's Pre-Disaster Mitigation (PDM) Grant, Flood Mitigation Assistance Grant Programs (FMA), and Hazard Mitigation Grant Program.

Below are some of the other state programs that may provide financial support for mitigation activities:

- DCED Flood Mitigation Program
- DCED H2O PA Flood Control Projects
- DCED H2O PA High Hazard Unsafe Dam Projects
- DCED H2O PA Water Supply, Sanitary Sewer and Storm Water Projects
- DCED PA Small Water and Sewer
- DCNR Community Conservation Partnerships Program
- DCNR Pennsylvania Heritage Areas Program
- DCNR Pennsylvania Recreational Trails Program
- DCNR Land and Water Conservation Fund

Below are some of the federal programs that may provide financial support for mitigation activities:

- FEMA Community Assistance Program – State Support Services Element (CAP-SSSE)
- FEMA Community Disaster Loan Program
- FEMA Community Rating System
- FEMA Emergency Management Performance Grants (EMPG)
- FEMA Environmental Planning and Historic Preservation Program (EHP)
- FEMA Flood Mitigation Assistance Program
- FEMA Hazard Mitigation Grant Program (HMGP)
- FEMA Individuals and Households Program (IHAP)

- FEMA National Dam Safety Program
- FEMA National Flood Insurance Program
- FEMA Pre-Disaster Mitigation Program
- FEMA Public Assistance Program (PA)
- FEMA Regional Catastrophic Preparedness Grant Program
- FEMA Repetitive Flood Claims Program (RFC)
- FEMA Severe Repetitive Loss Grant Program
- USACE Continuing Authorities Program
- USACE Flood Plain Management Services Program (FPMS)
- USACE Inspection of Completed Works Program (ICW)
- USACE National Levee Safety Program
- USACE Planning Assistance to States
- USACE Rehabilitation and Inspection Program (RIP)

Capital Improvement Financing

Because most of the capital investments involve the outlay of substantial funds, local governments can seldom pay for these facilities through annual appropriations in the annual operating budget. Therefore, numerous techniques have evolved to enable local government to pay for capital improvements over a time period exceeding one year. Public finance literature and state laws governing local government finance classify techniques that are used to finance capital improvements. The techniques include revenue bonds, lease-purchase, authorities and special district, current revenue (pay-as-you-go); reserve funds; and tax increment financing. Most municipalities have very limited local tax funds for capital projects. Grants and other funding are always priorities.

Indebtedness through General Obligation Bonds

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

Municipal Authorities

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

Sewer Authorities

Sewer authorities include multi-purpose authorities with sewer projects. They sell bonds to finance acquisition of existing systems for construction, extension, or system improvement. 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 by 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.

Water Authorities

Water authorities are multi-purpose 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 one of the principal activities of the local government facilities' financing authorities. An operating water authority issues bonds to purchase existing facilities to construct, extend, or improve a system. The primary source of revenue is user fees based on metered usage. The cost of construction 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 also directly operated by municipal governments and by privately owned public utilities regulated by the Pennsylvania Public Utility Commission. The Pennsylvania Department of Environmental Protection has a program to assist with consolidating small water systems to make system upgrades more cost effective.

U.S. Department of Agriculture Circuit Riding Program (Engineer)

The Circuit Riding Program is an example of intergovernmental cooperation. This program offers municipalities the ability to join to accomplish a common goal. The circuit rider is a municipal engineer who serves several small municipalities simultaneously. These are municipalities that may be too small to hire a professional engineer for their own operations yet need the skills and expertise the engineer offers. Municipalities can jointly obtain what no one municipality could obtain on its own.

5.2.4. Education and Outreach

The Snyder County Emergency Management Agency conducts public outreach at public events to update the citizens and visitors of the county on natural and human-caused hazards. The county conservation district also conducts outreach on various activities and projects in the county.

Education activities that directly impact hazard mitigation in Snyder County predominantly revolve around the first responders. Providing fire, medical, search and rescue training, and education enhances the response and recovery capabilities of response agencies in the county. Newly appointed emergency management coordinators are trained in both duties and responsibilities and damage assessment – which includes a discussion on mitigation; this training can be translated into teaching municipal employees or local emergency services to assist them during a disaster.

The county also has several websites and social media accounts that can educate residents about hazard mitigation and risk while also communicating information in the event of a disaster:

Snyder County EMA: https://www.snydercounty.org/departments/emergency-management/

Snyder County EMA Facebook: https://www.facebook.com/p/Snyder-County-Emergency-Management-Agency-100069400170632/

The websites of the Snyder County Emergency Management Agency and the Snyder County Planning Commission also post information to educate residents, particularly in disaster preparedness, floodplain management, and zoning requirements. The Snyder County Planning Commission currently provides access to planning documents and educational brochures about the benefits of planning and helpful guides. The DES also holds quarterly Local Emergency Planning Committee (LEPC) meetings that are open to the public, which serve as another means to conduct outreach and educate the public about hazard mitigation.

Education and outreach on the NFIP are necessary. With new regulations in flood-plain management, updated digital flood insurance rate maps and new rates for insurance policies, education, and outreach on the NFIP would assist the program. The Snyder County Local Planning Team will identify actions necessary to complete this.

5.2.5. Plan Integration

Plan integration recognizes that hazard mitigation is most effective when it works in efficient coordination with other plans, regulations, and programs. Plan integration promotes safe, resilient growth, effective management, an overall reduction of risk, by ensuring that the goals and actions established in the Hazard Mitigation Plan are included in the comprehensive planning efforts so they can affect future land use and development. Some of the most important areas of planning and regulatory capabilities which hazard mitigation goals and actions should be integrated include comprehensive plans, the hazard mitigation plans from all surrounding or encompassing areas, EOPs, building codes, floodplain ordinances, subdivision, land development ordinances, stormwater management plans and ordinances, and zoning ordinances. All of these tools provide mechanisms for the implementation of adopted mitigation strategies.

Snyder County Comprehensive Plan

Overview

Comprehensive plans establish the overall vision, goals, and objectives for a community's growth. The Snyder County in the 21st Century a Strategic Comprehensive Plan was adopted by the Snyder County Commissioners on March 29, 2001. The plan is a collaborative effort between communities and populations in Snyder County and contains both regional priorities and actions for each community in the county. The plan establishes countywide goals and objectives, describes environmental and demographic characteristics, identifies potential capital improvement projects, and inventories existing planning initiatives and tools in the county.

As part of the update process, the goals and objectives in the 2001 Comprehensive Plan were reviewed, and those that are currently supportive of hazard mitigation goals and principles were identified. The plan also identified opportunities to integrate goals and objectives from the 2019 Hazard Mitigation Plan and 2025 HMP Update into the next update of the comprehensive plan.

Recommendations for Continued and Future Integration

As discussed, many of the goals and objectives outlined in the Snyder County Comprehensive Plan are related to the hazard mitigation risks and goals established in the HMP. Several could be revised to include updated information from this HMP. Additionally, the comprehensive plan can identify the places of higher vulnerability that are identified in this plan for all the high-risk hazards, and include objectives aimed at reducing the risk to these vulnerable areas. For example, an objective of the comprehensive plan could be to encourage elevation and flood proofing of structures in the Special Flood Hazard Area (SFHA) by seeking Flood Mitigation Assistance (FMA) grants and strictly enforcing floodplain management ordinances in certain communities (See Section 4.3.3 for Flooding and Flash Flooding information). Similarly, an objective for communities that are most vulnerable to subsidence and land failure could be to educate property owners about mine subsidence, associated risks, and actions to take in the event of an emergency. These types of objectives could also be created for medium-risk hazards when appropriate.

Another key opportunity for further integration of hazard mitigation into planning and regulatory tools is to incorporate hazard mitigation goals and objectives into the future Snyder County Comprehensive Plan update. The Snyder County Comprehensive Plan also ties into the Snyder County Hazard Mitigation Plan when mitigation strategy is considered. The mitigation principles outlined in this hazard mitigation plan are used and reviewed in long-range planning throughout Snyder County.

Integration of Hazard Mitigation into Local Mechanisms

Integration of hazard mitigation principles into local mechanisms can be efficient for Snyder County. With twenty-one municipalities, local mitigation mechanisms can directly interface with the Snyder County HMP. These potential integration items include municipal comprehensive plans, municipal flood plans, or development plans for transportation and community resources. The municipalities should review the completed HMP and utilize items identified in the risk assessment, mitigation strategy, and capability assessment sections. Previously, hazard mitigation information from the Snyder County plans has been integrated into other planning mechanisms. All municipalities can also utilize portions of the hazard mitigation plan into their planning mechanisms, but this can be completed under the authority of Snyder County. These planning mechanisms could include comprehensive plans, flood plans, or development plans for transportation. Previous successful mitigation and plan integration has occurred in the development of comprehensive plans at the local level and this information and integration should continue through the formal update process of all plans in Snyder County.

Further discussion on plan integration can be found in section 7.3 of this hazard mitigation plan.

6. Mitigation Strategy

6.1. Update Process Summary

Mitigation goals are general guidelines that explain what the county wants to achieve. Goals are usually expressed as broad policy statements representing desired long-term results. Mitigation objectives describe strategies or implementation steps to attain the identified goals. Objectives are more specific statements than goals; the described steps are usually measurable and can have a defined completion date. There were five goals, and seventeen objectives identified in the 2019 hazard mitigation plan. The 2025 Snyder County Hazard Mitigation Plan Update has five goals and twenty-one objectives. Objectives have been added and arranged in order to associate them with the most appropriate goal. These changes are noted in *Table 82 – 2019 Mitigation Goals and Objectives Review*. These reviews are based on the five-year hazard mitigation plan review worksheet, which includes a survey on existing goals and objectives completed by the local planning team. Municipal officials then provided feedback on the changes to the goals and objectives via a mitigation strategy update meeting. Copies of these meetings and all documentation associated with the meetings are located in Appendix C.

Actions provide more detailed descriptions of specific work tasks to help the county, and its municipalities achieve prescribed goals and objectives. There were twenty-two actions identified in the 2019 mitigation strategy. A review of the 2019 mitigation actions was completed by the local planning team. The results of this review are identified in *Table 83 – 2019 Mitigation Actions Review*. Actions were evaluated by the local planning team with the intent of carrying over any actions that were not started or continuous for the next five years.

Table 82 - 2019 Mitigation Goals and Objectives Review

Snyder County 2019 Mitigation Goals and Objectives		
Goal/Objective	**Description**	**Comment**
Goal 1	**Strengthen County and local capabilities to reduce the potential impacts of flooding on existing and future public/private assets, including structures, critical facilities, and infrastructure.**	2025 Review: "…including structures, critical facilities, and community lifelines."
Objective A	Protect existing structures from damage that can be caused by hazards.	2025 Review: "…caused by all hazards."

Snyder County 2019 Mitigation Goals and Objectives		
Goal/Objective	**Description**	**Comment**
Objective B	Promote management and regulatory procedures that would reduce the impacts of hazards on public and private property.	2025 Review: Review with Derick. "…impacts of flooding hazards on public and private property."
Objective C	Develop local structural projects to reduce the impacts of natural and human-caused hazards on public and private property.	2025 Review: "Review, examine, and develop local projects to reduce the impacts of flooding hazards on public and private property."
Objective D	Maintain streams and culverts to reduce backup and flooding.	2025 Review: No major update.
Objective E	Protect critical facilities from the impacts of natural and human-caused hazards.	2025 Review: "Protect critical facilities and community lifelines from the impacts of flooding hazards."
Goal 2	**Increase intergovernmental cooperation and build public-private partnerships to implement activities that will reduce the impacts of natural, human-made, and technological hazards.**	2025 Review: "…all hazards." Add conservation as objectives.
Objective A	Develop regulations limiting development in hazard-prone areas.	2025 Review: No major update.
Objective B	Lessen impacts on natural resources and open space from natural and human-caused hazards.	2025 Review: Review with county conservation.
Objective C	Direct new growth away from hazard-prone areas.	2025 Review: Combining this objective with Objective A
New Objective	Lessen impacts on community lifelines, county critical facilities, and the populations of Snyder County from all hazards.	2025 Review: N/A
New Objective	Continue collaboration with county agencies and departments on hazard mitigation projects and efforts, including relevant plan updates and maintenance.	2025 Review: N/A

Snyder County 2019 Mitigation Goals and Objectives		
Goal/Objective	**Description**	**Comment**
Goal 3	**Enhance planning and emergency response efforts among state, county, and local emergency management personnel to protect public health and safety.**	2025 Review: "…efforts among local, county, and state emergency management personnel…"
Objective A	Improve coordination and communication between departments.	2025 Review: "Improve coordination and communication between the Snyder County emergency service departments."
Objective B	Ensure adequate training and resources for those involved in emergency response, services, relief, or hazard mitigation.	2025 Review: Review with Derick. Rewrite this objective and possibly tie in increased coordination between Snyder County and local EMC's.
Objective C	Ensure adequacy of equipment and technology.	2025 Review: Review for action based consistency.
Objective D	Ensure that residents receive relief and are evacuated as quickly as possible in the event of a disaster.	2025 Review: "Assist / coordinate in disaster."
Goal 4	**Continue to build Snyder County's spatial informational resources to strengthen public and private hazard mitigation planning and decision-support capabilities.**	2025 Review: Review and potentially move this goal and all objectives as other objectives and actions. New Objective 2.4: "Continue to coordinate with Union County for maintaining and updating Snyder County's GIS data for everyday operations and hazard mitigation planning."
Objective A	Develop data management policies to ensure adequate data management.	2025 Review: Action 2.4.1 "Review data policies in place between Union County and Snyder County to ensure adequate data management."

Snyder County 2019 Mitigation Goals and Objectives		
Goal/Objective	**Description**	**Comment**
Objective B	Develop and update detailed databases related to hazards and hazard mitigation.	2025 Review: Action 2.4.2 "Integrate GIS data in hazard mitigation planning, including developing detailed databases in conjunction with Union County."
Goal 5	**Increase public awareness on both the potential impacts of natural hazards and activities to reduce those hazards.**	2025 Review: "Increase the public awareness of all hazards, including the potential impacts and activities to reduce those impacts."
Objective A	Develop public education and outreach programs on hazards and hazard mitigation.	2025 Review: Review with Derick. County is involved in increased insurance discussions.
Objective B	Educate property owners in hazard-risk areas regarding their risks and the precautions they can take.	2025 Review: No major update.
Objective C	Encourage property owners in the 1 percent annual chance floodplain to purchase flood insurance.	2025 Review: "…special flood hazard area (1% annual chance floodplain)…"

Table 83 - 2019 Mitigation Actions Review

Snyder County Mitigation Actions Review Worksheet						
Existing Mitigation Actions *(2019 HMP)*	***Status***					***Review Comments***
	No Progress/ Unknown	**In Progress/Not Yet Complete**	**Continuous**	**Completed**	**Discontinued**	
1. Create and maintain a web-based inventory of the county's access and functional needs population to strengthen emergency response and evacuation operations.	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP
2. Strengthen the county's domestic animal health surveillance by familiarizing the Snyder County agricultural community with the list of reportable diseases and conditions related to animal health per the OIE and the Pennsylvania Domestic Animal Act (Act 100 of 1996).	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP
3. Develop and maintain a GIS dataset of all municipal TCPs and ACPs for evacuation route planning.	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP
4. Continue to participate in the Wyoming Valley Levee Raising project through Luzerne County and the USACE.	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP

Snyder County Mitigation Actions Review Worksheet						
Existing Mitigation Actions *(2019 HMP)*	***Status***					***Review Comments***
	No Progress/ Unknown	**In Progress/Not Yet Complete**	**Continuous**	**Completed**	**Discontinued**	
5. Continue to work with the county's agricultural community to develop and implement the County Animal Response Team (CART) to strengthen the County's comprehensive emergency management program.	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP
6. Integrate the five-year maintenance cycle of the HMP with both the 10-year and biennial review and maintenance cycles of the County Comprehensive Plan and County Regional Emergency Operations Plan, respectively (see Section 7 on the Plan Maintenance Process).	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP
7. Ensure county and municipal subdivision and land development ordinances are consistent with Chapter 102 Erosion and Sedimentation Control requirements.	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP

Snyder County Mitigation Actions Review Worksheet						
Existing Mitigation Actions *(2019 HMP)*	***Status***					***Review Comments***
	No Progress/ Unknown	**In Progress/Not Yet Complete**	**Continuous**	**Completed**	**Discontinued**	
8. Develop a countywide greenway plan as an integral part of the County Comprehensive Plan update to manage development and its encroachment on floodplains, and impact on riparian buffers and stream corridors.	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP
9. Consider adopting a countywide post-disaster recovery and reconstruction ordinance using the model ordinance included in the APA/FEMA PAS Report No. 483/484.	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP
10. Maintain a countywide capital improvements plan to program, schedule, prioritize, and budget both county and municipal capital improvements.	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP
11. Encourage the County's National Flood Program communities to participate in the NFIP CRS and attain discount opportunities on flood insurance premiums.	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP

Snyder County Mitigation Actions Review Worksheet						
Existing Mitigation Actions *(2019 HMP)*	***Status***					***Review Comments***
	No Progress/ Unknown	**In Progress/Not Yet Complete**	**Continuous**	**Completed**	**Discontinued**	
12. Maintain the County's Hazard Mitigation Planning GIS datasets and disseminate the information to municipalities through ESRI's free ArcGIS Explorer software.	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP
13. Collaborate with the PA DEP Bureau of Radiation Protection to ensure the state's Radon Awareness Campaign and public service announcements are disseminated throughout Snyder County.	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP
14. Maintain and disseminate a list of PA DEP-certified radon testers, mitigators, and laboratories (current lists are available through PA DEP at http://www.dep.state.pa.us/dep/deputate/airwa ste/rp/Radon_Division/Radon_Homepage.htm).	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP

Snyder County Mitigation Actions Review Worksheet						
Existing Mitigation Actions *(2019 HMP)*	*Status*					*Review Comments*
	No Progress/ Unknown	**In Progress/Not Yet Complete**	**Continuous**	**Completed**	**Discontinued**	
15. Incorporate the County's Flood Warning and Response System (FWRS) Procedures into ESF #2 (Communications and Warning) of the County's Regional EOP.	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP
20. Increase awareness of extreme temperature risk and safety.	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP
23. PTO generator to be used at the township shed (evacuation center) and as needed elsewhere in the county during emergencies. 27,500 Watt generator - trailer and driveshaft.	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP
42. The hazard mitigation plan may consider this an evacuation route during a disaster. Some part of the trail would follow existing power line easements, which would also provide better access and protection for these facilities.	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP

Snyder County Mitigation Actions Review Worksheet						
Existing Mitigation Actions *(2019 HMP)*	***Status***					***Review Comments***
	No Progress/ Unknown	**In Progress/Not Yet Complete**	**Continuous**	**Completed**	**Discontinued**	
43. Cleaning out creek from bridge culvert west to West Perry Township line, also possibly lining the Mahantango Creek with large quarry rock or Rip Rap. (Perry Township)	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP
52. Elevate, Acquire, and demolish homes within the floodplain that are subject to flooding.	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP
62. To provide a tone alert radio receiver system as part of the county emergency notification system for natural and human-made disasters of flooding. To warn all residents of potential or actual occurrences of flooding.	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP
66. Install in the Snyder County 9-1-1 Center an automatic call system to alert of flood event, using existing telephone lines. (Penn Township)	**X**					**2025 Comment:** No update provided. **Note:** All actions were combined with projects in the 2019 HMP
Notes: Numbers for actions match the 2019 combined project and actions table. Numbers that are not on this table correspond to projects and those numbers can be found in the project review table.						

6.2. Mitigation Goals and Objectives

Based on results of the goals and objectives evaluation exercise and input from the local planning team, a list of five goals and twenty-one corresponding objectives were developed. *Table 84 – 2025 Goals and Objectives* details the mitigation goals and objectives established for the 2025 Snyder County Hazard Mitigation Plan.

Table 84 - 2025 Goals and Objectives

Snyder County 2025 Goals and Objective	
Goal/Objective	**Description**
Goal 1	**Strengthen local and county capabilities to reduce the potential impacts of flooding on existing and future public/private assets, including structures, critical facilities, and community lifelines.**
Objective 1.1	Protect existing structures from damage that can be caused by flooding hazards.
Objective 1.2	Promote management and regulatory procedures that would reduce the impacts of flooding hazards on public and private property.
Objective 1.3	Review, examine, and develop local projects to reduce the impacts of flooding hazards on public and private property.
Objective 1.4	Maintain streams and culverts to reduce backup and flooding.
Objective 1.5	Protect critical facilities and community lifelines from the impacts of flooding hazards.
Goal 2	**Increase intergovernmental cooperation and build public/private partnerships to implement activities that will reduce the impacts of all hazards.**
Objective 2.1	Develop regulations limiting development in hazard-prone areas and direct new growth away from those areas.
Objective 2.2	Lessen impacts on natural resources and open space from natural and human-caused hazards.
Objective 2.3	Lessen impacts on community lifelines, municipal/county critical facilities, and the populations of Snyder County from all hazards.
Objective 2.4	Continue collaboration with county agencies and departments on hazard mitigation projects and efforts, including relevant plan updates and maintenance.

Snyder County 2025 Goals and Objective	
Goal/Objective	**Description**
Objective 2.5	Continue close collaboration with the Snyder County Conservation District to identify, implement, and complete environmental projects.
Objective 2.6	Continue to coordinate with Union County for maintaining and updating Snyder County's GIS data for everyday operations and hazard mitigation planning.
Goal 3	**Enhance planning and emergency response efforts among local, county, and state emergency services personnel to protect public health and safety.**
Objective 3.1	Improve coordination and communication between the Snyder County emergency service departments and agencies.
Objective 3.2	Encourage and enhance the coordination between Snyder County and the local emergency management coordinators through direct outreach and methods.
Objective 3.3	Ensure adequacy of equipment and technology.
Objective 3.4	Assist and coordinate response in the event of a disaster, including the release of relief and the evacuation procedures.
Goal 4	**Increase the public awareness of all hazards, including the potential impacts and activities to reduce those vulnerabilities.**
Objective 4.1	Develop public education and outreach programs on hazards and hazard mitigation.
Objective 4.2	Educate the property owners in hazard-risk areas regarding their risks and the precautions that can be taken.
Objective 4.3	Encourage property owners in the special flood hazard area (1% annual chance floodplain) to purchase flood insurance or review their need for flood insurance.
Goal 5	**Participate in FEMA's High-Hazard Potential Dam Program (HHPD).**
Objective 5.1	Educate all stakeholders regarding FEMA's HHPD program.
Objective 5.2	Reduce the long-term vulnerabilities from eligible high-hazard potential dams that pose an unacceptable risk to the public.
Objective 5.3	Identify, by area, locations that could potentially be impacted by FEMA's HHPD program.

Goal 5 and Objective 5.1, 5.2, and 5.3 relate to multiple mitigation actions in *Table 86 – 2025 Mitigation Action Plan*. Objective 5.1 relates to any mitigation actions that have a prefix of 5.1. Objective 5.2 relates to any mitigation actions that have a prefix of 5.2. Finally, Objective 5.3 relates to any mitigation actions that have a prefix of 5.3. All three of the mitigation actions are covered by Goal 5 of the goals and objectives for the 2025 Hazard Mitigation Plan. These mitigations reduce the vulnerability of county populations and structures by educating the public on the HHPD program, enhancing local policies and procedures for HHPD planning, and digitizing dam inundation areas for future analysis and prevention of losses.

6.3. Identification and Analysis of Mitigation Techniques

This section includes an overview of alternative mitigation actions based on the goals and objectives identified in Section 6.2. There are four general mitigation strategy techniques to reducing hazard risks.

- Planning and regulations
- Structure and infrastructure
- Natural systems protection
- Education and awareness

Planning and Regulations: These actions include government authorities, policies or codes that influence the way land and buildings are developed and built. The following are some examples.

- Comprehensive plans
- Land use ordinances
- Subdivision regulations
- Development review
- Building codes and enforcement
- National Flood Insurance Program and Community Rating System
- Capital improvement programs
- Open space preservation
- Stormwater management regulations and master plans

The planning and regulations technique will protect and reduce the impact of specific hazards on new and existing buildings by improving building code standards and regulating new and renovation construction. The improved building codes will decrease the impact of risk hazards. Subdivision and land development enhancements will also augment this process. Ensuring that municipalities participate in the National Flood Insurance Program and encourage participation in the Community Rating System will decrease the impact as well.

Structure and infrastructure implementation: These actions involve modifying existing structures and infrastructure or constructing new structures to reduce hazard vulnerability. The following are examples:

- Acquisitions and elevations of structures in flood prone areas
- Utility undergrounding
- Structural retrofits
- Floodwalls and retaining walls
- Detention and retention structures
- Culverts
- Safe rooms

Structure and infrastructure implementation is a technique that removes or diverts the hazard from structure or protects the structure from a specific hazard. The new or renovated structures are therefore protected or have a reduced impact of hazards.

Natural Systems Protection: These are actions that minimize damage and losses and also preserve or restore the functions of natural systems. They include the following:

- Erosion and sediment control
- Stream corridor restoration
- Forest management
- Conservation easements
- Wetland restoration and preservation

Natural resource protection techniques allow for the natural resource to be used to protect or lessen the impact on new or renovated structures through the management of these resources. Utilization and implementation of the examples above will protect new and existing buildings and infrastructure.

Education and Awareness: These are actions to inform and educate citizens, elected officials and property owners about hazards and potential ways to mitigate them and may also include participation in national programs. Examples of these techniques include the following.

- Radio and television spots
- Websites with maps and information
- Real estate disclosure
- Provide information and training
- NFIP outreach

- StormReady
- Firewise communities

The education and awareness technique will protect and reduce the impact of specific hazards on new and existing buildings through education of citizens and property owners on the impacts that specific hazards could have on new or renovated structures. This information will allow the owner to make appropriate changes or enhancements that will lessen or eliminate the impacts of hazards.

Table 85 – Mitigation Strategy Technique Matrix provides a matrix identifying the mitigation techniques used for all low, moderate, and high-risk hazards in the county. The specific actions associated with these techniques are included in *Table 86 – 2025 Mitigation Action Plan*.

Table 85 - Mitigation Strategy Technique Matrix

Snyder County Mitigation Strategy Technique Matrix				
Hazard	MITIGATION TECHNIQUE			
	Planning and Regulations	Structure and Infrastructure	Natural Systems Protection	Education and Awareness
Drought	X	X	X	
Earthquake	X	X	X	
Extreme Temperature	X	X	X	X
Flood, Flash Flood, and Ice Jam Flood	X	X	X	X
Hurricane and Tropical Storms	X	X	X	
Invasive Species	X	X	X	
Landslides	X	X	X	
Pandemic, Epidemic, Endemic, and Infectious Disease	X	X	X	X
Radon Exposure	X	X	X	X
Subsidence and Sinkhole	X	X	X	
Tornado and Windstorm	X	X	X	
Wildfire	X	X	X	
Winter Storms	X	X	X	
Blighted Properties	X	X		
Dam Failure	X	X	X	X
Emergency Services Shortage	X	X		
Environmental Hazards	X	X		
Substance Use Disorder	X	X		
Terrorism and Cyberterrorism	X	X		
Transportation Accidents	X	X		

Snyder County Mitigation Strategy Technique Matrix				
Hazard	MITIGATION TECHNIQUE			
	Planning and Regulations	Structure and Infrastructure	Natural Systems Protection	Education and Awareness
Utility Interruptions	X	X		

6.4. Mitigation Action Plan

The Snyder County Hazard Mitigation Local Planning Team (LPT) immediately began work on the mitigation strategy section of the 2025 hazard mitigation plan (HMP) update after the risk assessment section was completed. The LPT started this section by reviewing the 2019 HMP mitigation strategy section. A review of the previous goals, objectives, actions, and project opportunities documented in the 2019 HMP was conducted. The next step the LPT completed was the brainstorming of possible new actions based on new identified risks. The LPT compiled all this information for presentations to the municipalities.

MCM Consulting Group, Inc. completed municipality meetings at various time periods via virtual platforms or in-person meetings. During all these meetings, an overview of mitigation strategy was presented, and the municipalities were informed that they needed to have at least one hazard-related mitigation action for their municipality. All municipalities were invited to attend these meetings. Municipalities that were not able to join conference calls were contacted individually.

The municipalities were notified of draft mitigation actions and encouraged to provide new mitigation actions that could be incorporated into the plan. Municipalities were provided copies of their previously submitted mitigation opportunity forms and asked to determine if the projects were still valid. Municipalities were solicited for new project opportunities as well. All agendas, sign in sheets, and other support information from these meetings is included in Appendix C.

Mitigation measures for the 2025 Snyder County HMP are listed in the mitigation action plan. *Table 86 – 2025 Mitigation Action Plan* is the 2025 Snyder County Mitigation Action Plan. This plan outlines mitigation actions and projects that comprise a strategy for Snyder County. The action plan includes actions, a benefit and cost prioritization, a schedule for implementation, any funding sources to complete the action, a responsible agency or department and an estimated cost. All benefit and cost analysis were completed using the Pennsylvania Emergency Management Agency recommended analysis tool. The completed analysis is located in Appendix H. *Table 86 – 2025 Mitigation Action Plan* is a matrix that identifies the county and/or municipalities responsible for mitigation actions in the new mitigation action plan. *Table 87 –*

Municipal Hazard Mitigation Actions Checklist shows which actions tie to specific municipalities for responsibilities. *Table 88 – Objective to Action Checklist* shows that each mitigation objective has a mitigation action item related to it. *Table 89 – Actions Tied to Hazards* illustrates the specific actions that are tied to each hazard outlined in the hazard mitigation plan.

Funding acronym definitions:

FMA:	Flood Mitigation Assistance Grant Program, administered by the Federal Emergency Management Agency
HMGP:	Hazard Mitigation Grant Program, administered by the Federal Emergency Management Agency
BRIC:	Building Resilient Infrastructure and Communities (BRIC) Program, administered by the Federal Emergency Management Agency
EMPG:	Emergency Management Performance Grant, administered by the Federal Emergency Management Agency
HSGP:	Homeland Security Grant Program, administered by the Federal Emergency Management Agency
HMEP:	Hazardous Material Emergency Planning Grant, administered by the Pennsylvania Emergency Management Agency
HMRF:	Hazardous Material Response Fund, administered by the Pennsylvania Emergency Management Agency
HMERP:	Hazard Mitigation Emergency Response Program administered by the Pennsylvania Emergency Management Agency
HHPD:	Rehabilitation of High-Hazard Potential Dams Grant Program, administered by the Federal Emergency Management Agency

Evaluate and Prioritize Mitigation Actions

Mitigation Action Evaluation:

Evaluating mitigation actions involves judging each action against certain criteria to determine whether or not it can be executed. The feasibility of each mitigation action is evaluated using the ten evaluation criteria set forth in the Mitigation Action Evaluation methodology as outlined in the Commonwealth of Pennsylvania’s All-Hazard Mitigation Planning, Standard Operating

Guide. The methodology solicits input on whether each action is highly effective or feasible and ineffective or not feasible for the criteria. These criteria are listed below and aid in determining the feasibility of implementing one action over another.

- Life Safety: Will the action be effective in promoting public safety?
- Property Protection: Will the action be effective in protecting public or private property?
- Technical: How effective will the action be in avoiding or reducing future losses?
- Political: Does the action have public and political support?
- Legal: Does the community have the authority to implement the proposed measure?
- Environmental: Will the action provide environmental benefits, and will it comply with local, state, and federal environmental regulations?
- Social: Will the action be acceptable by the community, or will it cause any one segment of the population to be treated unfairly?
- Administrative: Is there adequate staffing and funding available to implement the action in a timely manner?
- Local Champion: Is there local support for the action to help ensure its completion?
- Other Community Objectives: Does the action address any current or future community objectives either through municipal planning or community goals?

To evaluate the mitigation actions, each action is identified as highly effective or feasible, ineffective, or not favorable and no cost or benefit. For each criterion, the prioritization methodology assigns a "+" if the action is highly effective or feasible, a "-" if the action was ineffective or not feasible, and a "N" if no cost of benefit could be associated with the suggested action or the action was no applicable to the criteria.

Mitigation Action Prioritization:

Actions should be compared with one another to determine a ranking or priority by applying the multi-objective mitigation action prioritization criteria. Scores are 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.
- Address High Risk Hazard (weight: 15% of score): The action reduces vulnerability for people and property from a hazard identified as high risk.
- Address 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, and data circuits, etc.

Scores of 1, 2, or 3 are assigned for each multi-objective mitigation action prioritization criterion where 1 is a low score and 3 is a high score. Actions are prioritized using the cumulative score assigned to each. Each mitigation action is 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

The cumulative results of the prioritization of mitigation actions is identified in the mitigation action evaluation and prioritization tool. The results for the mitigation action evaluation and prioritization are located in Appendix H of this plan.

Table 86 - 2025 Mitigation Action Plan

Snyder County 2025 Mitigation Action Plan									
Action Number	**Mitigation Actions**		**Hazard Vulnerability**	**Prioritization**			**Implementation**		
	Category	**Description/ Action Items**		**High**	**Medium**	**Low**	**Schedule**	**Funding**	**Local Champion**
1.1.1	Planning and Regulations	Continue to participate in the Wyoming Valley Levee Raising project through Luzerne County and the United States Army Corps of Engineers (USACE).	Flooding		X		2025-2030	Local	Snyder County EMA

Snyder County 2025 Mitigation Action Plan									
Action Number	Mitigation Actions		Hazard Vulnerability	Prioritization			Implementation		
	Category	Description/ Action Items		High	Medium	Low	Schedule	Funding	Local Champion
1.2.1	Education and Awareness	Promote the natural functioning of floodplains and the regulatory procedures in place to protect them from development.	Flooding	X			2025-2030	Local	Snyder County Conservation District
1.3.1	Structure and Infrastructure	Purchase, elevate, acquire, relocate, demolish, or demolish/reconstruct homes within the floodplain or Special Flood Hazard Area that are subject to routine flooding or repetitive damage.	Flooding			X	2025-2030	FMA, BRIC, Local	Snyder County Munis.
1.4.1	Structure and Infrastructure	Regularly clean and maintain drainage culverts along roads that are of primary concern for flash flooding.	Flash Flooding	X			2025-2030	BRIC, Local	Snyder County Conservation District
1.4.2	Structure and Infrastructure	Map undersized or non-functioning culverts throughout the county.	Flash Flooding	X			2025-2030	BRIC, Local	Snyder County Conservation District Snyder County GIS
1.5.1	Structure and Infrastructure	Evaluate the need for relocation of culturally significant historic items, properties, or structures that can be moved out of areas of increased flood vulnerability.	Flooding			X	2025-2030	BRIC. Local	Snyder County EMA
2.1.1	Planning and Regulations	Enforce the municipal floodplain ordinance regulations in place at each local jurisdiction.	Flooding	X			2025-2030	FMA, Local	Snyder County Munis.

Snyder County 2025 Mitigation Action Plan									
Action Number	Mitigation Actions		Hazard Vulnerability	Prioritization			Implementation		
	Category	Description/ Action Items		High	Medium	Low	Schedule	Funding	Local Champion
2.2.1	Natural Systems Protection	Ensure county and municipal subdivision and land development ordinances are consistent with Chapter 102 Erosion and Sedimentation Control requirements.	All Natural Hazards		X		2025-2030	Local	Snyder County Conservation District
2.3.1	Planning and Regulations	Examine and research cybersecurity directives, best practices, and resources from the United States Department of Homeland Security's (US DHS) Cybersecurity & Infrastructure Security Agency (CISA) to lessen the impacts of a potential cybersecurity incident at the county or at critical infrastructure/community lifelines.	Cyberterrorism and Cybersecurity		X		2025-2030	Local	Snyder County Information Technology
2.3.2	Planning and Regulations	Implement any items for cybersecurity that are deemed applicable for the county critical infrastructure from the Department of Homeland Security's CISA recommendations.	Cyberterrorism and Cybersecurity	X			2025-2030	Local	Snyder County Information Technology
2.3.3	Planning and Regulations	Develop drought plans to address water usage and recommendations in times of low precipitation and drought declarations.	Drought			X	2025-2030	HMGP, Local	Snyder County Munis.

Snyder County 2025 Mitigation Action Plan									
	Mitigation Actions			Prioritization			Implementation		
Action Number	**Category**	**Description/ Action Items**	**Hazard Vulnerability**	**High**	**Medium**	**Low**	**Schedule**	**Funding**	**Local Champion**
2.3.4	Structure and Infrastructure	Review the maintenance status of all municipal buildings to ensure that they are earthquake resistant. If deficiencies are identified, evaluate ways to resolve those issues.	Earthquake			X	2025-2030	BRIC. Local	Snyder County Munis.
2.3.5	Structure and Infrastructure	Monitor slope movement in municipalities that are at high-risk of landside, including those municipalities with critical infrastructure or community lifelines within slope areas greater than 25°.	Landslide			X	2025-2030	Local	Snyder County Munis.
2.3.6	Planning and Regulations	Review the areas of social vulnerability in each municipality and determine where those areas of vulnerability directly overlap with high-risk radon areas.	Radon Exposure			X	2025-2030	Local	Snyder County Munis.
2.3.7	Structure and Infrastructure	Review areas of past subsidence events within each municipality for soil movement that could result in damage to emergency shelters, community lifelines, and areas of social vulnerability.	Subsidence and Sinkhole			X	2025-2030	Local	Snyder County Munis.
2.3.8	Structure and Infrastructure	Examine areas where dense vegetation interface with community lifelines and reduce those areas to prevent wildfire events close to those locations.	Wildfire			X	2025-2030	Local	Snyder County Munis.

Snyder County 2025 Mitigation Action Plan									
Action Number	Mitigation Actions		Hazard Vulnerability	Prioritization			Implementation		
	Category	Description/ Action Items		High	Medium	Low	Schedule	Funding	Local Champion
2.4.1	Planning and Regulations	Continue to work with Centre County's County Animal Response Team (CART) to strengthen the County's comprehensive emergency management program.	All Natural Hazards Transportation Accidents		X		2025-2030	Local	Snyder County EMA
2.4.2	Planning and Regulations	Integrate the five-year maintenance cycle of the HMP with both the 10-year and biennial review and maintenance cycles of the County Comprehensive Plan and County Regional Emergency Operations Plan, respectively.	All Hazards	X			2025-2030	Local	Snyder County EMA Snyder County Planning Snyder County LPT
2.4.3	Planning and Regulations	Develop a countywide greenway plan as an integral part of the County Comprehensive Plan update to manage development and its encroachment on floodplains, and impact on riparian buffers and stream corridors.	Fooding			X	2025-2030	Local	Snyder County Planning
2.4.4	Planning and Regulations	Maintain a countywide capital improvements plan to program, schedule, prioritize, and budget both county and municipal capital improvements.	All Hazards		X		2025-2030	Local	Snyder County EMA Snyder County Planning

Snyder County 2025 Mitigation Action Plan									
Action Number	Mitigation Actions		Hazard Vulnerability	Prioritization			Implementation		
	Category	Description/ Action Items		High	Medium	Low	Schedule	Funding	Local Champion
2.4.5	Planning and Regulations	Work with Snyder County and the regional department of health to review the current infectious disease statistics, including but not limited to positive Lyme Disease and West Nile Virus cases.	Pandemic, Epidemic, and Infectious Diseases			X	2025-2030	Local	Snyder County Munis.
2.5.1	Planning and Regulations	Identify and map natural projects and natural resources currently integrated into Snyder County Conservation District items.	All Natural Hazards		X		2025-2030	Local	Snyder County GIS (Union) Snyder County Conservation District
2.6.1	Planning and Regulations	Continue to communicate with Union County on the hazard mitigation GIS datasets and disseminate that information to other Snyder County departments.	All Hazards	X			2025-2030	Local	Snyder County EMA Snyder County Planning Snyder County GIS (Union)

Snyder County 2025 Mitigation Action Plan									
Action Number	Mitigation Actions		Hazard Vulnerability	Prioritization			Implementation		
	Category	Description/ Action Items		High	Medium	Low	Schedule	Funding	Local Champion
2.6.2	Planning and Regulations	Review data policies in place between Union County and Snyder County to ensure adequate data management.	All Hazards		X		2025-2030	Local	Snyder County EMA Snyder County Planning Snyder County GIS (Union)
2.6.3	Planning and Regulations	Integrate GIS data in hazard mitigation planning, including developing detailed databases in conjunction with Union County.	All Hazards		X		2025-2030	Local	Snyder County EMA Snyder County Planning Snyder County GIS (Union)
3.1.1	Planning and Regulations	Coordinate the needs of municipal emergency service departments with the Snyder County Emergency Management Agency.	All Hazards	X			2025-2030	Local	Snyder County EMA Snyder County Munis.
3.2.1	Planning and Regulations	Plan additional communication between the Snyder County Emergency Management Agency and the Snyder County municipalities for increased hazard mitigation discussions.	All Hazards		X		2025-2030	Local	Snyder County EMA Snyder County Munis.

Snyder County 2025 Mitigation Action Plan									
Action Number	Mitigation Actions		Hazard Vulnerability	Prioritization			Implementation		
	Category	Description/ Action Items		High	Medium	Low	Schedule	Funding	Local Champion
3.3.1	Planning and Regulations	Encourage municipalities to review all emergency response equipment to identify deficiencies and items needed to cover gaps.	All Hazards	X			2025-2030	Local	Snyder County EMA
3.3.2	Planning and Regulations	Work with Snyder County to resolve identified deficiencies in equipment and technology for emergency response and recovery.	All Hazards	X			2025-2030	Local	Snyder County Munis.
3.4.1	Planning and Regulations	Create and maintain a web-based inventory of the county's access and functional need population to strengthen emergency response operations.	All Hazards			X	2025-2030	Local	Snyder County EMA Snyder County Information Technology
3.4.2	Planning and Regulations	Develop and maintain a GIS dataset of all municipal traffic control points (TCPs) and access control points (ACPs) for evacuation route planning.	All Hazards		X		2025-2030	Local	Snyder County EMA Snyder County Planning
3.4.3	Planning and Regulations	Consider adopting a countywide post-disaster recovery and reconstruction ordinance using the model ordinance included in the APA/FEMA PAS Report No. 483/484.	All Hazards		X		2025-2030	Local	Snyder County EMA

Snyder County 2025 Mitigation Action Plan									
Action Number	Mitigation Actions		Hazard Vulnerability	Prioritization			Implementation		
	Category	Description/ Action Items		High	Medium	Low	Schedule	Funding	Local Champion
3.4.4	Planning and Regulations	Incorporate the county's Flood Warning and Response System (FWRS) Procedures into ESF #2 (Communications and Warning) of the county's Regional Emergency Operations Plan (EOP).	Flooding	X			2025-2030	FMA, Local	Snyder County EMA Snyder County Planning
3.4.5	Planning and Regulations	Review the trails and other travel features in the county for access to community lifelines during a hazard event.	All Hazards		X		2025-2030	Local	Snyder County GIS (Union) Snyder County EMA
3.4.6	Planning and Regulations	Review all snow emergency route signage in each municipality for evacuations and travel.	Winter Storm			X	2025-2030	HMGP, Local	Snyder County Munis.
4.1.1	Education and Awareness	Strengthen the county's domestic animal health surveillance by familiarizing the Snyder County agricultural community with the list of reportable diseases and conditions related to animal health per the OIE and the Pennsylvania Domestic Animal Act (Act 100 of 1996).	Animal/Agricultural Hazards Infectious Disease			X	2025-2030	Local	Snyder County Conservation District Snyder County Agricultural Communities
4.1.2	Education and Awareness	Collaborate with the PA DEP Bureau of Radiation Protection to ensure the state's Radon Awareness Campaign and public service announcements are disseminated throughout Snyder County.	Radon Exposure			X	2025-2030	Local	Snyder County EMA

Snyder County 2025 Mitigation Action Plan									
Action Number	Mitigation Actions		Hazard Vulnerability	Prioritization			Implementation		
	Category	Description/ Action Items		High	Medium	Low	Schedule	Funding	Local Champion
4.1.3	Education and Awareness	Maintain and disseminate a list of PA DEP-certified radon testers, mitigators, and laboratories (current lists are available through the Pennsylvania Department of Environmental Protection).	Radon Exposure			X	2025-2030	Local	Snyder County EMA Snyder County Conservation District
4.1.4	Education and Awareness	Increase awareness of extreme temperature risk and safety.	Extreme Temperatures		X		2025-2030	Local	Snyder County EMA
4.2.1	Education and Awareness	Encourage the county's National Flood Insurance Program (NFIP) communities to participate in the NFIP Community Rating System (CRS) and attain discount opportunities on flood insurance premiums.	Flooding		X		2025-2030	Local	Snyder County EMA Snyder County Munis.
4.3.1	Education and Awareness	Provide flood insurance information to all constituents in Snyder County and municipalities on the value of flood insurance through the NFIP.	Flooding		X		2025-2030	Local	Snyder County EMA Snyder County Munis.
5.1.1	Education and Awareness	Distribute educational pamphlets about the High-Hazard Potential Dam (HHPD) Program to municipalities and county residents.	Dam Failure			X	2025-2030	HHPD, Local	Snyder County EMA Snyder County GIS (Union)

Snyder County 2025 Mitigation Action Plan									
Action Number	Mitigation Actions		Hazard Vulnerability	Prioritization			Implementation		
	Category	Description/ Action Items		High	Medium	Low	Schedule	Funding	Local Champion
5.2.1	Education and Awareness	Provide education on local mitigation policies and programs that address high-hazard potential dams to county residents and municipalities.	Dam Failure		X		2025-2030	HHPD, Local	Snyder County EMA Snyder County GIS (Union)
5.2.2	Planning and Regulations	Ensure continued collaboration with both private and public dam owners to increase their input in the planning process and to increase cooperation for future plan developments.	Dam Failure	X			2025-2030	HHPD, Local	Snyder County EMA Snyder County LPT
5.2.3	Natural Systems Protection	Research the feasibility of installing flood protection measures in areas around Snyder County that would be adversely impacted by flooding from a high-hazard potential dam failure, including natural spaces, local parks, and outdoor areas.	Dam Failure			X	2025-2030	HHPD, Local	Snyder County EMA Snyder County Conservation District
5.2.4	Structure and Infrastructure	If funding becomes available, perform acquisitions, elevations, relocations, and foundation stabilization on homes and structures within areas of potential impact from a failure of a high-hazard potential dam in Snyder County.	Dam Failure			X	2025-2030	HHPD, Local	Snyder County EMA Snyder County Conservation District Snyder County LPT

Snyder County 2025 Mitigation Action Plan									
Action Number	Mitigation Actions		Hazard Vulnerability	Prioritization			Implementation		
	Category	Description/ Action Items		High	Medium	Low	Schedule	Funding	Local Champion
5.2.5	Planning and Regulations	Review or develop evacuation plans for the Snyder County high-hazard dams. If plans are already in place in emergency action plans, review those items.	Dam Failure	X			2025-2030	HHPD, Local	Snyder County EMA Snyder County LPT
5.3.1	Education and Awareness	Acquire digitized dam inundation GIS polygons to determine at risk populations for dams designated high-hazard potential dams.	Dam Failure	X			2025-2030	HHPD, Local	Snyder County EMA Snyder County GIS (Union)

Table 87 - Municipal Hazard Mitigation Actions Checklist

Municipal Hazard Mitigation Actions Checklist											
Municipality	**1.1.1**	**1.2.1**	**1.3.1**	**1.4.1**	**1.4.2**	**1.5.1**	**2.1.1**	**2.2.1**	**2.3.1**	**2.3.2**	**2.3.3**
Adams Township							X				X
Beaver Township							X				X
Beavertown Borough							X				X
Center Township							X				X
Chapman Township							X				X
Franklin Township							X				X
Freeburg Borough							X				X
Jackson Township							X				X
McClure Borough							X				X
Middleburg Borough							X				X
Middlecreek Township							X				X
Monroe Township							X				X
Penn Township							X				X
Perry Township							X				X
Selinsgrove Borough							X				X
Shamokin Dam Borough							X				X
Spring Township							X				X
Union Township							X				X
Washington Township							X				X
West Beaver Township							X				X
West Perry Township							X				X
Snyder County	X	X	X	X	X	X		X	X	X	

Municipal Hazard Mitigation Actions Checklist											
Municipality	**2.3.4**	**2.3.5**	**2.3.6**	**2.3.7**	**2.3.8**	**2.4.1**	**2.4.2**	**2.4.3**	**2.4.4**	**2.4.5**	**2.5.1**
Adams Township	X	X	X	X	X					X	
Beaver Township	X	X	X	X	X					X	
Beavertown Borough	X	X	X	X	X					X	
Center Township	X	X	X	X	X					X	
Chapman Township	X	X	X	X	X					X	
Franklin Township	X	X	X	X	X					X	
Freeburg Borough	X	X	X	X	X					X	
Jackson Township	X	X	X	X	X					X	
McClure Borough	X	X	X	X	X					X	
Middleburg Borough	X	X	X	X	X					X	
Middlecreek Township	X	X	X	X	X					X	
Monroe Township	X	X	X	X	X					X	
Penn Township	X	X	X	X	X					X	
Perry Township	X	X	X	X	X					X	
Selinsgrove Borough	X	X	X	X	X					X	
Shamokin Dam Borough	X	X	X	X	X					X	
Spring Township	X	X	X	X	X					X	
Union Township	X	X	X	X	X					X	

Municipal Hazard Mitigation Actions Checklist											
Municipality	**2.3.4**	**2.3.5**	**2.3.6**	**2.3.7**	**2.3.8**	**2.4.1**	**2.4.2**	**2.4.3**	**2.4.4**	**2.4.5**	**2.5.1**
Washington Township	X	X	X	X	X					X	
West Beaver Township	X	X	X	X	X					X	
West Perry Township	X	X	X	X	X					X	
Snyder County						X	X	X	X		X

Municipal Hazard Mitigation Actions Checklist											
Municipality	**2.6.1**	**2.6.2**	**2.6.3**	**3.1.1**	**3.2.1**	**3.3.1**	**3.3.2**	**3.4.1**	**3.4.2**	**3.4.3**	**3.4.4**
Adams Township				X	X		X				
Beaver Township				X	X		X				
Beavertown Borough				X	X		X				
Center Township				X	X		X				
Chapman Township				X	X		X				
Franklin Township				X	X		X				
Freeburg Borough				X	X		X				
Jackson Township				X	X		X				
McClure Borough				X	X		X				
Middleburg Borough				X	X		X				
Middlecreek Township				X	X		X				
Monroe Township				X	X		X				
Penn Township				X	X		X				
Perry Township				X	X		X				
Selinsgrove Borough				X	X		X				
Shamokin Dam Borough				X	X		X				
Spring Township				X	X		X				
Union Township				X	X		X				
Washington Township				X	X		X				
West Beaver Township				X	X		X				
West Perry Township				X	X		X				
Snyder County	X	X	X	X	X	X		X	X	X	X

Municipal Hazard Mitigation Actions Checklist											
Municipality	**3.4.5**	**3.4.6**	**4.1.1**	**4.1.2**	**4.1.3**	**4.1.4**	**4.2.1**	**4.3.1**	**5.1.1**	**5.2.1**	**5.2.2**
Adams Township		X					X	X			
Beaver Township		X					X	X			
Beavertown Borough		X					X	X			
Center Township		X					X	X			
Chapman Township		X					X	X			
Franklin Township		X					X	X			
Freeburg Borough		X					X	X			
Jackson Township		X					X	X			
McClure Borough		X					X	X			
Middleburg Borough		X					X	X			
Middlecreek Township		X					X	X			
Monroe Township		X					X	X			

Municipal Hazard Mitigation Actions Checklist											
Municipality	**3.4.5**	**3.4.6**	**4.1.1**	**4.1.2**	**4.1.3**	**4.1.4**	**4.2.1**	**4.3.1**	**5.1.1**	**5.2.1**	**5.2.2**
Penn Township		X					X	X			
Perry Township		X					X	X			
Selinsgrove Borough		X					X	X			
Shamokin Dam Borough		X					X	X			
Spring Township		X					X	X			
Union Township		X					X	X			
Washington Township		X					X	X			
West Beaver Township		X					X	X			
West Perry Township		X					X	X			
Snyder County	X		X	X	X	X	X	X	X	X	X
Snyder County Agriculture Communities			X								

Municipal Hazard Mitigation Actions Checklist											
Municipality	**5.2.3**	**5.2.4**	**5.2.5**	**5.3.1**							
Adams Township											
Beaver Township											
Beavertown Borough											
Center Township											
Chapman Township											
Franklin Township											
Freeburg Borough											
Jackson Township											
McClure Borough											
Middleburg Borough											
Middlecreek Township											
Monroe Township											
Penn Township											
Perry Township											
Selinsgrove Borough											
Shamokin Dam Borough											
Spring Township											
Union Township											
Washington Township											
West Beaver Township											
West Perry Township											
Snyder County	X	X	X	X							

Table 88 - Objective to Action Checklist

Objective	Number of Actions
Objective 1.1	1
Objective 1.2	1
Objective 1.3	1

Objective	Number of Actions
Objective 1.4	2
Objective 1.5	1
Objective 2.1	1
Objective 2.2	1
Objective 2.3	8
Objective 2.4	5
Objective 2.5	1
Objective 2.6	3
Objective 3.1	1
Objective 3.2	1
Objective 3.3	2
Objective 3.4	6
Objective 4.1	4
Objective 4.2	1
Objective 4.3	1
Objective 5.1	1
Objective 5.2	5
Objective 5.3	1

Table 89 - Actions Tied to Hazard

Actions Tied to Hazard	
Hazard	**Actions Related**
Natural Hazards	
Drought	2.2.1, 2.3.3, 2.4.1, 2.4.2, 2.4.4, 2.5.1, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5
Earthquake	2.2.1, 2.3.4, 2.4.1, 2.4.2, 2.4.4, 2.5.1, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5
Extreme Temperature	2.2.1, 2.4.1, 2.4.2, 2.4.4, 2.5.1, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5, 4.1.4
Flash Flooding	1.4.1, 1.4.2, 2.2.1, 2.4.1, 2.4.2, 2.4.4, 2.5.1, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5
Flood	1.1.1, 1.2.1, 1.3.1, 1.5.1, 2.1.1, 2.2.1, 2.4.1, 2.4.2, 2.4.3, 2.4.4, 2.5.1, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.4, 3.4.5, 4.2.1, 4.3.1

Actions Tied to Hazard	
Hazard	**Actions Related**
Hurricane and Tropical Storm	2.2.1, 2.4.1, 2.4.2, 2.4.4, 2.5.1, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5
Ice Jam	2.2.1, 2.4.1, 2.4.2, 2.4.4, 2.5.1, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5
Invasive Species	2.2.1, 2.4.1, 2.4.2, 2.4.4, 2.5.1, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5
Landslides	2.2.1, 2.3.5, 2.4.1, 2.4.2, 2.4.4, 2.5.1, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5
Pandemic, Epidemic, and Infectious Disease	2.2.1, 2.4.1, 2.4.2, 2.4.4, 2.4.5, 2.5.1, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5, 4.1.1
Radon Exposure	2.2.1, 2.3.6, 2.4.1, 2.4.2, 2.4.4, 2.5.1, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5, 4.1.2, 4.1.3
Subsidence and Sinkhole	2.2.1, 2.3.7, 2.4.1, 2.4.2, 2.4.4, 2.5.1, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5
Tornado and Windstorm	2.2.1, 2.4.1, 2.4.2, 2.4.4, 2.5.1, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5
Wildfire	2.2.1, 2.3.8, 2.4.1, 2.4.2, 2.4.4, 2.5.1, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5
Winter Storm	2.2.1, 2.4.1, 2.4.2, 2.4.4, 2.5.1, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5, 3.4.6
Human-Caused Hazards	
Blighted Properties	2.4.2, 2.4.4, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5
Dam Failure	2.4.2, 2.4.4, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5, 5.1.1, 5.2.1, 5.2.2, 5.2.3, 5.2.4, 5.2.5, 5.3.1
Emergency Services Shortage	2.4.2, 2.4.4, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5
Environmental Hazards	2.4.2, 2.4.4, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5
Substance Use Disorder	2.4.2, 2.4.4, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5

Actions Tied to Hazard	
Hazard	**Actions Related**
Terrorism and Cyberterrorism	2.3.1, 2.3.2, 2.4.2, 2.4.4, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5
Transportation Accidents	2.4.2, 2.4.4, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5
Utility Interruptions	2.4.2, 2.4.4, 2.6.1, 2.6.2, 2.6.3, 3.1.1, 3.2.1, 3.3.1, 3.3.2, 3.4.1, 3.4.2, 3.4.3, 3.4.5

7. Plan Maintenance

7.1. Update Process Summary

Monitoring, evaluating, and updating this plan is critical to maintaining its value and success in Snyder County's 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. This HMP update also defines the municipalities' role in updating and evaluating the plan. Finally, the 2025 HMP update encourages continued public involvement and how this plan may be integrated into other planning mechanisms in the county.

7.2. Monitoring, Evaluating and Updating the Plan

Hazard mitigation planning in Snyder County is a responsibility of all levels of government (i.e., county, and local), as well as the citizens of the county. The Snyder County Local Planning Team will be responsible for maintaining this multi-jurisdictional HMP. The local planning team will meet annually and following each emergency declaration to review the plan. The Snyder County Emergency Management Director and the Snyder County Planning Director will be the primary individuals responsible for reviewing and updating the plan at least once every five years. Every municipality that has adopted this plan will also be afforded the opportunity to provide updated information or information specific to hazards encountered during an emergency or disaster. Each review process will ensure that the hazard vulnerability and risk analysis reflect the current conditions of the county, that the capabilities assessment accurately reflects local circumstances and that the hazard mitigation strategies are updated based on the county's damage assessment reports and local mitigation project priorities. The HMP must be updated on a five-year cycle. An updated HMP must be completed and approved by the end of the five-year period. The monitoring, evaluating, and updating of the plan every five years will rely heavily on the outcomes of the annual HMP planning team meetings.

The Snyder County Local Planning Team will complete a hazard mitigation progress report to evaluate the status and accuracy of the multi-jurisdictional HMP and record the local planning team's review process. The annual plan review will be distributed to appropriate representatives at both PEMA and FEMA. The following items will be completed during the annual review and reporting process:

- Review the risk assessment section and identify occurrences of hazards within the last year. Identify date, time, damage, fatalities, and other specific information of the events. Also identify any new hazards that have occurred or increased risk with the county.
- Complete a review and update of the capability assessment section. Identify any capability weaknesses since the last review. The capability assessment surveys from the previous hazard mitigation plan will be reviewed and new capability assessment forms can be distributed to the municipalities during the annual review process.
- Complete a review of the mitigation strategy section. Review the goals and objectives identified in the 2025 HMP and determine if any updates are needed. Provide all mitigation actions and opportunities to the county and municipalities that are applicable. Have all entities complete an action review matrix and document all results in the report. Also, add any new actions that are identified. Complete a review of each mitigation opportunity and identify the status of each opportunity on the opportunity review spreadsheet. All information will be included in the annual review report.

The Snyder County Emergency Management Agency will maintain a copy of these records and place them in Appendix I of this plan. Snyder County will continue to work with all municipalities regarding hazard mitigation projects, especially those municipalities that did not submit projects for inclusion in this plan.

The Snyder County local planning team should also be reviewed annually to address any changes to the membership that may have occurred over the past calendar year. The LPT can be expanded and updated with new stakeholders to address potential changes in guidance by the Commonwealth of Pennsylvania and the Federal Emergency Management Agency.

7.3. Continued Public Involvement

The Snyder County Emergency Management Agency will ensure that the 2025 Snyder County Hazard Mitigation Plan is posted and maintained on the Snyder County website and will continue to encourage public review and comment on the plan. The Snyder County website that the plan will be located at is as follows: https://www.snydercounty.org/departments/planning-commission/

The public will have access to the 2025 Snyder County HMP through their local municipal office, the Snyder County Planning Commission, or the Snyder County Emergency Management Agency. Information on upcoming events related to the HMP or solicitation for comments will be announced via newsletters, newspapers, mailings, and the county website.

The citizens of Snyder County are encouraged to submit their comments to elected officials and/or members of the Snyder County HMP Local Planning Team. To promote public participation, the Snyder County Local Planning Team will post a public comment form as wells as the Hazard Mitigation Project Opportunity Form on the county's website. These forms will offer the public various opportunities to supply their comments and observations. All comments received will be maintained and considered by the Snyder County Hazard Mitigation Planning Team.

Once the Snyder County 2025 Hazard Mitigation Plan is adopted by the Snyder County Board of County Commissioners, the plan will be disseminated to various county agencies and local municipalities that develop and implement specific plans and ordinances. Each participating municipality will be responsible for implementing the specific recommendations in section 5.2.5, plan integration, of the capability assessment into their local planning documents including comprehensive plans, zoning ordinances, land development, and subdivision regulations. Whenever possible, the Snyder County Emergency Management Agency will serve as a liaison to assist with these integrations and updates. As discussed above in section 7.2, progress on multi-jurisdictional plan integration will be addressed as part of the annual review conducted by the Snyder County Local Planning Team.

8. Plan Adoption

8.1. Resolutions

In accordance with federal and state requirements, the governing bodies of each participating jurisdiction must review and adopt by resolution, the 2025 Snyder County Hazard Mitigation Plan. Copies of the adopting resolutions are included in this plan in Appendix J. FEMA Region III in Philadelphia, Pennsylvania is the final approval authority for the Hazard Mitigation Plan. PEMA also reviews the plan before submission to FEMA.

9. Appendices