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 Huntingdon County risk assessment provides in-depth knowledge of the hazards and vulnerabilities that affect Huntingdon 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 Huntingdon County Emergency Operations Plan (EOP), local EOPs and other public and private emergency management plans.

The Huntingdon 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 Huntingdon County Local Planning Team (LPT) reviewed and assessed the change in risk for all natural and human-caused hazards identified in the 2025 hazard mitigation plan. The mitigation planning team then identified hazards that were outlined within the Pennsylvania Hazard Mitigation Plan but not included in the 2025 Huntingdon County Hazard Mitigation Plan that could impact Huntingdon County. The team utilized the hazard identification and risk evaluation worksheet that was provided by the Pennsylvania Emergency Management Agency.

The Huntingdon County Steering Committee met with municipalities and provided guidance on how to complete the municipal hazard identification and risk evaluation worksheet. X number of municipalities in Huntingdon 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 Huntingdon County assessment data to estimate loss to particular hazards. Risk factor was then assessed to each of the twenty-nine 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 X – Presidential & Gubernatorial Disaster Declaration contains a list of all Presidential and Gubernatorial disaster declarations that have affected Huntingdon County and its municipalities from 1972 through 2021, according to the Pennsylvania Emergency Management Agency.

Table X - Presidential & Gubernatorial Disaster Declarations

Presidential Disaster Declarations and Gubernatorial Declarations and Proclamations		
Date	**Hazard Event**	**Action**
06/23/1972	Tropical Storm Agnes	Emergency Declarations
03/16/1993	Snowstorm	Proclamation of Emergency
01/13/1996	Blizzard	Emergency Declarations
01/21/1996	Flooding	Emergency Declarations
09/13/1996	Hurricane Fran	Emergency Declarations
03/14/2003	Snowstorm	Proclamation of Emergency
09/19/2004	Tropical Depression Frances	Emergency Declarations
09/10/2024	Hurricane Katrina	Proclamation of Emergency
04/16/2010	Snowstorm	Emergency Declarations
09/08/2011	Remnants of Tropical Storm Lee	Proclamation of Emergency
09/12/2011	Tropical Storm Lee	Emergency Declarations
10/29/2012	Hurricane Sandy	Proclamation of Emergency
01/10/2013	Hurricane Sandy	Emergency Declarations
10/01/2013	Severe Storms, Tornadoes and Flooding	Emergency Declarations

Presidential Disaster Declarations and Gubernatorial Declarations and Proclamations		
Date	**Hazard Event**	**Action**
03/13/2020	COVID-19 Pandemic	Emergency Declarations
03/30/2020	COVID-19 Pandemic	Emergency Declarations
09/10/2021	Remnants of Hurricane Ida	Emergency Declarations
Source: Pennsylvania Emergency Management Agency and Federal Emergency Management Agency		

4.2.2. Summary of Hazards

The Huntingdon 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-nine hazards. These twenty-nine hazards include all of the hazards profiled in the 2019 plan. The list below contains the hazards that have the potential to impact Huntingdon County as identified through previous risk assessments, the Huntingdon 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.

Hailstorm

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

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 occur in the U.S. each year, with about sixteen occurring in 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 burnt in a natural area. Wildfires can cause injuries or death and can ruin homes in their path. Wildfires can be caused by humans or lightning, and can happen anytime, though the risk increases in period of little rain. In Pennsylvania, 98% of wildfires are caused by people.

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 being affected by these hazards.

Civil Disturbance
A civil disturbance is defined by FEMA as a civil unrest activity (such as a demonstration, riot, or strike) that disrupts a community and requires intervention to maintain public safety.

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.

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.

Levee Failure
A levee is a human-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water to provide protection from temporary flooding (FEMA, 2016). A levee failure or breach occurs when a levee fails to prevent flooding on the landside of the levee. The consequences of a sudden levee failure can be catastrophic, with the resulting flooding causing loss of life, emergency evacuations, and significant property damage.

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 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.

Urban Fire and Explosions

Urban fires and explosions include those fires and explosions that occur within urban, or developed, regions, and often pose an increased threat due to their tendency to easily spread to neighboring structures. The effects may be minor or severe and include injury, loss of life, property damage, and residential or economic disruption/displacement.

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 Huntingdon 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 4.3.3). 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 Huntingdon 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 40.71 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 Huntingdon County. Rural farming areas of Huntingdon County are most at risk when a drought occurs. A drought can create a significant financial burden for the community. Approximately 95% of Huntingdon County farms are family-owned and operated. Additionally, 56.67% of the county farmland use is devoted to crop cultivation, 28.79% of farmland is woodland, 9.38% is pastureland, and 5.16% 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.

Huntingdon 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 X – Drought Preparation Phases* shows the FEMA-defined levels of drought severity along with suggested actions, requests, and goals.

Table X – 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 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 X – 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 X – 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
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 X – Economic and Environmental Impacts of Drought Events* and qualifies the potential economic and environmental impacts from a drought event.

Table X – 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 X – Past Drought Events in Huntingdon 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 X – Pennsylvania Palmer Drought Index 1900 – 1999*.

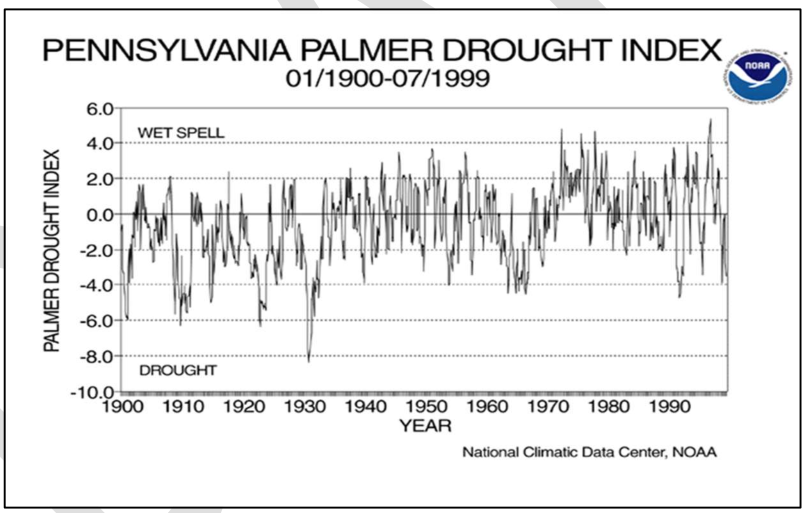
Based on the county's more recent disaster history and other drought occurrence data, the worst drought event in Huntingdon County occurred in the summer of 1999. Extended dry weather spurred Governor Thomas Ridge to declare a drought emergency in fifty-five counties. During this event, precipitation 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 X – Past Drought Events in Huntingdon County

Past Drought Events in Huntingdon 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	09/11/1992	Warning	144
09/11/1992	01/15/1993	Watch	126
09/01/1995	11/08/1995	Warning	68
11/08/1995	12/18/1995	Watch	40
07/17/1997	11/13/1997	Watch	119
12/03/1998	12/14/1998	Watch	11
12/14/1998	03/15/1999	Warning	91
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	12/16/1999	Warning	77

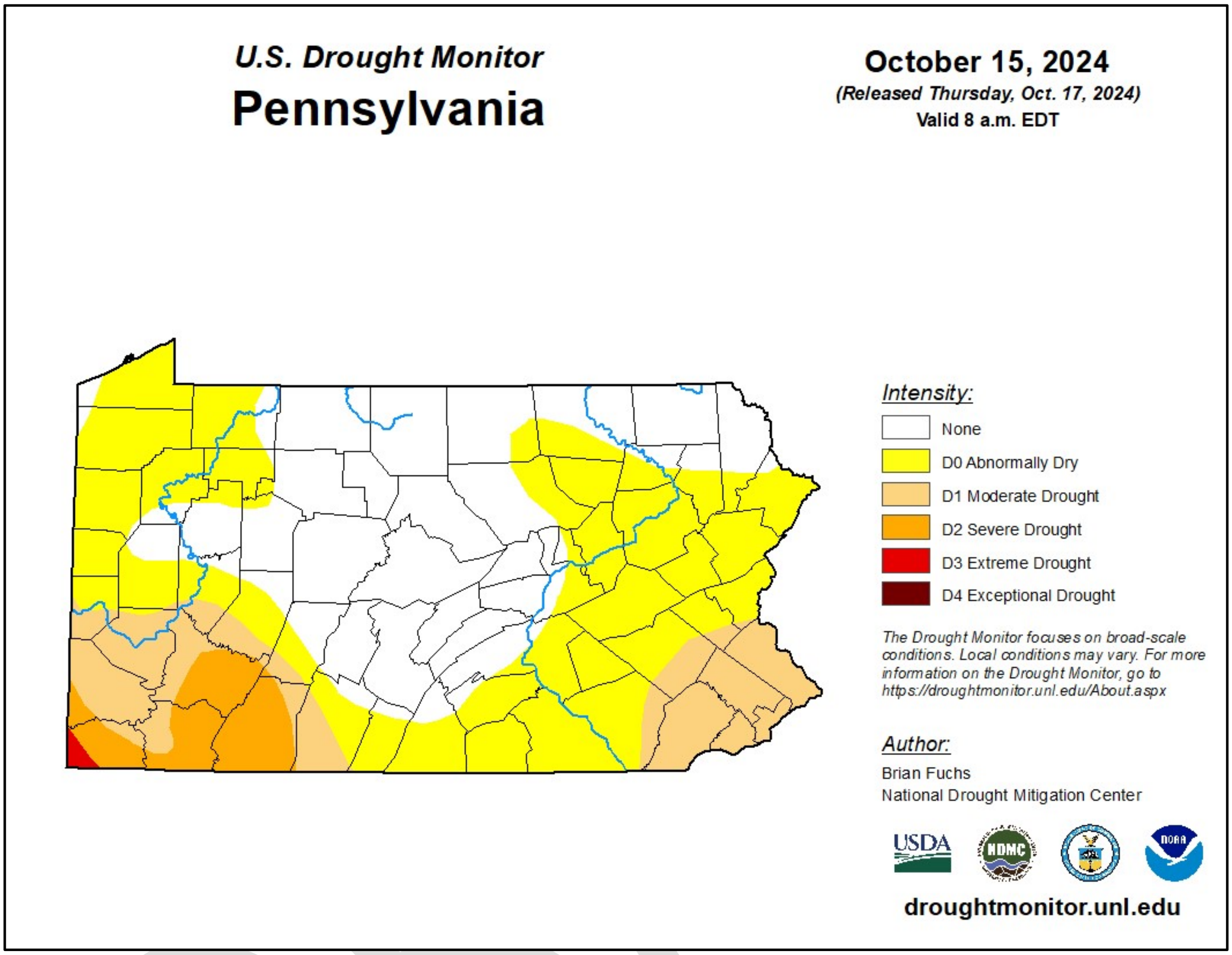
Past Drought Events in Huntingdon County			
Start Date	**End Date**	**Drought Status**	**Event Duration (Days)**
12/16/1999	05/05/2000	Watch	141
08/08/2001	12/05/2001	Watch	119
12/05/2001	02/12/2002	Warning	69
02/12/2002	05/13/2002	Emergency	90
08/09/2002	11/07/2002	Watch	90
04/11/2006	06/30/2006	Watch	80
08/06/2007	09/05/2007	Watch	30
09/16/2010	11/10/2010	Warning	55
08/05/2011	09/02/2011	Watch	28
06/17/2015	07/10/2015	Watch	23
08/02/2016	02/14/2017	Watch	196
08/21/2020	11/17/2020	Watch	88
06/15/2023	01/26/2024	Watch	225
Source: Pennsylvania Department of Environmental Protection, 2024 **Gubernatorial Disaster Declaration			

Figure X – 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. *Figure X – U.S. Drought Monitor, Pennsylvania* illustrates the conditions of drought in Pennsylvania at the time of the report.

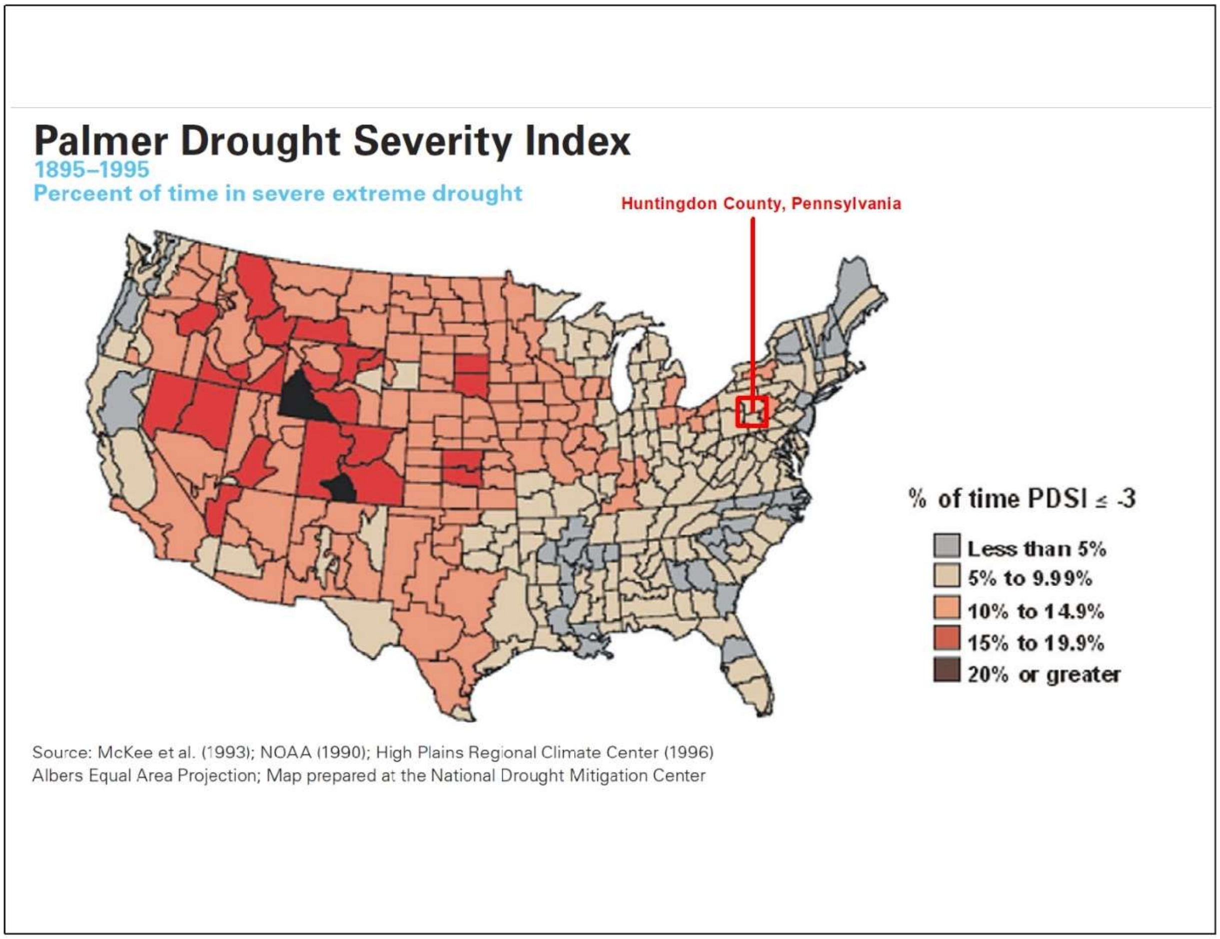
Figure X – U.S. Drought Monitor, Pennsylvania



4.3.1.4 Future Occurrence

change may lead to increased uncertainty and extremity of climate events. Huntingdon County experienced severe drought between 5% to 10% of the time between 1895 and 1995, as seen in *Figure X – Palmer Drought Severity Index*. This report can be used to make a rough estimate of the future probability of drought in Huntingdon 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 X – Palmer Drought Severity Index



The potential for a drought to occur in Huntingdon County is high. Given the frequency of drought watches issued for Huntingdon County and its municipalities, the county can reasonably expect to be under a drought watch likely once per year. While some form of drought condition frequently exists in Huntingdon County, the impact depends on the duration of the event, severity of conditions, and area affected. The map above shows that Huntingdon 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 Huntingdon County. Land use, especially agricultural land use, can exacerbate dry conditions, and these agricultural areas can be damaged by drought. There are 128,105 acres of farmland in Huntingdon 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 78% of land use in Huntingdon County is natural land which accounts for forest areas, including deciduous, evergreen, mixed deciduous and evergreen, forested wetlands, stream, and emergent wetlands. There are also fourteen state game lands, one state forest, and three state parks 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 wildfire, flash floods, and landslides can be found in Section 4.3.13.5, 4.3.4.5, and 4.3.8.5 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; 128,105 acres of Huntingdon County, or roughly 22.5% of the 569,125 total land acreage, make up farmland (United States Department of Agriculture [USDA], 2022 Census). The total number of farms in Huntingdon County is 671, and the average acreage for farms in Huntingdon County is 191 acres. Huntingdon County ranks 17th of sixty-seven counties in the commonwealth for agricultural production, totaling over $151 million annually. Agricultural production from crops, including nursery and greenhouse crops, accounts for more than $29 million in commerce annually. Production from livestock, poultry, and their products accounts for over $121 million annually. The livestock that has the greatest potential to be impacted are the cattle and calves and hogs and pigs. There are approximately 36,109 cattle and calves and 17,056 hogs and pigs. Acreage for farming has increased since the 2017 USDA Census when there was a reported total of 120,157 farming and drought vulnerable acres.

Huntingdon County also has 1,312 domestic wells and one irrigation well that would be adversely impacted by drought events. This impact would lead to lower water levels for at least 1,312 households and potentially one large farm. This well information was obtained by using the PA GEOCODE application to find well information from 01/01/2000 to 08/30/2024.

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 X – Drought-Vulnerable Land Use and Public Water Supply*.

Populations in Huntingdon 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 X – Population Change in Huntingdon County*, twenty-four of the forty-eight municipalities in Huntingdon County have experienced a population loss since the 2010 decennial census. Twenty-three municipalities have seen a net population increase, and one municipality saw no change from the 2010 decennial census to the 2020 decennial census. Based on this information, it can be speculated that these twenty-three municipalities may have an increased vulnerability to drought conditions, since 2010, due to the increase in population.

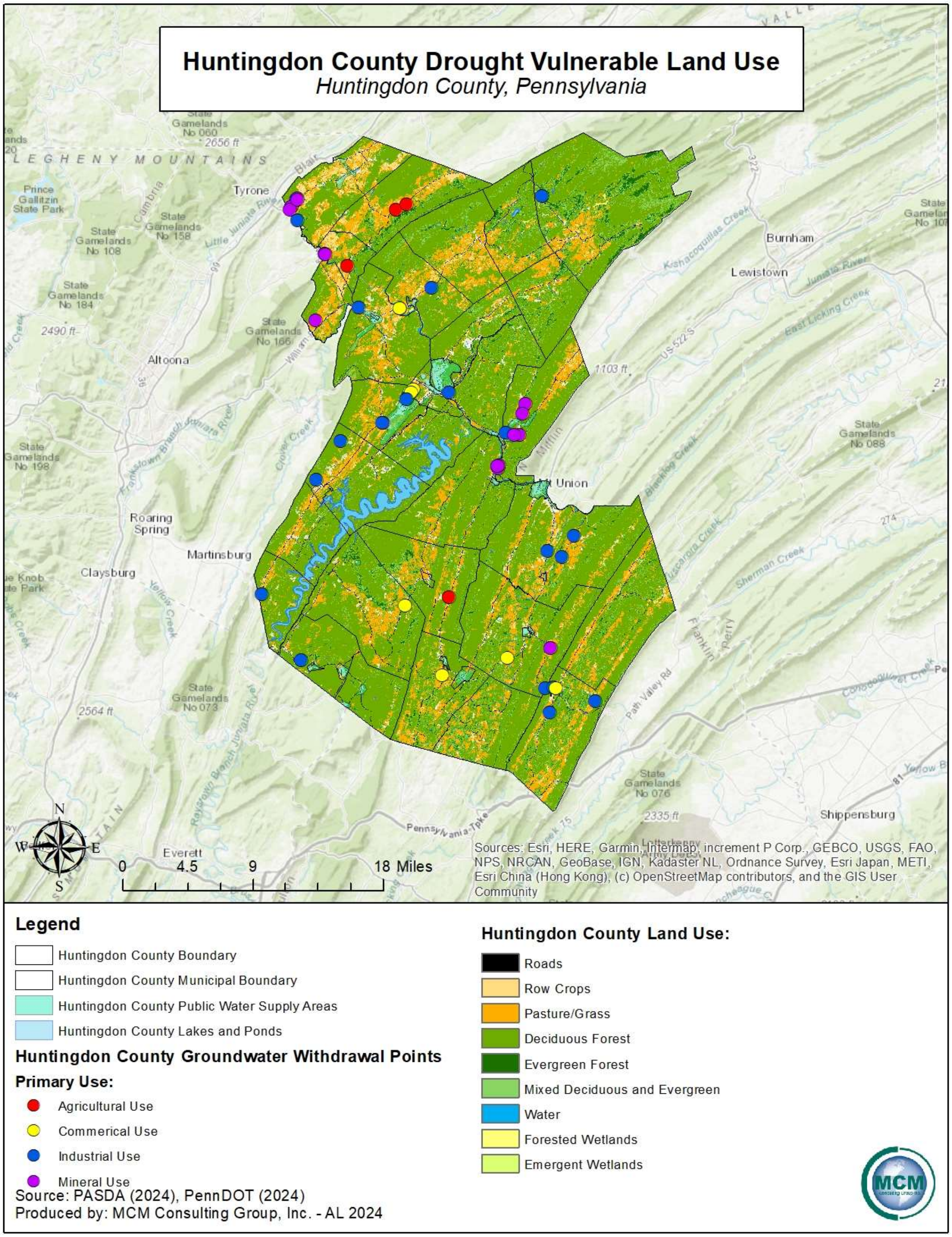
Municipalities with high vulnerability due to drought:

- Barree Township
- Birmingham Borough
- Broad Top City Borough
- Cromwell Township
- Dublin Township
- Dudley Borough
- Henderson Township
- Hopewell Township
- Lincoln Township
- Logan Towns
- Marklesburg Borough
- Mill Creek Borough
- Miller Township
- MorrisTownship
- Saltillo Borough
- Shade Gap Borough
- Shirleysburg Borough
- Smithfield Township
- Three Springs Borough
- Walker Township
- Warriors Mark Township
- West Township
- Wood Township

Drought also has the potential to impact historic and cultural resources in Huntingdon County. Huntingdon County has nine historic or cultural properties or buildings, and drought could impact utility delivery to those locations. All properties in Huntingdon 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 Huntingdon 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, Huntingdon 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 X – Drought-Vulnerable Land Use and Public Water Supply

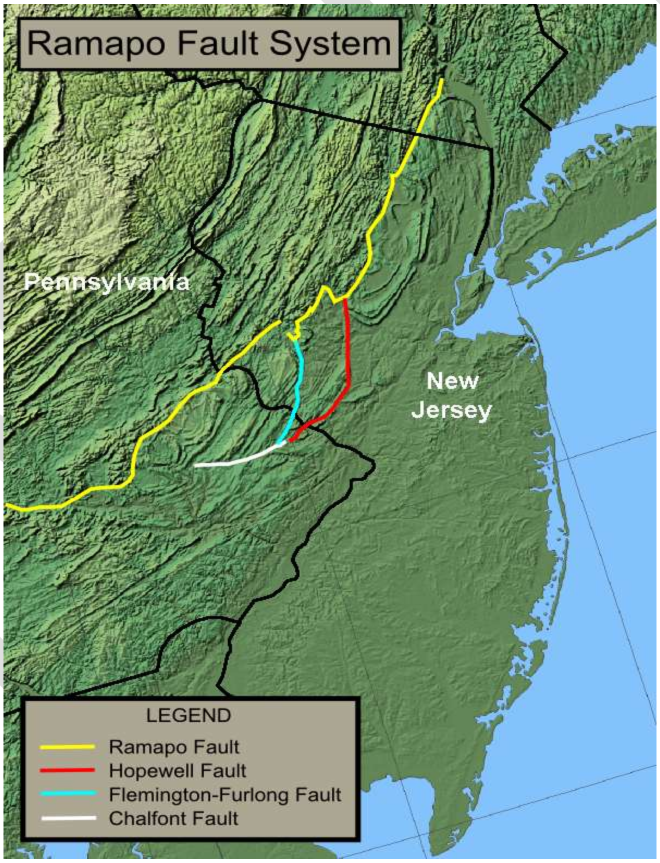


4.3.2. Earthquake

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 Huntingdon County, are usually mild events, impacting areas no greater than fifty 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 Huntingdon 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 X – Ramapo Fault System)* This fault system is associated with some small earthquakes, and it is thought unlikely to produce significant disruption.

Figure X - 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 Huntingdon County is to conduct a probabilistic earthquake-hazard analysis with the earthquakes that have already happened in and around the county. (See *Figure X - Pennsylvania Earthquake Hazard Zones*). Nevertheless, the United States Geological Survey (USGS) indicates that Huntingdon County has a low earthquake risk, and no historical earthquake events have occurred.

Natural gas extraction of the Marcellus/Utica Shale formation (see *Figure X - 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 Huntingdon 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 X - Richter Scale* summarizes Richter Scale magnitudes as they relate to the spatial extent of impacted areas. The Modified Mercalli Intensity Scale (*Table X - 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 X - 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 X - 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.	
X	**Disastrous**	Ground cracks profusely, many buildings destroyed, liquefaction and landslides widespread.	<7.3
XI	**Very Disastrous**	Most buildings and bridges collapse, roads, railways, pipes, and cables destroyed, general triggering of other hazards.	<8.1
XII	**Catastrophic**	Total destruction, trees fall, ground rises and falls in waves.	>8.1

4.3.2.3 Past Occurrence

According to USGS, no earthquakes have had an epicenter within Huntingdon 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 Huntingdon County are shown below at *Figure X – Pennsylvania Recorded Earthquake Events.* 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 X - Earthquake Hazard Zones* in 4.3.2.1 shows that Huntingdon County is in a 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 X - 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.

Climate change and its relationship with earthquakes is hard to identify. According to the U.S Geological Survey, climate change and earthquake correlation occurs when there is a large change in atmospheric pressure that can be caused by major storms which then could cause slow, small earthquakes. Over time, the release of energy from small earthquakes can lead to ground shaking earthquakes which can cause severe damage. This theory is not yet proven and is still subject to change but can provide some context to the impact of climate change.

Table X - Recent Earthquake Trends in Northeastern United States

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

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 Huntingdon 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

Huntingdon County. The 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 Huntingdon County's general public during an earthquake. Infrastructure is more at risk on the east coast than the west coast because of aging buildings inventory.

There are 374 bridges publicly documented by the Pennsylvania Department of Transportation that could be damaged and made unusable by a major earthquake event. These locations are evenly the county and damage to any of them would be detrimental to transportation and emergency response in Huntingdon County.

Impact of earthquakes on historic properties in Huntingdon County

Huntingdon County is a moderate of historic and cultural properties that could be adversely impacted by earthquakes. The vulnerability of each is related to the construction practices of the property at the time that it was constructed. Many of the historic properties in Huntingdon County were constructed before 1900 and are of a type of construction vulnerable to increased seismic events (brick and stone). There are thirty-five historic properties in Huntingdon County that are registered with the National Register of Historic Places.

These locations are:

- **Andrews Feed Mill (Wood)**
- **Baker Bridge (Stone)**
- **Barree Forge Furnace (Stone)**
- **Birmingham Bridge (Steel)**
- **Brumbaugh Homestead (Brick)**
- **Colerain Forges Mansion (Wood)**
- **Corbin Bridge (Steel)**
- **Frehn Bridge (Steel)**
- **Greenwood furnace (Brick)**
- **Greenwood Lake Dam (Stone)**
- **Hudson Grist Mill (Wood)**
- **Huntingdon Armory (Brick)**
- **Huntingdon Furnace (Stone)**
- **Lewis Smalley Homestead (Brick)**
- **Llyod and Henry Warehouse (Brick)**
- **Minersville Coke Ovens (Stone)**
- **Monroe Furnace (Stone)**
- **Paradise Furnace (Brick)**
- **Pennsylvania Canal Guard Lock and Feeder Dam (Stone)**

- **<u>Pennsylvania Furnace Mansion (Stone/Wood)</u>**
- **<u>Pennsylvania Railroad Bridge (Stone)</u>**
- **<u>Pennsylvania Railroad Old Bridge (Stone)</u>**
- **<u>Robb Farm (Brick)</u>**
- **<u>Runk Bridge (Steel)</u>**
- **<u>Shade Gap Feed and Flour Mill (Wood)</u>**
- **<u>Spruce Creek Rod and Gun Club (Brick)</u>**
- **<u>St. Mary's Covered Bridge (Wood)</u>**

There are also seven historic districts in Huntingdon County. These districts are the Huntingdon Borough Historic District, the Marklesburg Historic District, the Mount Union Historic District, the Pennsylvania Railroad District, the Robertsdale Historic District, the Whipple Dam State Park Day Use District, and the Woodvale Historic District.

Municipalities with high risk due to earthquakes:

- Barree Township
- Birmingham Borough
- Broad Top City Borough
- Cromwell Township
- Dublin Township
- Dudley Borough
- Henderson Township
- Hopewell Township
- Lincoln Township
- Logan Towns
- Marklesburg Borough
- Mill Creek Borough
- Miller Township
- MorrisTownship
- Saltillo Borough
- Shade Gap Borough
- Shirleysburg Borough
- Smithfield Township
- Three Springs Borough
- Walker Township
- Warriors Mark Township
- West Township
- Wood Township

All of the socially vulnerable populations in Huntingdon County are at an increased vulnerability to earthquakes. The homeless and the unsheltered populations are at risk if they are living in structurally unsound buildings and locations. Also, the economically vulnerable of Huntingdon County may not have the capability to fix or rebuild if their homes are damaged from an earthquake event.

As seen in *Table X – Population Change in Huntingdon County*, ten of the forty-eight municipalities in Huntingdon 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 ten municipalities with increase may have an increased/equivalent vulnerability to earthquakes, since 2010, due to the increase in population and construction.

Land use is a factor that has the potential to impact earthquake severity. Land use, in the form of a built environment, such as residential expansion, can cause earthquake impact severity to increase. Impact severity increases because as the built environment expands and becomes more complex, the impact the event can have on that area may also increase due to an influx of people, infrastructure, and critical infrastructure in the hazard area. With ten of municipalities seeing population increases between the 2010 decennial census and the 2020 decennial census, there has not been an increase in residential construction in Huntingdon County.

The seismic forces associated with an earthquake pose an immediate threat to telecommunication infrastructure, or other critical infrastructure in a community. When an earthquake 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 earthquake event is significant, can also result in a loss of communication capabilities, hindering response coordination, and leaving communities impacted by the earthquake vulnerable to other natural or human-caused hazards.

Earthquakes can also damage power distribution systems, leading to localized power outages or even widespread blackouts. Fallen power lines, damaged substations, and disrupted transformers may further contribute to the breakdown of the electrical grid surrounding the epicenter of the earthquake, and the consequences can include cascading pressure on essential services and other community lifelines, further impeding emergency operations and the capabilities within the impacted jurisdictions.

Earthquake events can also pose a threat to natural gas, water, and the numerous other materials and chemicals transported through underground water systems in Huntingdon County. During significant earthquakes, underground pipelines may crack, causing the transported material to leak into the ground and contaminate water sources in the county. In severe cases, water line bursts can cause cascading hazards to subsidence and sinkholes, when left unchecked. However, 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.

Figure X – Pennsylvania Earthquake Hazard Zones

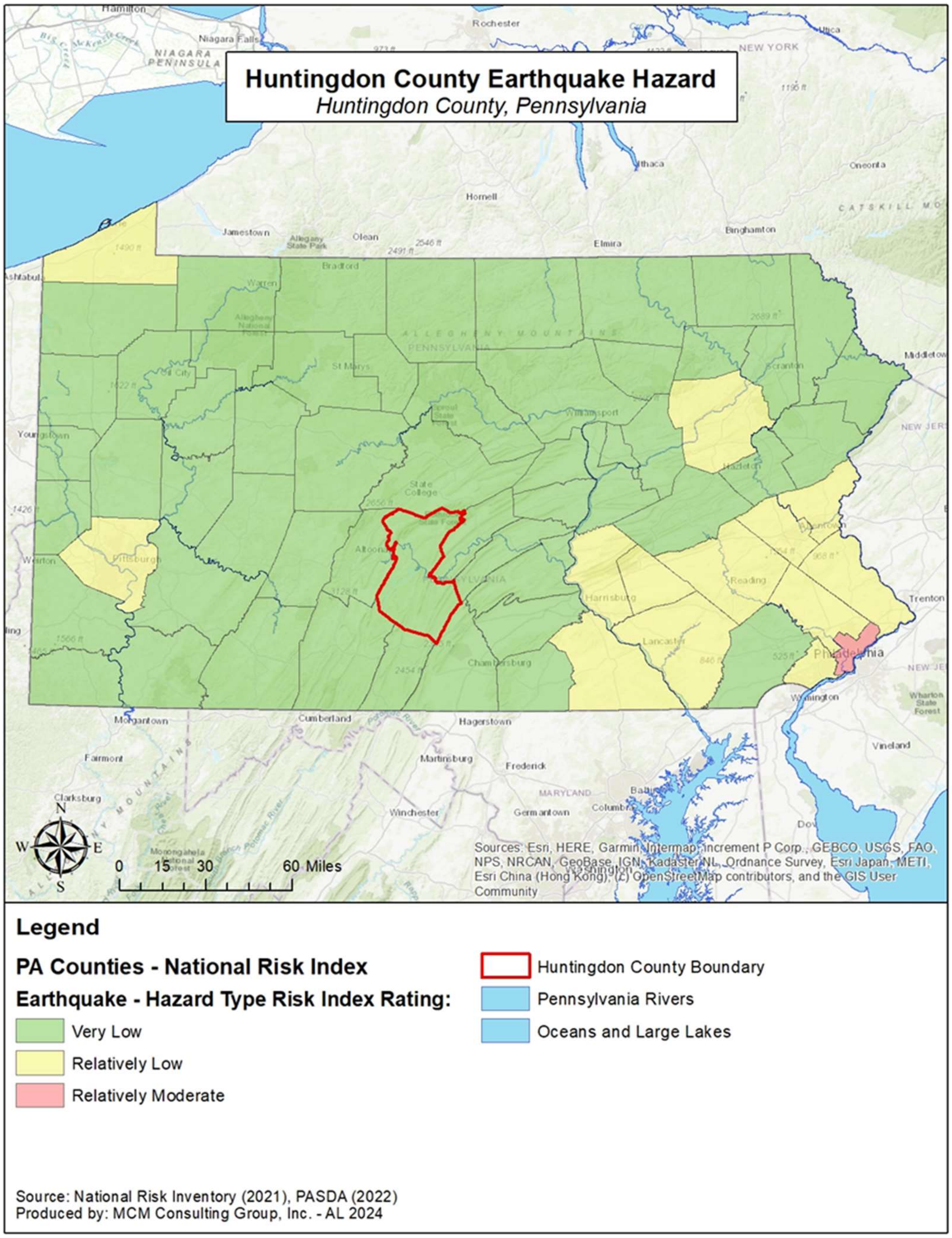


Figure X – Pennsylvania Oil and Gas Geology

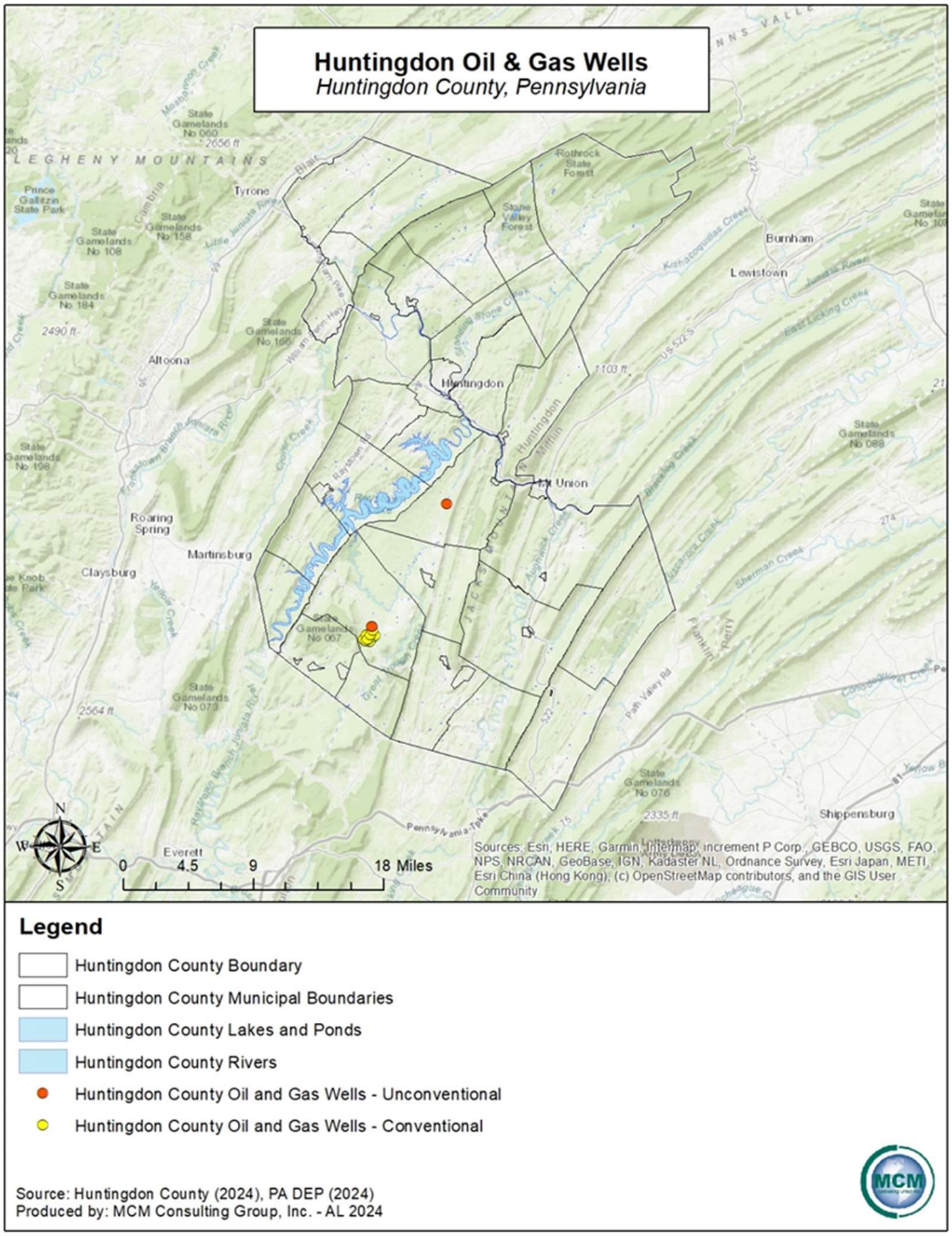
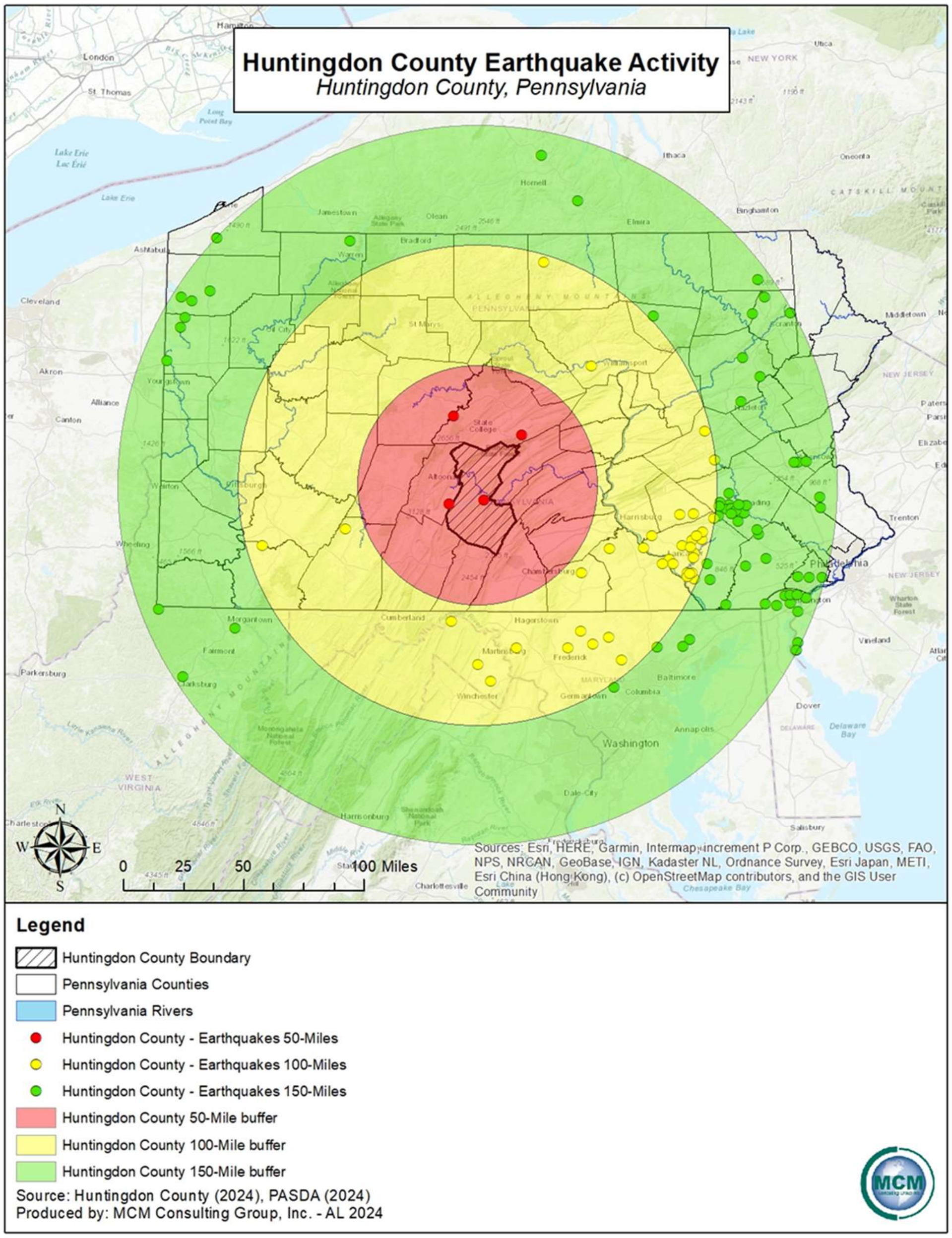


Figure X – Pennsylvania Recorded Earthquake Events



4.3.3. Extreme Temperatures

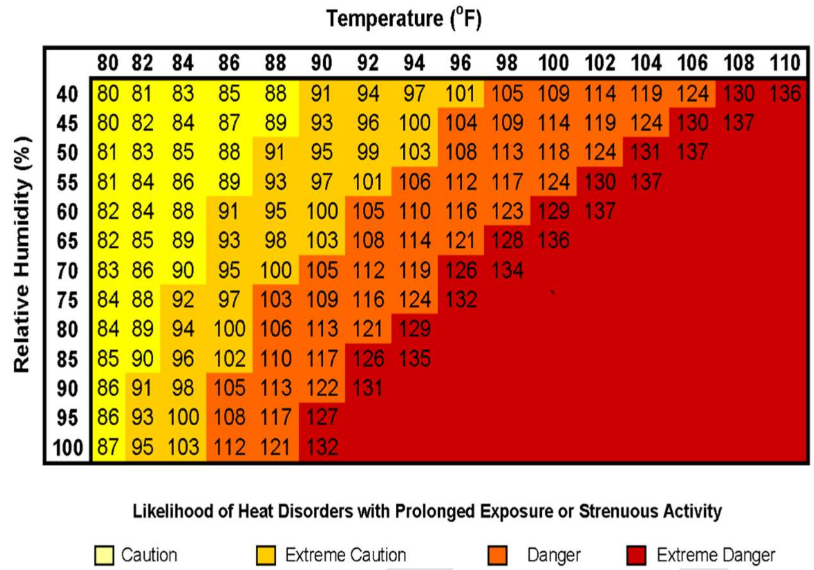
4.3.3.1 Location and Extent

Pennsylvania, and more specifically, Huntingdon 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 Huntingdon County, with average temperatures of 28.5°F. *Figure X - Average Minimum Temperature Trends for Pennsylvania* shows the average minimum temperatures in Pennsylvania with Huntingdon County identified. July has typically been the warmest month for Huntingdon County, with an average temperature of 73.9°F. *Figure X - Average Maximum Temperature Trends for Pennsylvania* shows the average maximum temperatures in Pennsylvania with Huntingdon County identified. Temperatures can vary across Huntingdon 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 Huntingdon 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 X - National Weather Service's Heat Index Matrix*.

Figure X - National Weather Service's Heat Index Matrix



Temperature (°F)

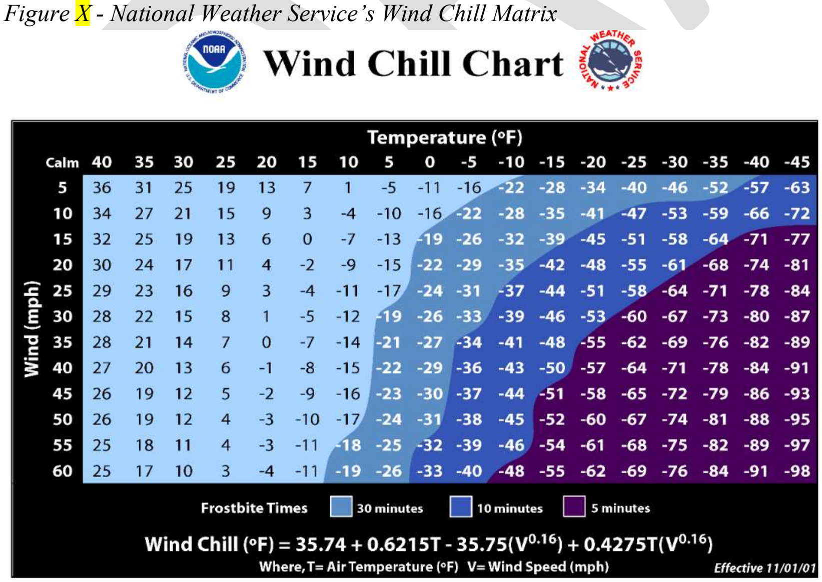
Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	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 X - National Weather Service's Wind Chill Matrix*.

Figure X - 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

Huntingdon County has had more past occurrences of extreme cold incidents than extreme heat due to the geographic location of the county. *Table X - Past Extreme Temperature Occurrences for Huntingdon County* shows the past occurrence events associated with extreme temperature (hot and cold) that have occurred in Huntingdon County. The data in the table was reported from early 2000s to the year 2024. Due to the source used, storm data is not made available until sixty days after an incident occurs according to NOAA, however, events most likely have occurred without being documented. With a total of seven different extreme temperature events that have occurred, seven of the events were extreme cold related and zero were 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 Huntingdon 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 to 09/03/2024, 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. In the 2011 event, there was 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. While this record-breaking event did not have a significant impact on Huntingdon County itself, it is still noteworthy due to the impacts it had across the Commonwealth as a whole and Huntingdon's neighboring counties.

Table X - Past Extreme Temperature Occurrences for Huntingdon County

Past Extreme Temperature Occurrences for Huntingdon County		
Location	**Date**	**Type**
Huntingdon County	02/05/2007	Extreme Cold/Wind Chill
Huntingdon County	02/05/2007	Extreme Cold/Wind Chill
Huntingdon County	02/10/2008	Extreme Cold/Wind Chill
Huntingdon County	01/16/2009	Extreme Cold/Wind Chill
Huntingdon County	01/06/2014	Extreme Cold/Wind Chill
Huntingdon County	02/15/2015	Extreme Cold/Wind Chill
Huntingdon County	12/23/2022	Extreme Cold/Wind Chill
Source: NOAA, 2024		

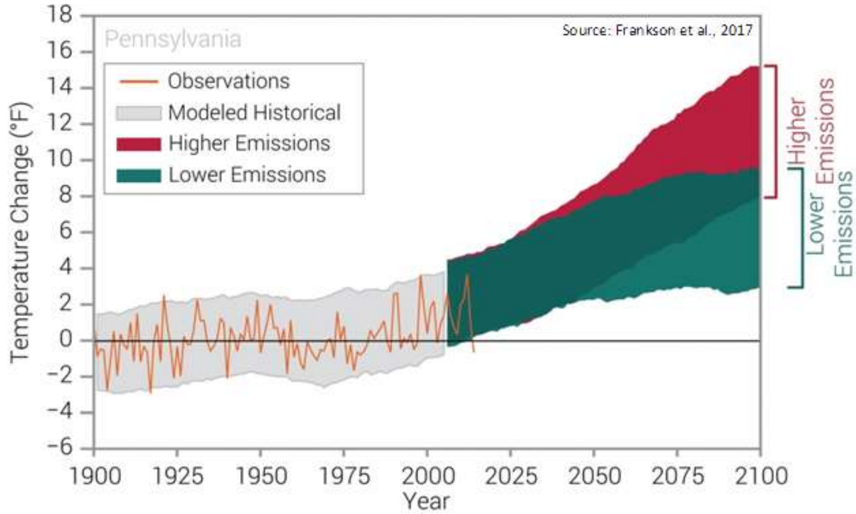
4.3.3.4 Future Occurrence

Extreme temperatures will continue to impact Huntingdon 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 X - 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, Huntingdon 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 X - 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 21.2% of Huntingdon County population) and the very young (five years or younger, accounting for 4.4% of Huntingdon 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 4.3.1.

All properties in Huntingdon 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.

All municipalities in Huntingdon County have the same risk to extreme temperature events. No one municipality has a greater risk than the others, but each municipality is at a high risk to extreme temperature events.

Extreme temperatures can have a significant impact on land use within Huntingdon 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 Huntingdon County will be impacted.

As seen in *Table X – Population Change in Huntingdon County*, twenty-four of the forty-eight municipalities in Huntingdon County have experienced a population loss since the 2010 decennial census. Twenty-three municipalities have seen a net population increase, and one municipality saw no change from the 2010 decennial census to the 2020 decennial census. Based on this information, it can be speculated that twenty-three municipalities may have an increased vulnerability to extreme temperatures, since 2010, due to the increase in population. Populations in Huntingdon 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.

Municipalities with high vulnerability due to extreme temperature events:

- Barree Township
- Birmingham Borough
- Broad Top City Borough
- Cromwell Township
- Dublin Township
- Dudley Borough
- Henderson Township
- Hopewell Township
- Lincoln Township
- Logan Towns
- Marklesburg Borough
- Mill Creek Borough
- Miller Township
- MorrisTownship
- Saltillo Borough
- Shade Gap Borough
- Shirleysburg Borough
- Smithfield Township
- Three Springs Borough
- Walker Township
- Warriors Mark Township
- West Township
- Wood Township

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 Huntingdon 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 X - Average Minimum Temperature Trends for Pennsylvania

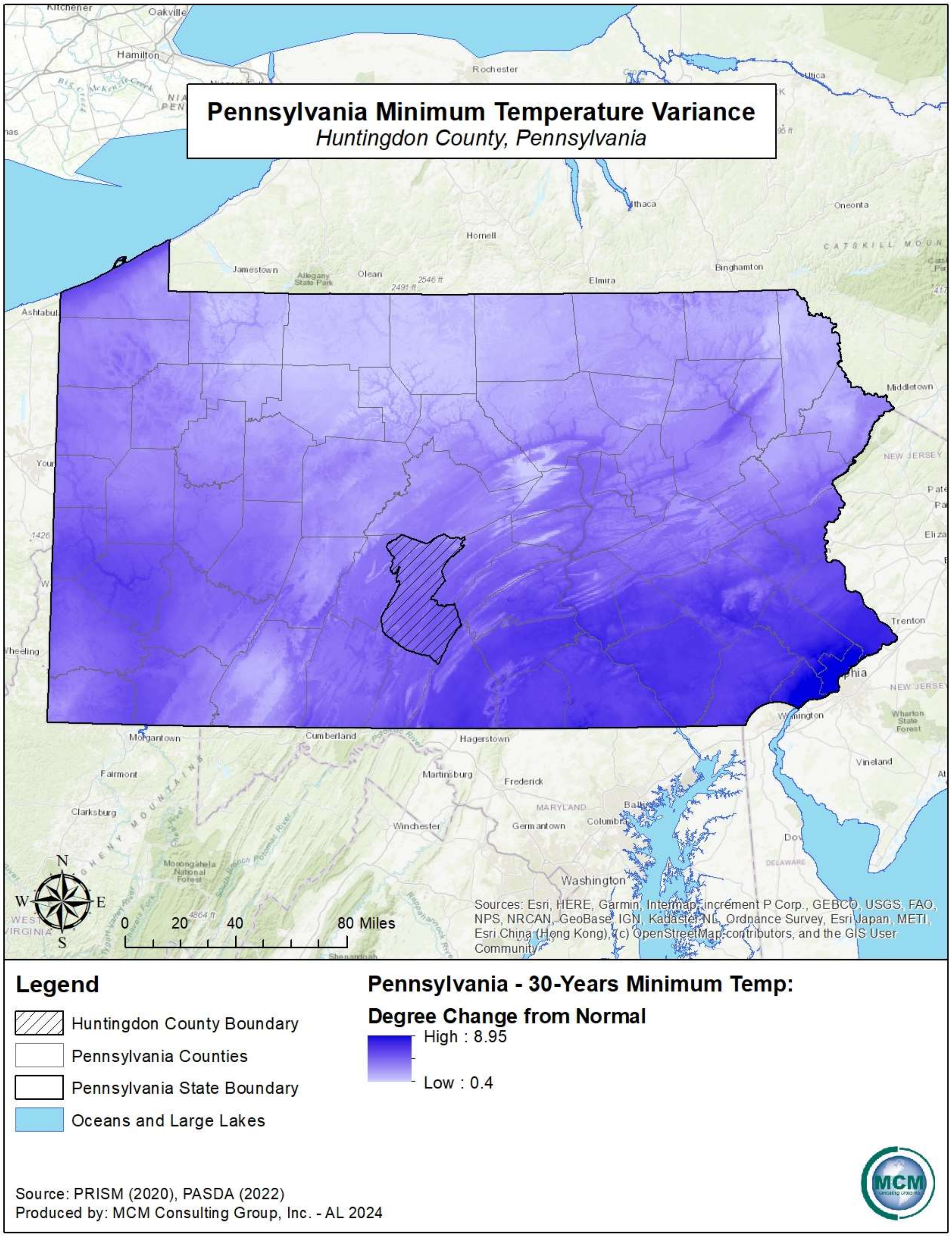
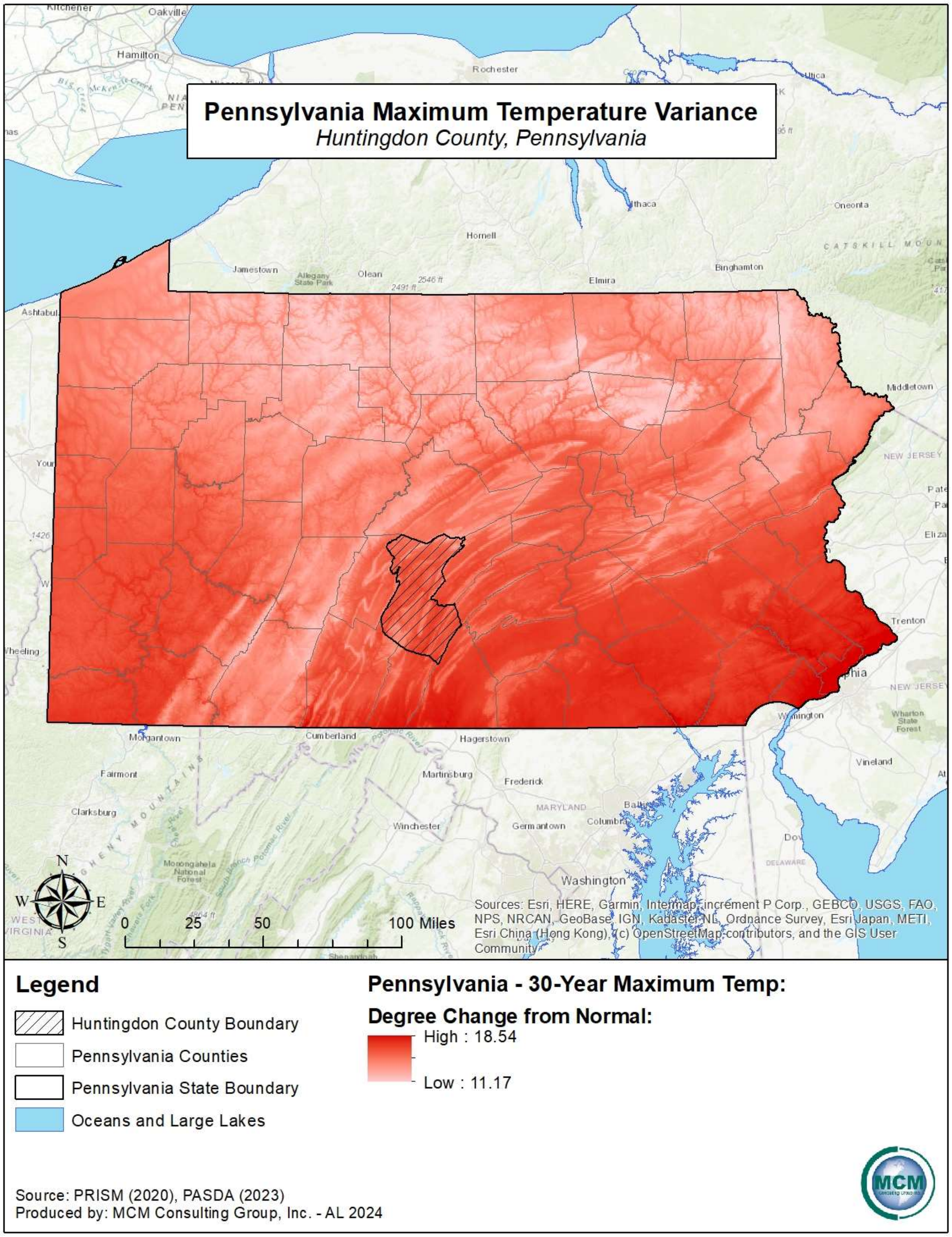


Figure X - Average Maximum Temperature Trends for Pennsylvania



4.3.4. Flood, Flash Flood, and Ice Jam Flood

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 Huntingdon 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 X – 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 Huntingdon 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 X – Flood Hazard High Risk Zones*. Appendix D of this hazard mitigation plan includes a flooding vulnerability map for each municipality in Huntingdon County with vulnerable structures and community lifeline facilities identified using the most current DFIRM data for Huntingdon 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 X – Flooding and Floodplain Diagram

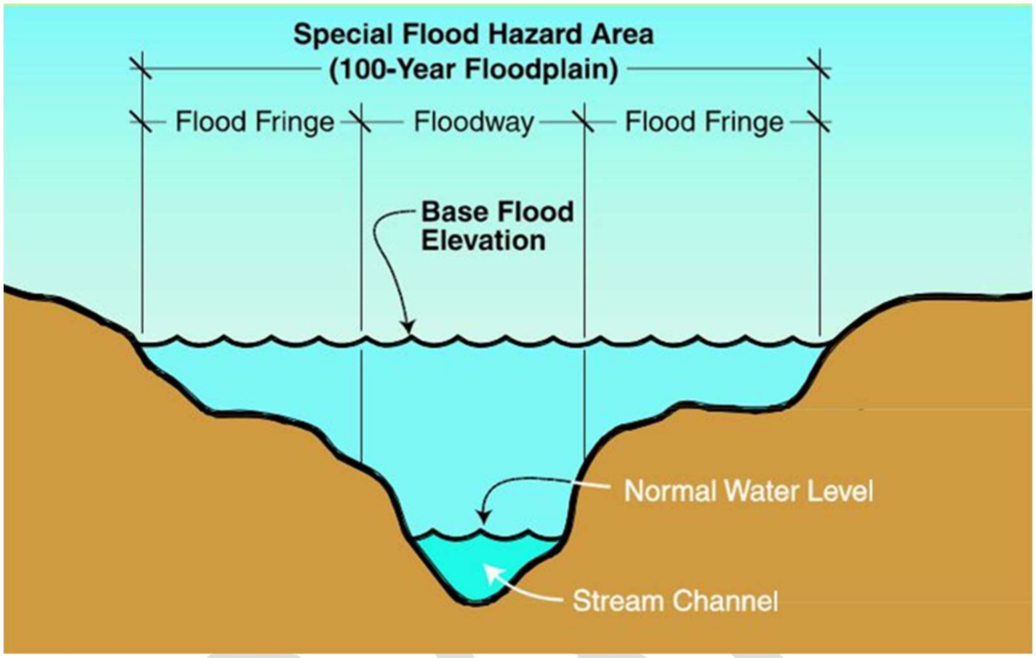


Table X – Flood Hazard High Risk Zones

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.
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 Juniata River Basin has caused significant flooding in Huntingdon County, specifically on the following streams, creeks, and their tributaries:

- Juniata River
    - Raystown Branch – Juniata River
    - Aughwick Creek
    - Standing Stone 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 Huntingdon 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 Huntingdon 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 span 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 home bound. 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 Huntingdon 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 Huntingdon 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 Huntingdon 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 X – 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 X – HAZUS Business Interruption Economic Loss Figures*. *Figure X – Loss by Occupancy Type* illustrates the breakdown of economic losses by either residential, commercial, industrial, or other use type.

Table X – HAZUS Building Loss Figures

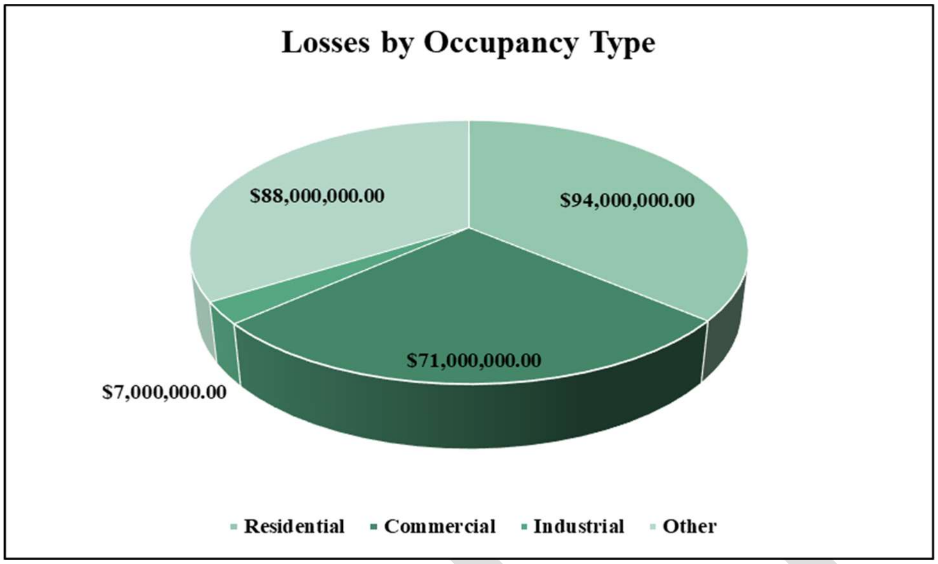
HAZUS Building Economic Loss Figures					
	Residential	**Commercial**	**Industrial**	**Other**	**Total**
Building:	$46,640,000.00	$6,230,000.00	$1,670,000.00	$2,890,000.00	$57,430,000.00
Content:	$23,020,000.00	$19,500,000.00	$4,080,000.00	$13,370,000.00	$59,970,000.00
Inventory:	$0.00	$290,000.00	$490,000.00	$330,000.00	$1,110,000.00
Subtotal:	**$69,660,000.00**	**$26,020,000.00**	**$6,240,000.00**	**$16,590,000.00**	**$118,510,000.00**
Source: HAZUS, 2024					

Table X – HAZUS Business Interruption Economic Loss Figures

HAZUS Business Interruption Economic Loss Figures					
	Residential	**Commercial**	**Industrial**	**Other**	**Total**
Income:	$560,000.00	$18,050,000.00	$120,000.00	$4,200,000.00	$22,930,000.00

HAZUS Business Interruption Economic Loss Figures					
	Residential	**Commercial**	**Industrial**	**Other**	**Total**
Relocation:	$15,930,000.00	$4,100,000.00	$110,000.00	$2,300,000.00	$22,440,000.00
Rental Income:	$6,660,000.00	$3,050,000.00	$20,000.00	$210,000.00	$9,940,000.00
Wage:	$1,340,000.00	$19,610,000.00	$200,000.00	$64,260,000.00	$85,410,000.00
Subtotal:	**$24,490,000.00**	**$44,810,000.00**	**$450,000.00**	**$70,970,000.00**	**$140,720,000.00**
Source: HAZUS, 2024					

Figure X – 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

Huntingdon 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 Huntingdon County from January 1996 to February 2024 is found in *Table X – 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 Huntingdon County's WebEOC information from 2020 to 2024.

Table X – Past Flood and Flash Flood Events

Past Flood and Flash Flood Events			
Event Location	**Event Date**	**Event Type**	**Property Damage Estimate**
Huntingdon County (Entire County)	01/19/1996	Flood	$0.00*
Huntingdon County (Entire County)	01/19/1996	Flash Flood	$0.00*
Huntingdon County (Southern Portion)	06/18/1996	Flash Flood	$0.00*
Shirleysburg Borough	06/20/1996	Flash Flood	$0.00*

Past Flood and Flash Flood Events			
Event Location	**Event Date**	**Event Type**	**Property Damage Estimate**
Huntingdon Borough	07/02/1996	Flash Flood	$0.00*
Huntingdon County (Entire County)	09/06/1996	Flash Flood	$0.00*
Huntingdon County (Southeast Portion)	09/13/1996	Flash Flood	$0.00*
Mount Union Borough	10/19/1996	Flash Flood	$0.00*
Huntingdon County (Entire County)	12/01/1996	Flash Flood	$0.00*
Huntingdon County (Entire County)	12/13/1996	Flash Flood	$0.00*
Huntingdon Borough	06/18/1997	Flash Flood	$0.00*
Huntingdon County (Entire County)	11/07/1997	Flash Flood	$0.00*
Huntingdon County (Entire County)	01/08/1998	Flash Flood	$0.00*
Huntingdon County (Entire County)	04/19/1998	Flash Flood	$0.00*
Huntingdon County (Entire County)	04/26/1998	Flash Flood	$0.00*
Alexandria Borough	07/07/1998	Flash Flood	$0.00*
Huntingdon County (Northern Portion)	07/08/1998	Flash Flood	$0.00*
Huntingdon County (Entire County)	01/23/1999	Flash Flood	$5,000.00*
Huntingdon Borough	07/28/2000	Flash Flood	$0.00*
Dudley Township	05/28/2002	Flash Flood	$5,000.00*
Huntingdon County (Entire County)	01/01/2003	Flood	$0.00*
Huntingdon County (Entire County)	01/02/2003	Flood	$0.00*
Huntingdon County (Entire County)	06/04/2003	Flood	$0.00*
Spruce Creek Township	09/27/2003	Flash Flood	$0.00*
Huntingdon County (Entire County)	11/19/2003	Flood	$0.00*
Huntingdon Borough	11/19/2003	Flash Flood	$0.00*
Huntingdon County (Entire County)	11/20/2003	Flood	$0.00*
Huntingdon County (Entire County)	12/11/2003	Flood	$0.00*
Huntingdon County (Entire County)	09/08/2004	Flood	$0.00*
Huntingdon County (Entire County)	09/09/2004	Flood	$0.00*
Huntingdon County (Entire County)	09/17/2004	Flood	$0.00*
Huntingdon County (Entire County)	09/18/2004	Flood	$0.00*
Huntingdon County (Entire County)	01/06/2005	Flood	$0.00*
Huntingdon County (Entire County)	03/28/2005	Flood	$0.00*
Huntingdon County (Entire County)	11/29/2005	Flood	$0.00*
Huntingdon County (Entire County)	11/30/2005	Flood	$0.00*
Huntingdon Borough	11/16/2006	Flash Flood	$0.00*
Huntingdon Borough	03/04/2008	Flood	$0.00*

Past Flood and Flash Flood Events			
Event Location	**Event Date**	**Event Type**	**Property Damage Estimate**
Union Township	05/28/2009	Flash Flood	$250,000.00*
Shade Gap Borough	03/13/2010	Flood	$0.00*
Springfield Township	05/23/2010	Flash Flood	$5,000.00*
Spruce Creek Township	12/01/2010	Flood	$10,000.00*
Todd Township	03/10/2011	Flood	$0.00*
Shirleysburg Borough	03/10/2011	Flood	$0.00*
Orbisonia Borough	04/16/2011	Flood	$0.00*
Henderson Township	05/03/2011	Flash Flood	$0.00*
Todd Township	09/01/2011	Flash Flood	$0.00*
Shirleysburg Borough	11/23/2011	Flood	$0.00*
West Township	03/11/2015	Flood	$0.00*
Shirley Township	09/01/2021	Flash Flood	$0.00*
		Total:	**$275,000.00***
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 X – 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 sixty repetitive loss properties in Huntingdon County. *Table X – Summary of Type of Repetitive Loss Properties by Municipality* illustrates the breakdown of type of repetitive loss properties in Huntingdon 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 X – Severe Repetitive Loss Properties* illustrates the communities within Huntingdon 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 Huntingdon County participate in the NFIP. Information on each participating municipality can be found in *Table X – Municipal NFIP Policies & Vulnerability*.

Table X – Repetitive Loss Properties

Repetitive Loss Properties						
Community Name	**Community Number**	**Cumulative Building Payment**	**Cumulative Contents Payment**	**Sum of Total Paid**	**Losses**	**Properties**
Alexandria Borough	420481	$75,723.18	$5,211.79	$80,934.97	3	1
Alexandria Borough	420481	$134,425.31	$16,600.00	$151,025.31	3	1
Alexandria Borough	420481	$8,615.85	$0.00	$8,615.85	2	1
Alexandria Borough	420481	$41,965.01	$0.00	$41,965.01	3	1
Alexandria Borough	420481	$8,184.30	$11,732.97	$19,917.27	2	1
Alexandria Borough	420481	$21,186.54	$0.00	$21,186.54	3	1
Alexandria Borough	420481	$65,147.21	$0.00	$65,147.21	3	1
Alexandria Borough	420481	$45,227.60	$1,200.00	$46,427.60	5	1
Alexandria Borough	420481	$90,960.27	$0.00	$90,960.27	2	1
Alexandria Borough	420481	$50,878.33	$6,623.87	$57,502.20	3	1
Alexandria Borough	420481	$53,817.42	$731.84	$54,549.26	2	1
Alexandria Borough	420481	$51,701.31	$0.00	$51,701.31	3	1
Brady Township	421684	$55,478.65	$27,769.35	$83,248.00	2	1
Cromwell Township	421688	$4,622.87	$0.00	$4,622.87	2	1
Cromwell Township	421688	$108,436.57	$0.00	$108,436.57	3	1
Franklin Township	422573	$11,067.65	$1,369.74	$12,437.39	2	1
Henderson Township	420960	$35,649.74	$0.00	$35,649.74	2	1

Repetitive Loss Properties						
Community Name	Community Number	Cumulative Building Payment	Cumulative Contents Payment	Sum of Total Paid	Losses	Properties
Henderson Township	420960	$19,722.28	$6,400.00	$26,122.28	3	1
Henderson Township	420960	$27,440.28	$1,777.64	$29,217.92	2	1
Henderson Township	420960	$44,454.81	$8,001.48	$52,456.29	2	1
Henderson Township	420960	$82,471.06	$4,078.30	$86,549.36	2	1
Huntingdon Borough	420486	$25,750.02	$27,800.00	$53,550.02	4	1
Huntingdon Borough	420486	$13,300.00	$100,650.58	$113,950.58	2	1
Huntingdon Borough	420486	$14,580.07	$16,653.67	$31,233.74	2	1
Huntingdon Borough	420486	$57,787.87	$7,361.92	$65,149.79	3	1
Huntingdon Borough	420486	$141,897.12	$80,932.08	$222,829.20	2	1
Huntingdon Borough	420486	$6,912.92	$5,000.00	$11,912.92	2	1
Huntingdon Borough	420486	$19,488.11	$5,451.70	$24,939.81	2	1
Huntingdon Borough	420486	$9,414.46	$470.75	$9,885.21	2	1
Huntingdon Borough	420486	$133,912.04	$61,872.50	$195,784.54	2	1
Huntingdon Borough	420486	$14,214.34	$0.00	$14,214.34	2	1
Juniata Township	421692	$6,804.93	$6,207.38	$13,012.31	2	1
Mapleton Borough	420487	$12,451.68	$0.00	$12,451.68	2	1
Mill Creek Borough	420488	$76,737.10	$13,500.00	$90,237.10	2	1

Repetitive Loss Properties						
Community Name	Community Number	Cumulative Building Payment	Cumulative Contents Payment	Sum of Total Paid	Losses	Properties
Mount Union Borough	420489	$1,846.53	$1,574.57	$3,421.10	2	1
Oneida Township	421697	$7,191.67	$1,376.00	$8,567.67	2	1
Oneida Township	421697	$7,922.61	$1,089.73	$9,012.34	2	1
Petersburg Borough	420490	$85,408.44	$11,883.75	$97,292.19	3	1
Petersburg Borough	420490	$43,302.32	$1,022.17	$44,324.49	4	1
Petersburg Borough	420490	$20,293.48	$1,245.14	$21,538.62	2	1
Petersburg Borough	420490	$41,090.10	$7,420.00	$48,510.10	2	1
Petersburg Borough	420490	$19,095.82	$3,056.96	$22,152.78	2	1
Porter Township	421699	$30,859.25	$4,743.35	$35,602.60	4	1
Porter Township	421699	$45,240.25	$10,450.86	$55,691.11	4	1
Porter Township	421699	$50,490.81	$8,859.52	$59,350.33	4	1
Porter Township	421699	$21,116.58	$6,311.86	$27,428.44	3	1
Porter Township	421699	$119,478.79	$12,160.00	$131,638.79	3	1
Porter Township	421699	$42,024.75	$7,435.78	$49,460.53	3	1
Porter Township	421699	$42,575.10	$10,000.00	$52,575.10	2	1
Porter Township	421699	$12,240.02	$3,122.82	$15,362.84	2	1
Shirley Township	421700	$32,548.41	$7,400.00	$39,948.41	4	1

Repetitive Loss Properties						
Community Name	Community Number	Cumulative Building Payment	Cumulative Contents Payment	Sum of Total Paid	Losses	Properties
Shirley Township	421700	$21,253.88	$11,265.28	$32,519.16	3	1
Shirley Township	421700	$30,115.30	$6,332.69	$36,447.99	2	1
Shirley Township	421700	$12,302.32	$3,645.96	$15,948.28	2	1
Smithfield Township	420494	$16,142.47	$3,729.49	$19,871.96	2	1
Walker Township	422577	$22,206.58	$11,202.47	$33,409.05	2	1
Walker Township	422577	$4,287.09	$0.00	$4,287.09	2	1
Walker Township	422577	$78,297.53	$21,852.73	$100,150.26	2	1
Walker Township	422577	$17,828.03	$0.00	$17,828.03	2	1
Walker Township	422577	$2,748.78	$1,830.20	$4,578.98	2	1
	Total:	**$2,398,333.81**	**$576,408.89**	**$2,974,742.70**	**150**	**60**
Source: FEMA, 2024						

Table X – 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
Alexandria	1	2	11	0	0
Brady Township	0	0	1	0	0
Cromwell Township	0	0	2	0	0
Franklin Township	0	0	1	0	0
Henderson Township	0	0	5	0	0
Huntingdon Borough	4	0	6	0	0

Juniata Township	0	0	1	0	0
Mapleton Borough	0	0	1	0	0
Mill Creek Borough	1	0	0	0	0
Mount Union Borough	0	0	1	0	0
Oneida Township	0	0	3	0	0
Petersburg Borough	0	0	5	0	0
Porter Township	0	0	8	0	0
Shirley Township	0	0	5	0	0
Smithfield Township	1	0	1	0	0
Walker Township	0	0	5	0	0
Source: FEMA, 2024					

Table X – Severe Repetitive Loss Properties

Severe Repetitive Loss Properties						
Community Name	**Community Number**	**Cumulative Building Payments**	**Cumulative Contents Payments**	**Sum of Total Paid**	**Losses**	**Properties**
Alexandria Borough	420481	$93,820.27	$17,340.34	$111,160.61	4	1
Alexandria Borough	420481	$24,000.00	$14,694.65	$38,694.65	2	1
Oneida Township	421697	$55,038.19	$31,357.63	$86,395.82	9	1
Shirley Township	421700	$104,109.76	$16,574.97	$120,684.73	6	1
Smithfield Township	420494	$1,159,535.41	$1,509,504.88	$2,669,040.29	7	1
Total:		**$1,436,503.63**	**$1,589,472.47**	**$3,025,976.10**	**28**	**5**
Source: FEMA, 2024						

Table X – Municipal NFIP Policies & Vulnerability

Municipal Participation in the National Flood Insurance Program			
Municipal Name	**Community Number**	**Initial FHBM**	**Latest Mapping Dates**
Alexandria Borough	420481	09/14/1973	10/16/2012
Barree Township	421683	12/06/1974	10/16/2012
Birmingham Borough	420482	12/06/1974	05/02/2018

Municipal Participation in the National Flood Insurance Program			
Municipal Name	**Community Number**	**Initial FHBM**	**Latest Mapping Dates**
Brady Township	421684	01/24/1975	10/16/2012
Broad Top City Borough	420483	01/10/1975	NSFHA
Carbon Township	421685	01/10/1975	10/16/2012
Cass Township	421686	12/29/1974	10/16/2012
Cassville Borough	422703	N/A	NSFHA
Clay Township	421687	12/13/1974	10/16/2012
Coalmont Borough	420484	03/28/1975	10/16/2012
Cromwell Township	421688	12/27/1974	10/16/2012
Dublin Township	421689	12/13/1974	10/16/2012
Dudley Borough	421681	11/08/1974	10/16/2012
Franklin Township	422573	12/27/1974	05/02/2018
Henderson Township	420960	05/31/1974	10/16/2012
Hopewell Township	421690	12/06/1974	10/16/2012
Huntingdon Borough	420486	12/06/1974	10/16/2012
Jackson Township	421691	12/13/1974	10/16/2012
Juniata Township	421692	01/17/1975	10/16/2012
Lincoln Township*	421693	01/03/1975	10/16/2012
Logan Township	421694	12/06/1974	10/16/2012
Mapleton Borough	420487	09/07/1973	10/16/2012
Marklesburg Borough	422574	01/31/1975	10/16/2012
Mill Creek Borough	420488	12/13/1974	10/16/2012
Miller Township	421695	11/29/1974	10/16/2012
Morris Township	421696	11/22/1974	05/02/2018
Mount Union Borough	420489	08/24/1973	10/16/2012
Oneida Township	421697	01/10/1975	10/16/2012
Orbisonia Borough	421682	11/08/1974	10/16/2012
Penn Township	421698	12/06/1974	10/16/2012
Petersburg Borough	420490	07/30/1976	10/16/2012
Porter Township	421699	12/06/1974	10/16/2012
Rockhill Borough	422575	01/17/1975	10/16/2012
Saltillo Borough	420492	01/31/1975	10/16/2012
Shirley Township	421700	12/13/1974	10/16/2012
Shirleysburg Borough	420493	11/15/1974	10/16/2012
Smithfield Township	420494	02/08/1974	10/16/2012
Springfield Township	421701	12/13/1974	10/16/2012

Municipal Participation in the National Flood Insurance Program			
Municipal Name	**Community Number**	**Initial FHBM**	**Latest Mapping Dates**
Spruce Creek Township	422621	12/20/1974	05/02/2018
Tell Township	421702	01/24/1975	10/16/2012
Three Springs Borough	422576	01/24/1975	10/16/2012
Todd Township	421703	12/27/1974	10/16/2012
Union Township	421704	12/06/1974	10/16/2012
Walker Township	422577	01/10/1975	10/16/2012
Warriors Mark Township	421705	01/17/1975	05/02/2018
West Township	421706	01/17/1975	10/16/2012
Wood Township	421707	12/20/1974	10/16/2012
Source: FEMA, 2024 Note: FHBM: Flood Hazard Boundary Map, NSFHA: No Special Flood Hazard Area *Denotes a non-participating community			

4.3.4.4 Future Occurrence

Flooding is a frequent problem throughout the Commonwealth of Pennsylvania. Huntingdon County will certainly be impacted by flooding events in the future, as Huntingdon 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 X – Flood Probability Summary*.

Table X – 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 Huntingdon 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 Huntingdon 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

Huntingdon 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 Huntingdon County, with vulnerable structures and community lifeline facilities that are located within the special flood hazard area.

Table X – 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 three facilities that are estimated to be at least moderately damaged by a 100-year flooding event in the HAZUS Level Two scenario that was completed for Huntingdon County. Of those three facilities that are estimated to be moderately damaged by the scenario, all three of those facilities will undergo a loss of use. Two fire stations will experience a loss of use. No hospitals will experience a loss of use. Also, one school will experience enough damage to result in loss of use and the education of the students would need to be moved to another location until such a time that repairs can be completed. Plans for such an event, and the damage that would result to essential facilities, must be in place to successfully mitigate the potential disruption to community lifeline facilities.

Table X - 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	18	2	0	2
Hospitals	1	0	0	0
Police Stations	5	0	0	0
Schools	29	1	0	1

Table X - 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 Huntingdon County GIS Department.

Table X - 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**
Alexandria Borough	183	0
Barree Township	466	0
Birmingham Borough	70	0
Brady Township	754	0
Broad Top City Borough	247	0
Carbon Township	327	0
Cass Township	1,055	0
Cassville Borough	120	0
Clay Township	1,042	0
Coalmont Borough	74	0
Cromwell Township	1,627	1
Dublin Township	1,281	0

County Structures Within Special Flood Hazard Area		
Municipality	**Site Structure Address Points Within Flood Area**	**Community Lifelines within Flood Area**
Dudley Borough	156	0
Franklin Township	575	0
Henderson Township	827	0
Hopewell Township	801	0
Huntingdon Borough	3,814	4
Jackson Township	1,132	0
Juniata Township	566	3
Lincoln Township	554	0
Logan Township	562	2
Mapleton Borough	251	2
Marklesburg Borough	239	0
Mill Creek Borough	187	0
Miller Township	465	0
Morris Township	392	0
Mount Union Borough	1,472	0
Oneida Township	800	0
Orbisonia Borough	286	0
Penn Township	1,147	1
Petersburg Borough	234	1
Porter Township	1,490	0
Rockhill Borough	270	0
Saltillo Borough	234	0
Shade Gap Borough	48	0
Shirley Township	2,424	1
Shirleysburg Borough	110	0
Smithfield Township	1,302	5
Springfield Township	852	1
Spruce Creek Township	279	0
Tell Township	837	0
Three Springs Borough	320	0
Todd Township	1,223	1
Union Township	1,133	0
Walker Township	1,206	0
Warriors Mark Township	1,307	0
West Township	558	0

County Structures Within Special Flood Hazard Area		
Municipality	**Site Structure Address Points Within Flood Area**	**Community Lifelines within Flood Area**
Wood Township	584	0
Totals:	**35,883**	**22**

Table X – 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 Huntingdon County. This information was compiled using Huntingdon County's GIS information with the assistance of the Huntingdon County GIS Department.

Table X – Community Lifeline Facilities Additional Information

Community Lifeline Facilities Additional Information		
Type of Facility:	**Facility Name:**	**Municipality:**
Community Lifelines		
National Register of Historic Places - Structure	St. Mary's Covered Bridge	Cromwell Township
Drug Take Back Location	Weis Markets	Huntingdon Borough
Fire Department	Huntingdon H&L Company 5	
Grocery Store	Weis Markets	
National Register of Historic Places - Building	Lloyd and Henry Warehouse	
Electric Substation	William F. Matson Generating Station	Juniata Township
National Register of Historic Places - Structure	Corbin Bridge	
Power Plant	William F. Matson Generating Station	
National Register of Historic Places - Structure	PA Railroad Bridge – Shavers Creek	Logan Township
Power Plant	Warrior Ridge Hydro	
Fire Department	Mapleton Company 2	Mapleton Borough
National Register of Historic Places - Building	H.O. Andrews Feed Mill	

Community Lifeline Facilities Additional Information		
Type of Facility:	**Facility Name:**	**Municipality:**
National Register of Historic Places - Building	Brumbaugh Homestead	Penn Township
Fire Department	Petersburg Company 4	Petersburg Borough
National Register of Historic Places - Structure	Runk Bridge	Shirley Township
Butcher	Brenneman's Meat Market	Smithfield Township
Electric Substation	UNKNOWN123848	
Fire Department	Smithfield Company 10	
Grocery Store	GIANT	
Medical Clinic	Convenient Care Center	
National Register of Historic Places - Structure	Frehn Bridge	Springfield Township
National Register of Historic Places - Structure	Baker Bridge	Todd Township

In addition to the items listed above, there are three properties that are considered historic and cultural for Huntingdon County that are registered with the National Register of Historic Place that are in the Special Flood Hazard Area. These properties are the Brumbaugh Homestead, the H.O. Andrews Feed Mill, and the Lloyd and Henry Warehouse. These locations are at an increased risk of flooding due to annual flood events unless mitigated.

Flash Flooding

Flash flooding is a common occurrence in Huntingdon 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 Huntingdon 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 X – Past Flood and Flash Flood Events* above.

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

- Alexandria Borough
- Huntingdon Borough
- Mount Union Borough

- Springfield Township
- Union Township

Although the above locations were identified as vulnerable areas in Huntingdon County, they are not the only locations that are vulnerable to flash flooding. The Huntingdon 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):

- Alexandria Borough
- Barree Township
- Birmingham Borough
- Brady Township
- Carbon Township
- Cass Township
- Clay Township
- Coalmont Borough
- Cromwell Township
- Dublin Township
- Dudley Borough
- Franklin Township
- Henderson Township
- Hopewell Township
- Huntingdon Borough
- Jackson Township
- Juniata Township
- Lincoln Township
- Logan Township
- Mapleton Borough
- Marklesburg Borough
- Mill Creek Borough
- Miller Township
- Morris Township
- Mount Union Borough
- Oneida Township
- Orbisonia Borough
- Penn Township
- Petersburg Borough

- Porter Township
- Rockhill Borough
- Saltillo Borough
- Shirley Township
- Shirleysburg Borough
- Smithfield Township
- Springfield Township
- Spruce Creek Township
- Tell Township
- Three Springs Borough
- Todd Township
- Union Township
- Walker Township
- Warriors Mark Township
- West Township
- Wood Township

All of the population of Huntingdon County, including the unserved and the underserved populations, are at an increased vulnerability to flooding hazards. Most of the municipalities in Huntingdon 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 Huntingdon 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 Juniata River.

Systems in Huntingdon County are at increased vulnerability to flooding hazards. All of the utilities in Huntingdon 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 Huntingdon County.

While flooding does not typically adversely affect natural areas, a comprehensive vulnerability assessment was completed for natural areas in Huntingdon 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 Huntingdon County:

- State Game Land 67
- State Game Land 71
- State Game Land 81

- State Game Land 99
- State Game Land 112
- State Game Land 118
- State Game Land 121
- State Game Land 251
- State Game Land 322
- Rothrock State Forest
- Standing Stone Creek Access
- Trough Creek State Park
- Tuscarora State Forest
- Whipple Dam State Park

Not all of these locations will be impacted by every flooding event in Huntingdon 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 X – Population Change in Huntingdon County,* ten 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 ten 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 Huntingdon 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 Huntingdon 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. Hailstorm

4.3.5.1 Location and Extent

Hail is possible within most thunderstorms. It is produced by cumulonimbus (storm clouds) and within two nautical miles of the parent storm. In the form of solid precipitation, hail is produced when an ice crystal collects additional water in the lower part of the storm but is pushed upward by the storm's updraft. The liquid water freezes in the upper regions of the storm, making the ice crystal larger, this is also known as a hailstone. The hail will continue to grow in this manner until its weight exceeds the force of the updraft. Hailstones can take the shape of spheres or irregular lumps of ice.

Hailstorms are not limited to any particular geographic area of the county. Prediction of the duration of the storm, nor the extent of area affected by such an occurrence, can be predicted.

4.3.5.2 Range of Magnitude

Hailstones can measure between 0.2 inches to six inches in diameter. The METAR (a format for reporting weather information, predominately used by pilots) reporting code for hail 0.20 inches or greater is GR, while smaller hailstones are coded GS. Hail that is larger than 0.80 inches are usually considered large enough to cause notable damage. The US National Weather Service issues severe thunderstorm warnings when expected hail is 1 inch or greater in diameter.

National Oceanic and Atmospheric Administration Skywarn program requests trained Skywarn Spotters measure hail with a ruler, but if one is not available, related terms can be used. See *Table X - Size of hail in related terms.* Hail should only be measured when it is safe to do so.

Table X – Size of hail in related terms

Size of hail in related terms	
Related item	**Size of hail**
BB	Less than 1/4"
Pea	1/4"
Dime	7/10"
Penny	3/4"
Nickel	7/8"
Quarter	1"
Half Dollar	1 1/4"
Walnut or ping-pong ball	1 1/2"
Golf ball	1 3/4"
Lime	2"
Tennis ball	2 1/2"
Baseball	2 3/4"
Large apple	3"
Softball	4"
Grapefruit	4 1/2"

Environmental and other impacts from hailstorms ranges from:

- Crop production damage;

- Flooding caused by accumulation of hail that blocks drains;
- Loss of electric power;
- Trees brought down;
- Flash flooding; and,
- Mudslides.

4.3.5.3 Past Occurrence

In the 1960's the National Weather Service (NWS) developed the Skywarn® program. Skywarn® has trained weather spotters who provide reports of severe weather to NWS. These reports assist meteorologists to make life-saving warning decisions. Concerned citizens, amateur radio operators, truck drivers, emergency management personnel and others volunteer their time and energy to report hazardous weather impacting their communities.

Even with data from Doppler radar, satellite, and surface weather stations, NWS technology cannot detect every instance of weather such as hail. So, reports from Skywarn® volunteers is a vital service for making warnings to those in the storm's path.

NOAA's National Weather Service storm prediction center reports on hail events for Huntingdon County are detailed in *Table X – National Weather Service Hail Reports*.

Table X – National Weather Service Hail Reports

National Weather Service Hail Reports			
Date	**Time**	**Location**	**Size (inches)**
04/09/2021	16:40	Spruce Creek	1.00
05/26/2001	17:20	Huntingdon	0.88
07/10/2001	13:30	Huntingdon	1.75
04/28/2002	16:00	Orbisonia	1.00
05/07/2003	14:25	Petersburg	0.88
06/06/2005	14:32	Shade Gap	0.88
07/09/2006	13:28	Saltillo	0.75
07/18/2006	15:15	Mapleton	0.88
05/10/2007	16:30	Broad Top City	0.88
08/30/2007	16:01	Warriors Mark	0.75

National Weather Service Hail Reports			
Date	**Time**	**Location**	**Size (inches)**
06/22/2008	15:15	Three Springs	1.00
06/22/2008	18:00	Entriken	1.00
07/24/2008	13:52	Alexandria	0.88
06/10/2009	16:10	Mount Union	0.75
05/27/2011	16:18	Todd	1.75
05/27/2011	16:24	Cassville	1.25
05/29/2012	13:15	Huntingdon	1.00
07/18/2012	12:31	Broad Top City	1.00
07/27/2014	16:26	McConnellstown	1.00
04/20/2015	18:10	Warriors Mark	1.00
05/30/2017	12:13	Alexandria	1.00
05/03/2019	17:17	Todd	0.88
05/23/2019	19:52	Dungarvin	1.00
05/23/2019	20:00	Neff Mills	1.75
08/04/2023	17:32	Mapleton	1.50

It should be noted that all occurrences of hail in Huntingdon County may not have been recorded in the table above. This is due to lack of reports to the NWS, either because the hail happened at uninhabited locations, during overnight hours, or residents that observed the hail were not Skywarn® spotters.

4.3.5.4 Future Occurrence

Hailstorms are associated with thunderstorms and should be considered highly likely for Huntingdon County. While death and severe injury are rarely attributed to hailstorms, they still pose a threat to unsheltered peoples, vehicles, livestock, crops, and even structures, so vulnerability to the hazard should continue to be monitored. Huntingdon County should expect to see moderate hailstorm weather events, and the hazards which they entail, perpetuate.

Climate change can influence hailstorms through several methods. Rising global temperatures can lead to increased atmospheric moisture, providing more fuel for severe thunderstorms that spawn hail. Changes in atmospheric circulation patterns may also contribute, altering the conditions to favor hail formation. Warmer temperatures can elevate the freezing level in the atmosphere, allowing hailstones to grow larger before reaching the ground. Additionally, shifts in wind patterns may affect the distribution and intensity of storms, influencing hailstorm frequency and severity. Climate change-induced changes in precipitation patterns may also impact the availability of supercooled water needed for hailstone formation. Overall, the complex interplay of atmospheric factors influenced by climate change contributes to the alteration of hailstorm characteristics, potentially leading to more intense and frequent hail events with broader implications for agriculture, infrastructure, and communities.

4.3.5.5 Vulnerability Assessment

Automobiles, aircraft, skylights, livestock, and farmers' crops can all be seriously damaged by hail. The National Weather Service estimates that large hailstorms events cause over one-billion USD in damages to agriculture every year.

Hail can damage vehicles in Huntingdon County. There are estimated to be 25,630 passenger vehicles, 11,873 trucks, and 198 buses in Huntingdon County in 2023 according to vehicle registrations from the Pennsylvania Department of Transportation Bureau of Motor Vehicles.

Roofs can also be damaged by hail, although it often goes undetected until structural damage is seen, such as leaks and cracks. Although it is rare, hail has been known to cause concussions or fatal head traumas to humans. To alleviate damage from hail, automobiles could be placed in garages, grounded aircraft could be placed in hangers, and livestock and people could be moved inside structures during the storm. Unfortunately crops, skylights, roofs, and flying aircraft are unable to be protected from hail.

As seen in *Table X – Population Change in Huntingdon County*, twenty-four of the forty-eight municipalities in Huntingdon County have experienced a population loss since the previous decennial census in 2010. However, twenty-three municipalities saw minor, total population growth over the same period, while one municipality saw no change in population. Based on this information, it can be speculated that these twenty-three municipalities may have an increased vulnerability of impacts from hailstorm, since 2010, due to the increase in population.

Municipalities with high vulnerability to hailstorm:

- Barree Township
- Birmingham Borough
- Broad Top City Borough
- Cromwell Township
- Dublin Township
- Dudley Borough
- Henderson Township
- Hopewell Township
- Lincoln Township
- Logan Towns
- Marklesburg Borough
- Mill Creek Borough
- Miller Township
- MorrisTownship

- Saltillo Borough
- Shade Gap Borough
- Shirleysburg Borough
- Smithfield Township
- Three Springs Borough
- Walker Township
- Warriors Mark Township
- West Township
- Wood Township

Hailstorms may, at times, disproportionately impact underserved, unserved, and socially vulnerable populations, exacerbating existing disparities. Vulnerable communities often lack resources to fortify homes or vehicles against hail damage, resulting in severe property losses.

Land use changes, such as urbanization and deforestation, can indirectly impact hailstorms. Urban heat islands, created by increased impervious surfaces, may alter local temperature patterns. Changes in surface roughness due to urban development can influence wind dynamics. Additionally, variations in land cover affect local atmospheric moisture levels, potentially influencing the intensity and dynamics of thunderstorms conducive to hail formation.

Hailstorms impact both natural and cultural areas through physical damage and economic consequences. In natural ecosystems, hail can harm crops, disrupt ecological balance, and damage vegetation. Forests may suffer tree loss and habitat disruption. In cultural areas, agriculture faces significant economic losses, affecting livelihoods and food supply. Infrastructure, such as buildings and vehicles, can incur damage, leading to financial burdens for communities.

Hailstorms can directly impact historic and cultural properties in Huntingdon County. There are nine historic and cultural properties and approximately eight historic structures in Huntingdon County that could be damaged by hail and hail events. Hail can damage older building materials, delicate building materials and finishes, specifically glass. All of the historic and cultural properties in Huntingdon County are vulnerable, but it is unlikely that all of the properties would be impacted by the same hail event. Localized vulnerability is of paramount concern.

Systems and community lifelines can be significantly vulnerable to hailstorm events in Huntingdon County. Power lines and power utilities can be damaged and made inoperable by hail events if that hail is of sufficient diameter to bring down power transmission lines or damage electric substations. Water and wastewater utilities can be damaged by hail, as tanks and basins can be damaged by the impact of hail. Transmission lines for these utilities are not a primary concern, because those are typically located underground and are not usually impacted by hail. Roads and transportation systems could be moderately impacted by hail, but those impacts are primarily related to vehicle impacts.

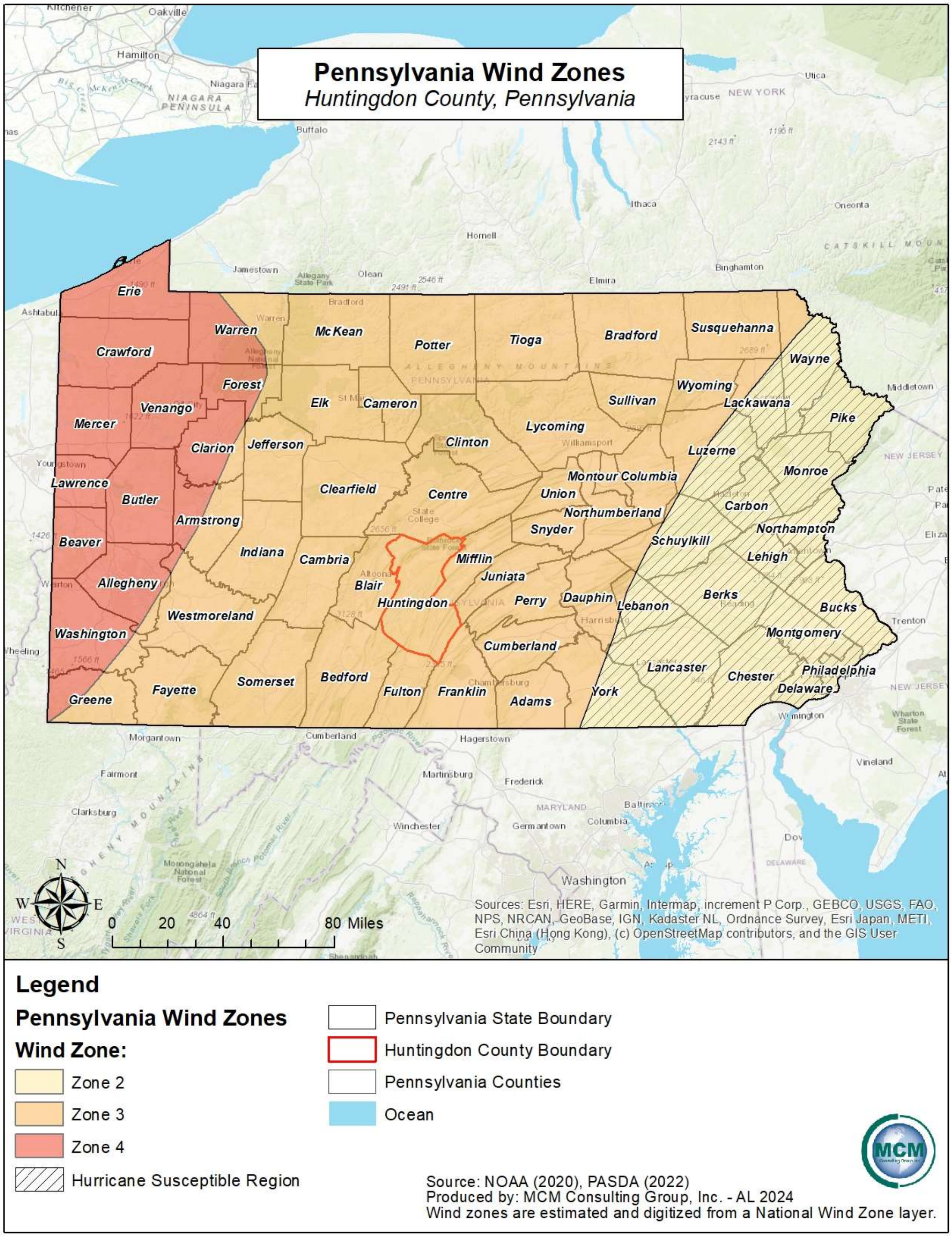
4.3.6. Hurricane and Tropical Storm

4.3.6.1 Location and Extent

Huntingdon 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 Huntingdon 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 Huntingdon County is located about 180 miles inland of the East Coast of the United States, tropical storms can track inland and cause heavy rainfall and strong winds. Huntingdon County is located inland of the East Coast region, designated by FEMA, as being Hurricane-Susceptible (see *Figure X – Pennsylvania Wind Zones*). Huntingdon County falls within wind zone three as shown in *Figure X – Pennsylvania Wind Zones*. Wind zone three 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 Huntingdon County are equally subject to the impacts of hurricanes and tropical storms that track near the county. Areas in Huntingdon County which are subject to flooding, wind, and winter storm damage are particularly vulnerable.

Figure X – Pennsylvania Wind Zones



4.3.6.2 Range of Magnitude

4.3.6.2 Range of Magnitude

Table X – 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

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 L. Expected damage from hurricane force winds is measured using the Saffir-Simpson Scale (*Table X – 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 Huntingdon 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.

4.3.6.3 Past Occurrence

Table X - History of Coastal Storms Impacting Huntingdon County lists all coastal storms that have impacted Huntingdon County from 1855 to 2024 *Figure X – Historic Tropical Storms/Hurricanes in Pennsylvania* identifies some past hurricanes that had an inland path through Pennsylvania. Hurricane Agnes was a severe coastal storm event in June 1972 that impacted Huntingdon 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, one of which occurred in Huntingdon County. The county was further impacted by extensive property and infrastructural damage**.** 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 Huntingdon County Although they were separate events, Hurricane Irene and Tropical Storm Lee together caused significant rainfall in Huntingdon 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.

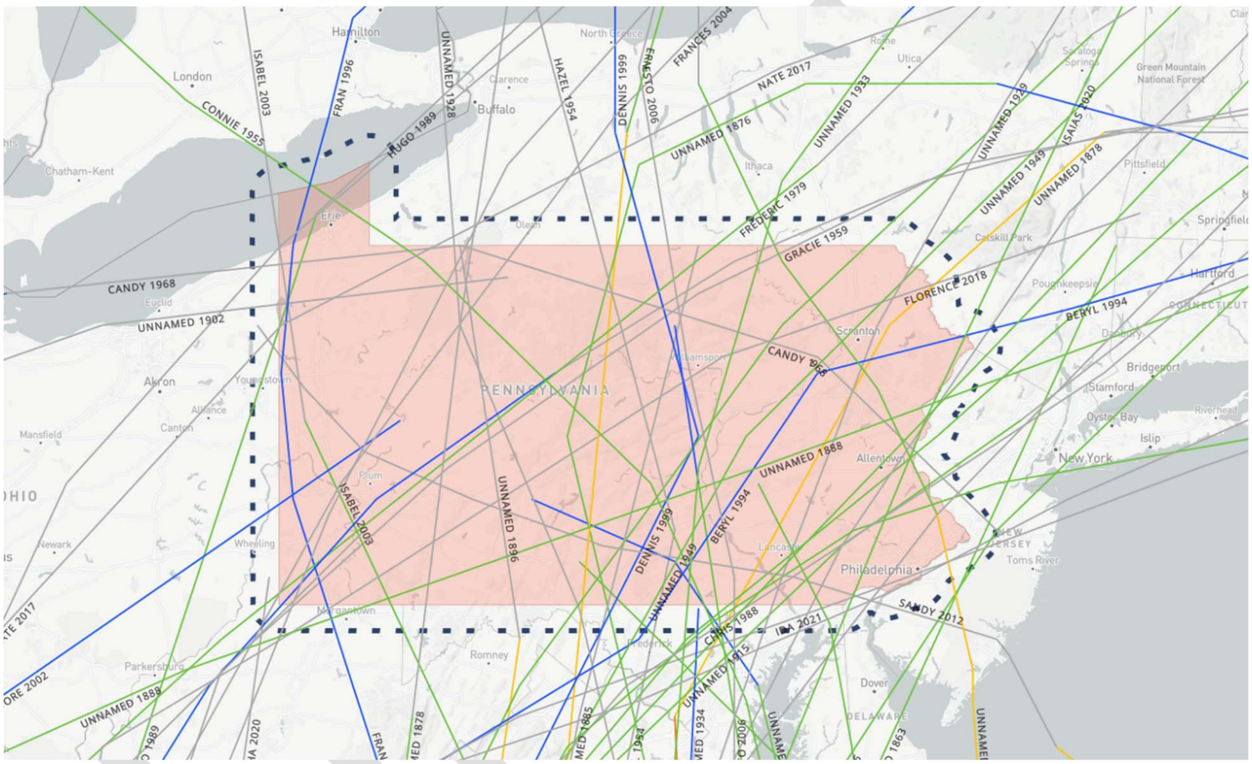
Hurricane Sandy was another coastal storm event that caused significant damage to Huntingdon County. Sandy caused significant wind damage and utility interruptions and led to a fourteen-day disaster declaration. Hurricane Sandy ranks among the most damaging coastal storms to ever impact Huntingdon County. Many areas of the county were without power for an extended period. The damage in Huntingdon County had an assessed public assistance per capita cost of $3.86. The total statewide public assistance cost was estimated at $20,146,356.

Table X - History of Coastal Storms Impacting Huntingdon County

History of Coastal Storms Impacting Huntingdon County			
Year	**Name**	**Speed (in knots) at time of county impact**	**Category**
2021	Ida	Extratropical Storm	Extratropical Storm
2021	Fred	20 Knots	Tropical Depression
2018	Florence	25 Knots	Extratropical Storm
2012	Sandy	50 Knots	Extratropical Storm
2006	Ernesto	35 Knots	Extratropical Storm
2004	Frances	30 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

History of Coastal Storms Impacting Huntingdon County			
Year	**Name**	**Speed (in knots) at time of county impact**	**Category**
1954	Hazel	70 Knots	Extratropical Storm
1952	Able	50 Knots	Tropical Storm
Source: NOAA, 2024			

Figure X – Historic Tropical Storms/Hurricanes in Pennsylvania –



4.3.6.4 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 X – Annual Probability of Wind Speeds* shows the annual probability of winds that reach the strength of tropical storms and hurricanes in Huntingdon County and the surrounding areas based on a sample period of forty-six years. According to FEMA, there is a very low probability each year that Huntingdon County will experience winds from coastal storms that could cause minimal to moderate damages (*Table X – Annual Probability of Wind Speeds).* The potential future impacts from a tropical storm or hurricane will be moderate. The probability of winds exceeding 118 mph is less than 0.08575 percent annually.

Table X - Annual Probability of Wind Speeds

Annual Probability of Wind Speeds (FEMA, 2000)		
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 Huntingdon County.

4.3.6.5 Vulnerability Assessment

The impacts of climate change are tangible and hazardous realities. Tropical storms tracking nearby Huntingdon 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 Huntingdon County which can cause damage to buildings and infrastructure. The assessment for flood-related vulnerability is addressed in Section 4.3.6 and a discussion of wind related vulnerability is addressed in Section 4.3.6. Due to the impact of hurricanes and tropical storms, the vulnerability for Huntingdon County is moderately high. 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. Huntingdon County vulnerability level is moderately high for direct building loss. The total direct building loss amount for Huntingdon County equates to 118.49 million dollars. The total business interruption value for Huntingdon County equates to 140.72 million dollars. Therefore, the vulnerability of direct building loss and business interruption is moderately high.

As seen in *Table X – Population Change in Huntingdon County*, twenty-four of the forty-eight municipalities in Huntingdon County have experienced a population loss since the previous decennial census in 2010. However, twenty-three municipalities saw minor, total population growth over the same period. Based on this information, it can be speculated that these twenty-three 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 increased risk to hurricane and tropical storm (based on previous GIS tracks):

- **Barree Township**
- **Birmingham Borough**
- **Broad Top City Borough**
- **Cromwell Township**
- **Dublin Township**
- **Dudley Borough**
- **Henderson Township**
- **Hopewell Township**
- **Lincoln Township**
- **Logan Township**
- **Marklesburg Borough**
- **Mill Creek Borough**
- **Miller Township**
- **Morris Township**
- **Saltillo Borough**
- **Shade Gap Borough**
- **Shirleysburg Borough**
- **Smithfield Township**
- **Three Springs Borough**
- **Walker Township**
- **Warriors Mark Township**
- **West Township**
- **Wood 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.

4.3.7. Invasive Species

4.3.7.1 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.

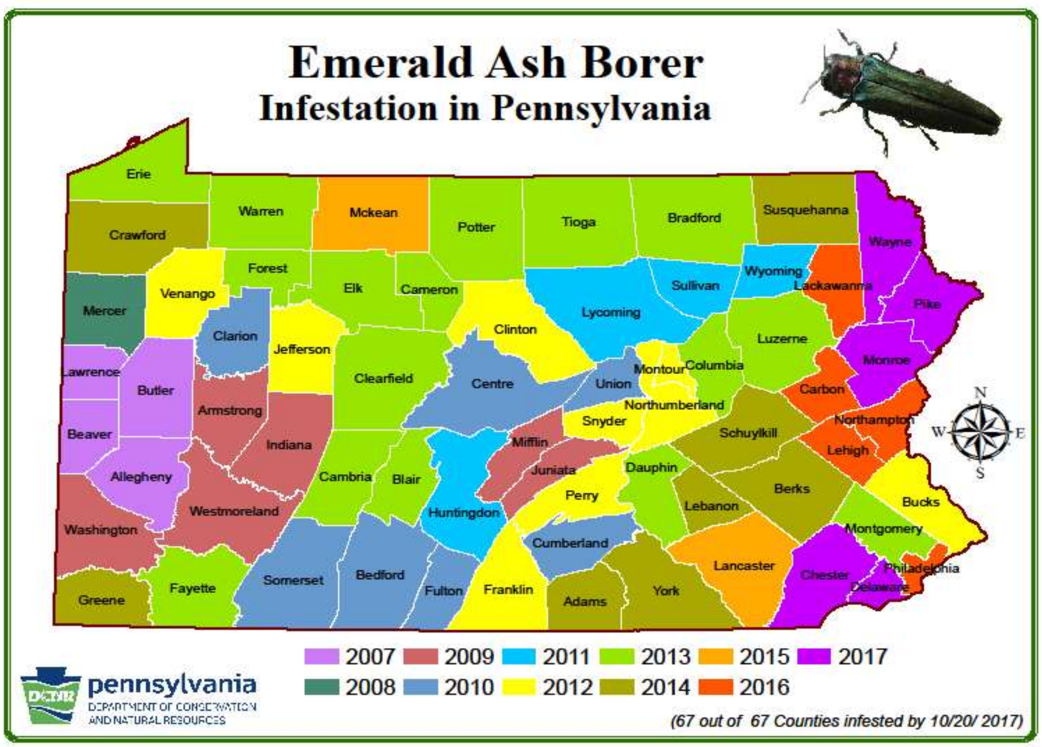
Terrestrial Invasive Species (TIS) are nonnative plants, vertebrates, arthropods, or pathogens that complete their lifecycle on land instead of in an aquatic environment and whose introduction does or is likely to cause economic/environmental damage or harm to human health.

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 X - Prevalent Invasive Species* lists invasive species that have been found in Huntingdon County.

4.3.7.2 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 an agricultural pest 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 Huntingdon County and the surrounding region (see *Figure X - Emerald Ash Borer Infestation in Pennsylvania*).

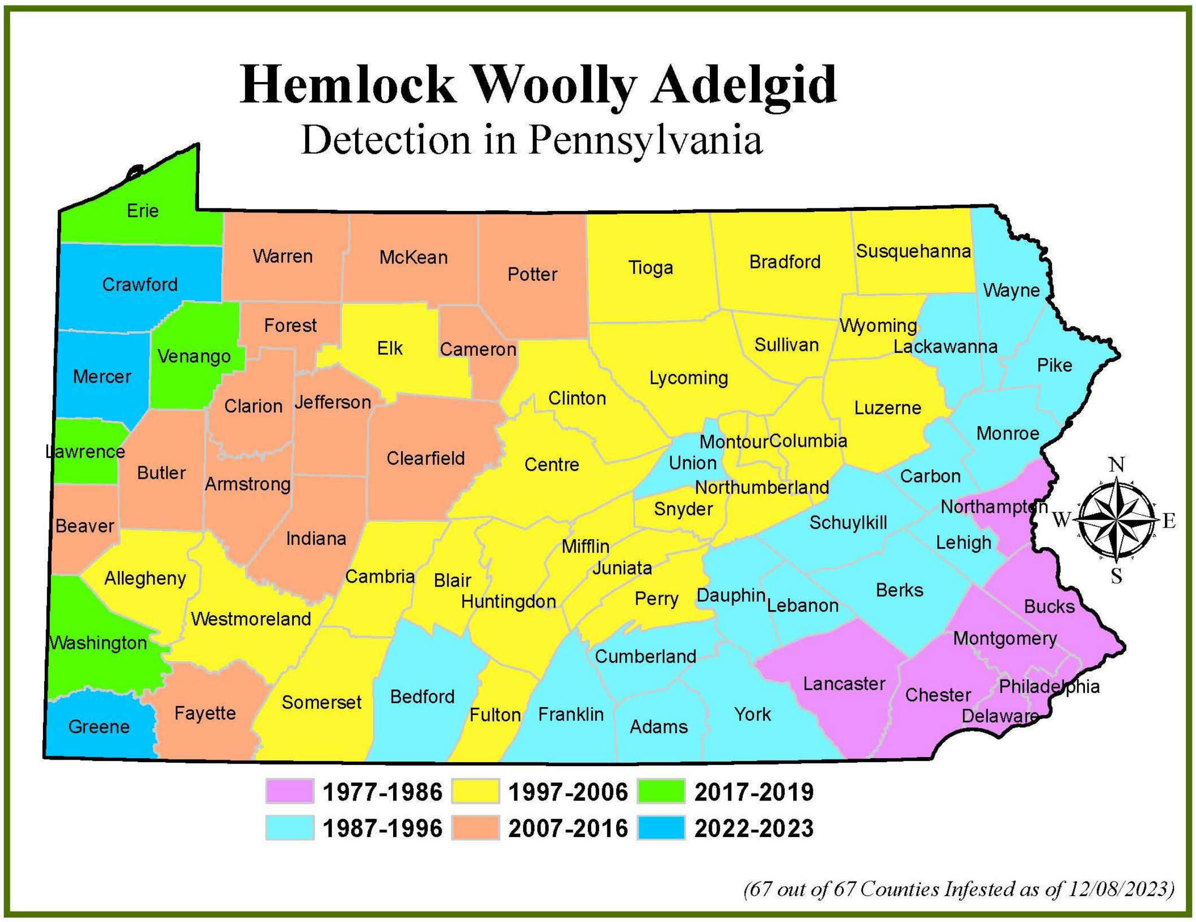
Figure X - Emerald Ash Borer Infestation in Pennsylvania



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 Huntingdon County, have been infested with this insect. See

Figure X - 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).

Figure X - Hemlock Woolly Adelgid Infestation in Pennsylvania



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. They 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 State Department of Agriculture gives the total number of infected counties as fifty-two out of sixty-seven, as of 2024. *Figure X – Pennsylvania Spotted*

Lanternfly Infestation illustrates the counties in Pennsylvania that are considered to be in the quarantine zone for this pest.

Figure X – Pennsylvania Spotted Lanternfly Infestation

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.

4.3.7.3 Past Occurrence

Invasive species have been entering Pennsylvania since the arrival of European settlers, but not all occurrences required government action. Huntingdon County is known for its great number of geographic features. There are various state game lands within the area which include state Game Lands 67, 71, 73, 81, 99, 112, 118, 121, 131, 166, 251, 278, and 322. Additionally, there are other areas in the county that have significant amounts of forest land and water features which species may invade. Due to the vast area of forests, there are many invasive terrestrial species that have been widespread in Huntingdon County that are common problems throughout the Commonwealth. Some of the most popular problematic species in Huntingdon County include:

- Emerald Ash Borer
- Hemlock Woolly Adelgid

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 Huntingdon County. In 2014, the spotted lanternfly was found in the commonwealth, and by 2020 Huntingdon County had entered the quarantine zone for the infestation.

Table X - Prevalent Invasive Species lists problematic non-native species that are established in Huntingdon County.

Table X - Prevalent Invasive Species

Prevalent Invasive Species (iMapInvasives, 2024)		
Scientific Name	**Common Name**	**Type**
Allegheny Crayfish	Faxonius obscurus	Animal
Asiatic Clam	Corbicula fluminea	Animal
Autumn Olive	Elaeagnus umbellata	Plant
Bishop's Goutweed	Aegopodium podagraria	Plant
Bitter Dock	Bitter Dock	Plant
Black Jetbead	Rhodotypos scandens	Plant
Bohemian Knotweed	Reynoutria x bohemica	Plant
Bouncing-bet	Saponaria officinalis	Plant
Brittle Naiad	Najas minor	Plant

Prevalent Invasive Species (iMapInvasives, 2024)		
Scientific Name	**Common Name**	**Type**
Buckthorn	Rhamnus cathartica	Plant
Bull Thistle	Cirsium vulgare	Plant
Burning Bush	Euonymus alatus	Plant
Canada Bluegrass	Poa compressa	Plant
Canada Thistle	Cirsium arvense	Plant
Carolina Fanwort	Cabomba caroliniana	Plant
Carpet-bugle	Ajuga reptans	Plant
Chicory	Cichorium intybus	Plant
Chinese Bushclover	Lespedeza cuneata	Plant
Chinese Mysterysnail	Cipangopaludina chinensis	Animal
Climbing Nightshade	Solanum dulcamara	Plant
Colt's-foot	Tussilago farfara	Plant
Common Carp	Cyprinus carpio	Animal
Common Chickweed	Stellaria media	Plant
Common Crown-vetch	Coronilla varia	Plant
Common Mullein	Verbascum thapsus	Plant
Common St. John's-wort	Hypericum perforatum	Plant
Common Star-of-Bethlehem	Ornithogalum umbellatum	Plant
Creeping Himalayan Knotweed	Persicaria posumbu	Plant
Creeping Smartweed	Polygonum caespitosum var. longisetum	Plant
Curly Dock	Rumex crispus	Plant
Curly-leaf Pondweed	Potamogeton crispus	Plant
Dame's Rocket	Hesperis matronalis	Plant
Deutzia	Deutzia spp.	Plant
Emerald Ash Borer	Agrilus planipennis	Animal
English Ivy	Hedera helix	Plant
Eurasian Water-milfoil	Myriophyllum spicatum	Plant
European Alder	Alnus glutinosa	Plant
European Lily-of-the-valley	Convallaria majalis	Plant
European Privet	Ligustrum vulgare	Plant
European Water-milfoil	Myriophyllum spicatum	Plant
Flathead Catfish	Pylodictis olivaris	Animal
Freshwater Jellyfish	Craspedacusta sowerbyi	Animal
Garden Bird's-foot-trefoil	Lotus corniculatus	Plant
Garlic Mustard	Alliaria petiolata	Plant
Giant-chickweed	Myosoton aquaticum	Plant

Prevalent Invasive Species (iMapInvasives, 2024)		
Scientific Name	**Common Name**	**Type**
Golden Rain-tree	Koelreuteria paniculata	Plant
Goldfish	Carassius auratus	Animal
Great Hedge Bedstraw	Galium mollugo	Plant
Greater Celandine	Chelidonium majus	Plant
Greenside Darter	Etheostoma blennioides	Animal
Ground-ivy	Glechoma hederacea	Plant
Hedge Maple	Acer campestre	Plant
Hemlock Woolly Adelgid	Adelges tsugae	Animal
Hydrilla	Hydrilla verticillata	Plant
Indian Mock Strawberry	Duchesnea indica	Plant
Japanese Angelica Tree	Aralia elata	Plant
Japanese Barberry	Berberis thunbergii	Plant
Japanese Honeysuckle	Lonicera japonica	Plant
Japanese Knotweed	Reynoutria japonica var. japonica	Plant
Japanese Spiraea	Spiraea japonica	Plant
Japanese Stiltgrass	Microstegium vimineum	Plant
Joint-head Arthraxon	Arthraxon hispidus	Plant
Kudzu	Pueraria montana var. lobata	Plant
Lady's Thumb	Persicaria maculosa	Plant
Lesser Celandine	Ranunculus ficaria	Plant
Lesser Periwinkle	Vinca minor	Plant
Marshpepper Knotweed	Persicaria hydropiper	Plant
Meadow Goat's-beard	Tragopogon dubius	Plant
Mile-a-minute vine	Persicaria perfoliata	Plant
Morrow's Honeysuckle	Lonicera morrowii	Plant
Mugwort	Artemisia vulgaris	Plant
Multiflora Rose	Rosa multiflora	Plant
Norway Maple	Acer platanoides	Plant
Orchard Grass	Dactylis glomerata	Plant
Poison-hemlock	Conium maculatum	Plant
Princess Tree	Paulownia tomentosa	Plant
Privet	Ligustrum spp.	Plant
Purple Loosestrife	Lythrum salicaria	Plant
Quagga Mussel	Dreissena bugensis	Animal
Queen Anne's Lace	Daucus carota	Plant
Rainbow Smelt	Osmerus mordax	Animal
Red-eared Slider	Trachemys scripta elegans	Animal
Reed Canary Grass	Phalaris arundinacea	Plant

Prevalent Invasive Species (iMapInvasives, 2024)		
Scientific Name	**Common Name**	**Type**
Roundleaf Bittersweet	Celastrus orbiculatus	Plant
Russian Olive	Elaeagnus angustifolia	Plant
Rusty Crayfish	Faxonius rusticus	Animal
Slider	Trachemys scripta	Animal
Spongy Moth	Lymantria dispar	Animal
Spotted Starthistle	Centaurea stoebe ssp. micranthos	Plant
Sweetclover	Melilotus officinalis	Plant
Tree-of-Heaven	Ailanthus altissima	Plant
Wild Basil	Clinopodium vulgare	Plant
Wild Parsnip	Pastinaca sativa	Plant
Wild Teasel	Dipsacus fullonum	Plant
Wineberry	Rubus phoenicolasius	Plant
Winter Creeper	Euonymus fortunei	Plant
Yellow-bellied Slider	Trachemys scripta scripta	Animal
Zebra Mussel	Dreissena polymorpha	Animal

4.3.7.4 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 Huntingdon County but have not yet been detected inside the county (see *Table X – 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 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 Huntingdon County.

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.

Table X – Future Vulnerable Species

Future Vulnerable Species (iMapInvasives, 2024)		
Common Name	**Scientific Name**	**Type**
Alewife	Alosa pseudoharengus	Animal
Alkali Grass	Puccinellia distans	Plant
Alsike Clover	Trifolium hybridum	Plant
American Water Lotus	Nelumbo lutea	Plant
Amur Corktree	Phellodendron amurense	Plant
Amur honeysuckle	Lonicera maackii	Plant
Amur Maple	Acer ginnala	Plant
Aneilema	Murdannia keisak	Plant
Apple Mint	Mentha x rotundifolia	Plant
Asiatic Dayflower	Commelina communis	Plant
Balsam Woolly Adelgid	Adelges piceae	Animal
Bamboo	Phyllostachys spp.	Plant
Banded Mysterysnail	Viviparus georgianus	Animal
Bee-bee Tree	Tetradium daniellii	Plant
Beech Leaf Disease Nematode	Litylenchus crenatae mccannii	Animal
Beech Scale	Cryptococcus fagisuga	Animal
Beefsteak Plant	Perilla frutescens	Plant
Big-eared Radix	Radix auricularia	Animal
Bigleaf Lupine, Giant Lupine	Lupinus polyphyllus	Plant
Bird's Foot Trefoil	Lotus corniculatus	Plant
Black Bindweed	Fallopia convolvulus	Plant
Black Knapweed, Black Starthistle	Centaurea nigra	Plant
Black Locust	Robinia pseudoacacia	Plant
Black Medic	Medicago lupulina	Plant
Black Mustard	Brassica nigra	Plant
Black Swallowwort	Cynanchum louiseae	Plant
Bloody-red Shrimp	Hemimysis anomala	Animal
Blue-button	Knautia arvensis	Plant

Future Vulnerable Species (iMapInvasives, 2024)		
Common Name	**Scientific Name**	**Type**
Blue Catfish	Ictalurus furcatus	Animal
Blue Cattail, Hybrid Cattail	Typha x glauca	Plant
Blunt-leaved Privet	Ligustrum obtusifolium	Plant
Bog Bulrush	Schoenoplectiella mucronata	Plant
Border Privet	Ligustrum obtusifolium	Plant
Boston-ivy	Parthenocissus tricuspidata	Plant
Brazilian Waterweed	Egeria densa	Plant
Bristled knotweed	Polygonum caespitosum	Plant
Broadleaf Water-milfoil	Myriophyllum heterophyllum	Plant
Brown knapweed	Centaurea jacea	Plant
Brown Marmorated Stink Bug	Halyomorpha halys	Animal
Brown Starthistle	Centaurea jacea	Plant
Butter-and-eggs	Linaria vulgaris	Plant
California Privet	Ligustrum ovalifolium	Plant
Callery Pear	Pyrus calleryana	Plant
Caper Spurge	Euphorbia lathyris	Plant
Carline Thistle	Carlina vulgaris	Plant
Carter's Moss Animal	Lophopodella carteri	Animal
Castor-Aralia	Kalopanax septemlobus	Plant
Cheatgrass	Bromus tectorum	Plant
Chinese lespedeza	Lespedeza cuneata	Plant
Chinese privet	Ligustrum sinense	Plant
Chinese Silvergrass	Miscanthus sinensis	Plant
Chinese Wisteria	Wisteria sinensis	Plant
Chinese Yam	Dioscorea polystachya	Plant
Chocolate Vine	Akebia quinata	Plant
Codlins And Cream, Hairy Willow-herb	Epilobium hirsutum	Plant
Cogon Satin-tail	Imperata cylindrica	Plant
Colonial Bentgrass	Agrostis capillaris	Plant
Common Barberry, European Barberry	Berberis vulgaris	Plant
Common Buckthorn	Rhamnus cathartica	Plant
Common Cocklebur	Xanthium strumarium var. strumarium	Plant
Common Dayflower	Commelina communis	Plant
Common Frogbit	Hydrocharis morsus-ranae	Plant
Common Morning-Glory	Ipomoea purpurea	Plant

Future Vulnerable Species (iMapInvasives, 2024)		
Common Name	**Scientific Name**	**Type**
Common Reed	Phragmites australis ssp. Australis	Plant
Common Speedwell	Veronica officinalis	Plant
Common Star-of-Bethlehem	Ornithogalum umbellatum	Plant
Common Valerian	Valeriana officinalis	Plant
Common Velvetgrass	Holcus lanatus	Plant
Common Water-Hyacinth	Eichhornia crassipes	Plant
Corktree	Phellodendron spp.	Plant
Crazy Snake Worm; Alabama Jumper	Amynthas agrestis	Animal
Creeping Bentgrass	Agrostis stolonifera	Plant
Creeping Buttercup	Ranunculus repens	Plant
Creeping Jenny	Lysimachia nummularia	Plant
Creeping Yellowcress	Rorippa sylvestris	Plant
Crown Vetch	Coronilla varia	Plant
Cup-Plant	Silphium perfoliatum var. perfoliatum	Plant
Cutleaf Blackberry	Rubus laciniatus	Plant
Cutleaf Teasel	Dipsacus laciniatus	Plant
Cypress Spurge	Euphorbia cyparissias	Plant
Daphne	Daphne mezereum	Plant
Deer Ked	Lipoptena cervi	Animal
Didymo	Didymosphenia geminata	Protist
Diffuse-spotted Knapweed Hybrid	Centaurea x psammogena	Plant
Dockweed Smartweed; Curlytop Knotweed	Polygonum lapathifolium	Plant
Dog Rose	Rosa canina	Plant
Drooping Star-of-Bethlehem	Ornithogalum nutans	Plant
Eastern Helleborine	Epipactis helleborine	Plant
Elecampane	Inula helenium	Plant
Elm Zigzag Sawfly	Aproceros leucopoda	Animal
Elongate Hemlock Scale	Fiorinia externa	Animal
English Plantain	Plantago lanceolata	Plant
European Alder	Alnus glutinosa	Plant
European Barberry	Berberis vulgaris	Plant
European Fly honeysuckle, Dwarf Honeysuckle	Lonicera xylosteum	Plant
European Frogbit; Common Frogbit	Hydrocharis morsus-ranae	Plant
European Speedwell	Veronica beccabunga	Plant

Future Vulnerable Species (iMapInvasives, 2024)		
Common Name	**Scientific Name**	**Type**
European Starling	Sturnus vulgaris	Animal
European Swallow-Wort	Cynanchum rossicum	Plant
European Water Fern	Marsilea quadrifolia	Plant
False Spiraea	Sorbaria sorbifolia	Plant
Fanwort	Cabomba caroliniana	Plant
Field Bindweed	Convolvulus arvensis	Plant
Field Garlic	Allium vineale	Plant
Field Hawkweed	Hieracium caespitosum	Plant
Field Pepper-Grass	Lepidium campestre	Plant
Field Sowthistle	Sonchus arvensis	Plant
Fishhook Waterflea	Cercopagis pengoi	Animal
Five-leaf Akebia	Akebia quinata	Plant
Five-leaf Aralia	Acanthopanax sieboldianus	Plant
Floating Bladderwort	Utricularia inflata	Plant
Flowering Rush	Butomus umbellatus	Plant
Fly Honeysuckle, Bell's honeysuckle	Lonicera x bella	Plant
Fool's-Parsley	Aethusa cynapium	Plant
Forget-me-not	Myosotis scorpioides	Plant
Foxtail Mint	Mentha x villosa	Plant
Freshwater Drum	Aplodinotus grunniens	Animal
Fullers Teasel	Dipsacus fullonum	Plant
Garden Loosestrife	Lysimachia vulgaris	Plant
Garden Stonecrop	Hylotelephium telephium	Plant
Giant Bentgrass	Agrostis gigantea	Plant
Giant foxtail	Setaria faberi	Plant
Giant Hogweed	Heracleum mantegazzianum	Plant
Giant Knotweed	Reynoutria sachalinensis	Plant
Gill-over-the-ground	Glechoma hederacea	Plant
Glossy False Buckthorn	Frangula alnus	Plant
Goatsrue	Galega officinalis	Plant
Golden Bamboo	Phyllostachys aurea	Plant
Gold-moss	Sedum acre	Plant
Goutweed	Aegopodium podagraria	Plant
Greater Burdock	Arctium lappa	Plant
Greater Spearwort	Ranunculus lingua	Plant
Great Hairy Willowherb	Epilobium hirsutum	Plant
Green Sunfish	Lepomis cyanellus	Animal
Hairy Bittercress	Cardamine hirsuta	Plant

Future Vulnerable Species (iMapInvasives, 2024)		
Common Name	**Scientific Name**	**Type**
Hamilton's Spindletree	Euonymus hamiltonianus	Plant
Hammerhead worm, broadhead planarians	Bipalium spp.	Animal
Hardy Kiwi Vine	Actinidia arguta	Plant
Honeysuckle	Lonicera spp.	Plant
House Sparrow	Passer domesticus	Animal
Incised Fumewort	Corydalis incisa	Plant
Introduced Pine Sawfly	Diprion similis	Animal
Italian Arum	Arum italicum	Plant
Ivy-leaved morning-glory	Ipomoea hederacea	Plant
Ivy-leaved speedwell	Veronica hederifolia	Plant
Japanese Beetle	Popillia japonica	Animal
Japanese Black Pine	Pinus thunbergiana	Plant
Japanese Brome	Bromus japonicus	Plant
Japanese Holly	Ilex crenata	Plant
Japanese Hops	Humulus japonicus	Plant
Japanese Maple	Acer palmatum	Plant
Japanese Mysterysnail	Cipangopaludina japonica	Animal
Japanese Privet	Ligustrum japonicum	Plant
Japanese Snowball	Viburnum plicatum	Plant
Japanese-Spurge	Pachysandra terminalis	Plant
Japanese Tree Lilac	Syringa reticulata	Plant
Japanese Virgin's-bower	Clematis terniflora	Plant
Japanese Wisteria	Wisteria floribunda	Plant
Java Waterdropwort	Oenanthe javanica	Plant
Jimsonweed	Datura stramonium	Plant
Johnson Grass	Sorghum halepense	Plant
Jointed grass	Arthraxon hispidus	Plant
Jumping Worms	Amynthas-Metaphire spp.	Animal
Katsura Tree	Cercidiphyllum japonicum	Plant
Kentucky Bluegrass	Poa pratensis	Plant
Kentucky Fescue	Lolium arundinaceum	Plant
Knapweed	Centaurea spp.	Plant
Lawn Pennywort	Hydrocotyle sibthorpioides	Plant
Leafy Spurge	Euphorbia virgata	Plant
Leatherleaf Mahonia	Mahonia bealei	Plant
Lesser Burdock	Arctium minus	Plant
Linden Arrow-wood	Viburnum dilatatum	Plant
Meadow Fescue	Schedonorus pratensis	Plant

Future Vulnerable Species (iMapInvasives, 2024)		
Common Name	**Scientific Name**	**Type**
Meadow Hawkweed	Hieracium caespitosum	Plant
Meadow Timothy	Phleum pratense	Plant
Mimosa	Albizia julibrissin	Plant
Mock Strawberry, Indian Strawberry	Duchesnea indica	Plant
Moneywort	Lysimachia nummularia	Plant
Mud Bithynia	Bithynia tentaculata	Animal
Mudmat	Glossostigma cleistanthum	Plant
Musk Thistle	Carduus nutans	Plant
Mute Swan	Cygnus olor	Animal
Mystery snail	Cipangopaludina spp.	Animal
Narrowleaf Bittercress	Cardamine impatiens	Plant
Narrowleaf Cattail	Typha angustifolia	Plant
Nepalese Browntop	Microstegium vimineum	Plant
Nepal Smartweed	Persicaria nepalensis	Plant
New Zealand Mudsnail	Potamopyrgus antipodarum	Plant
Northern Catalpa	Catalpa speciosa	Animal
Northern Snakehead	Channa argus	Animal
Norway Spruce	Picea abies	Plant
Oakleaf Goosefoot	Chenopodium glaucum	Plant
Oleaster	Elaeagnus spp.	Plant
Onerow Yellowcress	Rorippa microphylla	Plant
Orange Daylily	Hemerocallis fulva	Plant
Orange-eye Butterfly-bush	Buddleja davidii	Plant
Orange Hawkweed	Hieracium aurantiacum	Plant
Oriental Bittersweet	Celastrus orbiculatus	Plant
Oriental Redtip	Photinia villosa	Plant
Oriental Weatherfish, Pond Loach	Misgurnus anguillicaudatus	Animal
Oxeye Daisy	Leucanthemum vulgare	Plant
Pale Swallowwort	Cynanchum rossicum	Plant
Palmer Amaranth	Amaranthus palmeri	Plant
Paper Mulberry	Broussonetia papyrifera	Plant
Parrot Feather Watermilfoil	Myriophyllum aquaticum	Plant
Peppermint	Mentha x piperita	Plant
Perennial Pea	Lathyrus latifolius	Plant
Periwinkle	Vinca minor	Plant
Pestilence wort, Purple Butter-bur	Petasites hybridus	Plant
Policemen's Helmet, Himalayan Balsam	Impatiens glandulifera	Plant

Future Vulnerable Species (iMapInvasives, 2024)		
Common Name	**Scientific Name**	**Type**
Pond Water-starwort	Callitriche stagnalis	Plant
Porcelainberry	Ampelopsis brevipedunculata	Plant
Poverty Brome	Bromus sterilis	Plant
Primrose-willow	Ludwigia peploides	Plant
Purple Deadnettle	Lamium purpureum	Plant
Purple Foxglove	Digitalis purpurea	Plant
Purpletop Vervain, Purpletop Verbena	Verbena bonariensis	Plant
Ragged Robin	Silene flos-cuculi	Plant
Ravenna Grass	Tripidium ravennae	Plant
Redbreast sunfish	Lepomis auritus	Animal
Red Fescue	Festuca rubra	Plant
Red sorrel	Rumex acetosella	Plant
Red Swamp Crayfish	Procambarus clarkii	Animal
Rock Pigeon	Columba livia	Animal
Rose-of-Sharon	Hibiscus syriacus	Plant
Rough bluegrass	Poa trivialis	Plant
Round Goby	Neogobius melanostomus	Animal
Rudd	Scardinius erythrophthalmus	Animal
Sawtooth Oak	Quercus acutissima	Plant
Scotch Pine	Pinus sylvestris	Plant
Scribner's Bluegrass	Poa trivialis	Plant
Scud, Euryhaline Amphipod	Echinogammarus ischnus	Animal
Sea Lamprey	Petromyzon marinus	Animal
Shattercane; Broom-corn	Sorghum bicolor	Plant
Sheep Sorrel	Rumex acetosella	Plant
Shrubby Bushclover	Lespedeza bicolor	Plant
Siberian Elm	Ulmus pumila	Plant
Siebold's Viburnum	Viburnum sieboldii	Plant
Silver Grass	Miscanthus spp.	Plant
Slender Cottonweed	Froelichia gracilis	Plant
Slender Falsebrome	Brachypodium sylvaticum	Plant
Small-flower Hairy Willowherb	Epilobium parviflorum	Plant
Smooth Brome	Bromus inermis	Plant
Spiny Naiad; Hollyleaf Naiad	Najas marina	Plant
Spotted Cat's-ear	Hypochaeris radicata	Plant
Spotted Knapweed	Centaurea stoebe ssp. Micranthos	Plant
Spotted Lanternfly	Lycorma delicatula	Animal

Future Vulnerable Species (iMapInvasives, 2024)		
Common Name	**Scientific Name**	**Type**
Star-mustard	Coincya monensis	Plant
Starry Stonewort	Nitellopsis obtusa	Plant
St. Johnswort	Hypericum perforatum	Plant
Stringy Stonecrop	Sedum sarmentosum	Plant
Swallow-wort	Cynanchum spp.	Plant
Sweet Bedstraw, Woodruff	Galium odoratum	Plant
Sweet Cherry	Prunus avium	Plant
Sweetflag, Calamus	Acorus calamus	Plant
Sweet Vernal Grass	Anthoxanthum odoratum	Plant
Sycamore Maple	Acer pseudoplatanus	Plant
Tall Buttercup	Ranunculus acris var. acris	Plant
Tall fescue	Schedonorus pratensis	Plant
Tatarian Honeysuckle	Lonicera tatarica	Plant
Teasel	Dipsacus spp.	Plant
Three-stamen Waterwort	Elatine triandra	Plant
Tickseed Beggarticks	Bidens aristosa	Plant
Touch-me-not Bittercress	Cardamine impatiens	Plant
True Forget-me-not	Myosotis scorpioides	Plant
Tufted Vetch	Vicia cracca ssp. Cracca	Plant
Variable Watermilfoil	Myriophyllum heterophyllum):	Plant
Velvet-grass	Holcus lanatus	Plant
Velvetleaf	Abutilon theophrasti	Plant
Viburnum Leaf Beetle	Pyrrhalta viburni	Animal
Virile Crayfish	Faxonius virilis	Animal
Wall-lettuce	Mycelis muralis	Plant
Water Chestnut	Trapa natans	Plant
Watercress	Rorippa nasturtium-aquaticum	Plant
Water Lettuce	Pistia stratiotes	Plant
Wavyleaf Basketgrass	Oplismenus undulatifolius	Plant
Wayfaring-tree	Viburnum lantana	Plant
Weak-leaf Yucca	Yucca flaccida	Plant
Weevil	Larinus turbinatus	Plant
Western Mosquitofish	Gambusia affinis	Animal
White Clover	Trifolium repens	Plant
White Moth Mullein	Verbascum blattaria	Plant
White Mulberry	Morus alba	Plant
White Poplar	Populus alba	Plant

Future Vulnerable Species (iMapInvasives, 2024)		
Common Name	**Scientific Name**	**Type**
White River Crayfish	Procambarus acutus	Animal
White Sweet-clover	Melilotus albus	Plant
White Willow	Salix alba	Plant
Wild Chervil	Anthriscus sylvestris	Plant
Wild Garlic	Allium vineale	Plant
Winged Spindletree	Euonymus alatus	Plant
Winter Aconite	Eranthis hyemalis	Plant
Wisteria	Wisteria spp.	Plant
Yellow Arch-angel	Lamiastrum galeobdolon	Plant
Yellow flag	Iris pseudacorus	Plant
Yellow Floatingheart	Nymphoides peltata	Plant
Yellow Iris	Iris pseudacorus	Plant
Yellow Sweetclover	Melilotus officinalis	Plant

4.3.7.5 Vulnerability Assessment

Huntingdon 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 Huntingdon 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 Huntingdon County, there is a risk of future damage from invasive species that are present in the area. With about 875 square miles of total land in Huntingdon County, there is vulnerability to various land sites and waterways. If an invasive species were to invade the popular terrestrial areas or waterways in Huntingdon 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 Huntingdon 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 Huntingdon 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 X - Prevalent Invasive Species for priority species in Huntingdon County.*

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 Huntingdon County, but not yet present in the county (priority species in *Table X – 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.

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

As seen in *Table X – Population Change in Huntingdon County*, Barree Township, Birmingham Borough, Broad Top City Borough, Cromwell Township, Dublin Township, Dudley Borough, Henderson Township, Hopewell Township, Lincoln Township, Logan Township, Marklesburg Borough, Mill Creek Borough, Miller Township, Morris Township, Saltillo Borough, Shade Gap Borough, Shirleysburg Borough, Smithfield Township, Three Springs Borough, Walker Township, Warriors Mark Township, West Township, Wood Township, has 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 risk to invasive species, since 2010, due to the increase in population and construction.

The historic properties in Huntingdon County are at different levels of vulnerability to invasive species. Many of the historic properties in Huntingdon County are made of brick and masonry construction and are at a lower risk of vulnerability from invasive species. However, there are also buildings that are historic in Huntingdon County that are of wood construction. Additionally, the historic and culturally significant covered bridges in Huntingdon County are made of wood and could be damaged by invasive species making them more vulnerable.

Land use changes in Huntingdon County could be a factor in the potential impact invasive species have on native species. 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.

Invasive species in Huntingdon County pose a significant threat to infrastructure systems through various mechanisms. Invasive plants like kudzu or Japanese knotweed can damage infrastructure such as roads, bridges, and buildings by infiltrating cracks and causing structural damage. Their aggressive growth can also obstruct drainage systems, leading to flooding and erosion, thus compromising the integrity of roads and bridges.

Invasive animals, such as feral hogs or zebra mussels, can disrupt infrastructure by burrowing into embankments, weakening them and increasing the risk of collapse. Additionally, animals like rodents or insects may gnaw on electrical wiring and utility cables, leading to malfunctions or even fires, posing risks to both infrastructure and public safety.

Furthermore, invasive species can interfere with transportation systems by clogging waterways. For example, invasive aquatic plants can impede navigation channels, necessitating costly scouring operations. Invasive insects like the emerald ash borer can devastate tree populations, including those lining roads or railways, posing hazards from falling trees and impacting transportation routes.

4.3.8. Landslide

4.3.8.1 Location and Extent

Rock falls and other slope failures can occur in areas of Huntingdon 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 Huntingdon County as generally low, but includes local areas of moderate to high susceptibility. *Figure X – Landslide Hazard Areas* shows areas of landslide susceptibility in Huntingdon County. A majority of Huntingdon County is located in the Ridge and Valley physiographic province which is known for low to moderate vulnerability to 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.

4.3.8.2 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 Huntingdon County.

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

4.3.8.3 Past Occurrence

No comprehensive list of landslide incidents in Huntingdon 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.

4.3.8.4 Future Occurrence

Historically, significant landslide events are likely to occur on average once every one to four years in Huntingdon 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 Huntingdon 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.

4.3.8.5 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 Huntingdon 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 Huntingdon 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 Huntingdon County are vulnerable to landslides. *Table X – 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 X – Structure Vulnerability Data

Structure Vulnerability Data		
Municipality	**Number of Addressable Structures Per Municipality**	**Number of Structures in Slope Area**
Alexandria Borough	183	0
Barree Township	466	0
Birmingham Borough	70	0
Brady Township	754	0
Broad Top City Borough	247	1
Carbon Township	327	0
Cass Township	1,055	1
Cassville Borough	120	0
Clay Township	1,042	0
Coalmont Borough	74	0
Cromwell Township	1,627	3
Dublin Township	1,281	0
Dudley Borough	156	0
Franklin Township	575	2

Structure Vulnerability Data		
Municipality	**Number of Addressable Structures Per Municipality**	**Number of Structures in Slope Area**
Henderson Township	827	1
Hopewell Township	801	0
Huntingdon Borough	3,814	1
Jackson Township	1,132	0
Juniata Township	566	2
Lincoln Township	554	0
Logan Township	562	0
Mapleton Borough	251	0
Marklesburg Borough	239	0
Mill Creek Borough	187	0
Miller Township	465	0
Morris Township	392	0
Mount Union Borough	1,472	0
Oneida Township	800	0
Orbisonia Borough	286	0
Penn Township	1,147	0
Petersburg Borough	234	0
Porter Township	1,490	0
Rockhill Borough	270	0
Saltillo Borough	234	0
Shade Gap Borough	48	0
Shirley Township	2,424	0
Shirleysburg Borough	110	0
Smithfield Township	1,302	1
Springfield Township	852	0
Spruce Creek Township	279	1
Tell Township	837	0
Three Springs Borough	320	0
Todd Township	1,223	0
Union Township	1,133	3
Walker Township	1,206	1
Warriors Mark Township	1,307	0
West Township	558	0
Wood Township	584	0
Totals:	**35,883**	**17**

There are no historic or cultural properties in Huntingdon County that are registered with the National Register of Historic Places and within a slope area of equal to or 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°):

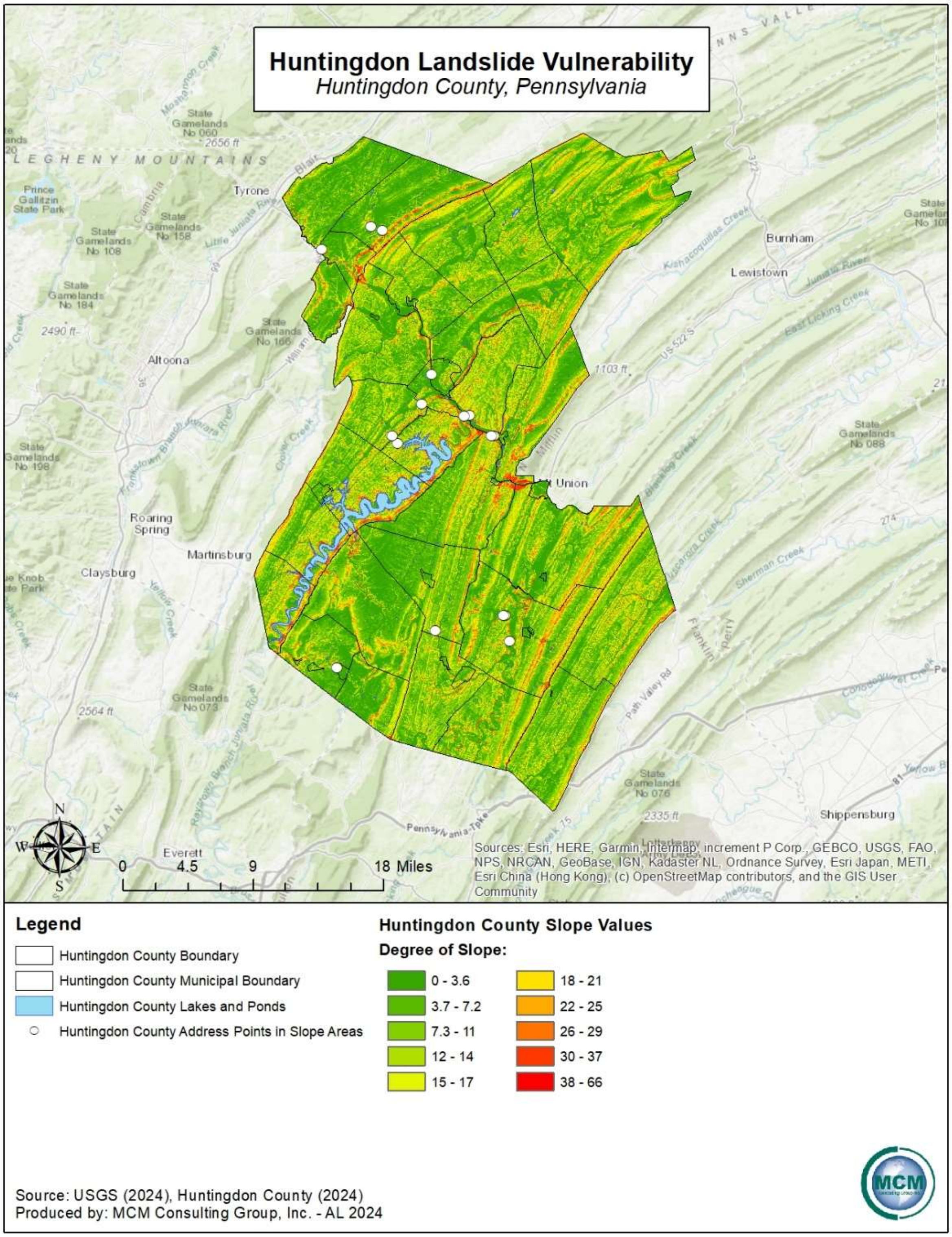
- Barree Township
- Birmingham Borough
- Brady Township
- Broad Top City Borough
- Carbon Township
- Cass Township
- Cassville Borough
- Clay Township
- Coalmont Borough
- Cromwell Township
- Dublin Township
- Dudley Township
- Franklin Township
- Henderson Township
- Hopewell Township
- Huntingdon Borough
- Jackson Township
- Juniata Township
- Lincoln Township
- Logan Township
- Mapleton Borough
- Marklesburg Borough
- Mill Creek Borough
- Mille Township
- Morris Township
- Mount Union Borough
- Oneida Township
- Penn Township
- Petersburg Borough
- Porter Township
- Shirley Township
- Smithfield Township
- Springfield Township
- Spruce Creek Township
- Tell Township
- Three Springs Borough
- Todd Township
- Union Township
- Walker Township
- Warriors Mark Township
- West Township
- Wood Township

The socially vulnerable populations and communities in Huntingdon 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 X – Population Change in Huntingdon County*, Barree Township, Birmingham Borough, Broad Top City Borough, Cromwell Township, Dublin Township, Dudley Borough, Henderson Township, Hopewell Township, Lincoln Township, Logan Township, Marklesburg Borough, Mill Creek Borough, Miller Township, Morris Township, Saltillo Borough, Shade Gap Borough, Shirleysburg Borough, Smithfield Township, Three Springs Borough, Walker Township, Warriors Mark Township, West Township, Wood Township 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 Huntingdon 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 Huntingdon 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 most state game lands in Huntingdon County, the Rothrock State Forest, and the Tuscarora State Forest. 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 Huntingdon County could be damaged by landslides. This could include any farming, land cultivation, lumbering, or development of natural products.

Figure X – Landslide Hazard Areas



4.3.9. Pandemic and Infectious Disease

4.3.9.1 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 Huntingdon 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.

4.3.9.2 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 X - Pandemic Influenza Phases*.

Table X - 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.
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	

4.3.9.3 Past Occurrence

Several pandemic influenza outbreaks have occurred over the past 100 years that not only affected Huntingdon County but the United States as a whole. *Table X - 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 Huntingdon 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 Huntingdon County. There is a lack of data which provides exact numbers of deaths that occurred in Huntingdon County from the Spanish Flu, however there were a total of 60,000 deaths in Pennsylvania. Deaths occurring in Huntingdon 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.

Huntingdon 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 Huntingdon County.

COVID-19

Huntingdon 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 Huntingdon County was in March 2020. Beginning in December of 2020, there was a large-scale vaccination effort to combat COVID-19. Municipalities in Huntingdon County indicated no major change in the pandemic and infectious disease section of the risk factor assessment municipal comparison.

Table X - 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
2009	Swine flu/Novel H1NI
2020	COVID-19
Sources: WHO & CDC, 2020	

Infectious Disease

Not only has Huntingdon County experienced pandemic events, but the county has also experienced infectious disease events. The two major infectious disease events experienced across Huntingdon 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 Huntingdon 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 Huntingdon County, 2018 had the most positive cases in Huntingdon County since 2015. Over the past five years, no human has tested positive for West Nile Virus in Huntingdon County. *Table X - West Nile Virus Control Program in Huntingdon County since 2015* outlines the West Nile Virus within Huntingdon County from 2015 to 2023.

Table X - West Nile Virus Control Program in Huntingdon County since 2015

West Nile Virus Control Program in Huntingdon County Since 2015				
Year	Total Positives	Human Positives	Mosquito Positives	Bird Positives
2015	4	0	3	1
2016	0	0	0	0
2017	2	0	0	2
2018	8	1	2	5
2019	2	0	0	2
2020	0	0	0	0
2021	0	0	0	0
2022	3	0	3	0
2023	4	0	3	1
Source: PA Department of Environmental Protection, 2024				

Lyme Disease

Lyme Disease has been present in the United States and Huntingdon 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. Huntingdon County has an overall approximately 807 confirmed cases of Lyme disease from 2000 until 2020, although actual totals may be significantly higher due to under reporting. Huntingdon 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. Huntingdon 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 Huntingdon County. *Table X - Lyme Disease Data for Huntingdon County* outlines the total positive cases of Lyme Disease within Huntingdon County since 2000 to 2020. Data after 2020 was not available for this report.

Table X - Lyme Disease Data for Huntingdon County

Lyme Disease Data for Huntingdon County	
Year	Total Positives
2000	2
2001	0
2002	3
2003	2
2004	4
2005	0
2006	2

Lyme Disease Data for Huntingdon County	
Year	**Total Positives**
2007	0
2008	8
2009	20
2010	19
2011	23
2012	26
2013	51
2014	87
2015	95
2016	166
2017	143
2018	67
2019	85
2020	4
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.

4.3.9.4 Future Occurrence

Pandemic & Epidemic

The probability of a widespread public health emergency effecting Huntingdon 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 Huntingdon County and Pennsylvania as a whole lack natural immunity.

<u>Influenza</u>

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 Huntingdon 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 Huntingdon 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 Huntingdon County. Climate change is discussed below in Section 4.3.9.5.

4.3.9.5 Vulnerability Assessment

Huntingdon 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 at least ninety-three locations. This includes but is not limited to one hospital, eight medical clinics, four police stations, and eighteen 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 diseases:

- Alexandria Borough
- Barree Township
- Brimingham Borough
- Brady Township
- Broad Top City Borough
- Carbon Township
- Cass Township
- Cassville Borough
- Clay Township
- Cromwell Township
- Dublin Township
- Dudley Borough
- Franklin Township
- Henderson Township
- Hopewell Township
- Huntingdon Borough
- Jackson Township
- Juniata Township
- Lincoln Township
- Logan Township
- Mapleton Borough

- Marklesburg Borough
- Mill Creek Borough
- Miller Township
- Morris Township
- Mount Union Borough
- Oneida Township
- Orbisonia Borough
- Penn Township
- Petersburg Borough
- Porter Township
- Rockhill Borough
- Saltillo Borough
- Shade Gap Borough
- Shirley Township
- Shirleysburg Borough
- Smithfield Township
- Springfield Township
- Spruce Creek Township
- Tell Township
- Three Springs Borough
- Todd Township
- Union Township
- Walker Township
- Warriors Mark Township
- West Township
- Wood 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.

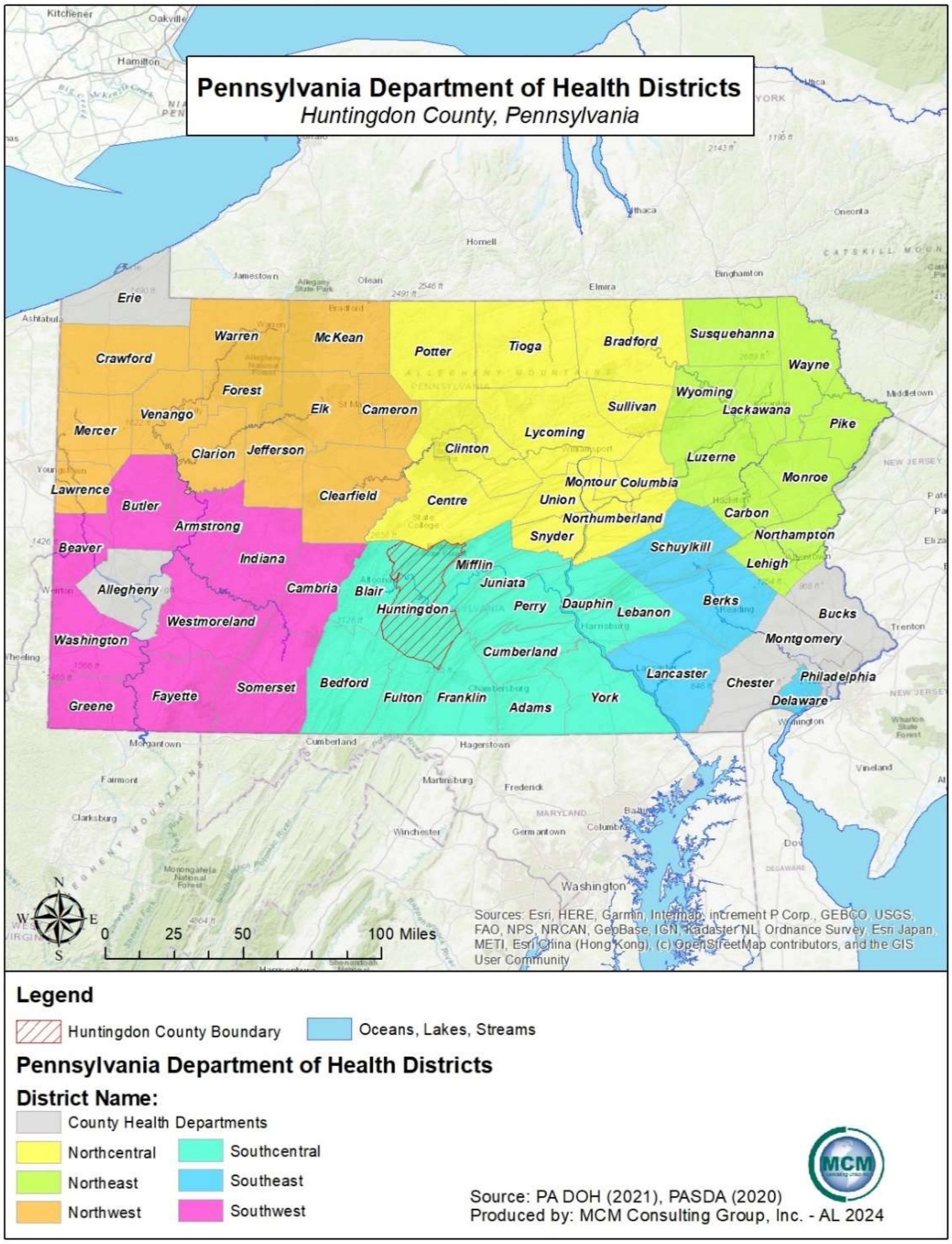
PODs are coordinated with county emergency managers by the PA DOH with the six regional healthcare districts (see *Figure X - Pennsylvania Department of Health Districts*). Huntingdon County is in the Southcentral region.

Land use and land development could directly impact the vulnerability of Huntingdon 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 Huntingdon 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 Huntingdon 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 twenty-three Municipalities in Huntingdon County that have seen an increase in population between 2010 and 2020. This information is shown in *Table X – Population Change in Huntingdon County*, Huntingdon County should monitor population growth in the boroughs and cities of the county. The socially vulnerable populations in Huntingdon 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 Huntingdon County and the difficulty in receiving treatment for health issues stemming from pandemics, epidemics, and infectious diseases. The national social vulnerability index for Huntingdon County from CDC/ATSDR (Center for Disease Control and Prevention/Agency for Toxic Substances and Disease Registry) is 0.3481 which represents a low to medium level of vulnerability.

Figure X - Pennsylvania Department of Health Districts



Source: PA DOH, 2019

4.3.10. Radon Exposure

4.3.10.1 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.

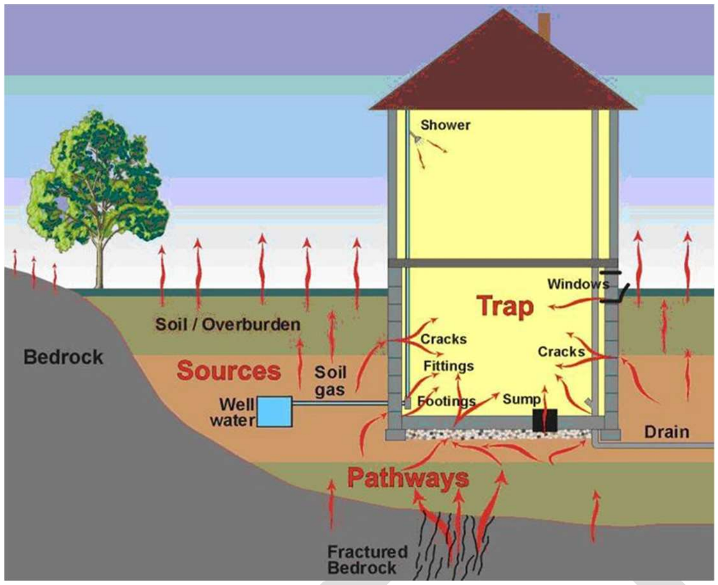
- Some more common rocks have higher than average uranium content (5 to 50 ppm), and proximity to such rocks also increases the risk of radon exposure. These rock types include black shales as well as granitic and felsic alkali igneous rocks. This is the most common source of high radon levels in Pennsylvania. 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 X - 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 X - 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 Huntingdon 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.

4.3.10.2 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 radioactively 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 X - 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 X - Radon Risk for Smokers and Nonsmokers* below, a smoker exposed to radon has a much higher risk of lung cancer.

Table X - 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
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

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**
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.

4.3.10.3 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 X – Radon Test Results in Huntingdon County shows a total of twelve zip codes in Huntingdon 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 17264-zip code, which is in three-springs of the county, with an average reading of 25.3 pCi/L within location of the basement. Most reporting zip codes in Huntingdon 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 10.18 pCi/L, and the average first floor reading is 2.9 pCi/L.

Table X - Radon Test Results in Huntingdon County

Radon Level Test Results (PA DEP, 2020)					
Zip Code	**Postal Community**	**Location**	**Number of Tests**	**Max Result pCi/L**	**Average Result pCi/L**
16611	Alexandria/Barree	Basement	100	118.0	10.6
16621	Broad Top City	Basement	31	31.1	7.2
16647	Hesston	Basement	85	296.2	21.7
16652	Huntingdon	Basement	1496	162.0	7.8
		First Floor	142	21.6	2.9
16657	James Creek	Basement	83	68.6	8.9
16683	Spruce Creek	Basement	31	64.7	10.4
16877	Warriors Mark	Basement	250	137.8	13.8
		First Floor	55	21.0	3.9
17052	Mapleton Depot	Basement	34	19.2	5.6
17060	Mill Creek	Basement	36	19.2	6.1
17066	Mount Union	Basement	96	174.7	8.5
17243	Orbisonia	Basement	36	36.0	9.8
17264	Three Springs	Basement	56	503.7	25.3
Source: PA DEP, 2024					

4.3.10.4 Future Occurrence

Radon exposure is likely given the geologic and geomorphic conditions in Huntingdon 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 X – Pennsylvania Radon Levels*. Each zone reflects the average short-term measurement of radon that can be expected in a building without radon controls. Huntingdon County is located within zone one with a highest 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 X - 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 X - 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
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 Huntingdon 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 Huntingdon County. It is possible that climate change could impact soil and bedrock erosion rates in Huntingdon County, but these impacts would be minor or unknown, at this time.

4.3.10.5 Vulnerability Assessment

Proper testing for radon levels should be conducted across Huntingdon 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.

Huntingdon County is in the EPA Radon Hazard Zone One, 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 X – 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 HMP estimates that there are 17,134 vulnerable buildings in Huntingdon 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 3,427 buildings) would be $4,112,160.00.

There is only one property in Huntingdon County that is at an increased risk of radon exposure if it has not already been mitigated for radon levels. That location is the Shade Gap Feed and Flour Mill. This location had a previous observed basement avaergae of 13.8 pCi/L. There 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 8.5 pCi/L and 10.6 pCi/L of measured radon levels. Those properties are listed below.

- Brumbaugh Homestead
- Colerain Forges Mansion
- Pennsylvania Furnace Mansion

The cultural resources in Huntingdon County could be adversely impacted by radon exposure. The areas that underlay in Huntingdon County have previous average radon levels between 5.6 pCi/L and 25.3 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 12):

- Cass Township
- Clay Township
- Cromwell Township
- Dublin Township
- Franklin Township
- Juniata Township

- Penn Township
- Saltillo Borough
- Shade Gap Borough
- Springfield Township
- Tell Township
- Three Springs Borough
- Todd Township
- Walker Township
- Warriors Mark Township
- Wood Township

Municipalities without an increased risk of radon exposure (with areas with a basement pCi/L under 12):

- Alexandria Borough
- Barree Township
- Birmingham Borough
- Brady Township
- Broad Top City Borough
- Carbon Township
- Cassville Borough
- Coalmont Borough
- Dudley Borough
- Henderson Township
- Hopewell Township
- Huntingdon Borough
- Jackson Township
- Lincoln Township
- Logan Township
- Mapleton Borough
- Marklesburg Borough
- Mill Creek Borough
- Miller Township
- Morris Township
- Mount Union Borough
- Oneida Township
- Orbisonia Borough
- Petersburg Borough
- Porter Township
- Rockhill Borough

- Shirley Township
- Shirleysburg Borough
- Smithfield Township
- Spruce Creek Township
- Union Township
- West Township

Socially vulnerable populations in Huntingdon County are at an increased vulnerability to radon exposure than other groups in Huntingdon County. Approximately 11.8% of the population of Huntingdon 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 Huntingdon 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 Huntingdon County experienced population growth. These increases can be seen in *Table X – Population Change in Huntingdon 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 Huntingdon 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 systems.

Figure X - Pennsylvania Radon Levels

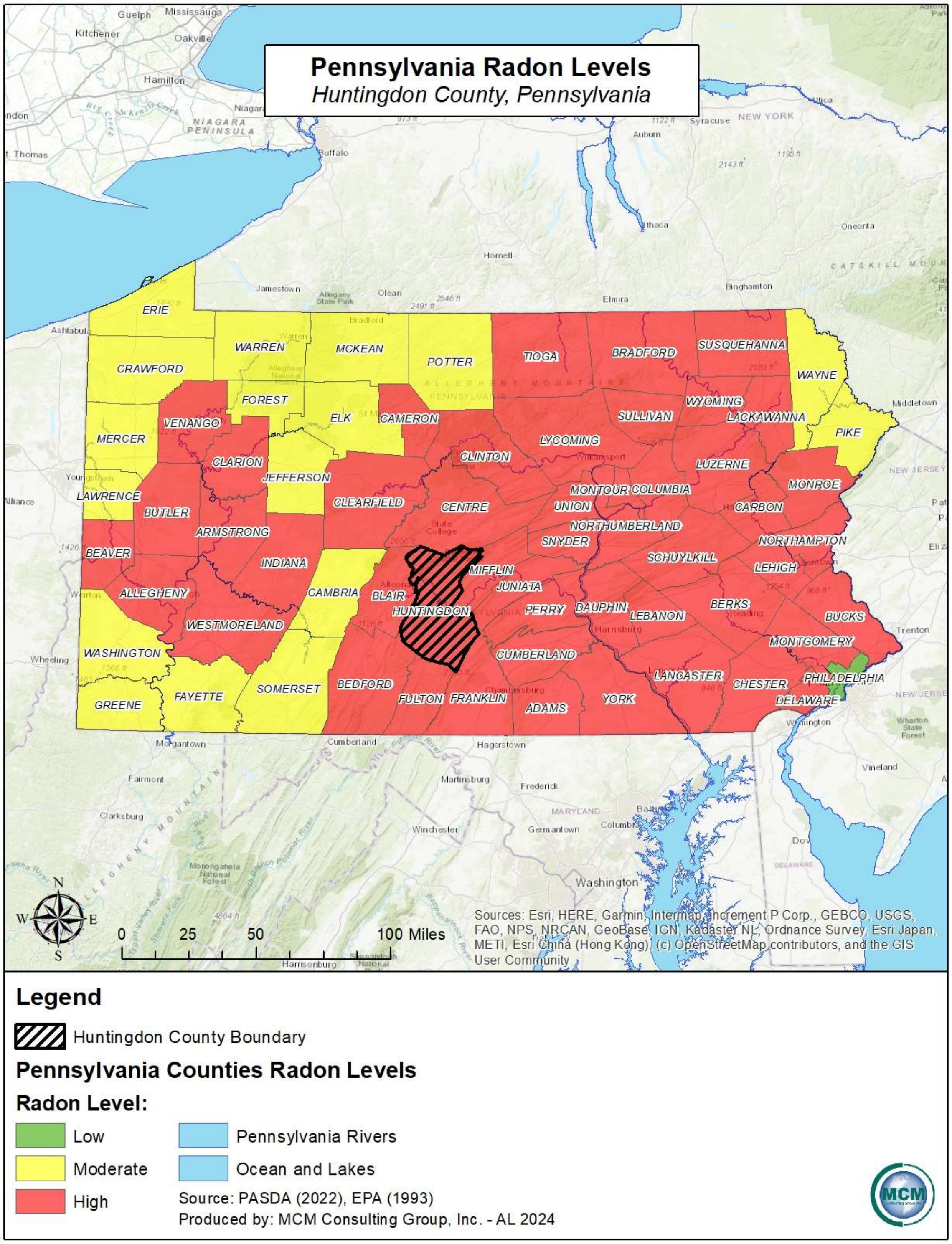
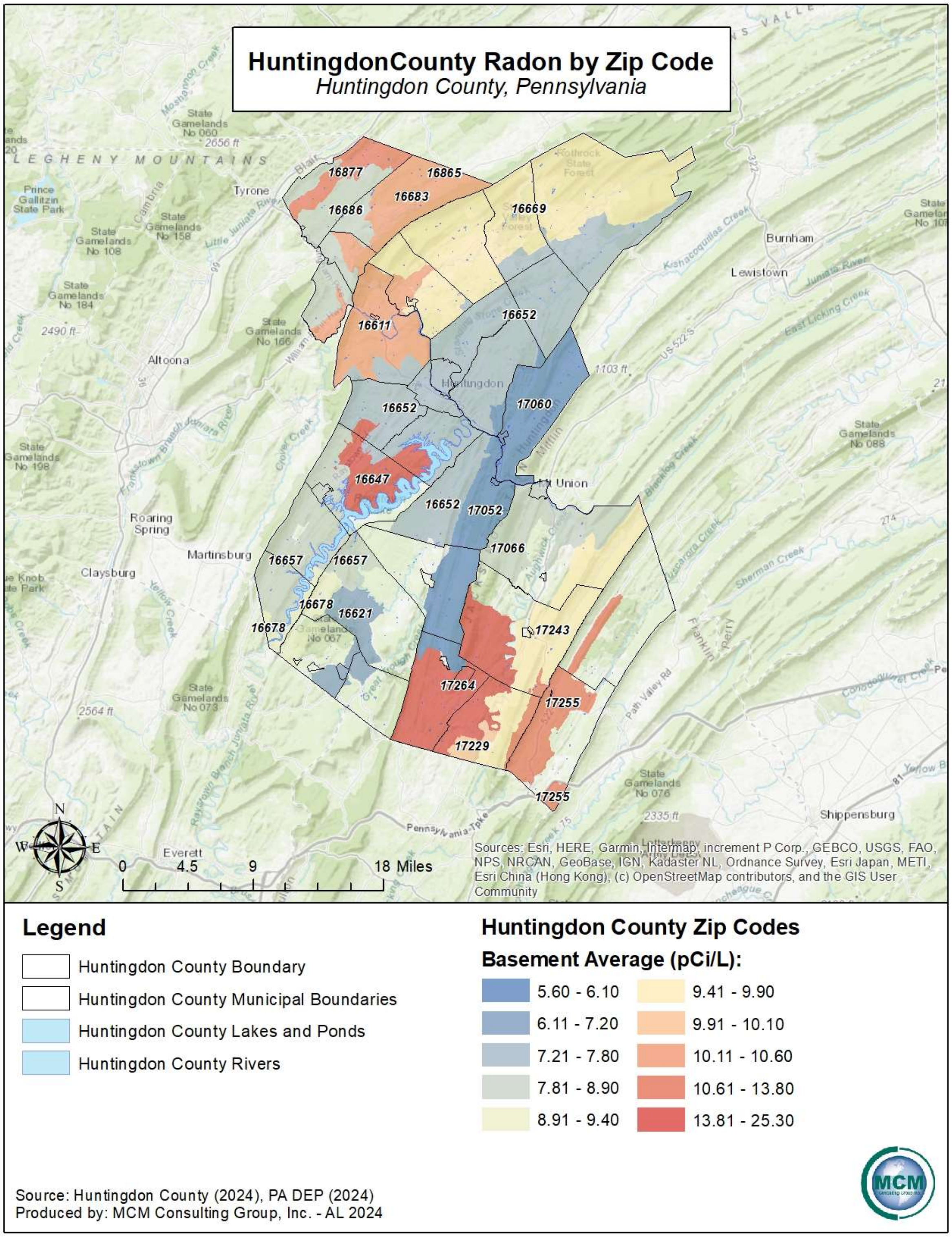


Figure X - Radon Levels by Zip Code



4.3.11. Subsidence and Sinkhole

4.3.11.1 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 Huntingdon County is located in a karst vulnerable area. Subsidence in Huntingdon 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. Huntingdon 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.

4.3.11.2 Range of 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 Huntingdon 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 Huntingdon County local planning team assigned a risk factor assessment score of 2.6 to subsidence and sinkhole formation. This places the hazard at a high risk factor. *Figure X – 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. Huntingdon County has a large portion of mining areas and is therefore one of these regions.

4.3.11.3 Past Occurrence

There is no comprehensive list of mine subsidence in Huntingdon 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 zero fall within Huntingdon County. The fact that no sinkholes were identified does not necessarily mean there are no sinkholes in Huntingdon 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.

4.3.11.4 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 Huntingdon 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 Huntingdon 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 Huntingdon 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 X – Unsuitable Areas for Mining in Pennsylvania* illustrates the areas of Pennsylvania where mining could potentially cause a subsidence event or a sinkhole. None of these areas are located near Huntingdon County.

Climate change may increase the frequency of subsidence in Huntingdon 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 Huntingdon County.

4.3.11.5 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 Huntingdon 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.

Most of the mining that has occurred in Huntingdon County was superficial mining of natural resources. The mine sites were abandoned after extraction can potentially become areas susceptible to subsidence events. These areas can be seen in *Figure X – Abandoned Mined Sites* *in Huntingdon County*. Subsidence cannot be ruled out as a potential hazard for Huntingdon County. There are no state or county critical infrastructure facilities at risk in the county due to sinkholes.

Within Huntingdon County there are no assets (cultural and historic resources, critical infrastructure, and community lifelines) within 500 feet of abandoned mine locations int he county.

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

- Broad Top City Borough
- Carbon Township
- Shirley Township
- Todd Township
- Wood Township

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

- Alexandria Borough
- Barree Township
- Birmingham Township
- Brady Township
- Cass Township
- Cassville Borough
- Clay Township
- Coalmont Borough
- Cromwell Township
- Dublin Township
- Dudley Borough
- Franklin Township
- Henderson Township
- Hopewell Township
- Huntingdon Borough
- Jackson Township
- Juniata Township
- Lincoln Township
- Logan Township
- Mapleton Borough
- Marklesburg Borough
- Mill Creek Borough
- Miller Township

- Morris Township
- Mount Union Borough
- Oneida Township
- Orbisonia Borough
- Penn Township
- Petersburg Borough
- Porter Township
- Rockhill Borough
- Saltillo Borough
- Shade Gap Borough
- Shirleysburg Borough
- Smithfield Township
- Springfield Township
- Spruce Creek Township
- Tell Township
- Three Springs Borough
- Union Township
- Walker Township
- Warriors Mark Township
- West 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 Huntingdon County. Huntingdon County has ten municipalities out of forty-eight that had a population increase between the 2010 and the 2020 US Census. This population change can also be seen in *Table X – Population Change in Huntingdon 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 Huntingdon 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 Huntingdon 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 Huntingdon 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 Huntingdon 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 X – Sinkhole Susceptibility in Pennsylvania

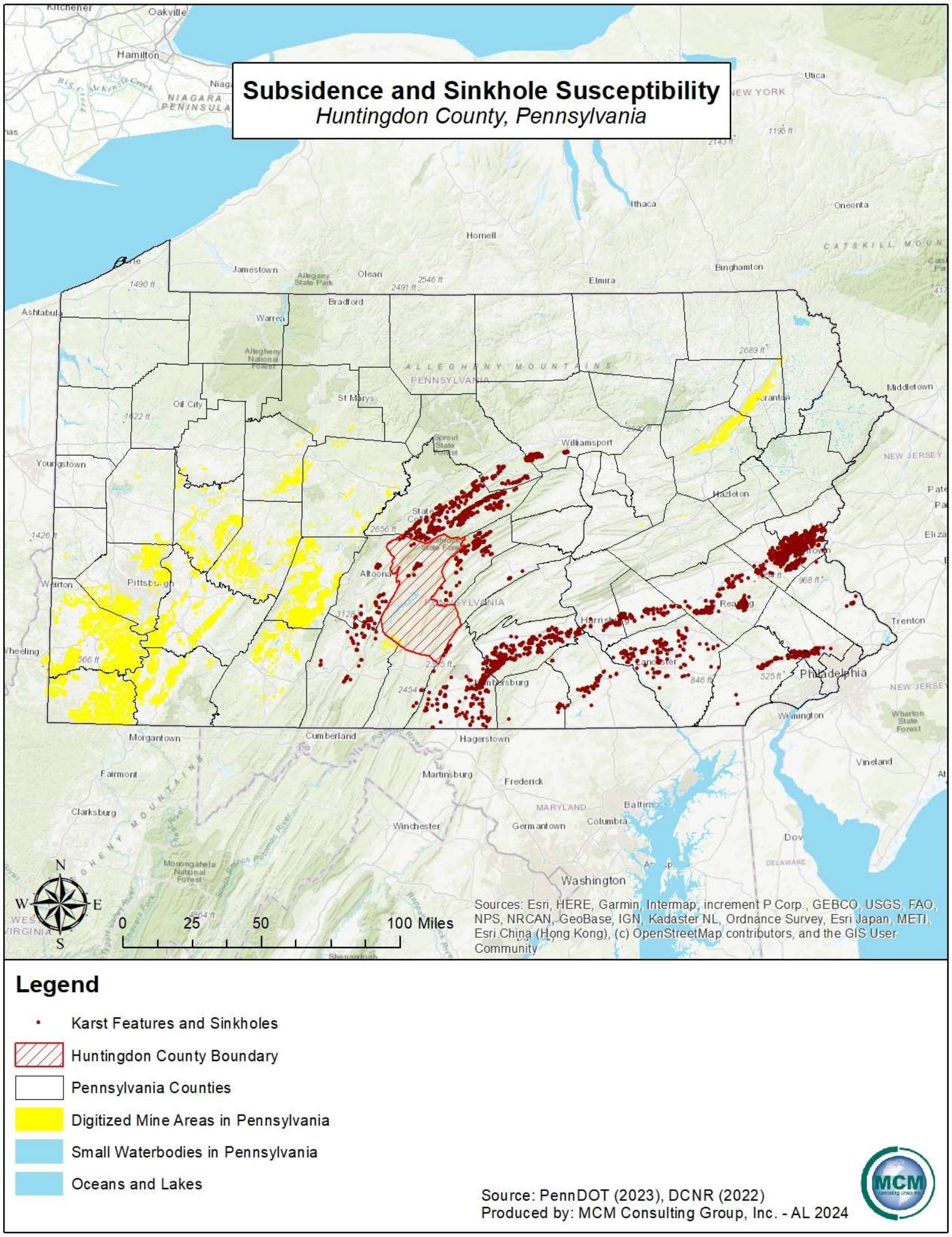


Figure X – Abandoned Mined Sites in Huntingdon County

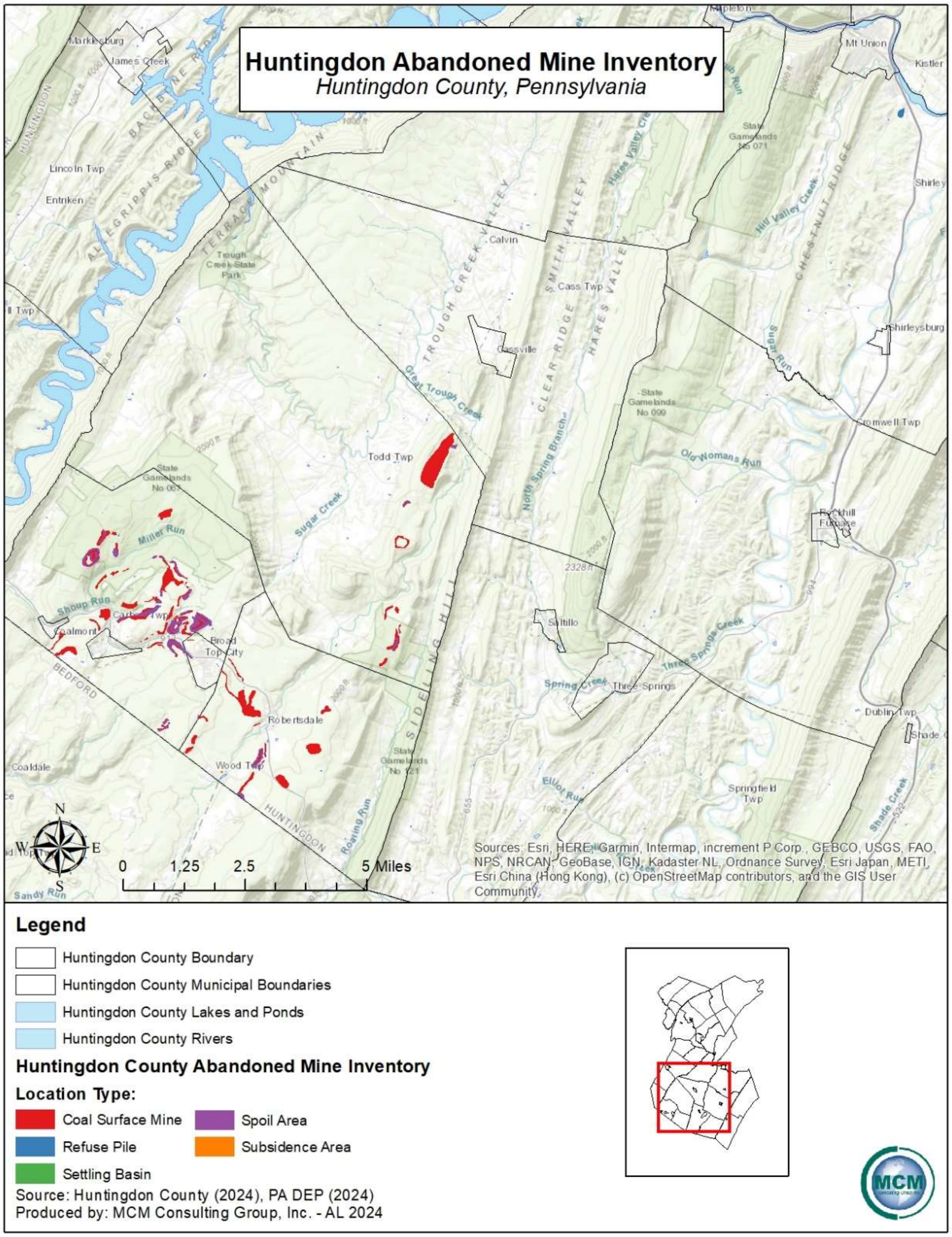
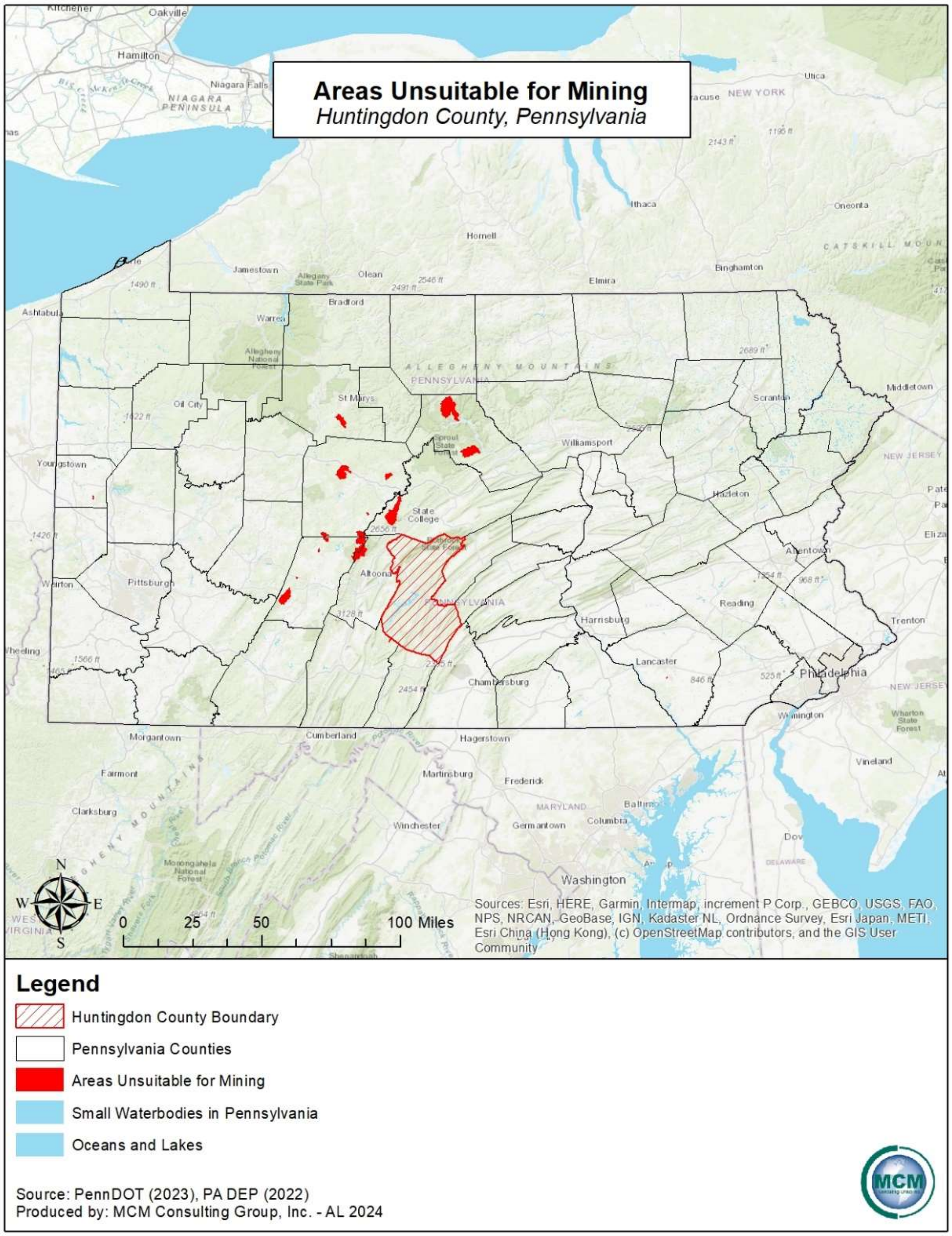


Figure X – Unsuitable Areas for Mining in Pennsylvania



4.3.12. Tornado and Windstorm

4.3.12.1 Location and Extent

Tornadoes and windstorms can occur throughout Huntingdon 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 Huntingdon County.

4.3.12.2 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 X – 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 X – Enhanced Fujita Scale* shows F-Scale categories with corresponding EF-Scale wind speeds.

Figure X – Pennsylvania Wind Zones Continued 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 Huntingdon County falls within Zone III, 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 Huntingdon 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 X - 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.
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 Huntingdon 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. Huntingdon County was 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.

4.3.12.3 Past Occurrence

Huntingdon County has experienced ten tornado events since 1970, and 182 wind incidents between 1981 and summer of 2024 as seen in *Table X – Huntingdon County Tornado History* and *Table X – Huntingdon County High Wind History*. Numerous sources provide information in regard to past occurrences and losses associated with tornadoes/windstorms in Huntingdon

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 and windstorm data was present until May 2024, even though more recent events could have possibly occurred. Historically, the county has experienced both severe windstorms and tornadoes.

The most recent tornado impacted Shade Gap Borough on April 19th, 2019.

Table X - Huntingdon County Tornado History

Huntingdon County Tornado History					
Location	**Date**	**Magnitude (F/EF Scale)**	**Deaths**	**Injuries**	**Property Damage**
Huntingdon County	06/27/1978	Unknown	0	0	$0.00
Huntingdon County	06/16/1985	F1	0	0	$25,000.00
Huntingdon County	06/30/1987	F0	0	0	$25,000.00
Huntingdon County	06/24/1989	F1	0	0	$250,000.00
Huntingdon County	11/20/1989	F2	0	0	$25,000.00
Huntingdon County	09/18/1991	F2	0	3	$250,000.00
Broad Top City Borough	04/28/2011	EF1	0	0	$10,000.00
Coalmont Borough	05/27/2011	EF1	0	0	$10,000.00
Calvin	05/27/2011	EF1	0	0	$10,000.00
Shade Gap Borough	04/19/2019	EF1	0	0	$100,000.00
Source: NOAA NCEI, 2024 Estimated Values are marked*					

Table X - Huntingdon County High Wind History

Huntingdon County High Wind History				
Location	**Date**	**Magnitude (knots)**	**Injuries**	**Property Damage**
Huntingdon County	08/03/1981	50 kts.	0	$0.00
Alexandria	07/02/1996	50 kts.	0	$0.00
Blairs Mills	07/02/1996	50 kts.	0	$0.00
Huntingdon	07/03/1996	50 kts.	0	$0.00
Alexandria	07/19/1996	50 kts.	0	$0.00
Newton Hamilton	07/30/1996	50 kts.	0	$0.00
MT Union	08/15/1996	50 kts.	0	$0.00
Alexandria	10/18/1996	50 kts.	0	$0.00
Huntingdon	11/08/1996	50 kts.	0	$0.00
Marklesburg	11/08/1996	50 kts.	0	$0.00
Warriors Mark	11/08/1996	50 kts.	0	$0.00
Huntingdon	05/19/1997	51 kts.	0	$0.00
Huntingdon	06/18/1997	51 kts.	0	$0.00
Mill Creek	07/05/1997	51 kts.	0	$0.00

Huntingdon County High Wind History				
Location	**Date**	**Magnitude (knots)**	**Injuries**	**Property Damage**
Orbisonia	07/15/1997	51 kts.	0	$0.00
Smithfield	05/29/1998	51 kts.	0	$0.00
Huntingdon	05/29/1998	51 kts.	0	$0.00
Shade Gap	05/31/1998	51 kts.	0	$0.00
Warriors Mark	06/02/1998	51 kts.	0	$0.00
Warriors Mark	06/16/1998	51 kts.	0	$0.00
Petersburg	06/23/1998	51 kts.	0	$0.00
Marklesburg	06/30/1998	51 kts.	0	$0.00
Huntingdon County	09/29/1999	60 kts.	0	$4,000.00
Huntingdon County	01/10/2000	50 kts.	0	$0.00
Huntingdon County	12/12/2000	Unknown	0	$0.00
Huntingdon County	02/10/2001	Unknown	0	$13,900.00
Spruce Creek	04/09/2001	50 kts	0	$0.00
Huntingdon	06/12/2001	50 kts	0	$0.00
Warriors Mark	07/01/2001	50 kts	0	$0.00
Warriors Mark	08/19/2001	50 kts	0	$0.00
Petersburg	08/28/2001	50 kts	0	$0.00
Alexandria	08/31/2001	50 kts	0	$0.00
Huntingdon	10/16/2001	50 kts	0	$0.00
Huntingdon County	03/09/2002	50 kts.	0	$5,550.00
Huntingdon	05/12/2002	50 kts.	0	$0.00
Orbisonia	05/12/2002	50 kts.	0	$0.00
Huntingdon	05/31/2002	50 kts.	0	$0.00
MT Union	05/31/2002	50 kts.	0	$0.00
Petersburg	06/04/2002	50 kts.	0	$0.00
Huntingdon	07/23/2002	50 kts.	0	$0.00
MT Union	07/06/2003	50 kts.	0	$0.00
MC Alevy’s Fort	07/18/2003	50 kts.	0	$0.00
Calvin	07/18/2003	50 kts.	0	$0.00
Petersburg	07/21/2003	50 kts.	0	$0.00
Robertsdale	08/26/2003	50 kts.	0	$0.00
Spring MT	08/27/2003	50 kts.	0	$0.00
Huntingdon County	11/13/2003	60 kts.	0	$0.00
Huntingdon	11/19/2003	50 kts.	0	$0.00
Huntingdon	05/07/2004	50 kts.	0	$0.00
Huntingdon	05/07/2004	50 kts.	0	$0.00
Cassville	05/15/2004	50 kts.	0	$0.00
Shirleysburg	05/25/2004	50 kts.	0	$0.00
Warriors Mark	08/04/2004	50 kts.	0	$0.00
Huntingdon County	12/01/2004	60 kts.	0	$0.00
Warriors Mark	06/06/2005	50 kts.	0	$0.00

Huntingdon County High Wind History				
Location	**Date**	**Magnitude (knots)**	**Injuries**	**Property Damage**
Shade Gap	09/29/2005	50 kts.	0	$0.00
Shade Gap	06/22/2006	50 kts.	0	$0.00
Shade Gap	11/16/2006	60 kts.	0	$20,000.00
Huntingdon County	12/01/2006	45 kts.	0	$0.00
MC Alevy's Fort	05/31/2007	50 kts.	0	$0.00
Alexandria	06/08/2007	50 kts.	0	$0.00
Orbisonia	06/13/2007	50 kts.	0	$0.00
Spruce Rock	06/19/2007	50 kts.	0	$0.00
Huntingdon	06/27/2007	50 kts.	0	$0.00
Huntingdon	06/27/2007	50 kts.	0	$0.00
Orbisonia	07/29/2007	50 kts.	0	$0.00
Borad Top City	08/09/2007	50 kts.	0	$0.00
Warriors Mark	08/30/2007	50 kts.	0	$0.00
Allenport	06/10/2008	70 kts.	0	$10,000.00
Huntingdon	06/16/2008	50 kts.	0	$0.00
Mapleton	06/16/2008	50 kts.	0	$0.00
Huntingdon	06/22/2008	50 kts.	0	$2,500.00
Petersburg	06/22/2008	50 kts.	0	$2,500.00
Mc Alevy's Fort	06/22/2008	50 kts.	0	$2,500.00
Mapleton	07/20/2008	50 kts.	0	$0.00
Huntingdon County	02/12/2009	50 kts.	0	$25,000.00
Huntingdon	04/16/2010	50 kts.	0	5,000.00
Snyder Town	05/14/2010	74 kts.	0	0.00
Snyder Town	05/27/2011	50 kts.	0	$0.00
Huntingdon	05/27/2011	50 kts.	0	$0.00
Orbisonia	05/27/2011	50 kts.	0	$0.00
Orbisonia	05/27/2011	50 kts.	0	$0.00
Huntingdon	05/27/2012	50 kts.	0	$5,000.00
Mill Creek	05/27/2012	50 kts.	0	$5,000.00
MT Union	05/27/2012	50 kts.	0	$5,000.00
Warrior Ridge	05/29/2012	50 kts.	0	$10,000.00
Shade Gap	06/29/2012	50 kts.	0	$5,000.00
Calvin	07/07/2012	50 kts.	0	$5,000.00
Allenport	07/07/2012	50 kts.	0	$5,000.00
Huntingdon County	10/29/2012	50 kts.	0	$0.00
Alexandria	04/24/2013	50 kts.	0	$2,000.00
Huntingdon	04/24/2013	50 kts.	0	$2,000.00
Huntingdon	05/22/2013	50 kts.	0	$5,000.00
Warriors Mark	06/13/2013	50 kts.	0	$2,500.00
Barree	06/13/2013	50 kts.	0	$2,500.00
Huntingdon	06/13/2013	50 kts.	0	$5,000.00

Huntingdon County High Wind History				
Location	**Date**	**Magnitude (knots)**	**Injuries**	**Property Damage**
Huntingdon	06/25/2013	50 kts.	0	$5,000.00
Manor Hill	06/27/2013	50 kts.	0	$2,000.00
Snydertown	07/07/2013	50 kts.	0	$5,000.00
Blacklog	07/07/2013	50 kts.	0	$5,000.00
Orbisonia	07/07/2013	50 kts.	0	$2,000.00
Huntingdon	07/07/2013	50 kts.	0	$5,000.00
MT Union	07/07/2013	50 kts.	0	$2,000.00
Huntingdon	11/01/2013	50 kts.	0	$0.00
MC Alevy’s Fort	11/01/2013	50 kts.	0	$0.00
MT Union	11/01/2013	50 kts.	0	$0.00
Spruce Rock	07/03/2014	50 kts.	0	$1,000.00
Mapleton	07/03/2014	50 kts.	0	$500.00
Mill Creek	07/03/2014	50 kts.	0	$500.00
Petersburg	07/13/2014	50 kts.	0	$500.00
Donation	06/08/2015	50 kts.	0	$3,000.00
Donation	06/08/2015	50 kts.	0	$500.00
Neffs Mills	06/12/2015	50 kts.	0	$500.00
MT Union	06/12/2015	50 kts.	0	$500.00
Shade Gap	06/23/2015	50 kts.	0	$1,000.00
Huntingdon County	04/03/2016	52 kts.	0	$0.00
Petersburg	07/25/2016	52 kts.	0	$2,000.00
Cottage	02/12/2017	52 kts.	0	$40,000.00
Huntingdon	02/12/2017	52 kts.	0	$10,000.00
Center Union	04/30/2017	52 kts.	0	$2,000.00
Spruce Rock	05/01/2017	52 kts.	0	$6,000.00
Shy Beaver	05/01/2017	52 kts.	0	$0.00
Petersburg	05/01/2017	52 kts.	0	$15,000.00
Pennsylvania Furnace	05/01/2017	52 kts.	0	$3,000.00
Coalmont	05/01/2017	52 kts.	0	$5,000.00
Blacklog	05/01/2017	52 kts.	0	$2,000.00
Huntingdon	05/30/2017	52 kts.	0	$3,000.00
Huntingdon	05/30/2017	52 kts.	0	$1,000.00
Greenwood Furnace	06/18/2017	52 kts.	0	$1,000.00
Mc Alevy’s Fort	08/04/2017	52 kts.	0	$8,000.00
Ardenheim	08/19/2017	52 kts.	0	$7,000.00
Huntingdon County	04/04/2018	52 kts.	0	$0.00
MC Connellstown	07/02/2018	52 kts.	0	$3,000.00
Smithfield	07/02/2018	52 kts.	0	$4,000.00
Petersburg	07/02/2018	52 kts.	0	$3,000.00
Huntingdon County	02/24/2019	52 kts.	0	$0.00
Huntingdon	04/14/2019	52 kts.	0	$3,000.00

Huntingdon County High Wind History				
Location	**Date**	**Magnitude (knots)**	**Injuries**	**Property Damage**
Shade Gap	04/19/2019	61 kts.	0	$15,000.00
Shade Gap	04/19/2019	52 kts.	0	$9,000.00
Shirleyburg	05/03/2019	52 kts.	0	$6,000.00
Cassville	05/28/2019	52 kts.	0	10,000.00
Three SPGS	05/28/2019	52 kts.	0	0.00
Aitch	06/28/2019	52 kts.	0	0.00
Cassville	06/29/2019	52 kts.	0	4,000.00
Shirleysburg	06/29/2019	52 kts.	35	10,000.00
Blacklog	06/29/2019	52 kts.	0	4,000.00
Snydertown	07/02/2019	52 kts.	0	10,000.00
MC Alevy's Fort	08/15/2019	52 kts.	0	3,000.00
Mill Creek	08/15/2019	52 kts.	0	2,000.00
Ardenheim	08/15/2019	52 kts.	0	4,000.00
Mill Creek	08/15/2019	52 kts.	0	4,000.00
Coalmont	08/15/2019	52 kts.	0	$5,000.00
Saulsburg	08/18/2019	52 kts.	0	$3,000.00
Mapleton	08/22/2019	52 kts.	0	$1,000.00
Robertsdale	04/08/2020	52 kts.	0	$6,000.00
Saulsburg	06/10/2020	52 kts.	0	$6,000.00
Hesston	06/22/2020	52 kts.	0	$0.00
Colfax	06/22/2020	52 kts.	0	$3,000.00
Coalmont	06/25/2020	52 kts.	0	$1,000.00
Greenwood Furnace	08/28/2020	52 kts.	0	$0.00
Mill Creek	08/28/2020	52 kts.	0	$4,000.00
Neffs Mills	08/28/2020	52 kts.	0	$3,000.00
Richvale	08/28/2020	52 kts.	0	$20,000.00
Frogtown	06/13/2021	52 kts.	0	$0.00
Warriors Mark	07/07/2021	52 kts.	0	$7,000.00
Newburg	07/11/2021	52 kts.	0	$5,000.00
Dungarvin	07/13/2021	52 kts.	0	$5,000.00
Hesston	08/11/2021	52 kts.	0	$4,000.00
Alexandria	08/11/2021	52 kts.	0	$9,000.00
Mill Creek	08/11/2021	52 kts.	0	$4,000.00
Frogtown	03/07/2022	52 kts.	0	$3,000.00
Orbisonia	03/07/2022	52 kts.	0	$5,000.00
Mapleton	03/31/2022	52 kts.	0	$2,000.00
Franklinville	07/01/2022	52 kts.	0	$4,000.00
Seven Springs	07/01/2022	52 kts.	0	$0.00
Graysville	07/14/2023	52 kts.	1	$20,000.00
Mapleton	09/07/2023	52 kts.	0	$3,000.00
Donation	09/07/2023	52 kts.	0	$4,000.00

Huntingdon County High Wind History				
Location	**Date**	**Magnitude (knots)**	**Injuries**	**Property Damage**
Mc Alevy's Fort	09/07/2023	61 kts.	0	$12,000.00
Neff's Mills	05/23/2024	52 kts.	0	$10,000.00
Neff's Mills	05/23/2024	52 kts.	0	$5,000.00
Mc Alevy's Fort	05/23/2024	52 kts.	0	$3,000.00
Source: NOAA NCEI, 2024 Estimated Values are marked*				

4.3.12.4 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 Huntingdon County is ranked as possible, but not highly likely. While the chance of being hit by a tornado in Huntingdon 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 Huntingdon County, as shown in *Figure X – Tornado Activity in Huntingdon County* below, are expected to have one tornado approximately every ten years as a future occurrence. The approximation of one to four tornadoes annually assists with determining the rate of future tornado occurrences within Huntingdon 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. Huntingdon 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.

4.3.12.5 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 Huntingdon 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 Huntingdon 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.

Huntingdon County's 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. Huntingdon County is considered to be a rural county that has a great amount of tourism which occurs in the surrounding hills, mountains, and state parks. Not only is the environment at risk to tornadoes and windstorms, but hikers, tourists, and hunters are also at risk when out in the environment. Consequently, in the event of a tornado or severe storm, these tourists have limited emergency notification measures which result in high vulnerability. A storm has the ability, potentially, to destroy structures, damage private and public property, and injure citizens and tourists to 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 X – Population Change in Huntingdon County*, Alexandria Borough, Franklin Township, Morris Township, Orbisonia Borough, Rockhill Borough, Smithfield Township, Springfield Township, Three Springs Borough, Walker Township and Warrior Mark Township has 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 Huntingdon County had a minor overall decrease between 2010 and 2020, it can be speculated that the built environment did not increase significantly.

There are no historic or cultural properties that are listed with the National Register of Historic Places that are at an increased risk of tornadoes in Huntingdon County. This analysis was run off of the previous tornado paths in the county and 500 feet vulnerability zones. These locations are where tornadoes have previously developed and may develop again.

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. However, there were no critical infrastructure or community lifelines within 500 feet of previous tornado tracks.

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

- Broad Top City Borough
- Carbon Township
- Cass Township
- Huntingdon Borough
- Jackson Township
- Penn Township
- Todd Township
- Union Township
- Wood Township

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

- Alexandria Borough

- Barree Township
- Birmingham Township
- Brady Township
- Cassville Borough
- Clay Township
- Coalmont Borough
- Cromwell Township
- Dublin Township
- Dudley Borough
- Franklin Township
- Henderson Township
- Hopewell Township
- Juniata Township
- Lincoln Township
- Logan Township
- Mapleton Borough
- Marklesburg Borough
- Mill Creek Borough
- Miller Township
- Morris Township
- Mount Union Borough
- Oneida Township
- Orbisonia Borough
- Petersburg Borough
- Porter Township
- Rockhill Borough
- Saltillo Borough
- Shade Gap Borough
- Shirley Township
- Shirleysburg Borough
- Smithfield Township
- Springfield Township
- Spruce Creek Township
- Tell Township
- Three Springs Borough
- Walker Township
- Warriors Mark Township
- West Township

Figure X – Pennsylvania Wind Zones Continued

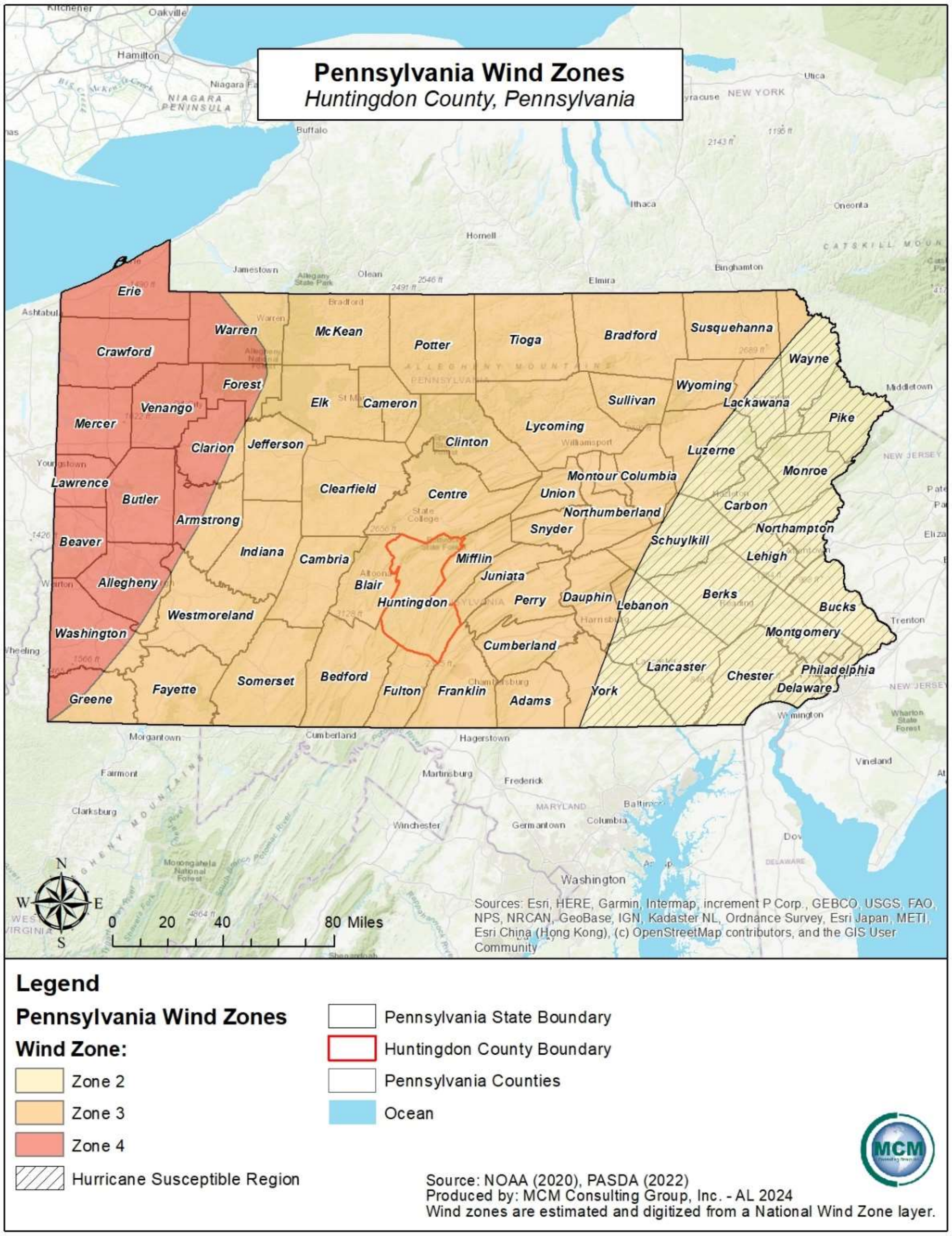


Figure X – Tornado Activity in Pennsylvania

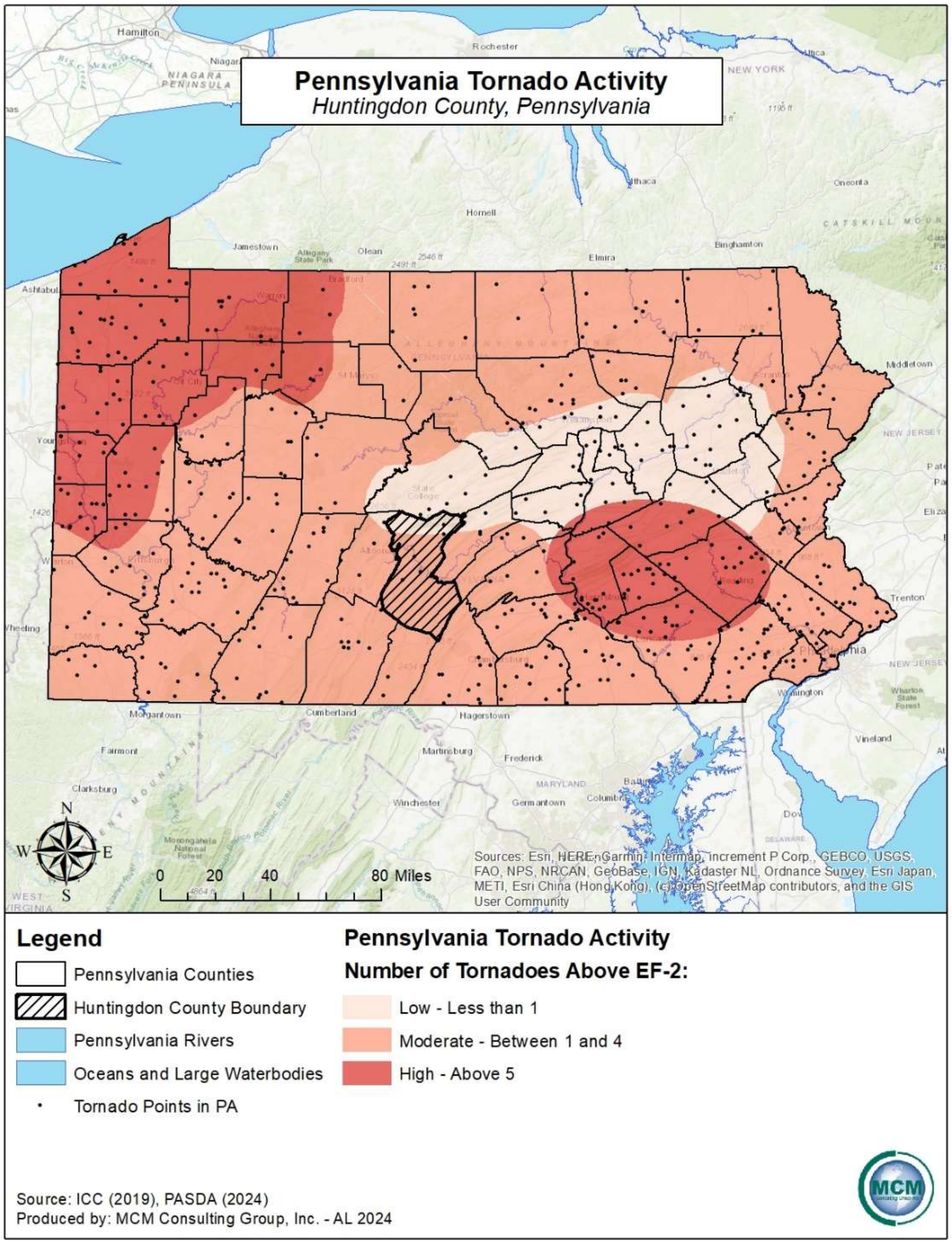
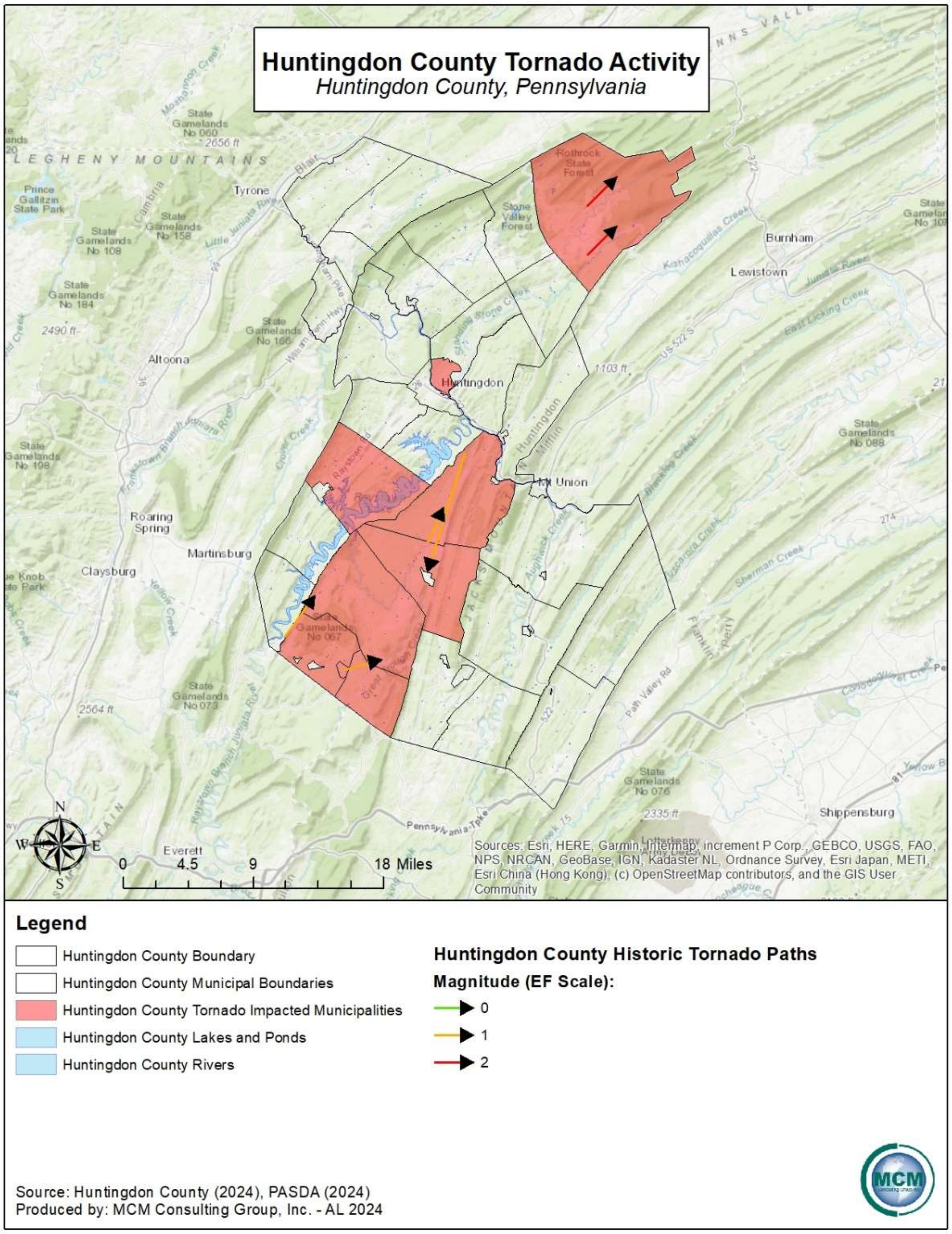


Figure X – Tornado Activity in Huntingdon County



4.3.13. Wildfire

4.3.13.1 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 Huntingdon 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.

4.3.13.2 Range and 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 Huntingdon 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 Huntingdon 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 X – Wildland Fire Assessment System* identifies each threat classification and provides a description of the level.

Table X – 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.

4.3.13.3 Past Occurrence

The Pennsylvania Department of Conservation and Natural Resources (DCNR) has an extensive history of reported wildfires in its state forestry system and districts. Historically, Huntingdon County experiences approximately fifteen 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. Huntingdon County lies mostly in District 5 (Rothrock State Forest District) with a small portion of the county lying in District 3 (Tuscarora State Forest District) of the DCNR's Bureau of Forestry. District 5 encompasses three counties, while District 3 encompasses six counties. In 2023, there were a total of fifty-eight fires in District 5 that were responsible for destroying 74.8 acres and in District 3 there were ninety-nine fires responsible for destroying 88.3 acres.

District 5 and District 3 report the following twenty-four-year wildfire summary based on observed and reported wildfires. *Table X – Annual Summary of Wildfire Events* illustrates the number of acres burned in a certain number of fires for District 5 and District 3 from the year 2000 to the year 2023.

Table X – Annual Summary of Wildfire Events

Annual Summary of Wildfire Events in District 5				
Year	**Number of Fires**	**Frequency Increase or Decrease**	**Acres**	**Severity Increase or Decrease**
2000	22	-	53.4	-
2001	14	⇩	127.2	⇧
2002	17	⇧	95.1	⇩
2003	5	⇩	26.6	⇩
2004	0	⇩	0.0	⇩
2005	15	⇧	48.2	⇧
2006	22	⇧	590.1	⇧
2007	16	⇩	7.7	⇩
2008	6	⇩	14.7	⇧
2009	11	⇧	11.9	⇩
2010	19	⇧	135.7	⇧
2011	10	⇩	13.5	⇩
2012	15	⇧	87.5	⇧
2013	17	⇧	30.0	⇩
2014	25	⇧	64.7	⇧
2015	19	⇩	76.4	⇧
2016	23	⇧	86.2	⇧
2017	9	⇩	15.4	⇩
2018	10	⇧	12.8	⇩
2019	9	⇩	10.5	⇩
2020	13	⇧	23.5	⇧
2021	8	⇩	43.5	⇧
2022	6	⇩	28.0	⇩
2023	58	⇧	74.8	⇧
Source: PA DCNR, 2023				

Annual Summary of Wildfire Events District 3				
Year	**Number of Fires**	**Frequency Increase or Decrease**	**Acres**	**Severity Increase or Decrease**
2000	8	-	21.8	-
2001	9	⇧	6.5	⇩
2002	2	⇩	0.8	⇩
2003	5	⇧	13.8	⇧
2004	1	⇩	0.1	⇩
2005	9	⇧	13.5	⇧
2006	17	⇧	72.4	⇧
2007	13	⇩	24.2	⇩
2008	5	⇧	1.2	⇩
2009	8	⇧	37.5	⇧
2010	15	⇧	25.6	⇩
2011	10	⇩	41.7	⇧
2012	15	⇧	50.9	⇧
2013	27	⇧	31.4	⇩
2014	32	⇧	52.8	⇧
2015	17	⇩	54.8	⇧
2016	24	⇧	149.4	⇧
2017	23	⇩	43.0	⇩
2018	13	⇩	57.0	⇧
2019	25	⇧	29.7	⇩
2020	33	⇧	49.3	⇧
2021	35	⇧	98.1	⇧
2022	25	⇩	25.3	⇩
2023	99	⇧	88.3	⇧
Source: PA DCNR, 2023				

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 441 prescribed burns carried out throughout the entire Commonwealth by numerous agencies and organizations totaling over 14,472 prescribed fire acres. The Pennsylvania Department of Conservation and Natural Resources (DCNR) is responsible for 63 prescribed burns in 2022 that accounted for 1,749 prescribed fire acres. This number is up by seventeen prescribed burns from the total number of forty-six reported prescribed burns in 2021 by the DCNR only. At the time of writing this plan, data on 2023 prescribed burns by DCNR were unavailable.

4.3.13.4 Future Occurrence

Annual occurrence of urban fires and wildfires in Huntingdon 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.

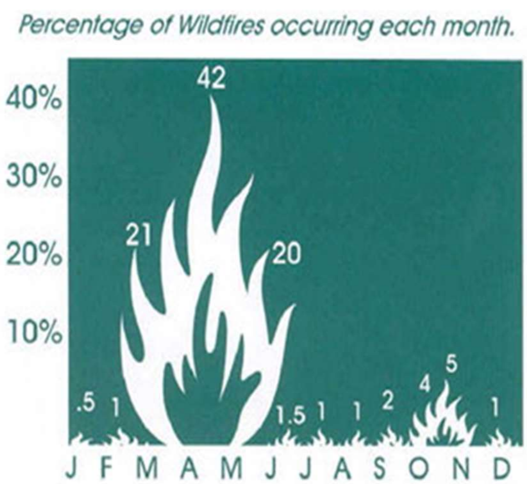
4.3.13.5 Vulnerability Assessment

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 X – 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 X – 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 X – Wildland Urban Interface* shows the extent of Huntingdon 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 eighteen fire departments that serve Huntingdon County, a list of which can be seen in *Table X* 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 Huntingdon County. *Figure X – Fire Stations Locations* illustrates the position of fire stations and the location of state game lands, state forests, and natural areas within Huntingdon 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 4.3.13.4, 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 X – Population Change in Huntingdon County*, twenty-three 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 vulnerability to wildfires, since 2010, due to the increase in population. Unserved, underserved, and socially vulnerable populations within Huntingdon 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 Huntingdon 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.

Huntingdon County promotes fishing, hunting, camping, hiking, canoeing, and other outdoor activities. These land use events can increase the risk of wildfires starting. Approximately 78% of Huntingdon County is made up of forest areas, including deciduous, evergreen, mixed deciduous and evergreen, forested wetlands, stream, and emergent wetlands. Natural areas can be extremely vulnerable to wildfires within Huntingdon 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.

Most of the historic and cultural properties that are located in Huntingdon County are at an increased vulnerability to wildfire events. Each property is of a construction type that would be vulnerable to wildfires in Huntingdon County. The majority of the historic properties in the county are constructed out of brick and stone, with wooden interiors that would be destroyed by fires. Also, six historic places are within 2-miles of a fire station in Huntingdon County. These locations are Brumbaugh Homestead, the Huntingdon Armory, the Hudson Grist Mill, the Lloyd and Henry Warehouse, the H.O. Andrews Feed Mill, and the Shade Gap Feed and Flour Mill. All other historic properties in the county are farther away from fire station locations which could result in a longer response time to fires.

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

- Alexandria Borough
- Birmingham Borough
- Brady Township
- Broad Top City Borough
- Clay Township
- Coalmont Borough
- Cromwell Township
- Hopewell Township
- Huntingdon Borough
- Juniata Township
- Lincoln Township
- Logan Township
- Mapleton Borough
- Marklesburg Borough
- Mill Creek Borough
- Mount Union Borough
- Orbisonia Borough
- Penn Township
- Petersburg Borough
- Porter Township
- Rockhill Borough
- Saltillo Borough
- Shade Gap Borough
- Shirley Township
- Shirleysburg Borough
- Smithfield Township
- Springfield Township
- Spruce Creek Township
- Three Springs Borough
- Union Township
- Walker Township
- Wood Township

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

- Barree Township
- Carbon Township
- Cass Township
- Cassville Borough
- Dublin Township
- Dudley Borough
- Franklin Township
- Henderson Township
- Jackson Township
- Miller Township
- Morris Township
- Oneida Township
- Tell Township
- Todd Township
- Warriors Mark Township
- West Township

Figure X – Wildland Urban Interface

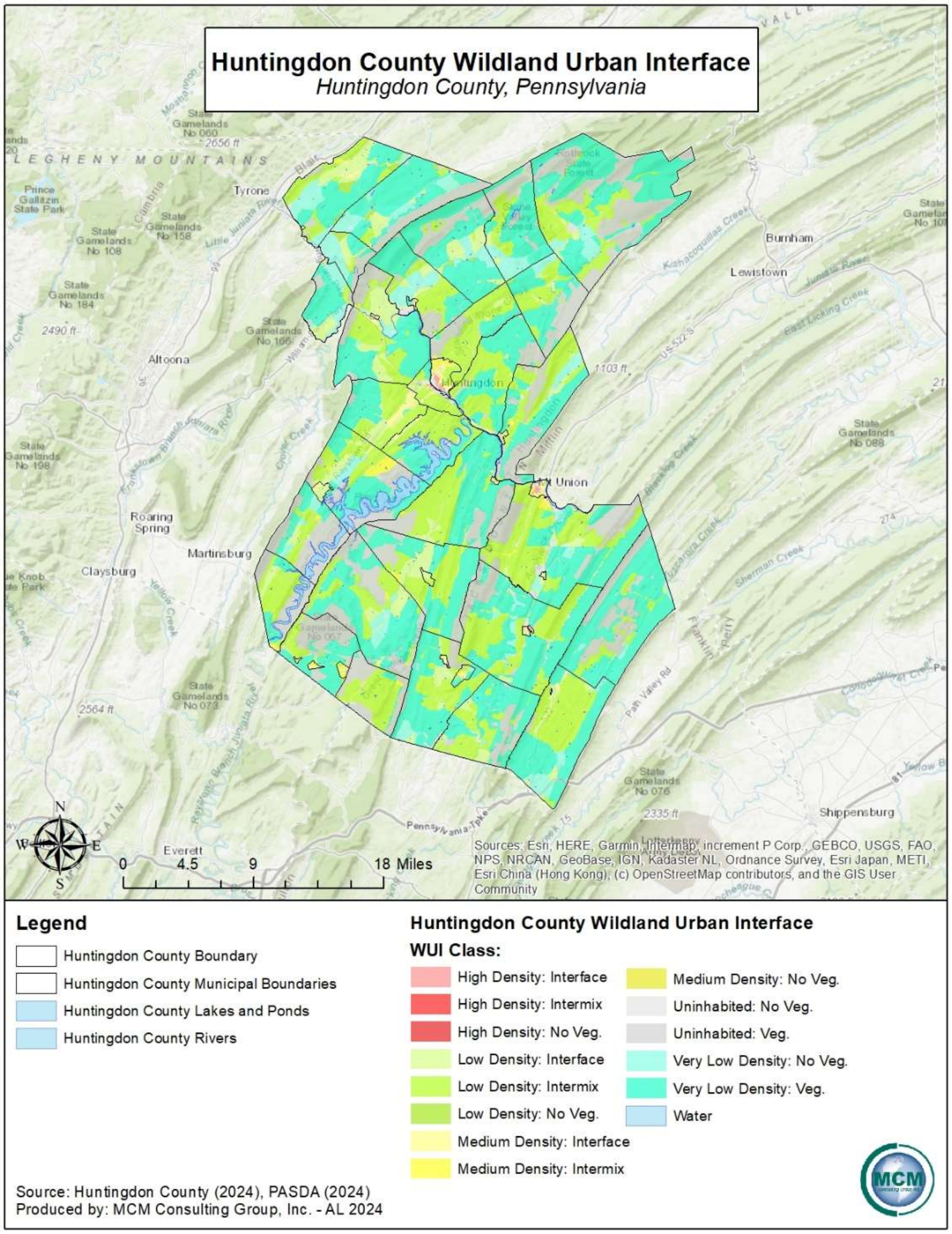
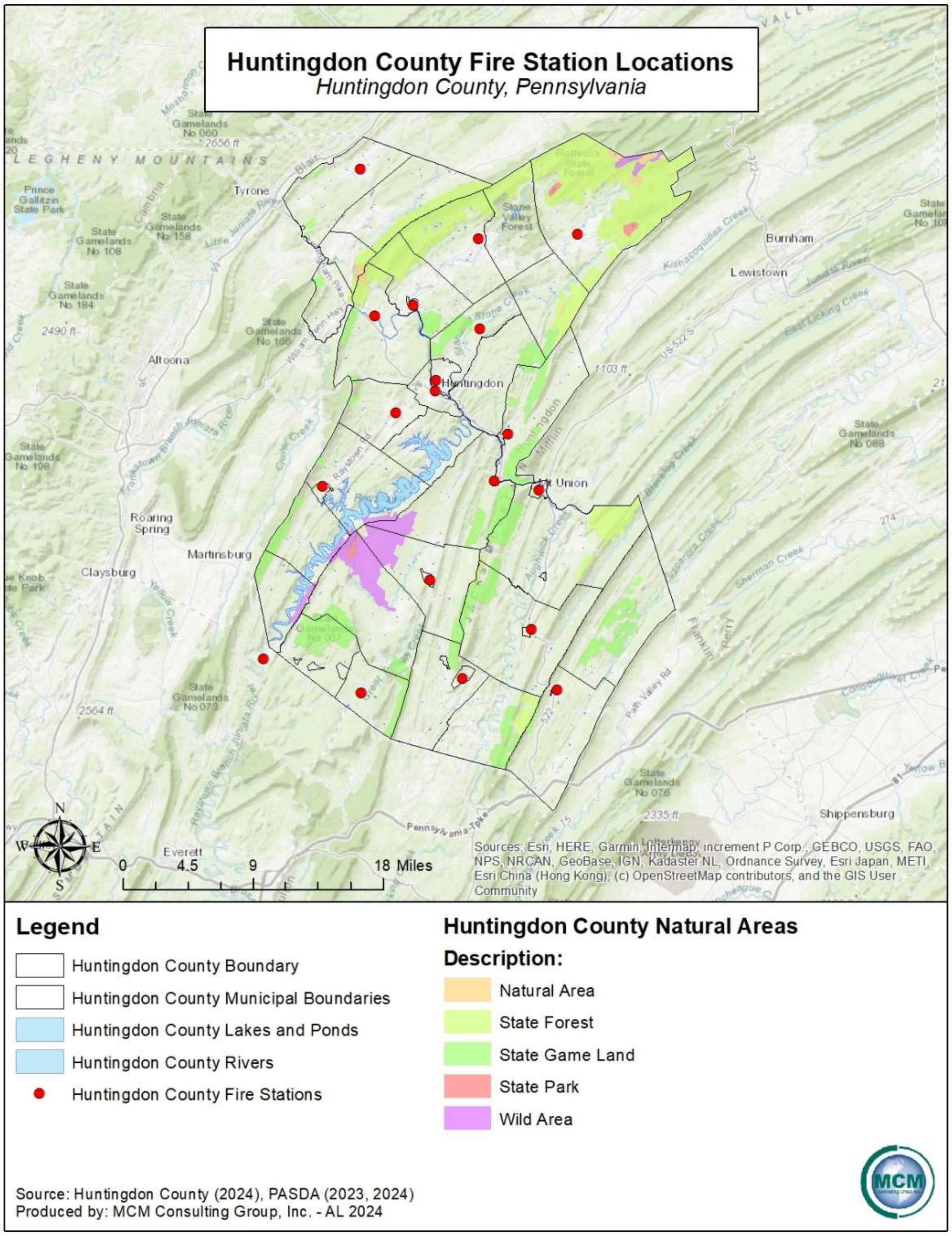


Figure X – Fire Stations Locations



4.3.14. Winter storm

4.3.14.1 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.

4.3.14.2 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 X – 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 X – 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.
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).

NESIS Winter Storm Rankings			
Category	**Description**	**NESIS Range**	**Definition**
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. Huntingdon County receives an average of about 25.7 inches of snowfall a year. Most areas of Huntingdon 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 X - Pennsylvania Annual Snowfall 1981 – 2010* illustrates the long-term trends for snowfall accumulation in Pennsylvania over three decades.

4.3.14.3 Past Occurrence

Figure X – Winter Storm Events by County in Pennsylvania shows the number of winter storm events from 1950 – 2013 for the Commonwealth of Pennsylvania. When looking at data from NOAA from 1950-2024 Huntingdon County has had one blizzard event, twenty-four heavy snow events, seven ice storms, and twenty-eight winter storms. A list of these events for Huntingdon County is outlined in *Table X – Huntingdon County Winter Storm History*. *Table X – Recent*

Annual Snowfall Estimates shows recent annual snowfall measurements as stated by NOAA. Overall, Huntingdon County has experienced a decrease on the annual estimated average of snowfall. On average, the annual snowfall totals have decreased in the time periods from 2020 to present.

Table X – Recent Annual Snowfall Estimates

Recent Annual Snowfall Estimates	
Time Span	**Snowfall Estimates (inches)**
1999-2000	10.9
2000-2001	22.1
2001-2002	9.4
2002-2003	50.0
2003-2004	63.1
2004-2005	22.2
2005-2006	19.4
2006-2007	24.2
2007-2008	23.0
2008-2009	12.4
2009-2010	17.1
2010-2011	23.1
2011-2012	8.3
2012-2013	31.4
2013-2014	43.2
2014-2015	30.9
2015-2016	22.8
2016-2017	21.5
2017-2018	26.1
2018-2019	38.7
2019-2020	3.4
2020-2021	30.5
2021-2022	21.3
2022-2023	16.6
2023-2024	19.1
Source: NOAA, 2024	

Table X – Huntingdon County Winter Weather History

Huntingdon County Winter Weather History		
Location	**Date**	**Event Type**
Huntingdon County	01/07/1996	Blizzard

Huntingdon County Winter Weather History		
Location	**Date**	**Event Type**
Huntingdon County	01/12/1996	Heavy Snow
Huntingdon County	11/28/1996	Heavy Snow
Huntingdon County	02/13/1997	Winter Storm
Huntingdon County	03/14/1997	Ice Storm
Huntingdon County	11/14/1997	Heavy Snow
Huntingdon County	12/29/1997	Heavy Snow
Huntingdon County	01/15/1998	Ice Storm
Huntingdon County	01/02/1999	Winter Storm
Huntingdon County	01/08/1999	Winter Storm
Huntingdon County	01/14/1999	Winter Storm
Huntingdon County	03/14/1999	Heavy Snow
Huntingdon County	01/30/2000	Heavy Snow
Huntingdon County	02/13/2000	Ice Storm
Huntingdon County	02/18/2000	Winter Storm
Huntingdon County	12/13/2000	Winter Storm
Huntingdon County	03/04/2001	Heavy Snow
Huntingdon County	01/06/2002	Heavy Snow
Huntingdon County	12/05/2002	Heavy Snow
Huntingdon County	12/10/2002	Ice Storm
Huntingdon County	12/25/2002	Heavy Snow
Huntingdon County	02/16/2003	Heavy Snow
Huntingdon County	12/05/2003	Heavy Snow
Huntingdon County	01/14/2004	Heavy Snow
Huntingdon County	01/25/2004	Heavy Snow
Huntingdon County	02/03/2004	Heavy Snow
Huntingdon County	02/06/2004	Ice Storm
Huntingdon County	01/05/2005	Winter Storm
Huntingdon County	02/24/2005	Heavy Snow
Huntingdon County	12/09/2005	Heavy Snow
Huntingdon County	12/16/2005	Winter Storm
Huntingdon County	02/13/2007	Winter Storm
Huntingdon County	03/16/2007	Heavy Snow
Huntingdon County	02/01/2008	Winter Storm
Huntingdon County	01/06/2009	Ice Storm
Huntingdon County	12/19/2009	Winter Storm
Huntingdon County	02/05/2010	Winter Storm
Huntingdon County	02/09/2010	Winter Storm
Huntingdon County	02/01/2011	Winter Storm

Huntingdon County Winter Weather History		
Location	**Date**	**Event Type**
Huntingdon County	02/21/2011	Heavy Snow
Huntingdon County	10/29/2011	Heavy Snow
Huntingdon County	12/26/2012	Winter Storm
Huntingdon County	03/06/2013	Heavy Snow
Huntingdon County	11/26/2013	Ice Storm
Huntingdon County	02/04/2014	Winter Storm
Huntingdon County	02/13/2014	Heavy Snow
Huntingdon County	11/25/2014	Heavy Snow
Huntingdon County	02/08/2017	Winter Storm
Huntingdon County	03/13/2017	Winter Storm
Huntingdon County	03/20/2018	Winter Storm
Huntingdon County	11/15/2018	Winter Storm
Huntingdon County	02/11/2019	Winter Storm
Huntingdon County	02/20/2019	Winter Storm
Huntingdon County	12/16/2020	Winter Storm
Huntingdon County	01/31/2021	Winter Storm
Huntingdon County	02/01/2021	Winter Storm
Huntingdon County	03/12/2022	Winter Storm
Huntingdon County	12/15/2022	Winter Storm
Huntingdon County	01/06/2024	Heavy Snow
Source: NOAA NCEI, 2024		

4.3.14.4 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 Huntingdon 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.

4.3.14.5 Vulnerability Assessment

Severe winter storms are of significant concern to Huntingdon 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 Huntingdon County (45,145 according to the 2020 U.S. 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 X – Utility Outages in Huntingdon County in Winter* shows the number of power outages, phone outages, and 911 outages, that have occurred in the county during winter months, this data is limited due to data not being readily available for the Huntingdon County EMA to share with the public. Vulnerable populations within Huntingdon 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 x - 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 (%)**
Alexandria Borough	5	1.4	54	14.6
Barree Township	19	3.6	100	19.1
Birmingham Borough	7	11.1	18	28.6
Brady Township	37	4.5	152	18.4
Broad Top City Borough	25	5.4	101	21.9
Carbon Township	8	3.7	84	39.3
Cass Township	72	6.9	202	19.3
Cassville Borough	0	0	20	14.3
Clay Township	70	7.9	201	22.8
Coalmont Borough	3	6.4	5	10.6
Cromwell Township	58	4	468	32
Dublin Township	68	5.7	313	26.1
Dudley Borough	5	2.7	45	24.1
Franklin Township	6	1.4	113	27.2
Henderson Township	55	6.3	317	36.6
Hopewell Township	4	0.7	111	19.2
Huntingdon Borough	303	4.4	1,206	17.5
Jackson Township	39	4.5	219	25.2
Juniata Township	8	2.3	118	34.5
Lincoln Township	13	4	61	18.8
Logan Township	52	6.5	153	19.1
Mapleton Borough	30	8.3	47	13
Marklesburg Borough	30	8.5	81	23.1
Mill Creek Borough	15	4.8	47	15
Miller Township	12	3	114	28.5
Morris Township	26	4	52	8
Mount Union Borough	135	6.3	365	17.1
Oneida Township	41	3.8	253	23.5
Orbisonia Borough	62	12.9	100	20.8
Penn Township	29	3	244	25
Petersburg Borough	31	8.1	75	19.6
Porter Township	44	2.6	419	24.4

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 (%)**
Rockhill Borough	12	3.4	72	20.5
Saltillo Borough	64	13.9	42	9.2
Shade Gap Borough	4	4.3	23	24.7
Shirley Township	75	3.1	676	28.1
Shirleysburg Borough	7	4.6	47	30.7
Smithfield Township	73	1.6	442	9.5
Springfield Township	32	5.1	177	28
Spruce Creek Township	4	2.1	45	23.9
Tell Township	15	2.2	192	28.5
Three Springs Borough	16	4	104	25.8
Todd Township	58	6.4	199	22
Union Township	42	4.9	261	30.3
Walker Township	63	3.1	462	22.6
Warriors Mark Township	89	5	385	21.6
West Township	22	4	137	25
Wood Township	32	5.6	133	23.1
Source: United States Census Bureau (USCB), American Community Survey (ACS), 2024				

Approximately 4.4% of the total population of Huntingdon County is under the age of five years old and approximately 21.2% of the total population is sixty-five years old or older. In total, 25.6% of the population is at an increased risk from exposure to winter storm events and cascading hazards.

Table X – Utility Outages in Huntingdon County in Winter

Utility Outages in Huntingdon County in Winter		
Location	**Date**	**Event**
Walker Township	02/07/2023	MVC with power outage.
Source: Huntingdon County EMA WebEOC, 2024		

The entire general building stock inventory in Huntingdon 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 Huntingdon 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 Huntingdon County are at similar vulnerability to severe winter storms. The properties include but are not limited to the Brumbaugh Homestead, the

Huntingdon Armory, the Hudson Grist Mill, the Lloyd and Henry Warehouse, the Pennsylvania Furnace Museum, the Colerain Forges Mansion, the H.O. Andrews Feed Mill, the Shade Gap Feed and Flour Mill, and Christian Overy, Jr. House. The cultural aspects of Huntingdon County, including at least seven museums, are also at an increased vulnerability to winter storms. These museums are the Isett Heritage Museum, the Huntingdon County Historical Society, the Borad Top Area Coal Miners Museum, the Swigart Museum, the Hartslog Heritage Museum, and the Three Springs/Saltillo Historical Society.
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, Huntingdon County is generally well-prepared for snow and ice removal each season.

As mentioned above in Section 4.3.14.4, 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 X – Population Change in Huntingdon County*, twenty-three municipalities have seen a net population increase from the 2010 census to the 2020 census according to the American Community Survey. 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 Huntingdon 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 Huntingdon 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 Huntingdon County to winter storm events. Land use may impact the response capabilities of Huntingdon County in a winter storm event, but changes in that land use will not increase the vulnerability. Huntingdon 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 Huntingdon County. According to the Pennsylvania Department of Transportation, 446,991 tons of salt were used in the commonwealth, including Huntingdon County, during the 2022 through 2023 winter storm weather season. Although the use of salt and other anti-skid materials protect 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 Huntingdon 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 X - Pennsylvania Annual Snowfall 1981 – 2010

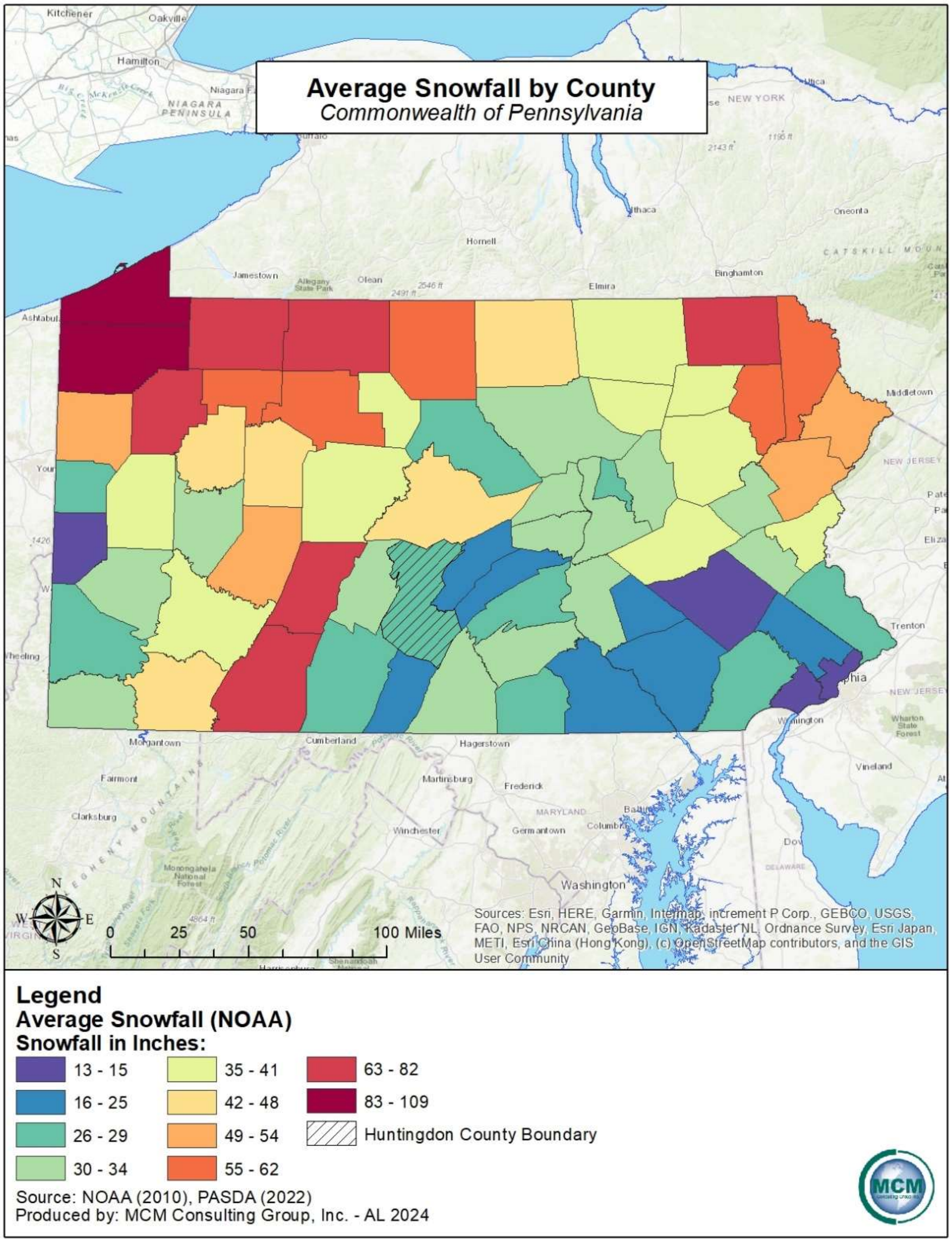
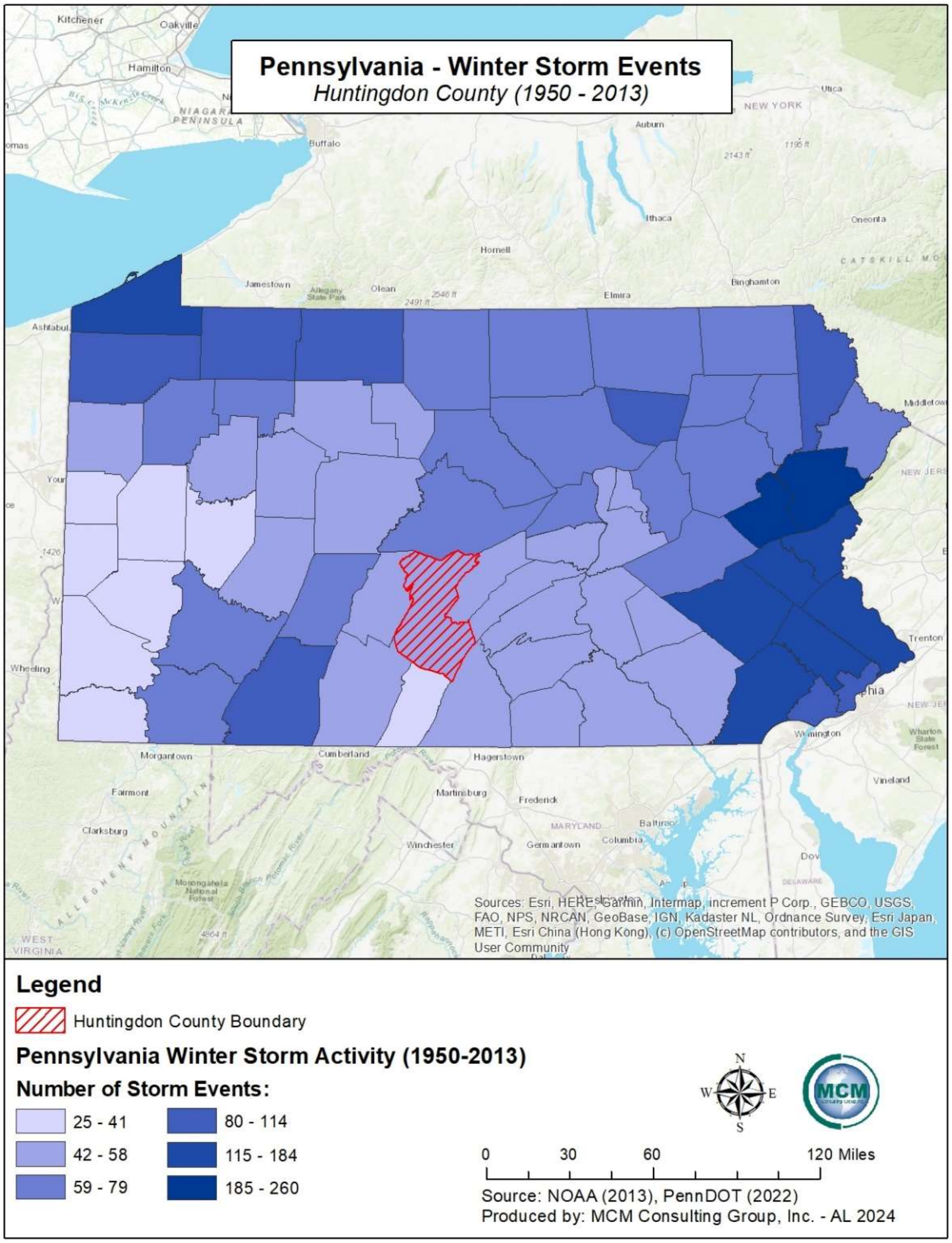


Figure X – Winter Storm Events by County in Pennsylvania



4.3.15. Blighted Properties

4.3.15.1 Location and Extent

The presence of blighted properties in Huntingdon 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.

4.3.15.2 Range of Magnitude

Huntingdon County has a large number of blighted properties that are located in urban environments, including the Huntingdon Borough. Most of the blighted properties in Huntingdon 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.

4.3.15.3 Past Occurrences

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

4.3.15.4 Future Occurrence

Blighted properties in Huntingdon 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 Huntingdon County is liable to decrease.

4.3.12.5 Vulnerability Assessment

Blighted properties are a significant concern when the health and safety of the citizens of Huntingdon 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 Huntingdon 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 Huntingdon County. If blighted properties fester in the county, people who travel to Huntingdon County for pleasure, whether that be for summer vacations or seasonal hunting, might reconsider that travel due to the presence of blighted properties.

4.3.16. Civil Disturbance

4.3.16.1 Location and Extent

Civil disturbance refers to mass acts of disobedience where participants can become hostile to authority and there is a threat to maintaining public safety and order. Such disturbances can often be forms of protest in the face of socio-political problems. Riots have not been frequent occurrences throughout the history of the Commonwealth, however when they occur, they can cause significant property damage, injury and even loss of life. The scale and scope of civil disturbance events varies widely. Government facilities, local landmarks, prisons, and universities are common sites where crowds and mobs may gather.

Criminal activity refers to all criminality, including enemy attack, sabotage, physical or information break of security, workplace or school violence, harassment, discrimination, and other crimes. Criminal activity is a very broad hazard category and similar to civil disturbance, the scale and scope of incidents or events vary widely.

4.3.16.2 Range and Magnitude

Civil disturbances can take the form of small gatherings or large groups blocking or impeding access to a building or disrupting normal activities by generating noise and intimidating people. They can range from a peaceful sit-in to a full-scale riot, in which a mob burns or otherwise destroys property and terrorizes individuals. Even in its more passive forms, a group that blocks roadways, sidewalks, or buildings interferes with public order. There are two types of large gatherings typically associated with civil disturbances: a crowd and a mob. A crowd may be defined as a casual, temporary collection of people without a strong, cohesive relationship. Crowds can be classified into four categories:

- **Casual Crowd**: A casual crowd is merely a group of people who happen to be in the same place at the same time. Violent conduct does not occur.
- **Cohesive Crowd**: A cohesive crowd consists of members who are involved in some type of unified behavior. Members of this group are involved in some type of common activity, such as worshipping, dancing, or watching a sporting event. Although they may have intense internal discipline, they require substantial provocation to arouse to action.
- **Expressive Crowd**: An expressive crowd is one held together by a common commitment or purpose. Although they may not be formally organized, they are assembled as an expression of common sentiment or frustration. Members wish to be seen as a formidable influence. One of the best examples of this type is a group assembled to protest.
- **Aggressive Crowd**: An aggressive crowd is comprised of individuals who have assembled for a specific purpose. This crowd often has leaders who attempt to arouse the members or motivate them to action. Members are noisy and threatening and will taunt authorities. They may be more impulsive and emotional and require only minimal

stimulation to arouse violence. Examples of this type of crowd could include demonstrators and strikers, though not all demonstrators and strikers are aggressive.

A mob can be defined as a large disorderly crowd or throng. Mobs are usually emotional, loud, tumultuous, violent, and lawless. Similar to crowds, mobs have different levels of commitment and can be classified into four categories:

- **Aggressive Mob**: An aggressive mob is one that attacks, riots, and terrorizes. The object of violence may be a person, property, or both. An aggressive mob is distinguished from an aggressive crowd only by lawless activity. Examples of aggressive mobs are the inmate mobs in prisons and jails, mobs that act out their frustrations after political defeat, or violent mobs at political protests or rallies.
- **Escape Mob**: An escape mob are those groups which attempt to flee from something such as a fire, bomb, flood, or other catastrophe. Members of escape mobs are generally difficult to control and can be characterized by unreasonable terror.
- **Acquisitive Mob**: An acquisitive mob is one motivated by a desire to acquire something. Riots caused by other factors often turn into looting sprees. This mob exploits a lack of control by authorities in safeguarding property.
- **Expressive Mob**: An expressive mob is one that expresses fervor or revelry following some sporting event, religious activity, or celebration. Members experience a release of pent-up emotions in highly charged situations.

In the event of a significant civil disturbance or criminal activity incident, local government operations and the delivery of services in the community may experience short-term disruptions. The greatest secondary effect is the impact on the economic and financial conditions of the affected community, particularly in relation to the property, facilities, and infrastructure damaged as a result of the disturbance. More serious acts of vandalism may result in limited power failure or hazardous material spills, leading to a possible public health emergency. Altered traffic patterns may increase the probability of a transportation accident.

Huntingdon County's greatest likelihood for civil disturbance is in Huntingdon, the county seat. Citizens, property, and infrastructure could be affected if a large-scale disorder were to take place. Typically, government facilities, landmarks, prisons, and universities are common sites where crowds or mobs may gather. Huntingdon County is home to four universities and post-secondary education centers, including: Pennsylvania Highlands Community College, Juniata College, DuBois Business College, and Huntingdon County Career and Technology Center.

4.3.16.3 Past Occurrence

The county has not experienced any *significant* civil disturbance events.

Following the death of African-American George Floyd in Minneapolis, Minnesota in May 2020 at the hands of law enforcement, civil unrest erupted across the nation. A Proclamation of

Disaster Emergency was established by the Governor's Office for the entire Commonwealth of Pennsylvania on April 15, 2021. This gave the Pennsylvania Emergency Management Agency Director command and control of the statewide emergency operations and directed all agencies and departments to utilize all resources and personnel to cope with the magnitude and severity of the event.

4.3.16.4 Future Occurrence

While unlikely, civil disturbances may occur in Huntingdon County, and it is difficult to accurately predict the probability of future occurrence for civil disturbance events over the long-term. However, *Table X - Civil Disturbance Events Reported to PEMA 2018-2023*, depicts the range of potential civil disturbances in Pennsylvania and gives the county some background for consideration of future occurrences.

Table X - Civil Disturbance Events Reported to PEMA 2018-2023

Table 4.3.18-4 Civil Disturbance Events Reported to PEMA-KC, 2018- 2023 (PEMA, 2023).

EVENT TYPE	2018	2019	2020	2021	2022	2023*
Demonstration	4	2	35	14	10	1
Juvenile Detention Center	7	0	0	0	0	0
Prison Disturbance	0	1	5	3	2	0
Detainee Escape	0	0	0	0	0	0
Protest	8	17	172	42	16	7
Large gathering	8	4	16	3	7	1
Riot	0	0	4	0	1	0
School Threat	0	0	0	0	0	0
Assault	0	0	0	0	0	0
Gun/Bomb Incident	0	0	0	0	0	0
Work Stoppage	0	0	0	0	2	0
Other	1	13	28	29	13	1
Civil Disorder - totals	***28***	***37***	***260***	***101***	***51***	***10***

**Events totaled through April 2023*

According to the Pennsylvania State Hazard Mitigation Plan, from 2018 to 2023, the commonwealth experienced an average of eighty-one civil disturbance events each year. While that number is relatively low and the occurrences in Huntingdon County are rare, the local planning team (LPT) decided civil disturbance should be regarded as a low-risk hazard due to the current political trends and frictions across the country.

4.3.16.5 Vulnerability Assessment

Climate change has the potential to increase Huntingdon County's vulnerability to civil disturbances, and disturbance events. Intense weather events and weather patterns can lead to riots and civil disturbance in areas that are directly impacted. For example, an extreme heat or drought event, that could become more common from climate change, could cause residents to seek water and resources, and create a conflict from increased competition for resources.

All municipalities in County Huntingdon can be vulnerable to civil disturbance and criminal activity; however. the anticipated impact from such events is minimal. These events may be sparked for varying reasons and the seriousness of the event may well be exacerbated by how authorities handle the crowd. At the writing of this plan, the political temperature of the country as a whole continues to run high, making this hazard vulnerability one for consistent monitoring by public safety officials.

4.3.17. Dam and Levee Failure

4.3.17.1 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 five high-hazard and five low-hazard dams in Huntingdon County that are both publicly and privately owned and are registered with the USACE in the NID. There are five dams within the county that are high-hazard and require an emergency action plan. *Table X – Huntingdon County Dam Inventory* illustrates the dams located in Huntingdon County. *Table X*

– *High-Hazard Dams Municipal Summary* summarizes the high-hazard dams in Huntingdon County by municipality. The municipalities not listed do not have high-hazard dams.

Table X – High-Hazard Dams Municipality Summary

High-Hazard Dams – Municipal Summary	
Municipality	**Number of High-Hazard Dams**
Barree Township	1
Juniata Township	1
Penn Township	1
Shirley Township	1
Smithfield Township	1
Total:	**5**
Source: NID, 2024	

Table X – Huntingdon County Dam Inventory

Huntingdon County Dams							
Dam Name	**River**	**Owner Name**	**Year Completed**	**Dam Height (feet)**	**Drainage Area (acres)**	**Hazard**	**EAP**
(No Name)	TR- Globe Run	Melvin Weyandt	1968	22	0.22	L	NR
Golden Pond	Globe Run	Hemlock Council of Girl Scouts	1968	28	0.22	L	NR
Huntingdon Smithfield Lily Creek	Lily Creek	Smithfield Township	1967	37	1.82	H	Y
Hutchinson	TR – Shavers Creek	Harvey Hutchinson	1959	20	2.02	L	NR
Lake Mount Union	Singers Gap Run	Mount Union Municipal Authority	1927	51	3.29	H	Y
Raystown Dam	Raystown Branch – Juniata River	CENAB	1973	15	960	H	Y
Raystown Dam – Hesston Dike	Raystown Branch – Juniata River	CENAB	1973	225	960	H	Y
Shaver's Creek	Shaver Creek	Pennsylvania State University	1961	48	8.3	H	Y
Warrior Ridge	Juniata River	American Hydro, Inc.	1906	27	837	L	NR
Whipple	Laurel Run	DCNR	1920	16	11.4	L	NR

Huntingdon County Dams							
Dam Name	River	Owner Name	Year Completed	Dam Height (feet)	Drainage Area (acres)	Hazard	EAP
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. Huntingdon County is home to four levee sections, which are detailed in *Table X – Huntingdon County Levee Inventory*.

Table X – Huntingdon County Levee Inventory

Huntingdon County Levee Inventory				
Levee Name	Flood Source	Levee Type	Levee Bank Side	Levee Length (miles)
Huntingdon Smithfield	Juniata River, Lily Creek, and Crooked Creek	Earthen	Right/Left	1.2926
Mount Union Levee	Juniata River	Earthen	Left	0.302448
Rockhill Levee	Blacklog Creek	Earthen	Left	0.725061
Three Springs Levee	Spring Creek and North Spring Branch	Earthen	Left	0.370234
Source: National Levee Database, 2024				

4.3.17.2 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 X – Huntingdon County Dams* shows the location of dams within Huntingdon 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 X – Huntingdon County Levee Locations* illustrates areas protected by the Huntingdon County levee systems. The figures following *Figure X – Huntingdon County Levee Locations* illustrate areas Huntingdon County that are heavily protected by levees. They are *Figure X – Huntingdon County Levee Locations – Smithfield, Figure X – Huntingdon County Levee Locations – Mount Union, Figure X – Huntingdon County Levee Locations – Rockhill*, and *Figure X – Huntingdon County Levee Locations – Three Springs*.

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.

4.3.17.3 Past Occurrence

Dams

There have been no past occurrences of dam failure or major incidence occurring at the locations of dams within Huntingdon 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 Huntingdon 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.

4.3.17.4 Future Occurrence

Dams

Although dam failures can occur at any time, given the right circumstances, the likelihood of a dam failure in Huntingdon 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 Huntingdon 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.

4.3.17.5 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 X – 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 X – Dam Classification

Dam Classification (PA Code 1980)		
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

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 five high-hazard dams in Huntingdon County vary greatly. The Raystown Dam and the Raystown Dam – Hesston Dike, located in Juniata Township and Penn Township, have the largest drainage area with a total of 960 acres. The dams that were constructed most recently are the Raystown Dam and the Raystown Dam – Hesston Dike, which are located in Juniata Township and Penn Township, which were constructed in 1973. The dam that is the oldest in the county is Warrior Ridge Dam, which was constructed in 1906. Raystown Dam – Hesston Dike is the tallest in the county with a height of 225 feet. All dams in Huntingdon County are owned by individual owners. The dams in Huntingdon 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 Huntingdon County and counties adjacent to Huntingdon County. A failure at any of the dams in Huntingdon 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 Huntingdon 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.

Huntingdon 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 X – High-Hazard Potential Dams Risk Type*:

Table X – 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 misoperation, 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 Huntingdon 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 mis-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 Huntingdon 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 Huntingdon 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 Huntingdon 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.

High-Hazard Dam Vulnerability Data				
Dam	**Total Population**	**Households without a vehicle**	**Households with limited English**	**Housing units that are mobile homes**
Huntingdon Smithfield Lily Creek	7,526	407	0	109
Lake Mount Union	482	26	0	112
Raystown Dam	451	15	0	55
Raystown Dam – Hesston Dike	599	19	0	71
Shaver's Creek	203	4	0	18
Total	**9,261**	**471**	**0**	**365**
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 Huntingdon County. There were no law enforcement locations within 2 miles of the dams. The information in the table below illustrates which infrastructure was located in that vulnerability zone.

High-Hazard Dam Vulnerability Data – Infrastructure				
Dam	**Hospitals**	**Nursing Homes**	**Fire Stations**	**Public Schools**
Huntingdon Smithfield Lily Creek	1	1	2	4
Lake Mount Union	0	0	0	0
Raystown Dam	0	0	0	0
Raystown Dam – Hesston Dike	0	0	0	0
Shaver's Creek	0	0	0	0
Source: RAPT, Homeland Infrastructure Foundation-Level Data, 2024				

The table below provides more information on infrastructure within 2 miles of high-hazard dams.

High-Hazard Dam Vulnerability Data – Infrastructure Names	
Dam	**Infrastructure Details**
Huntingdon Smithfield Lily Creek	1. Hospitals - Penn Highlands - Huntingdon 2. Nursing Homes - Huntingdon Park Rehab Center 3. Fire Stations - Two locations (Names not available)

High-Hazard Dam Vulnerability Data – Infrastructure Names	
Dam	**Infrastructure Details**
	4. Public Schools - Huntingdon Area Middle School - Huntingdon Area Senior High School - New Day CS - Southside Elementary School
Lake Mount Union	N/A
Raystown Dam	N/A
Raystown Dam – Hesston Dike	N/A
Shaver's Creek	N/A
Source: RAPT, Homeland Infrastructure Foundation-Level Data, 2024	

Levees

Each levee that is located in Huntingdon County is of different length and each protects areas from a different section of waterway and flood way. The Huntingdon/Smithfield Levee is the largest in Huntingdon County with a length of 1.2926 miles. The Mount Union Levee is the smallest in length in Huntingdon County with a length of 0.302448 miles.

The entire leveed areas for Huntingdon County protect a total of enter number of structures structures within the county. Also protected are enter number of points facility points with Huntingdon County that includes community lifeline facilities (municipal buildings, hospitals, police/fire/EMS, schools, childcare centers, and nursing/care homes) facilities. Each levee in Huntingdon County is a mainline levee and protects along a variety land features. A failure of levee in the urban areas in Huntingdon 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 Huntingdon County. *Table X – Number of Vulnerable Structures within Leveed Areas* shows the number of addressable structures and facility type points in the largest levee protection areas within Huntingdon 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 X – Number of Vulnerable Structure within Leveed Areas

Number of Vulnerable Structures within Leveed Areas		
Leveed Area Name	**Addressable Structures in Leveed Area**	**Facility Type Points in Leveed Area**
Huntingdon Smithfield	687	3

Number of Vulnerable Structures within Leveed Areas		
Leveed Area Name	**Addressable Structures in Leveed Area**	**Facility Type Points in Leveed Area**
Mount Union Levee	48	0
Rockhill Levee	125	0
Three Springs Levee	4	0
Totals:	**864**	**3**

Figure X – Huntingdon County Dams

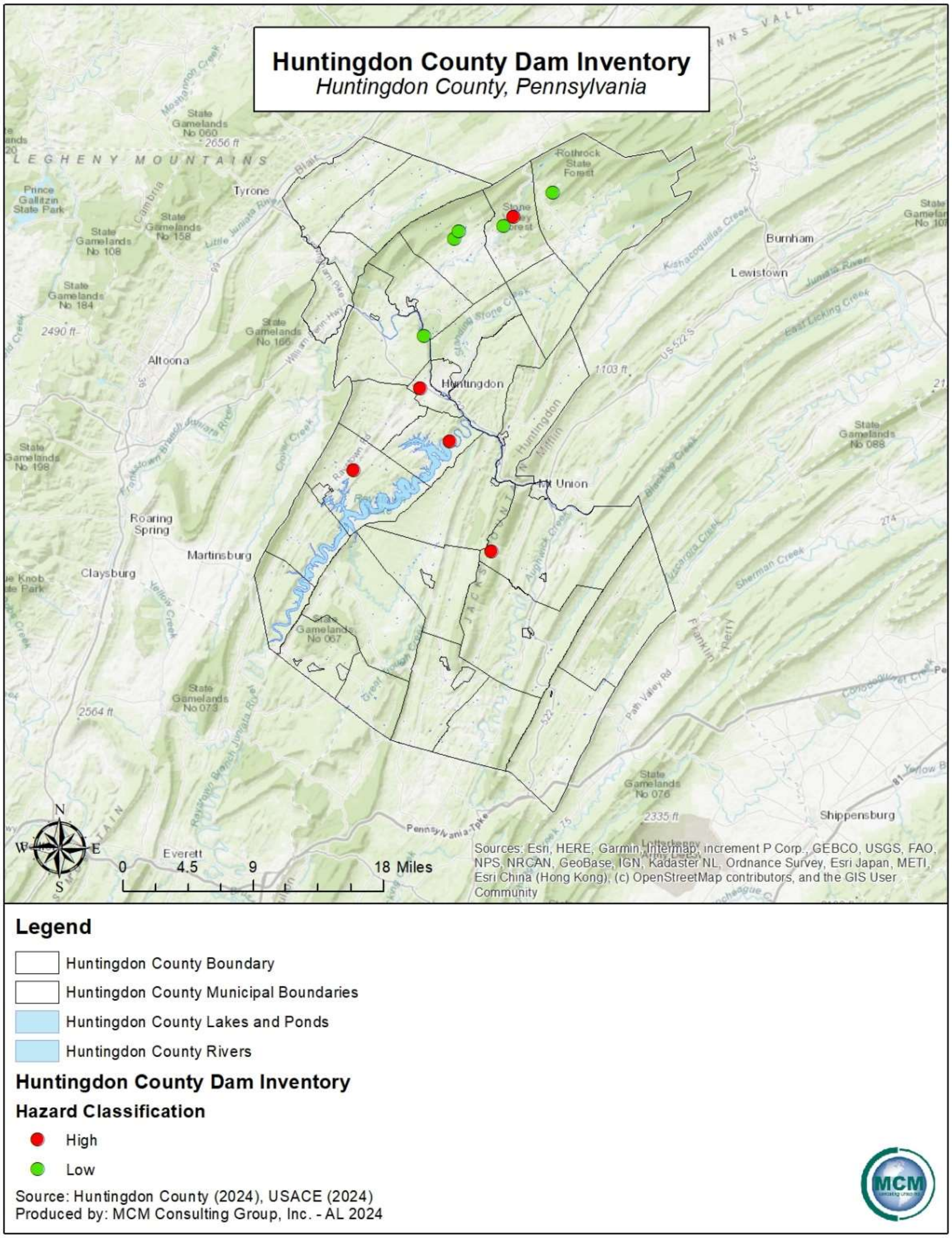


Figure X – Huntingdon County Levee Locations

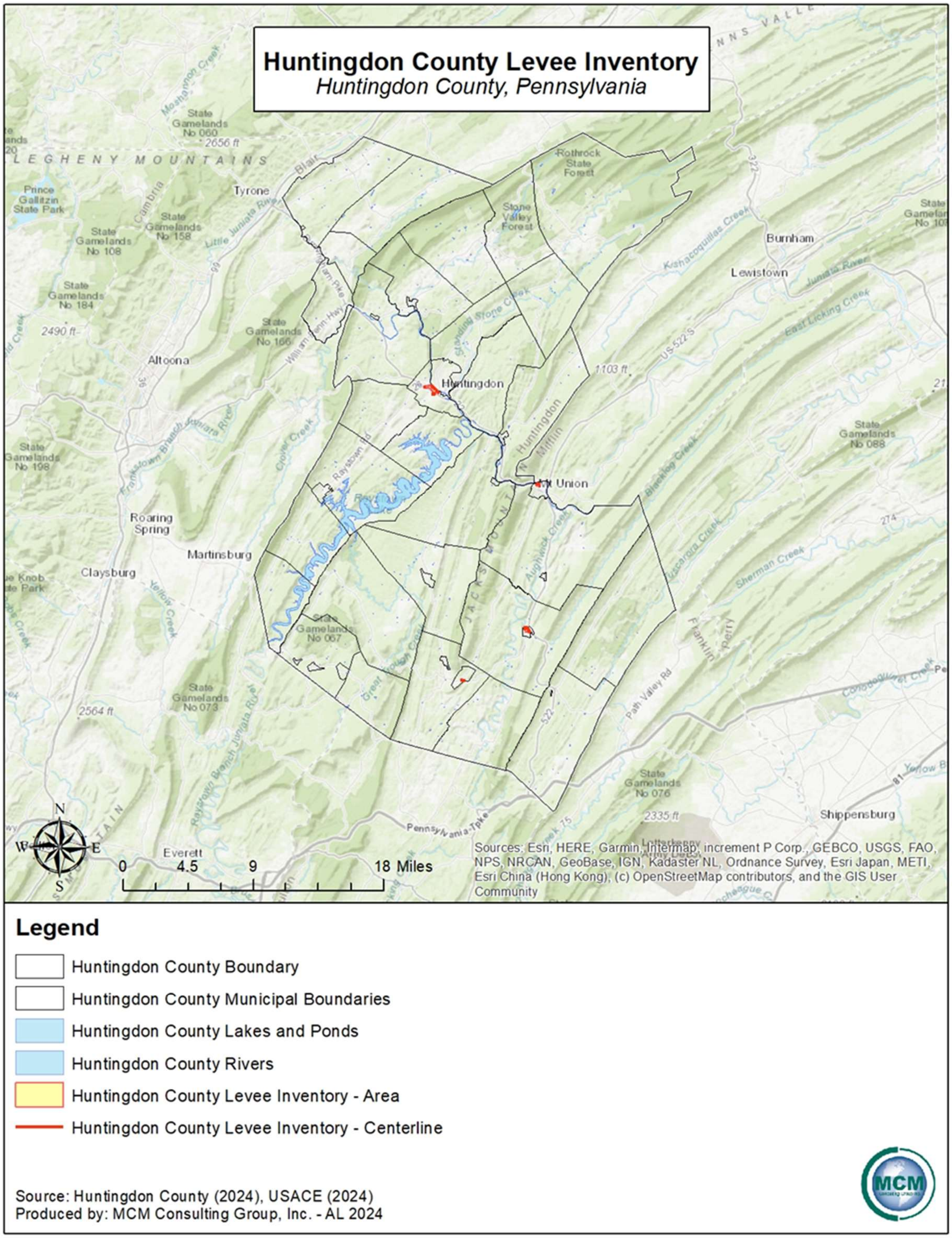


Figure X – Levee Locations – Smithfield

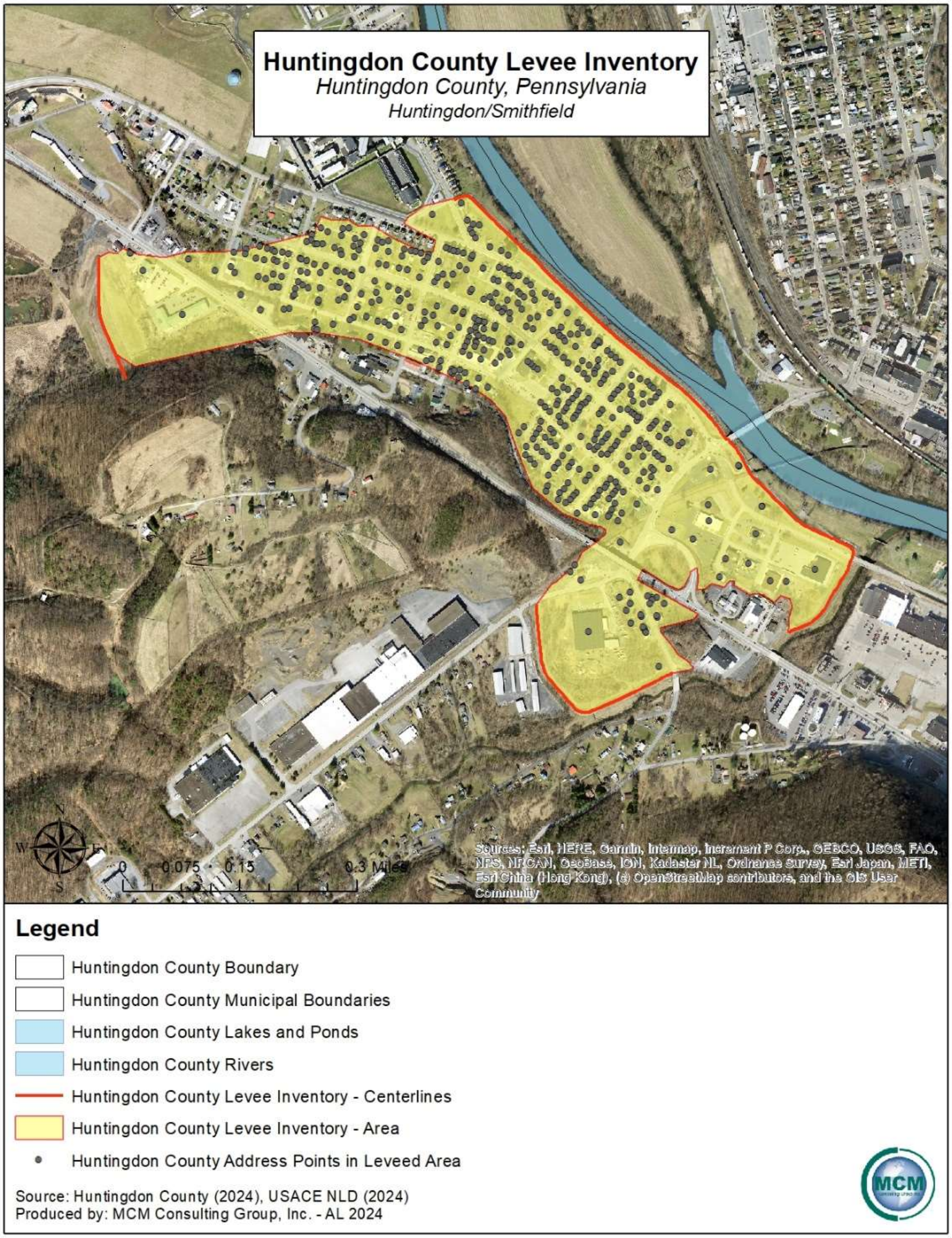


Figure X – Levee Locations – Mount Union

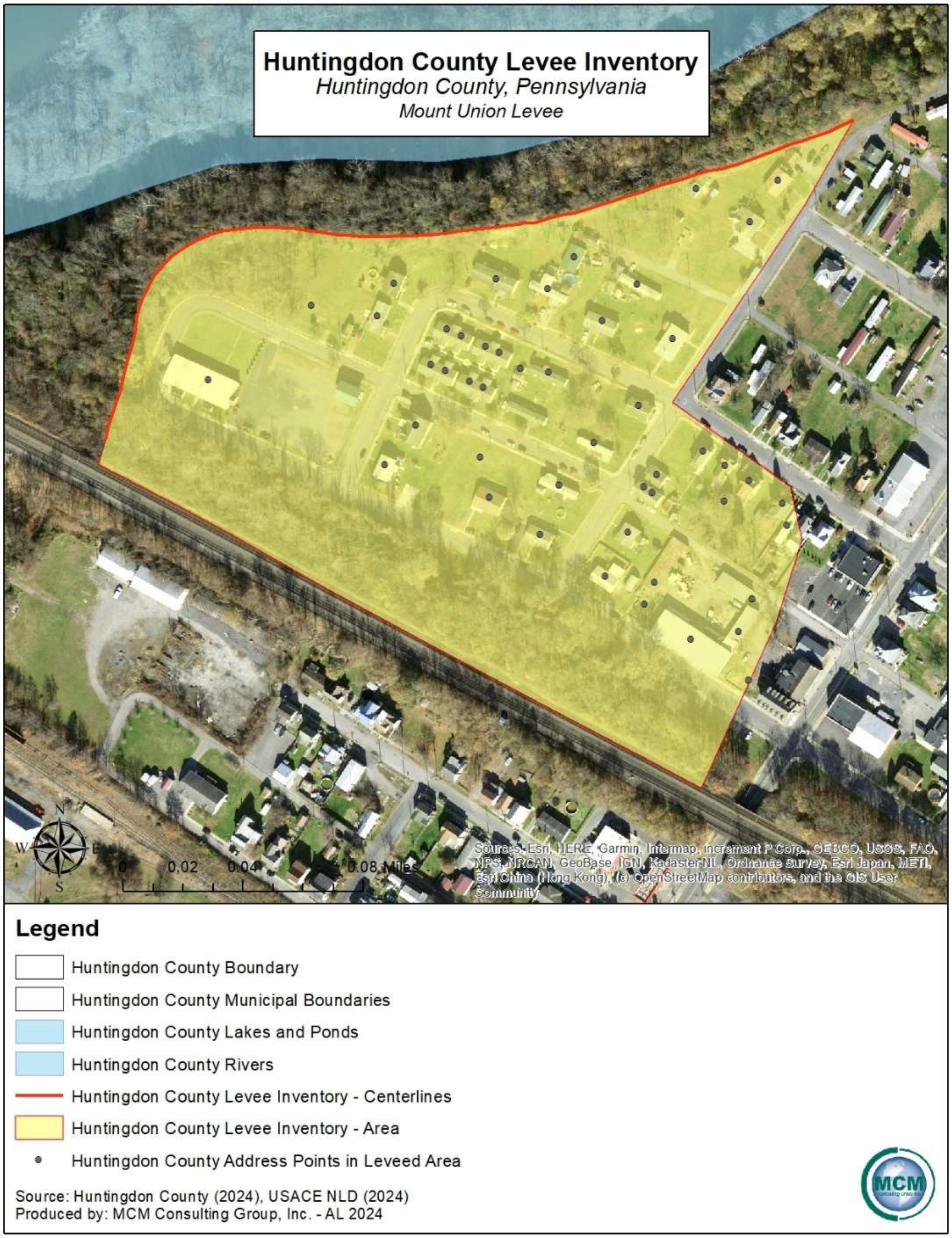


Figure X – Levee Locations – Rockhill

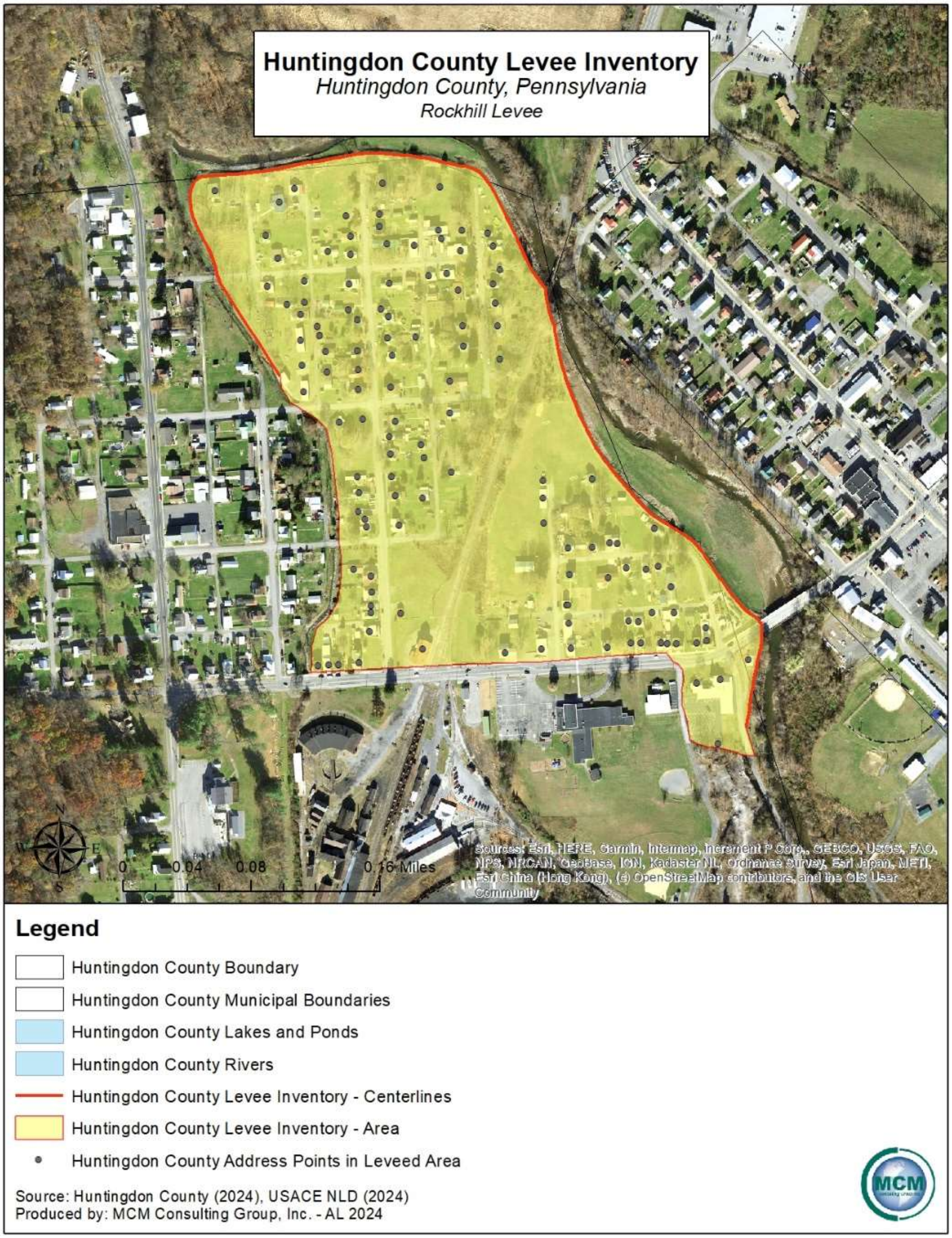
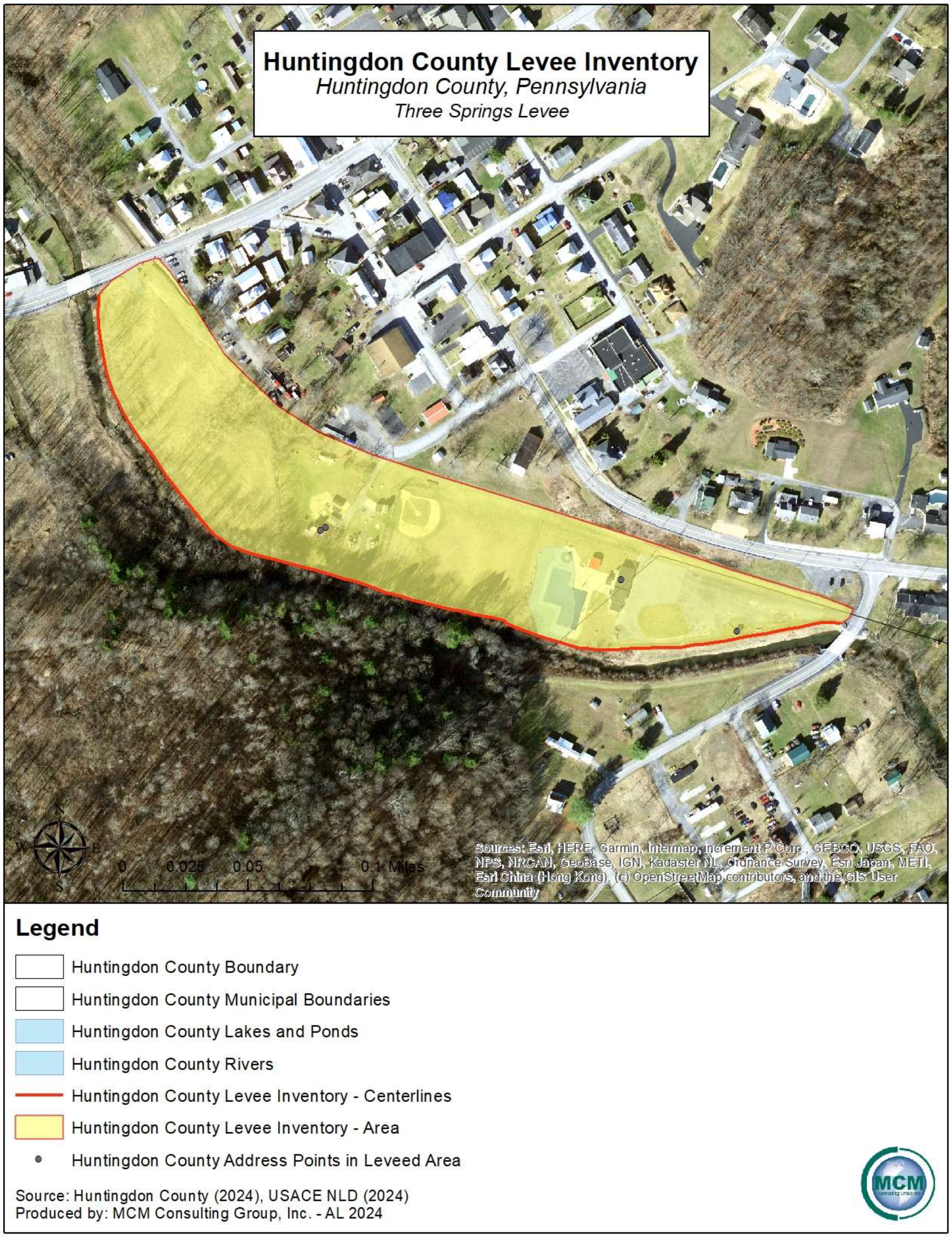


Figure X – Levee Locations – Three Springs



4.3.18. Environmental Hazards

4.3.18.1 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 X – Environmental Hazard Transportation Vulnerability* shows major transportation routes through Huntingdon County, including I-76, US 22, US522, PA 26, PA 35, PA 45, PA 103, PA 305, PA 350, PA 453, PA 475, PA 550, PA 641, PA 655, PA 747, PA 829, PA 913, and PA 994.

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 sixty-four SARA Title III facilities in Huntingdon 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 X – Hazardous Waste Locations* identifies any provided 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. As of 2024, there are two TRI facilities in Huntingdon County, all located around Mount Union.

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 X – Oil & Gas Well Locations* shows the location of all oil and gas wells in the county along with their proximity to surface waters.

4.3.18.2 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.

4.3.18.3 Past Occurrence

Transportation

In the past, deaths have resulted from a fuel oil truck fire. More recent events are recorded in the WebEOC and county reporting software and are summarized in *Table X – Hazardous Material Incidents*. Transportation accidents that involved hazardous materials were included in the table below.

Table X - Hazardous Material Incidents

Hazardous Material Incidents		
Municipality	**Date**	**Event**
Huntingdon Borough	01/06/2021	Fuel type smell where house exploded
Brady Township	09/16/2024	US Route 22 closed due to MVA with HazMat
Marklesburg Borough	01/11/2022	Chemical Release/Spill
Warriors Mark Township	02/09/2022	Manure Runoff
Shirleysburg Borough	02/11/2022	Pipeline Explosion
Porter Township	03/03/2022	Diesel Fuel Spill
Cassville Borough	05/03/2022	Heating Oil Spill
Petersburg Borough	07/18/2022	Fuel Spill
Mount Union Borough	08/04/2022	Hydraulic Oil Spill
Dudley Borough	09/06/2022	Fuel Spill
Three Springs Borough	01/22/2023	Heating Oil Spill
Jackson Township	03/25/2023	Fuel Spill
Rockhill Borough	04/14/2023	Oil Spill
Jackson Township	12/18/2023	Plow Truck Rollover
Mount Union Borough	01/09/2024	Fuel Spill
Mount Union Borough	01/12/2024	Fuel Spill
Three Springs Borough	03/02/2024	Fuel Spill
Huntingdon Borough	04/15/2024	Chemical Spill
Mount Union Bourgh	05/06/2024	Fuel Spill
Walker Township	05/08/2024	Fuel Spill
Lincoln Township	05/25/2024	Manure Spill
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.

Fixed Facility

There have been a number of hazardous material incidents in Huntingdon County in the past but few of those events have been related to fixed facilities in the county. More recent events are recorded in WebEOC and county reporting software and are summarized in *Table X – Hazardous Material Incidents*.

The EPA tracks the management of hazardous materials in facilities that handle significant amounts of hazardous materials. There is two TRI facilities in Huntingdon County as of 2024 that are summarized in *Table X – 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 X - TRI Facilities

Toxic Release Inventory Facilities				
Name	**Address**	**Industry Sector**	**Chemical**	**Production-related Waste Managed (lbs)**
Nov Fiber Glass Systems- Containment Solutions	14489 Croghan Pike, Mount Union PA, 17066	326- Plastics and Rubber	Dichloromethane, Dimethyl phthalate, Mathyl ethyl ketone, Styrence	137,252
Bonney Forge Corp	14496 Croghan Pike Mount Union, PA, 17066.	332- Fabricated Metals	Zinc compounds, Chromium, Nickel, Manganese, Nitrate compounds	344,469
Source: EPA, 2024				

As of 2024, Huntingdon County is home to two active natural gas wells.

4.3.18.4 Future Occurrence

Transportation

While many incidents involving hazardous material releases have occurred in Huntingdon 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 Huntingdon 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.

4.3.18.5 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 Huntingdon County is vulnerable to a hazardous materials incident caused along a transportation route. These incidents can occur along highways, railways, and pipelines. *Figure X – Environmental Hazard Transportation Vulnerability Map* identified the 2,000-foot hazard corridor for all major highways in Huntingdon County. *Figure X – Annual Truck Traffic Percentages* identifies the annual truck traffic percentages for all of the roadways in Huntingdon 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. Todd Township is the only municipality within Huntingdon County that contains an oil and gas wells. *Table X – Oil and Gas Wells & Drinking Water Wells* illustrates the type of well and the local domestic drinking water wells for each municipality.

Table X - Oil and Gas Wells & Drinking Water Wells

Oil & Gas Wells in Huntingdon County (2024)					
Municipality	Type of Well				Domestic Drinking Water Wells
	Active	Abandoned	Inactive	Proposed	
Todd Township	X				
Total:					
Source: PA DEP, 2024					

Figure X - Oil and Gas Well Locations

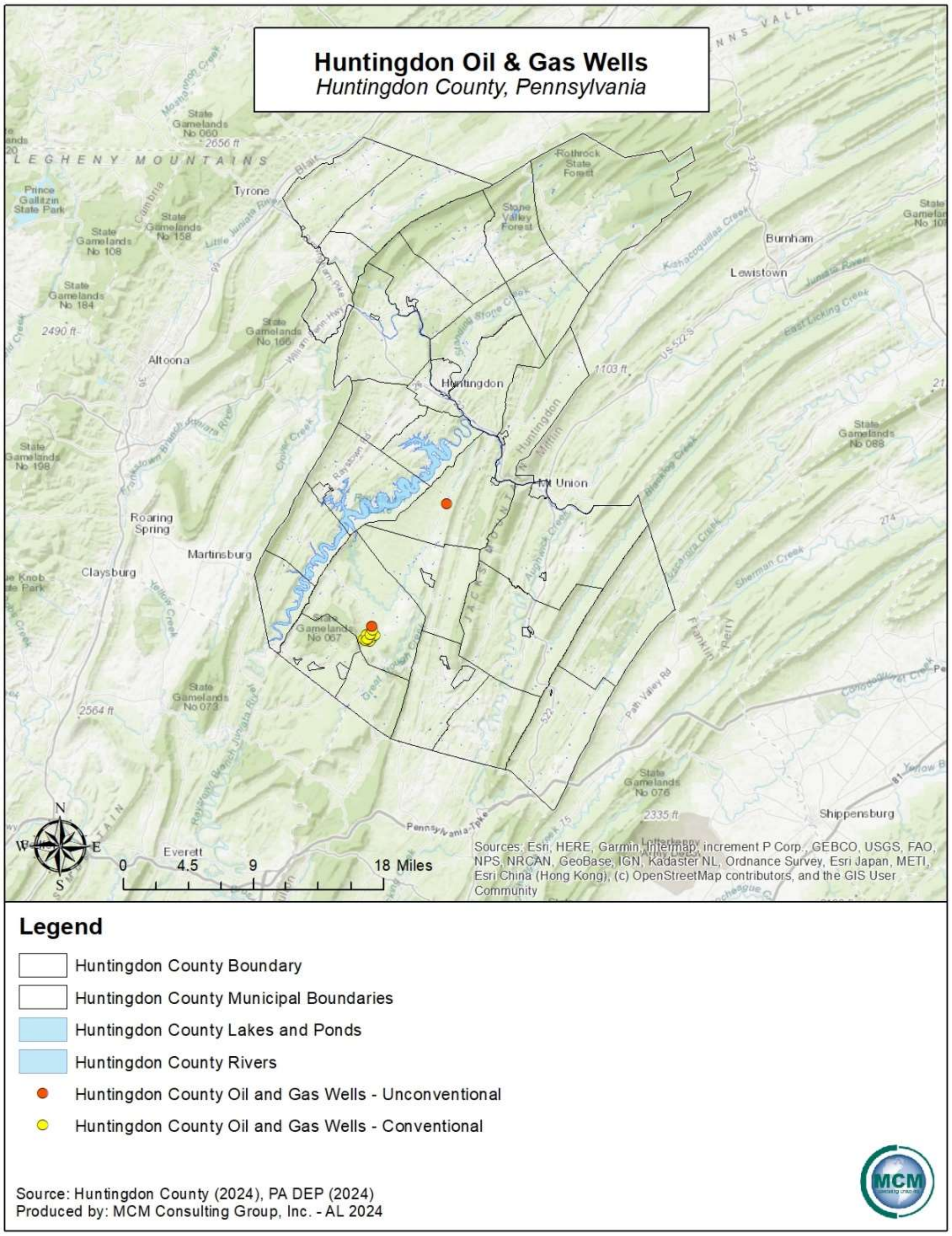


Figure X - Hazardous Waste Locations

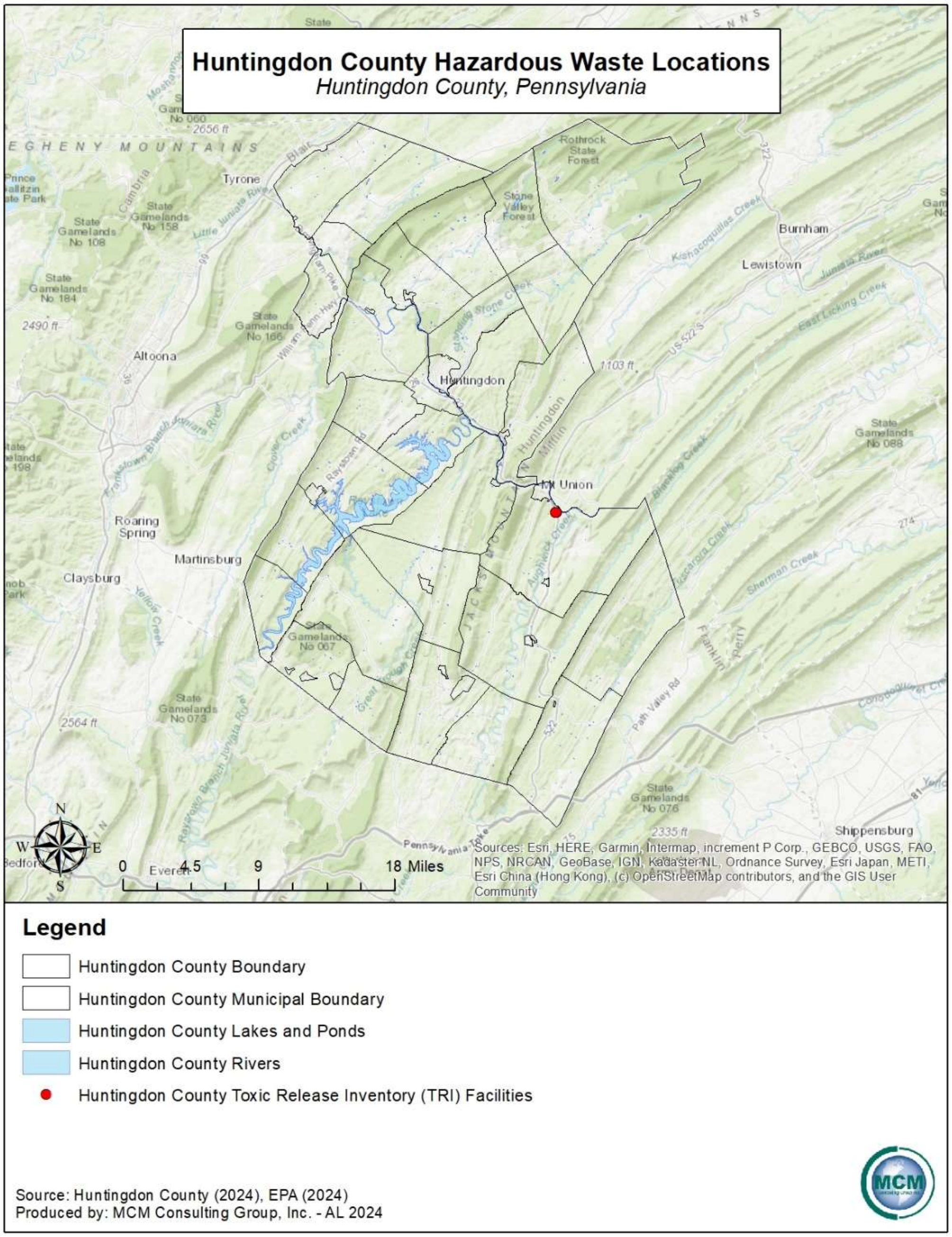


Figure X - Environmental Hazard Transportation Vulnerability

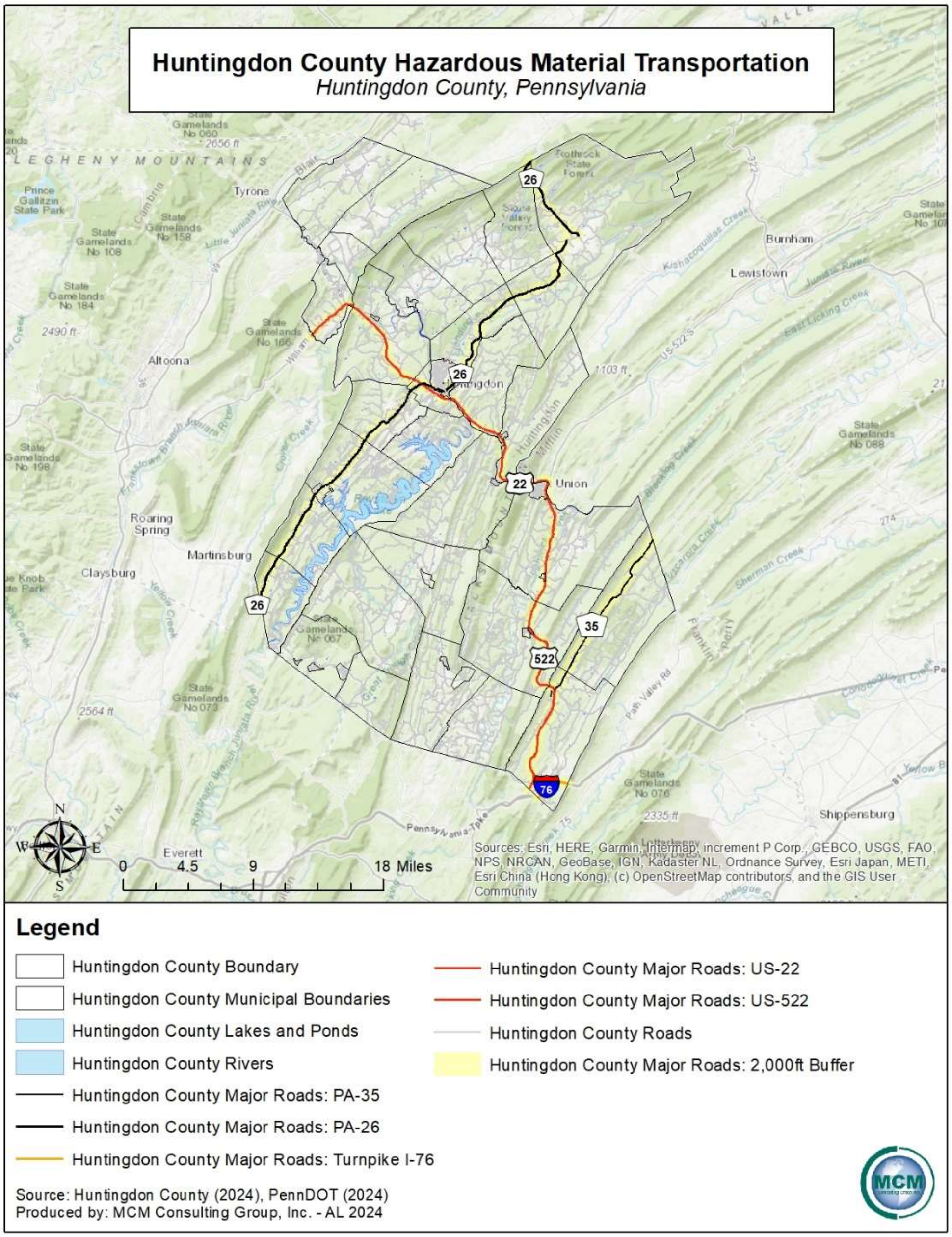
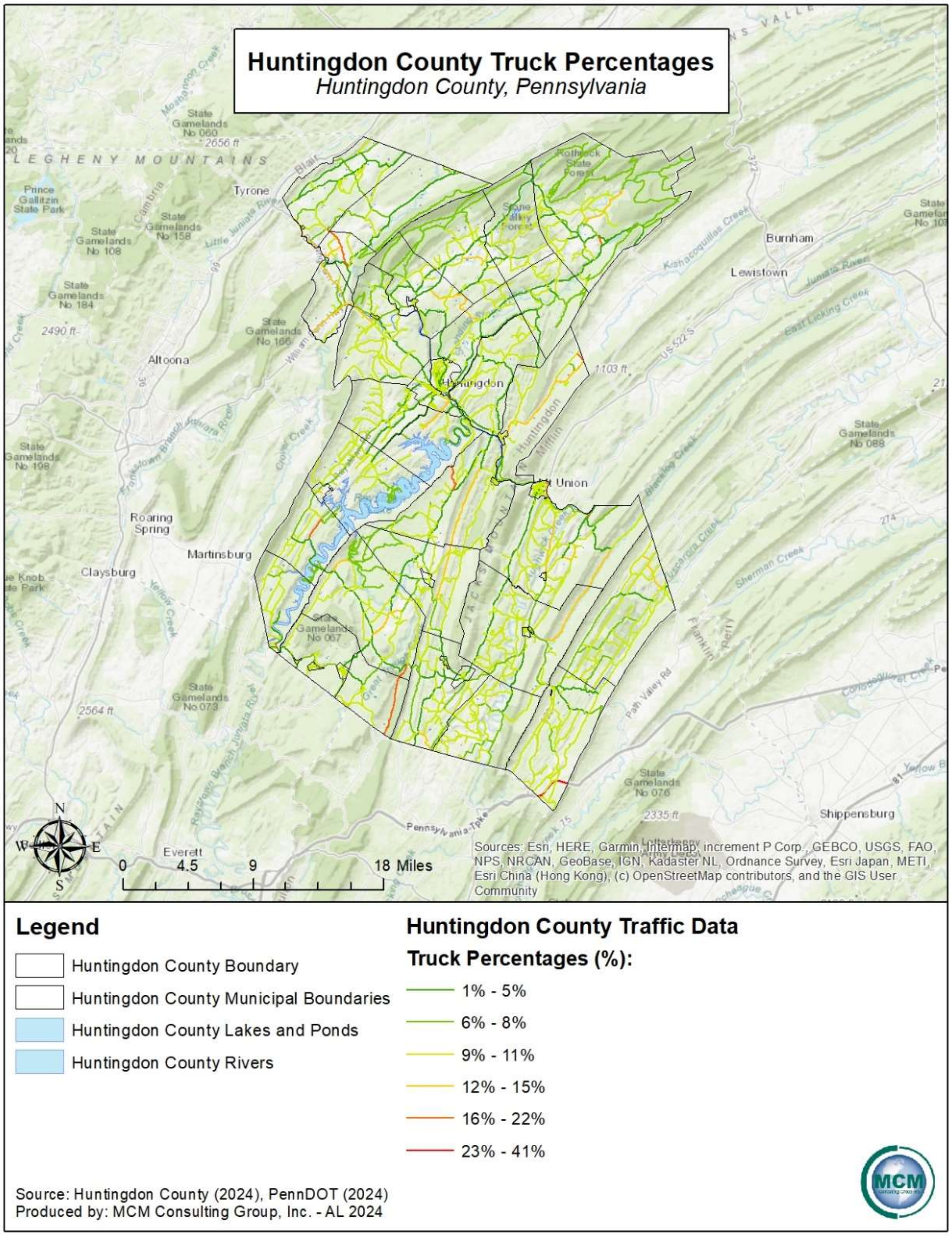


Figure X - Annual Truck Traffic Percentages



4.3.19. Substance Use Disorder

4.3.19.1 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 slightly 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 is being attributed to the uncertainty people are feeling due to the pandemic.

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 other addictive substances such as methamphetamines and alcohol can be problematic for the health of individuals in Huntingdon County, this profile focuses on opioid drugs and the substance use disorder epidemic. The opioid crisis along with substance use disorder 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.

4.3.19.2 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.

4.3.19.3 Past Occurrence

In 2023, there was an estimated total of 162 drug-related overdose deaths in the Huntingdon County. This is the highest number of overdose deaths ever recorded in a 12-month period, according to the recent provisional date from the CDC. *Table X – Drug Overdose Mortality In Huntingdon County* shows death rates and deaths per month in Huntingdon County from 2020 to 2023. Huntingdon County has experienced an increase in death rates from drug overdoses. The most common age group for opioid abuse in Huntingdon County is the 25-34 years of age demographic. In Huntingdon County the overdose rate of males is greater than the overdose rate of females. Whites have the highest total rate of overdose deaths in Huntingdon County, while Blacks have the highest per capita rate of overdose deaths when adjusted for population size. The most used opioids in Huntingdon County are fentanyl, heroin, cocaine, benzodiazepines, and Rx opioids. Data sets for 2024 were not available at the time of writing this plan.

Table X – Drug Overdose Mortality In Huntingdon County

Drug Overdose Mortality in Huntingdon County	
Year	Deaths Per Year
2020	144
2021	40
2022	74
2023	162

Table xx - 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%

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

4.3.19.4 Future Occurrence

Both Huntingdon 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 Huntingdon County, there are four drug take-back boxes located throughout the county. The drug take-back box locations include Huntingdon Borough Police Dept., Weis Markets in Huntingdon, State Police Troop G and the Mount Union 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. 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 Huntingdon 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 Huntingdon 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.

4.3.19.5 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 Huntingdon 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. The known risk factors of opioid misuse 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 Huntingdon 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. According to the National Library of Medicine the opioid epidemic in Pennsylvania increased 475% 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 in Huntingdon County would be a high number of overdoses among residents and insufficient first responder personnel and material resources.

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

Figure X - Opioid Overdose Deaths in Pennsylvania 2021

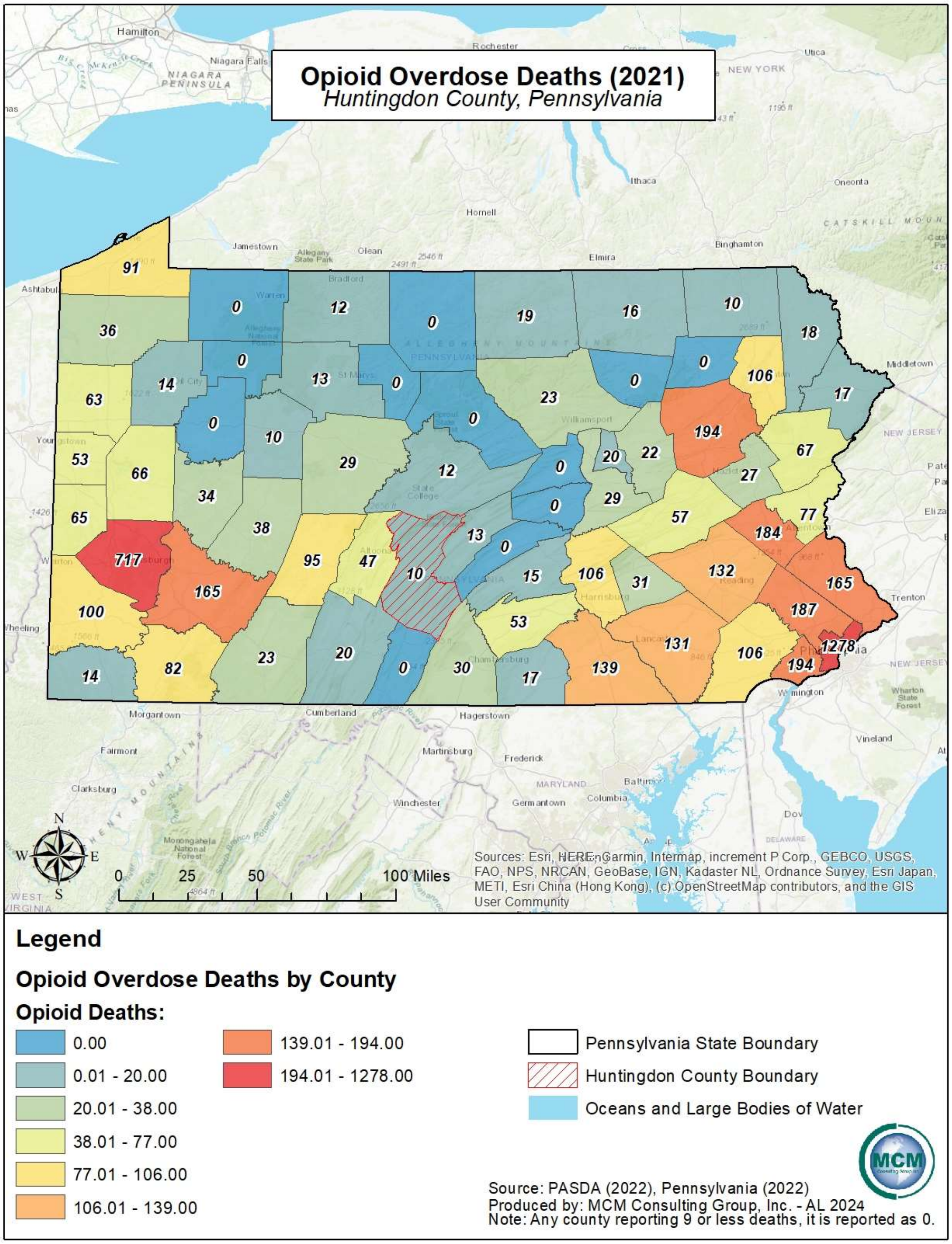
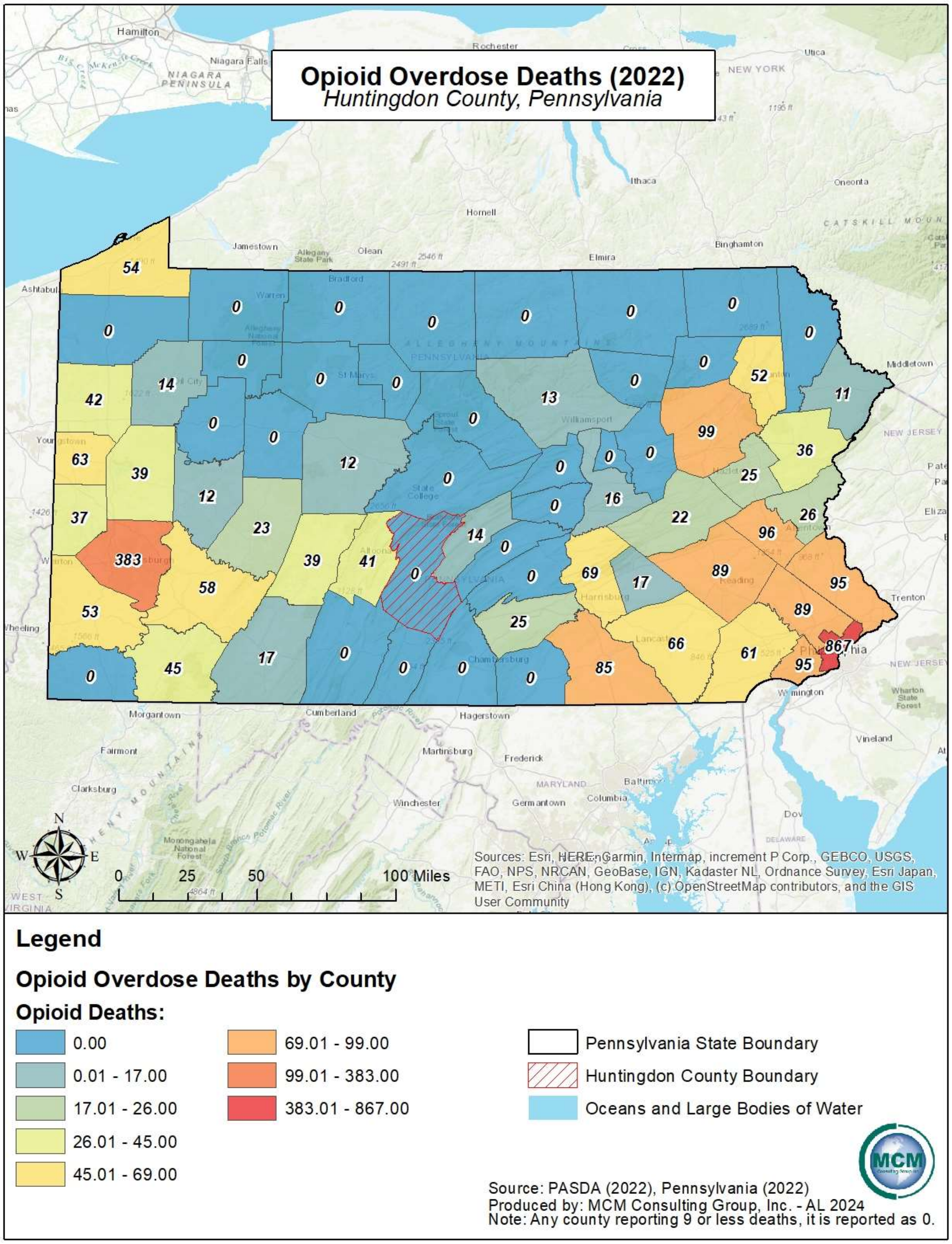


Figure X - Opioid Overdose Deaths in Pennsylvania 2022



4.3.20. Terrorism and Cyber Terrorism

4.3.20.1 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

4.3.20.2 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. Huntingdon County has four school districts (public schools K through 12th grade) that include thirteen primary, secondary, and high schools. There are two post-secondary schools located in Huntingdon 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 Huntingdon 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.

4.3.20.3 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 lead cyber security agency 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 Huntingdon 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.

Active Shooters

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.

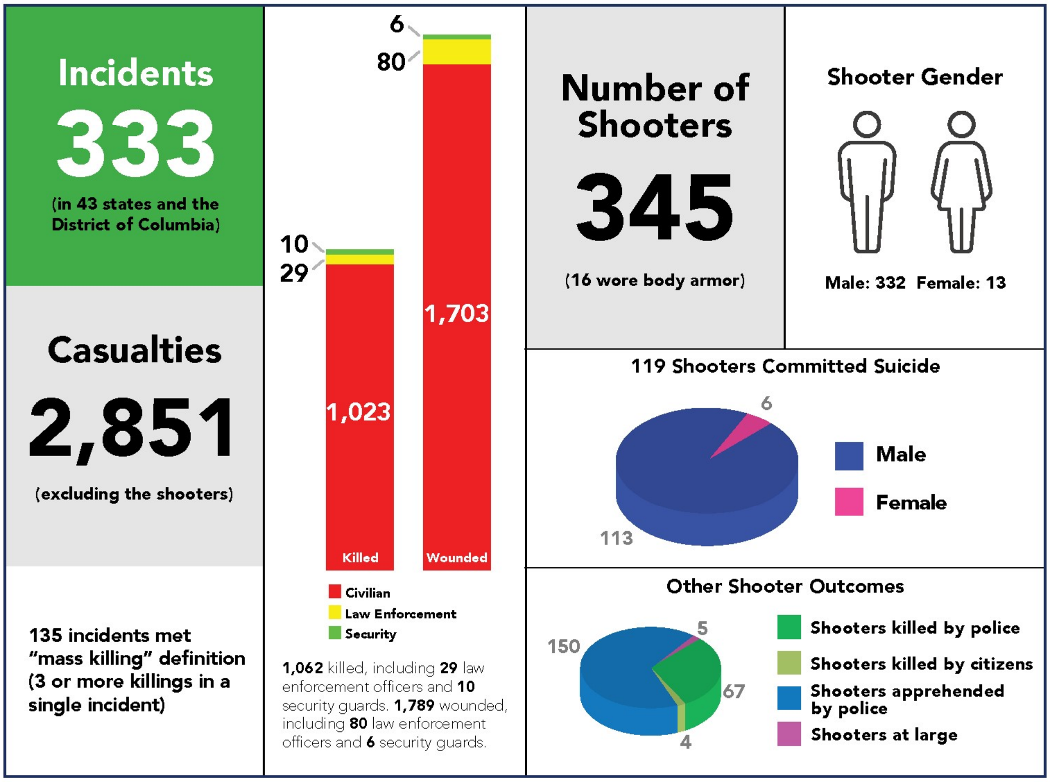
Other active shooter events in the United States in recent years include Virginia Tech (April 2007), Sandy Hook Elementary School (December 2012), San Bernardino, California (December 2015), an Aurora, Colorado movie theater (July 2012) a church in Charleston, South Carolina

(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 X – 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 X – Education Environments* shows two more summary pages from the report that detail active shooter statistics in educational environments.

Figure X - Active Shooter Incidents - 20 Year Active Shooter Summary

ACTIVE SHOOTER INCIDENTS

20-Year Active Shooter Summary



Incidents: 333 (in 43 states and the District of Columbia). Total casualties: 2,851 (excluding the shooters). 135 incidents met "mass killing" definition (3 or more killings in a single incident). Killed: 1,062 (including 1,023 civilians, 29 law enforcement officers and 10 security guards). Wounded: 1,789 (including 1,703 civilians, 80 law enforcement officers, and 6 security guards). Number of shooters: 345 (16 wore body armor). Shooter gender: 332 male, 13 female. 119 shooters committed suicide (113 male, 6 female). Other shooter outcomes: 67 killed by police, 4 killed by citizens, 150 apprehended by police, 4 at large.

Active Shooter Incidents 20-Year Review, 2000-2019 4

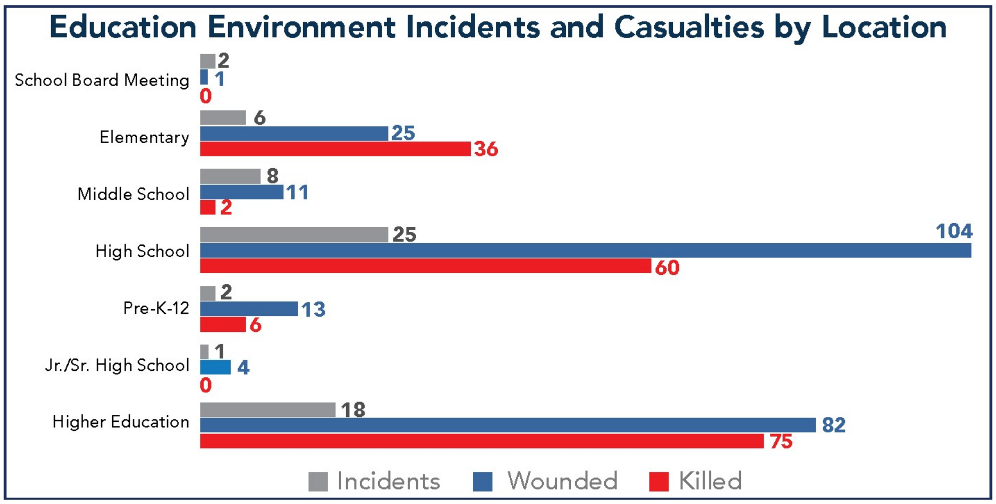
Figure X - Education Environments

ACTIVE SHOOTER INCIDENTS

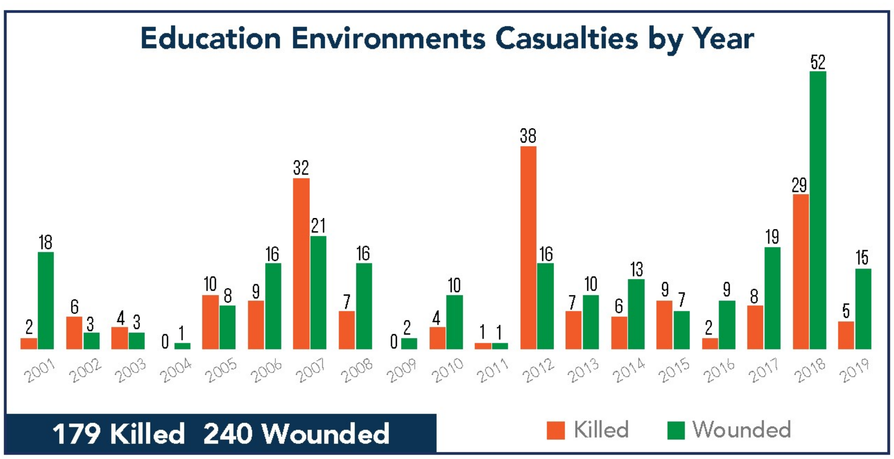
Education Environments

Quick Look:

Sixty-two incidents occurred in public and private educational settings, defined as schools covering pre-kindergarten to 12th grade, institutes of higher education, and school board meetings.



Education Environment Incidents and Casualties by Location: School Board Meeting (2 incidents, 1 wounded, 0 killed); Elementary (6 incidents, 25 wounded, 36 killed); Middle School (8 incidents, 11 wounded, 2 killed); High School (25 incidents, 104 wounded, 60 killed); Pre-K-12 (2 incidents, 13 wounded, 6 killed); Jr./Sr. High School (1 incident, 4 wounded, 0 killed); Higher Education (18 incidents, 82 wounded, 75 killed)

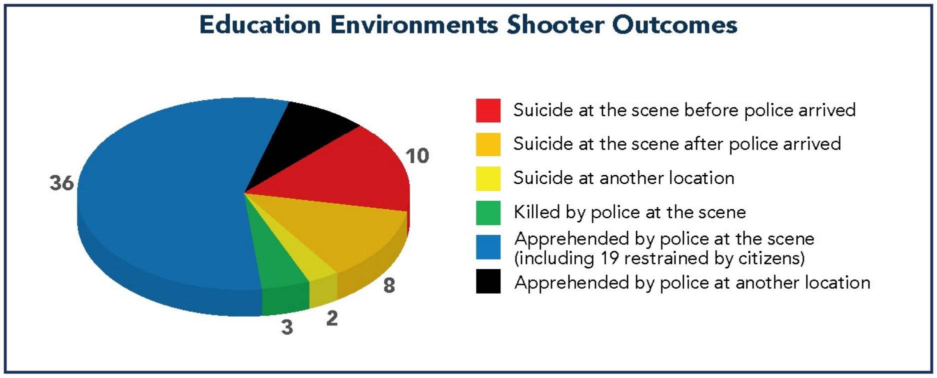


Education Environments Casualties by Year: 2001 (2 killed, 18 wounded); 2002 (6 killed, 3 wounded); 2003 (4 killed, 3 wounded); 2004 (0 killed, 1 wounded); 2005 (10 killed, 8 wounded); 2006 (9 killed, 16 wounded); 2007 (32 killed, 21 wounded); 2008 (7 killed, 16 wounded); 2009 (0 killed, 2 wounded); 2010 (4 killed, 10 wounded); 2011 (1 killed, 1 wounded); 2012 (38 killed, 16 wounded); 2013 (7 killed, 10 wounded); 2014 (6 killed, 13 wounded); 2015 (9 killed, 7 wounded); 2016 (2 killed, 9 wounded); 2017 (8 killed, 19 wounded); 2018 (29 killed, 52 wounded); 2019 (5 killed, 15 wounded)

Active Shooter Incidents 20-Year Review, 2000-2019 13

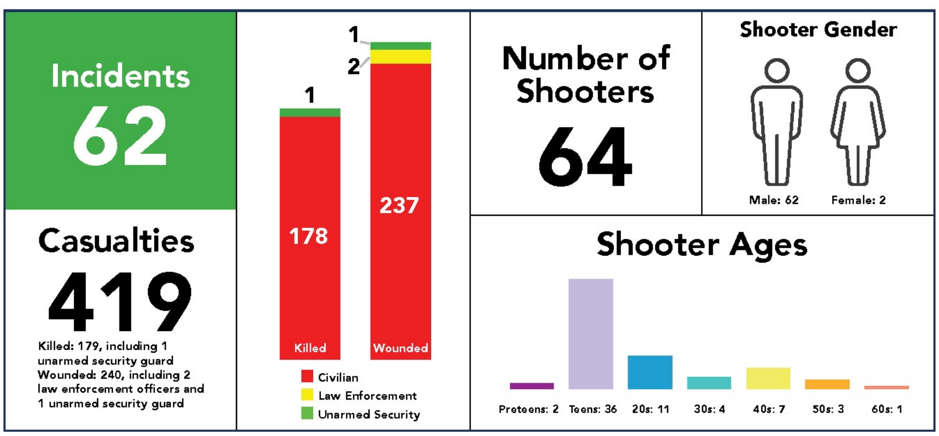
ACTIVE SHOOTER INCIDENTS

Education Environments



Education Environments Shooter Outcomes: Suicide at the scene before police arrived (10); Suicide at the scene after police arrived (8); Suicide at another location (2); Killed by police at the scene (3); Apprehended by police at the scene (including 19 restrained by citizens) (36); Apprehended by police at another location (5)

.**Key Findings:**



Incidents: 62. Total casualties: 419. Killed: 179 (including 178 civilians and 1 unarmed security guard). Wounded: 240 (including 237 civilians, 2 law enforcement officers, and 1 unarmed security guard). Number of shooters: 64. Shooter gender: 62 male, 2 female. Shooter ages: Preteens (2); Teens (36); 20s (11); 30s (4); 40s (7); 50s (3); 60s (1).

Active Shooter Incidents 20-Year Review, 2000-2019 14

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 Huntingdon 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.

4.3.20.4 Future Occurrence

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

4.3.20.5 Vulnerability Assessment

Huntingdon 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 Huntingdon 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.

4.3.21. Transportation Accidents

4.3.21.1 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 Huntingdon County there are 317 state-maintained and fifty-seven locally maintained bridges, according to PennDOT. Major transportation routes in Huntingdon County include U.S. 22 and a small portion of Interstate 76 in the southern tip of the county. Other state routes are also present in the county including State Route 26, 45, 305, 747, 829, 913, and 994. *Figure X – Major Transportation Routes* shows the major transportation systems in Huntingdon County.

Huntingdon County has no public airports within the county borders but there are airports in surrounding counties such as Centre, Blair, Mifflin, Juniata, Bedford, and Franklin counties. Huntingdon County does have multiple privately owned airports and a helipad, and potential does exist for accidents to occur. There also 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.

There are several freight and passenger rail lines in Huntingdon County. The railroad companies that operate within Huntingdon County include Norfolk Southern, Amtrak, Railways to Yesterday, and East Broad Top Connecting Railroad. Some of these companies are for the transportation of goods and freight, some are passenger rail lines, and one is a tourist/excursion railroad. 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 Huntingdon County.

There are three oil and gas wells located in Huntingdon County. Pipeline infrastructure is seen throughout the county. There are six major pipeline companies that transport hazardous materials in and through Huntingdon County. Of these six major companies, one is for natural gas only;

one is for natural gas and propane; one is for ethane and propane; one is for natural gas and hydrogen sulfide; one is for diesel, fuel oil, gasoline, jet fuel, kerosene, and propane; and one is for butane, ethane, fuel oil, aviation fuel, turbine engine, gasoline, light cycle oil, propane, diesel, and kerosene. *Figure X – Utility Pipelines Vulnerability* shows the various pipelines that run through Huntingdon County.

4.3.21.2 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 Huntingdon Borough, which is the county seat and home to nearly 6,827 residents during the 2020 U.S. Census. Huntingdon Borough is the most populated municipality in Huntingdon County and is home to numerous businesses, county buildings, and critical infrastructure. Huntingdon Borough is also situated along the Juniata River and a potential hazardous materials spill could affect the waterway and areas downstream as well could be impacted making the impacted area even larger. Such an event would constitute an immediate health hazard to the population and require evacuation.

4.3.21.3 Past Occurrence

Table X – PennDOT Crash Report for Huntingdon County shows crash statistics recorded by the Pennsylvania Department of Transportation between 2010 and 2023. Reports for 2024 were not available at the time of this report. The year 2017 had the most total crashes in Huntingdon County with 434 crashes, while 2020 had the fewest total crashes with 304 total crashes. The overall number of total crashes has increased over the span of four years between 2020 and 2023 in the county, going from 304 total crashes in 2020 to 334 total crashes in 2023. There have been no recorded crashes involving both trains and vehicles in Huntingdon County between the years of 2010 to 2023.

The majority of municipalities noted, on the municipality hazard identification and risk evaluation, that transportation accidents have not seen a major change in frequency or impact in Huntingdon County over the past five years. However, there were some municipalities that did note an increase in transportation accidents and contributed the increase in accidents to an increase in speed limits in their municipality.

Table X – PennDOT Crash Report for Huntingdon County

PennDOT Crash Report for Huntingdon County								
Year	Vehicle accidents for Huntingdon County				Vehicle Accident Deaths for Huntingdon 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	373	10	186	177	11	2	0	0
2011	406	11	205	190	12	5	0	0
2012	378	5	193	180	5	1	0	0
2013	392	13	194	185	14	2	2	0
2014	358	10	170	178	11	6	2	0
2015	401	5	197	199	7	2	0	0
2016	415	4	185	226	4	2	0	0
2017	434	5	200	229	5	2	0	0
2018	358	3	140	215	3	2	0	0
2019	392	6	162	224	7	1	0	0
2020	304	7	147	150	7	1	0	0
2021	322	9	111	202	9	1	0	0
2022	367	7	147	213	8	4	1	0
2023	334	9	140	185	9	3	1	0

4.3.21.4 Future Occurrence

Huntingdon County's population has decreased over the last decade, so it can be assumed that local traffic has decreased 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.

4.3.21.5 Vulnerability Assessment

A transportation accident can occur anywhere in Huntingdon 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. 9.6% of Huntingdon County bridges are in poor condition, indicating a vulnerability to transportation accidents, while 50.8% remain in fair condition and 39.6% are indicated to be 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 X– Average Daily Traffic on Major Highway Vulnerability* identifies all major highways and railroads within Huntingdon County.

Figure X – Major Transportation Routes

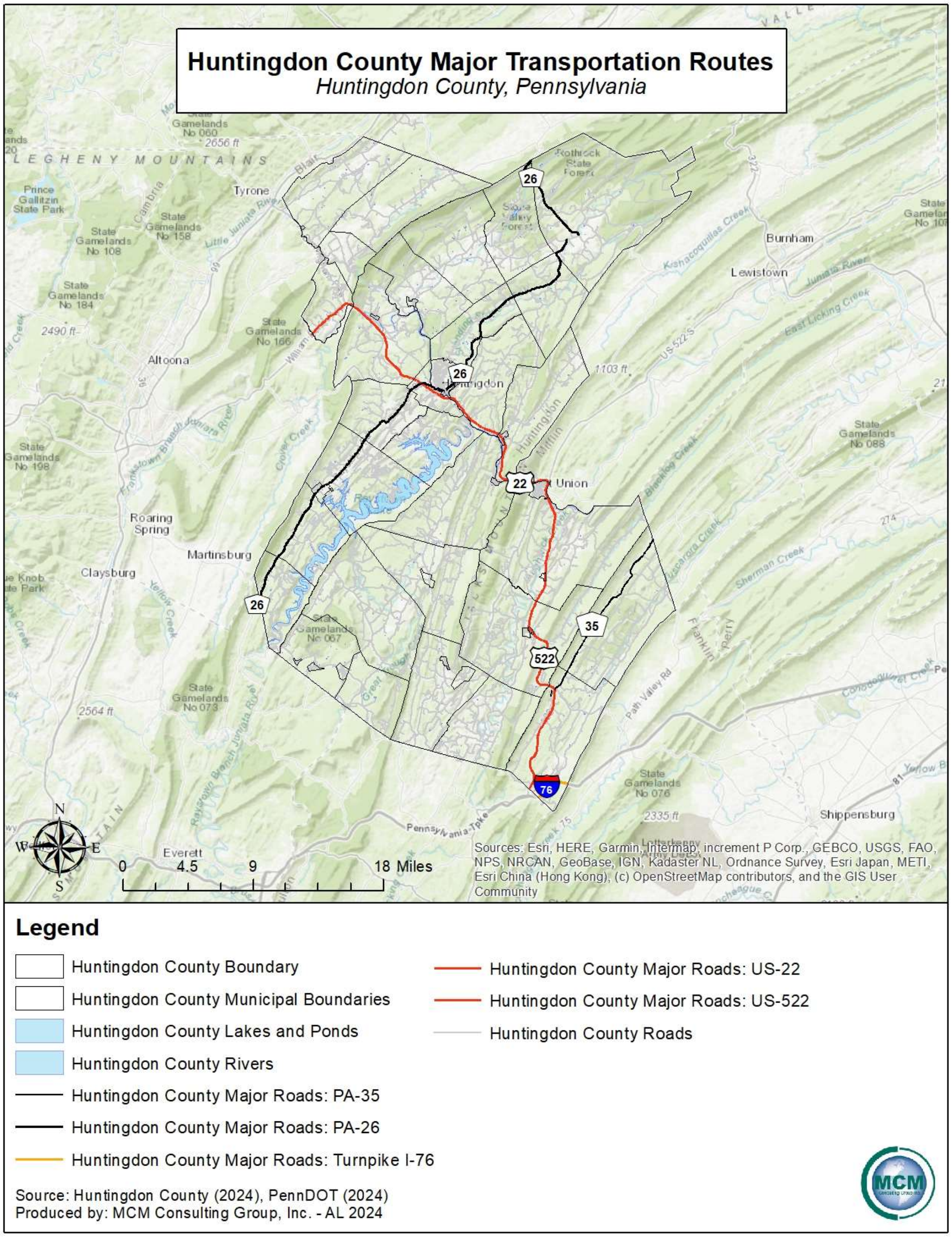


Figure X – Average Daily Traffic on Major Highway Vulnerability

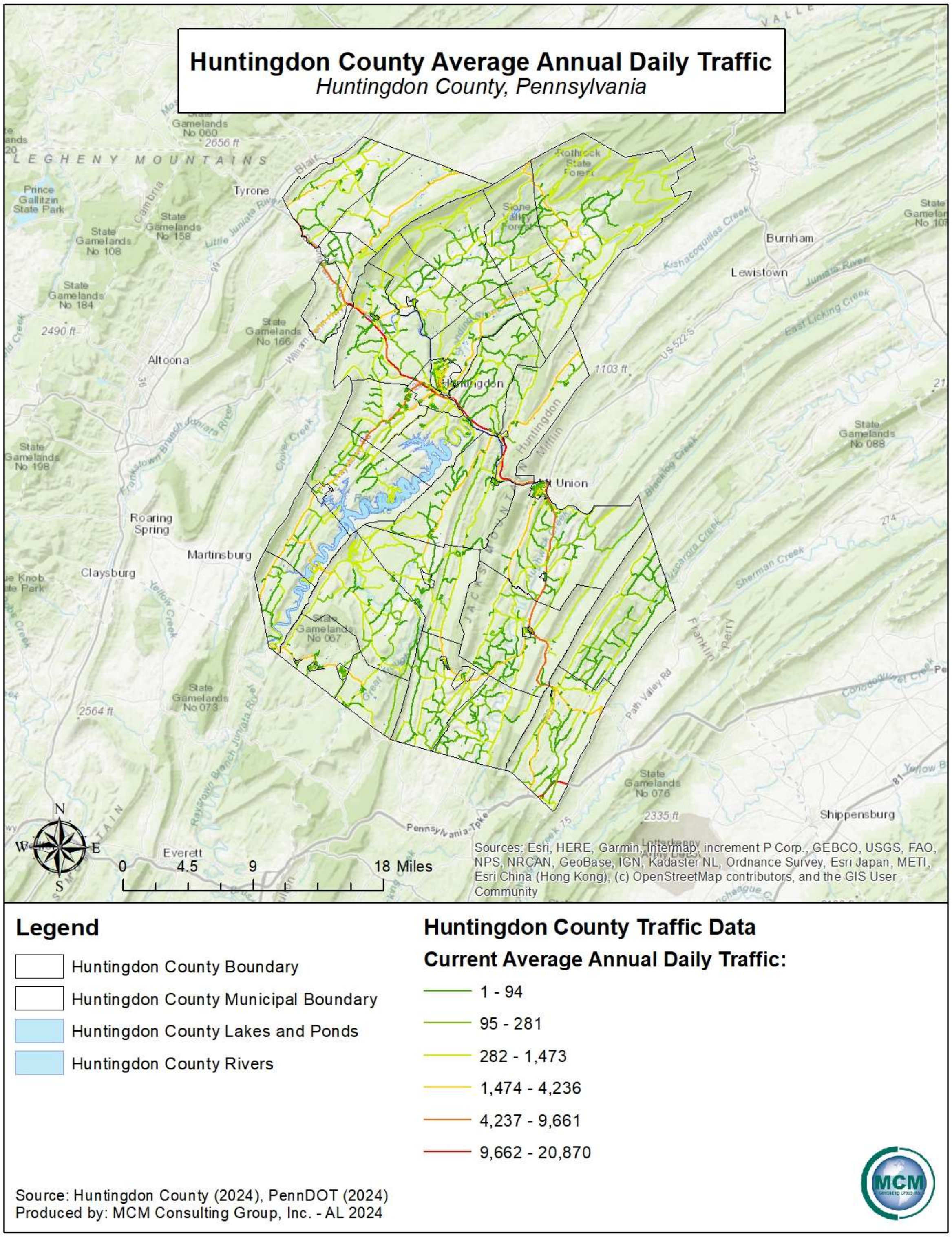


Figure X – Huntingdon County Truck Percentages

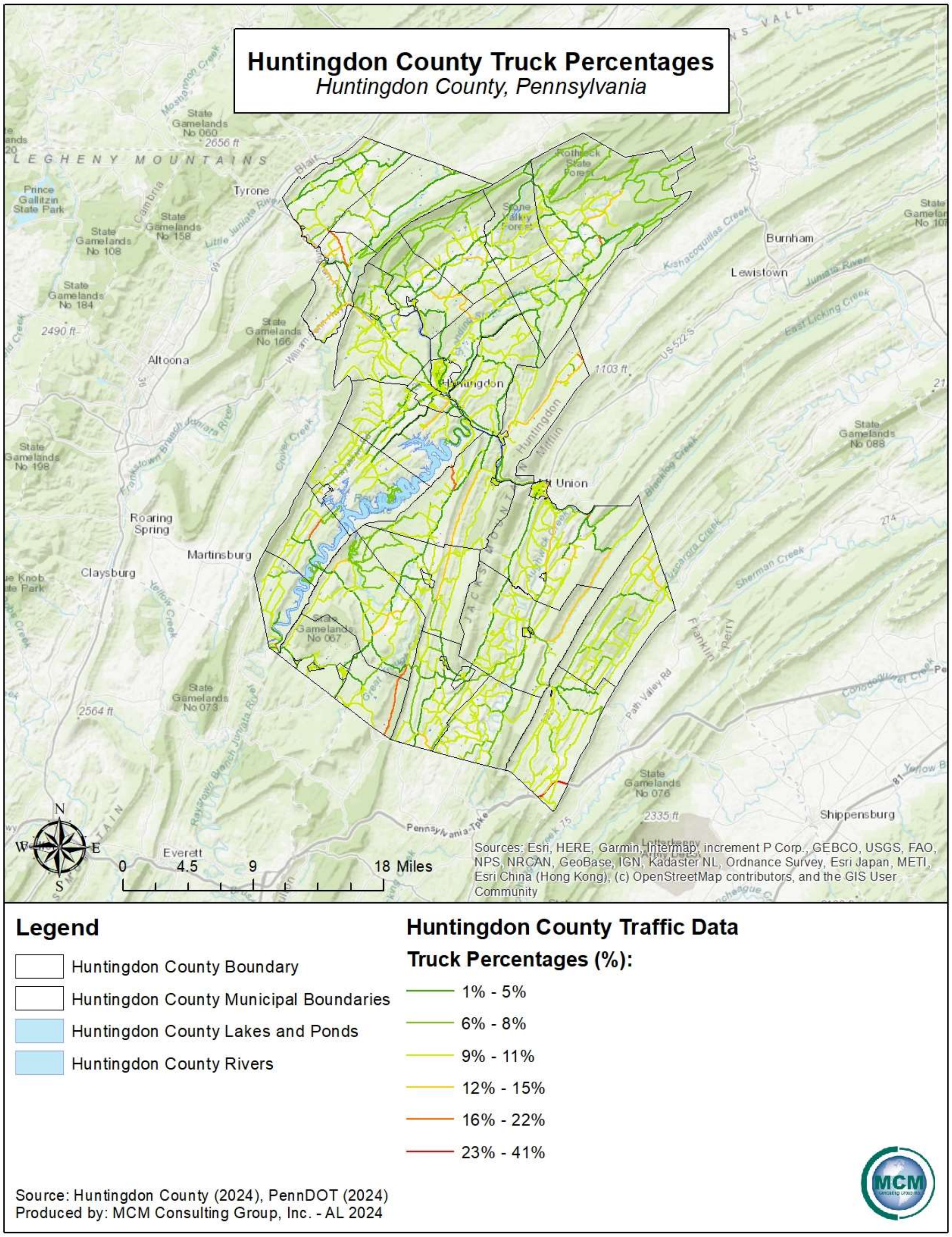
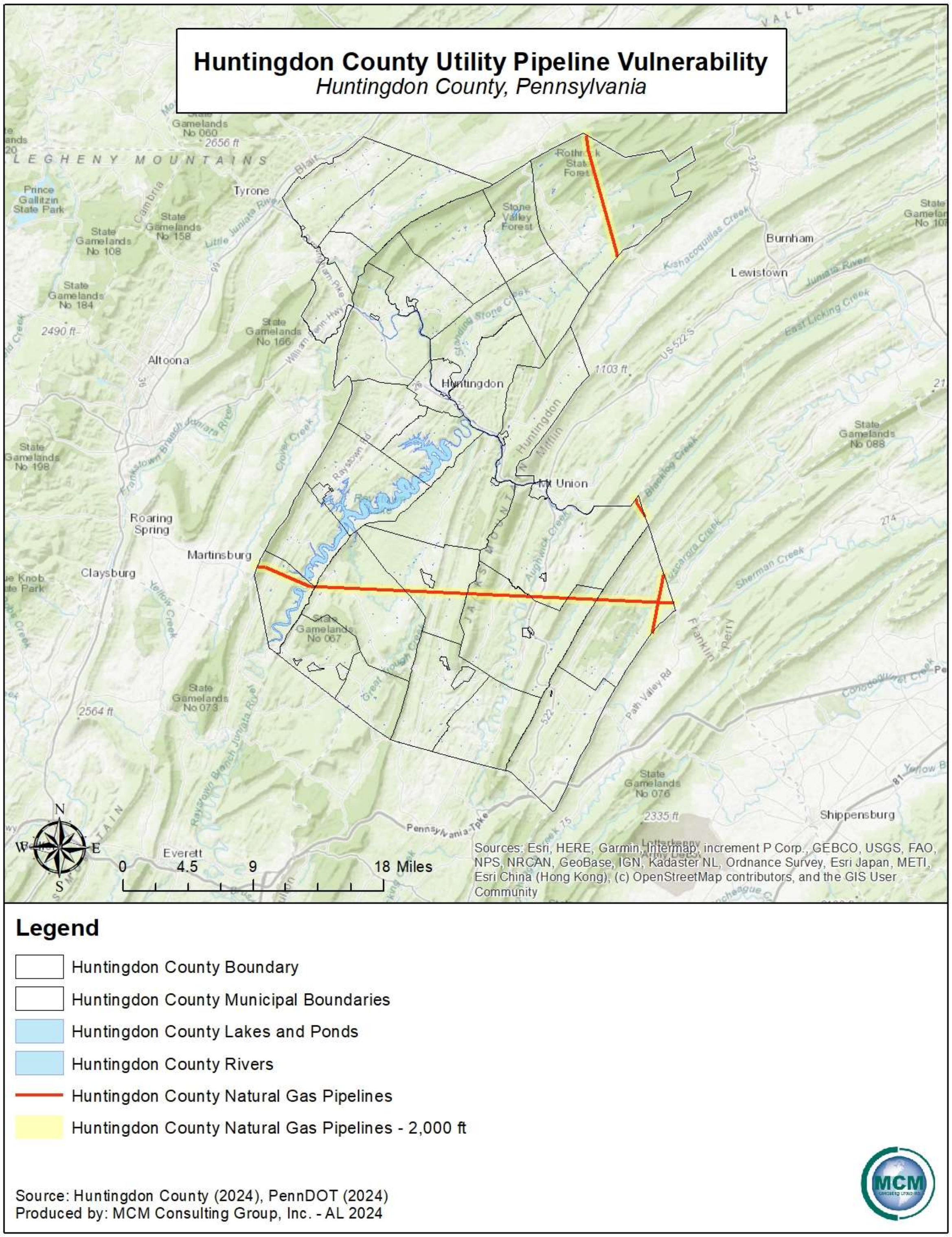


Figure X – Utility Pipelines Vulnerability



4.3.22. Urban Fire and Explosion

4.3.22.1 Location and Extent

Urban fire and explosion hazards incorporate vehicle and building/ structure fires, as well as overpressure ruptures, overheat explosions, or other explosions that do not ignite. Statewide, this hazard is most problematic in the denser, and more urbanized areas, occurring most often in residential structures (US Fire Administration, 2009). Urban fires can more easily spread from building to building in denser urban areas.

According to the U.S. Census Bureau, 2020 U.S. Census, Huntingdon County has approximately 20,807 housing units. Buildings that were constructed fifty or more years ago are at a higher risk of urban fires due to improvement in fire safety engineering practices. Nearly 27.4% of all structures in Huntingdon County were built before 1939.

Fires can start from numerous causes including human errors or electrical malfunctions. Most fires are small and have little impact on the greater community other than possibly increasing insurance rates. Oftentimes large urban fires are the result of other hazards such as storms, droughts, transportation accidents, hazardous material spills, arson, or terrorism.

Natural gas exploration and extraction sites can be associated with fires and explosion events. Well flares regularly burn off excess gas, and if improperly managed, such activities can be dangerous for the surrounding areas.

4.3.22.2 Range of Magnitude

Urban fires can occur in any populated area, and fires affecting one structure happen quite often. Urban fires are most threatening when the fire can rapidly spread from one structure to another. County Name is largely rural/semi-rural and does not have significant expanses of dense population.

Damages from fire and explosions ranges from minor smoke inhalation and/or water damage to the destruction of buildings. A worst-case scenario for any fire and or explosion would be in injuries and/or death of the occupants of the structures and the potential of injury or death of firefighters.

There are economic consequences related to a fire and explosion hazard, including:

- Loss in wages due to temporarily or permanently closed businesses
- Destruction and damage to business and personal assets
- Loss of tax base
- Recovery costs
- Loss related to the ability of public, private, and non-profit entities to provide post-incident relief.

The secondary effects of urban fire and explosion events relate to the ability of public, private, and non-profit entities to provide post-incident relief. Human services agencies (community support programs, health and medical services, public assistance programs and social services) can be affected by urban fire and explosion events. Effects include causing physical damage to facilities and equipment, disruption of emergency communications, loss of health and medical facilities and supplies, and an overwhelming load of victims who are suffering from the effects of the urban fire, including loss of their home or place of business.

4.3.22.3 Past Occurrence

From 1910 to 1990, the Commonwealth of Pennsylvania experienced 13 major fires in suburban and urban settings, and 10 of them occurred after 1980. Between 1978 and 1982, the average number of deaths per fire was 2.7. After October 1990, the average number of deaths per fire decreased. At the time of writing this plan Huntingdon County did not have access to data on major fire and explosions that have occurred in Huntingdon County since the year 2000.

As of August 2024, there were three active natural gas wells in Huntingdon County (PA DEP, 2024). Active gas wells in Huntingdon County should be closely monitored, and safety protocols should be strictly adhered to in order to avoid explosions and starting fires. Huntingdon County utilizes a database system called WebEOC to track incidents within the county. However, no such data was available to refence for urban fires or explosions during the development of this report, and as such no detailed report of past events can be displayed at this time.

4.3.22.4 Future Occurrence

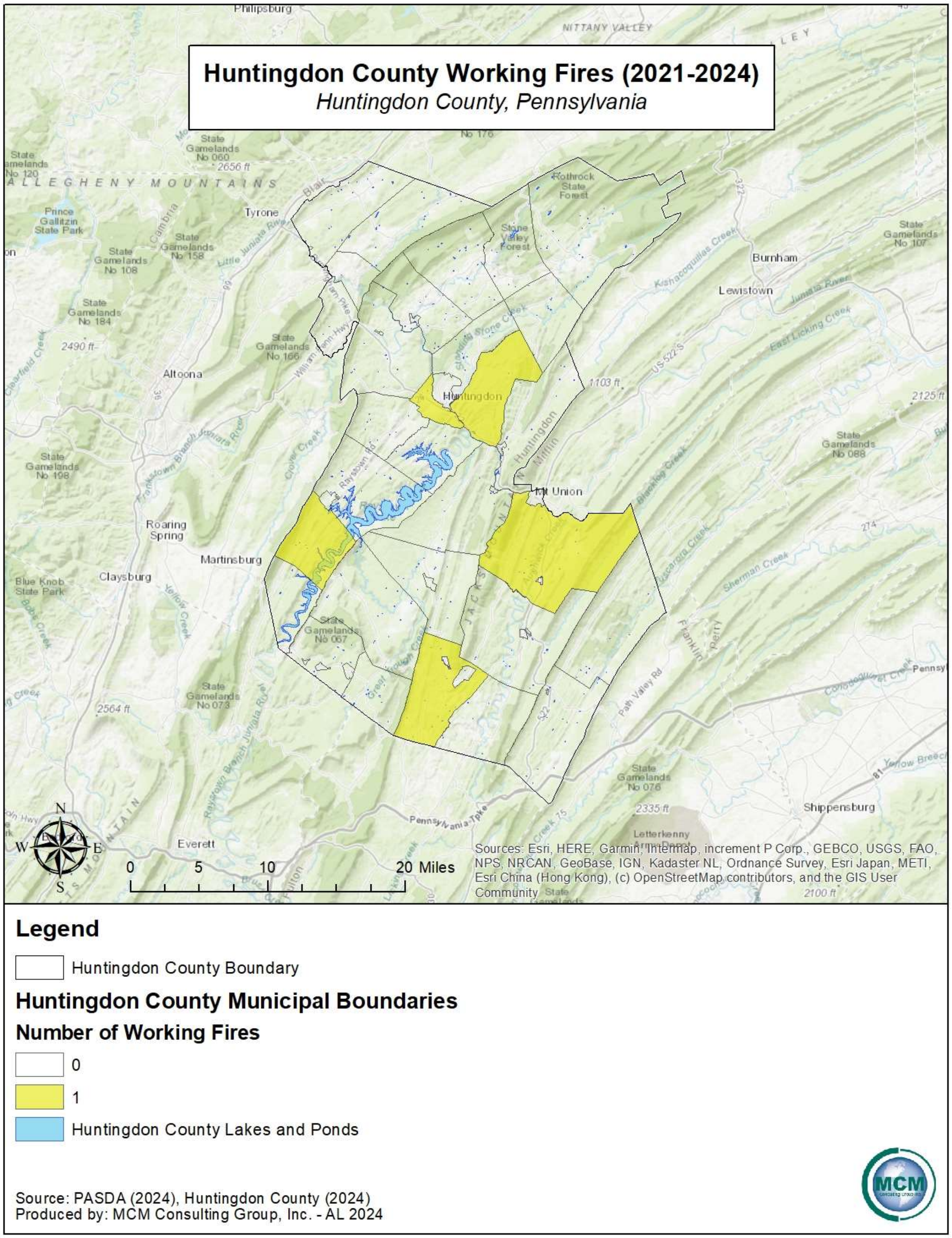
Small urban fires occur regularly and usually cause little damage. Areas with greater population and an increased rate of population density are at greater risk for future urban fires and explosions. The more urban areas of Huntingdon County include Huntingdon Borough.

Any new construction must comply with PA Department of Labor's statewide uniform construction codes. One requirement in the construction codes is automatic sprinkler requirements for buildings other than one- and two-family dwellings. In most cases, this requirement will contain fires to the point of origin.

4.3.22.5 Vulnerability Assessment

Fire and explosion vulnerability greatly depends on the vulnerability of other hazards. Most fires result from the secondary effect of another hazard. The probability of a fire or explosion occurring increases with population and economic growth. The natural gas industry and exploration is active and growing in Huntingdon County, and with it comes greater risk for fire and explosion. Urban fire risk also increases as the use of wood burning and kerosene space heaters increases. The elderly (those 65 years and older) tend to be more vulnerable to structure fires than other age groups, and often experience the highest number of deaths per fire. Older structures are more vulnerable to urban fire, and fires can spread faster to each other in areas with higher concentrations of housing. Potential secondary effects of urban fires include utility interruption and hazardous material spills. The following map *Figure X - County Name Working Fires* identifies previous fires as well as which of those resulted in fatalities.

Figure X - County Name Working Fires



4.3.23. Utility Interruption

4.3.23.1 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 Huntingdon County is shown in *Table X – Huntingdon County Utility Providers*.

Table X – Huntingdon County Utility Providers

Huntingdon County Utility Providers	
Utility Type	**Name of Utility Provider**
Electricity	Allegheny Electric Cooperative Inc., PPL Electric Utilities, Penelec - First Energy Corporation, Valley Rural Electric Cooperative,
Telephone/Lifeline/9-1-1/Wireless	Century Link, Verizon, Windstream, Access Wireless, American Assistance, Assurance Wireless, enTouch, Feel Safe Wireless, Full Service Network, Life Wireless, Limitless Wireless, Q-Link Wireless, SafeLink, Safety Net Wireless, Stand Up Wireless, Tag Mobile, Talk America Services, TerraCom Wireless, T-Mobile, TruConnect
Natural Gas	UGI Penn Natural Gas, National Fuel Gas Company, People's Gas, Martin Oil Company, Laurel Pipeline Company, Eastern Gas

Huntingdon County Utility Providers	
Utility Type	**Name of Utility Provider**
	Transmission and Storage, Enbridge (Texas Eastern Transmission LP
Water and Sewer	Alexandria Borough Water Authority, Alexandria Porter Joint Sewer and Water Authority, Broad Top Area Water Authority, Broad Top City Borough Sewer, Cassville Borough Water/Sewer Authority, Cromwell Township Sewer, Dudley Coalmont Carbon Township Joint Authority, Greenwood Furnace State Park, Hopewell Township (Cherrytown), Hopewell Township (Lakeview Estates), Huntingdon Borough Water and Sewer Authority, Mapleton Area Joint Municipal Authority, Mapleton Municipal Water Authority, Marklesburg Sewer Authority, Mill Creek Area Municipal Authority, Mount Union Municipal Authority, Neelyton Water Co-op, Oneida Township Sewer, Orbisonia Rockhill Joint Municipal Authority, Penn Township Sewer, Petersburg Sewer Authority, Petersburg Water Authority, Saltillo Borough Water, Saxton Borough Municipal Authority (Bedford County), SCI – Huntingdon, Shade Gap Area Joint Municipal Authority, Shirley Township General Authority, Smithfield Township Water and Sewer Authority, Three Springs Borough Water, Trough Creek State Park, Spring Creek Joint Sewer Authority, Walker Township Municipal Authority, Warriors Mark General Authority, Wood-Broad Top-Wells Joint Municipal Authority
Source: PA Public Utility Commission, 2024	

4.3.23.2 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 timely manner. A lack of potable drinking water can also become a major issue for areas impacted by utility interruptions.

<u>Electricity:</u>

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 Huntingdon County workforce.

4.3.23.3 Past Occurrence

Minor utility interruptions occur annually in Huntingdon County and occur most often in conjunction with winter weather and/or windstorms. Huntingdon County utilizes a database system called WebEOC to track incidents within the county. However, limited data was available for reference, from 2021 through 2024, during the development of this report. *Table X – Utility Interruptions in Huntingdon County* illustrates the number of interruptions to electric, natural gas, telecommunications, and water services that were shared for this plan update between 2021 and 2024.

Table X - Utility Interruptions in Huntingdon County

Utility Interruptions in Huntingdon County		
Date	**Event Type**	**Municipality**
11/02/2021	Utility Emergency – State correctional institution power failure	Smithfield Township
09/06/2022	Utility Emergency – Natural gas pipeline fire	Union Township
02/07/2023	Utility Emergency – MVC with power outage	Walker Township
05/23/2023	Utility Emergency – Water supply contamination	Lincoln Township
07/03/2023	Utility Emergency – Road closure	Cromwell Township
07/28/2023	Utility Emergency – Planned water outage	Alexandria Borough
08/02/2023	Utility Emergency – Power Outage	Huntingdon Borough
Source: Huntingdon County EMA WebEOC, 2024		

The Pennsylvania Public Utility Commission tracks the reliability of electric distribution companies (EDC) and outages. *Table X – 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 X - 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%)
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.

4.3.23.4 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 Huntingdon 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 Huntingdon 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.

4.3.23.5 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 X – Huntingdon County Utilities* illustrates the approximate locations of service lines and pipelines throughout Huntingdon 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 of the health, safety, and well-being of Huntingdon 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:

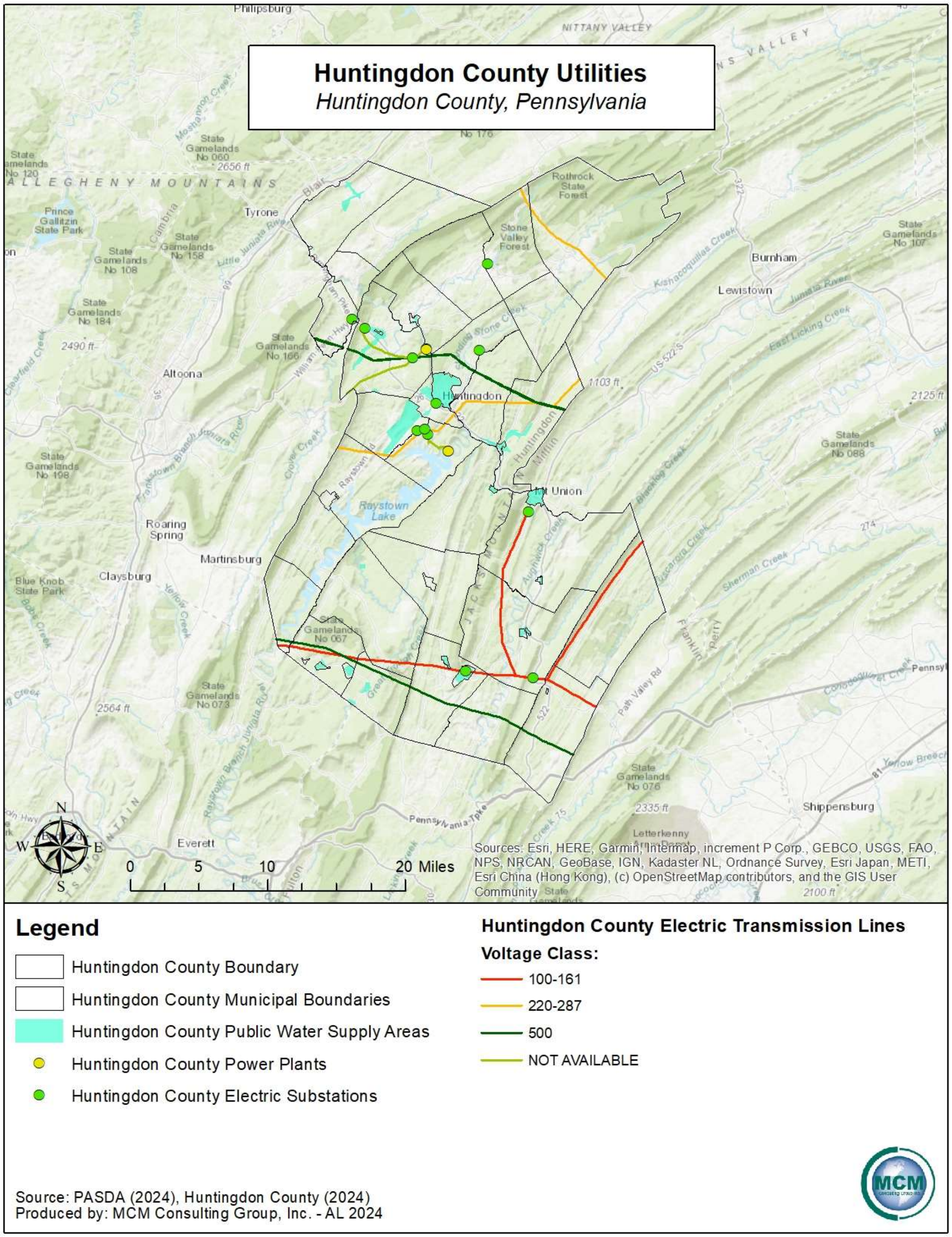
- Deterioration of line and facilities
- Puncturing the distribution lines by humans (either intentional or accidental)
- Coastal or winter storms
- Extreme heat or cold events
- Transportation accidents

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 Huntingdon 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 Huntingdon County are 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 X – Huntingdon 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 X – Risk Factor Approach Summary* 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 X - Risk Factor Approach Summary

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

Table X – 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 X - Risk Factor Approach Summary

Summary of Risk Factor Approach Used to Rank Hazard Risk.				
RISK ASSESSMENT CATEGORY	DEGREE OF RISK			WEIGHT VALUE
	LEVEL	CRITERIA	INDEX	
PROBABILITY *What is the likelihood of a hazard event occurring in a given year?*	**UNLIKELY**	LESS THAN 1% ANNUAL PROBABILITY	1	30%
	POSSIBLE	BETWEEN 1 & 10% ANNUAL PROBABILITY	2	
	LIKELY	BETWEEN 10 &100% ANNUAL PROBABILITY	3	
	HIGHLY LIKELY	100% ANNUAL PROBABILTY	4	
IMPACT *In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?*	**MINOR**	VERY FEW INJURIES, IF ANY. ONLY MINOR PROPERTY DAMAGE & MINIMAL DISRUPTION ON QUALITY OF LIFE. TEMPORARY SHUTDOWN OF CRITICAL FACILITIES.	1	30%
	LIMITED	MINOR INJURIES ONLY. MORE THAN 10% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE DAY.	2	
	CRITICAL	MULTIPLE DEATHS/INJURIES POSSIBLE. MORE THAN 25% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE WEEK.	3	
	CATASTROPHIC	HIGH NUMBER OF DEATHS/INJURIES POSSIBLE. MORE THAN 50% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR 30 DAYS OR MORE.	4	
SPATIAL EXTENT *How large of an area could be impacted by a hazard event? Are impacts localized or regional?*	**NEGLIGIBLE**	LESS THAN 1% OF AREA AFFECTED	1	20%
	SMALL	BETWEEN 1 & 10% OF AREA AFFECTED	2	
	MODERATE	BETWEEN 10 & 50% OF AREA AFFECTED	3	
	LARGE	BETWEEN 50 & 100% OF AREA AFFECTED	4	
WARNING TIME *Is there usually some lead time associated with the hazard event? Have warning measures been implemented?*	**MORE THAN 24 HRS**	SELF-DEFINED *(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)*	1	10%
	12 TO 24 HRS	SELF-DEFINED	2	
	6 TO 12 HRS	SELF-DEFINED	3	
	LESS THAN 6 HRS	SELF-DEFINED	4	
DURATION *How long does the hazard event usually last?*	**LESS THAN 6 HRS**	SELF-DEFINED *(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)*	1	10%
	LESS THAN 24 HRS	SELF-DEFINED	2	
	LESS THAN 1 WEEK	SELF-DEFINED	3	
	MORE THAN 1 WEEK	SELF-DEFINED	4	

4.4.2. Ranking Results

Using the methodology described in Section 4.4.1, *Table X – Risk Factor Assessment* lists the risk factor calculated for each of twenty-nine 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 X - Risk Factor Assessment

Huntingdon 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	Pandemic and Infectious Disease	4	4	4	1	4	**3.7**
	Substance Use Disorder	4	3	4	4	4	**3.7**
	Transportation Accidents	4	3	4	4	4	**3.4**
	Dam Failure	1	4	4	4	4	**3.1**
	Radon Exposure	3	2	4	1	4	**2.8**
	Windstorm	4	2	2	4	2	**2.8**
	Wildfire	4	2	2	4	2	**2.8**
	Utility Interruption	4	2	2	4	2	**2.8**
	Hurricane, Tropical storm	3	2	4	1	3	**2.7**
	Tornado	2	3	3	4	2	**2.7**
	Winter Storm	4	1	4	1	3	**2.7**
	Subsidence, Sinkhole	3	2	2	4	3	**2.6**
	Flood	3	2	3	1	3	**2.5**
	Flash Flood	4	1	2	4	2	**2.5**
	Civil Disturbance	4	1	2	4	2	**2.5**
MODERATE	Extreme Temperature	3	1	4	1	3	**2.4**
	Landslides	3	2	1	4	3	**2.4**
	Invasive Species	4	1	2	1	4	**2.4**
	Blighted Properties/ Structure Collapse	4	1	2	1	4	**2.4**

Huntingdon 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	
	Terrorism	3	2	2	4	1	**2.4**
	Levee Failure	2	2	2	4	3	**2.3**
	Fire and Explosion	2	2	2	4	2	**2.2**
LOW	Environmental Hazards – Fixed Facility	2	1	2	4	2	**1.9**
	Environmental Hazards – Transportation	2	1	2	4	2	**1.9**
	Drought	2	1	2	1	4	**1.8**
	Hailstorm	2	1	2	4	1	**1.8**
	Earthquake	1	1	2	4	2	**1.6**
	Civil Disturbance	1	1	1	3	1	**1.2**
	Ice Jam	1	1	1	1	1	**1**

Based on these results, there are fifteen high risk hazards, seven moderate risk hazards, and seven low risk hazards in Huntingdon 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 X – Countywide Risk Factor Assessment* shows the different municipalities in Huntingdon County and whether their risk is greater than (>), less than (<), or equal to (=) the risk factor assigned to the county as a whole. This table was developed by the consultant based on the findings in the hazard profiles located in sections 4.3.1 through 4.3.23.

Table X - Countywide Risk Factor

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk									
IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR									
JURISDICTION	Pandemic and Infectious Disease	Substance Use Disorder	Transportation Accidents	Dam Failure	Radon Exposure	Windstorm	Wildfire	Utility Interruption	Hurricane, Tropical Storm
	3.7	**3.7**	**3.4**	**3.1**	**2.8**	**2.8**	**2.8**	**2.8**	**2.7**
Alexandria Borough	=	=	=	=	=	=	=	=	=
Barree Township	=	=	=	=	=	=	=	=	=
Birmingham Borough	=	>	=	=	<	=	=	=	=
Brady Township	=	=	=	=	=	=	=	=	=
Broad Top City Borough	=	=	=	=	=	=	=	=	=
Carbon Township	=	=	=	=	=	=	=	=	=
Cass Township	=	=	=	=	=	=	=	=	=
Cassville Borough	=	=	=	=	=	=	=	=	=
Clay Township	=	=	=	=	=	=	=	=	=
Coalmont Borough	=	=	=	=	=	=	=	=	=
Cromwell Township	=	=	=	=	=	=	=	=	=
Dublin Township	=	=	=	=	=	=	=	=	=
Dudley Borough	=	=	=	=	=	=	=	=	=
Franklin Township	=	=	=	=	=	=	=	=	=
Henderson Township	=	=	=	=	=	=	=	=	=
Hopewell Township	=	=	=	=	=	=	=	=	=
Huntingdon Borough	=	=	=	=	=	=	=	=	=
Jackson Township	=	=	=	=	=	=	=	=	=

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk									
IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR									
JURISDICTION	Pandemic and Infectious Disease	Substance Use Disorder	Transportation Accidents	Dam Failure	Radon Exposure	Windstorm	Wildfire	Utility Interruption	Hurricane, Tropical Storm
	3.7	**3.7**	**3.4**	**3.1**	**2.8**	**2.8**	**2.8**	**2.8**	**2.7**
Juniata Township	=	=	=	=	=	=	=	=	=
Lincoln Township	=	=	=	=	=	=	=	=	=
Logan Township	=	=	=	=	=	=	=	=	=
Mapleton Borough	=	=	=	=	=	=	=	=	=
Marklesburg Borough	=	=	=	=	=	=	=	=	=
Mill Creek Borough	=	=	=	=	=	=	=	=	=
Miller Township	=	=	=	=	=	=	=	=	=
Morris Township	=	=	=	=	=	=	=	=	=
Mount Union Borough	=	=	=	=	=	=	=	=	=
Oneida Township	=	=	=	=	=	=	=	=	=
Orbisonia Borough	=	=	=	=	=	=	=	=	=
Penn Township	=	=	=	=	=	=	=	=	=
Petersburg Borough	=	=	=	=	=	=	=	=	=
Porter Township	=	=	=	=	=	=	=	=	=
Rockhill Borough	=	=	=	=	=	=	=	=	=
Saltillo Borough	=	=	=	=	=	=	=	=	=
Shade Gap Borough	=	=	=	=	=	=	=	=	=
Shirley Township	=	=	=	=	=	=	=	=	=
Shirleysburg Borough	=	=	=	=	=	=	=	=	=

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk									
IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR									
JURISDICTION	Pandemic and Infectious Disease	Substance Use Disorder	Transportation Accidents	Dam Failure	Radon Exposure	Windstorm	Wildfire	Utility Interruption	Hurricane, Tropical Storm
	3.7	**3.7**	**3.4**	**3.1**	**2.8**	**2.8**	**2.8**	**2.8**	**2.7**
Smithfield Township	=	=	=	=	=	=	=	=	=
Springfield Township	=	=	=	=	=	=	=	=	=
Spruce Creek Township	=	=	=	=	=	=	=	=	=
Tell Township	=	=	=	=	=	=	=	=	=
Three Springs Borough	=	=	=	=	=	=	=	=	=
Todd Township	=	=	=	=	=	=	=	=	=
Union Township	=	=	=	=	=	=	=	=	=
Walker Township	=	=	=	=	=	=	=	=	=
Warriors Mark Township	=	=	=	=	=	=	=	=	=
West Township	=	=	=	=	=	=	=	=	=
Wood Township	=	=	=	=	=	=	=	=	=

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk									
IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR									
JURISDICTION	Tornado	Winter Storm	Subsidence, Sinkhole	Flood	Flash Flood	Civil Disturbance	Extreme Temperature	Landslide	Invasive Species
	2.7	**2.7**	**2.6**	**2.5**	**2.5**	**2.5**	**2.4**	**2.4**	**2.4**
Alexandria Borough	=	=	=	=	=	=	=	=	=
Barree Township	=	=	=	=	=	=	=	=	=
Birmingham Borough	=	=	=	=	=	=	=	=	=
Brady Township	=	=	=	=	=	=	=	=	=
Broad Top City Borough	=	=	=	=	=	=	=	=	=
Carbon Township	=	=	=	=	=	=	=	=	=
Cass Township	=	=	=	=	=	=	=	=	=
Cassville Borough	=	=	=	=	=	=	=	=	=
Clay Township	=	=	=	=	=	=	=	=	=
Coalmont Borough	=	=	=	=	=	=	=	=	=
Cromwell Township	=	=	=	=	=	=	=	=	=
Dublin Township	=	=	=	=	=	=	=	=	=
Dudley Borough	=	=	=	=	=	=	=	=	=
Franklin Township	=	=	=	=	=	=	=	=	=
Henderson Township	=	=	=	=	=	=	=	=	=
Hopewell Township	=	=	=	=	=	=	=	=	=
Huntingdon Borough	=	=	=	=	=	=	=	=	=
Jackson Township	=	=	=	=	=	=	=	=	=
Juniata Township	=	=	=	=	=	=	=	=	=
Lincoln Township	=	=	=	=	=	=	=	=	=

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk									
IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR									
JURISDICTION	Tornado	Winter Storm	Subsidence, Sinkhole	Flood	Flash Flood	Civil Disturbance	Extreme Temperature	Landslide	Invasive Species
	2.7	**2.7**	**2.6**	**2.5**	**2.5**	**2.5**	**2.4**	**2.4**	**2.4**
Logan Township	=	=	=	=	=	=	=	=	=
Mapleton Borough	=	=	=	=	=	=	=	=	=
Marklesburg Borough	=	=	=	=	=	=	=	=	=
Mill Creek Borough	=	=	=	=	=	=	=	=	=
Miller Township	=	=	=	=	=	=	=	=	=
Morris Township	=	=	=	=	=	=	=	=	=
Mount Union Borough	=	=	=	=	=	=	=	=	=
Oneida Township	=	=	=	=	=	=	=	=	=
Orbisonia Borough	=	=	=	=	=	=	=	=	=
Penn Township	=	=	=	=	=	=	=	=	=
Petersburg Borough	=	=	=	=	=	=	=	=	=
Porter Township	=	=	=	=	=	=	=	=	=
Rockhill Borough	=	=	=	=	=	=	=	=	=
Saltillo Borough	=	=	=	=	=	=	=	=	=
Shade Gap Borough	=	=	=	=	=	=	=	=	=
Shirley Township	=	=	=	=	=	=	=	=	=
Shirleysburg Borough	=	=	=	=	=	=	=	=	=
Smithfield Township	=	=	=	=	=	=	=	=	=
Springfield Township	=	=	=	=	=	=	=	=	=
Spruce Creek Township	=	=	=	=	=	=	=	=	=

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk									
IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR									
JURISDICTION	Tornado	Winter Storm	Subsidence, Sinkhole	Flood	Flash Flood	Civil Disturbance	Extreme Temperature	Landslide	Invasive Species
	2.7	**2.7**	**2.6**	**2.5**	**2.5**	**2.5**	**2.4**	**2.4**	**2.4**
Tell Township	=	=	=	=	=	=	=	=	=
Three Springs Borough	=	=	=	=	=	=	=	=	=
Todd Township	=	=	=	=	=	=	=	=	=
Union Township	=	=	=	=	=	=	=	=	=
Walker Township	=	=	=	=	=	=	=	=	=
Warriors Mark Township	=	=	=	=	=	=	=	=	=
West Township	=	=	=	=	=	=	=	=	=
Wood Township	=	=	=	=	=	=	=	=	=

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk									
IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR									
JURISDICTION	Blighted Properties/Structure Collapse	Terrorism	Levee Failure	Fire and Explosion	Environmental Hazards – Fixed Facility	Environmental Hazards – Transportation	Drought	Hailstorm	Earthquake
	2.4	**2.4**	**2.3**	**2.2**	**1.9**	**1.9**	**1.8**	**1.8**	**1.6**
Alexandria Borough	=	=	=	=	=	=	=	=	=
Barree Township	=	=	=	=	=	=	=	=	=
Birmingham Borough	=	=	=	=	=	=	=	=	=
Brady Township	=	=	=	=	=	=	=	=	=
Broad Top City Borough	=	=	=	=	=	=	=	=	=
Carbon Township	=	=	=	=	=	=	=	=	=
Cass Township	=	=	=	=	=	=	=	=	=
Cassville Borough	>	=	=	=	=	=	=	=	=
Clay Township	=	=	=	=	=	=	=	=	=
Coalmont Borough	=	=	=	=	=	=	=	=	=
Cromwell Township	=	=	=	=	=	=	=	=	=
Dublin Township	=	=	=	=	=	=	=	=	=
Dudley Borough	=	=	=	=	=	=	=	=	=
Franklin Township	=	=	=	=	=	=	=	=	=
Henderson Township	=	=	=	=	=	=	=	=	=
Hopewell Township	=	=	=	=	=	=	=	=	=
Huntingdon Borough	=	=	=	=	=	=	=	=	=
Jackson Township	=	=	=	=	=	=	=	=	=
Juniata Township	=	=	=	=	=	=	=	=	=
Lincoln Township	=	=	=	=	=	=	=	=	=

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk									
IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR									
JURISDICTION	Blighted Properties/Structure Collapse	Terrorism	Levee Failure	Fire and Explosion	Environmental Hazards – Fixed Facility	Environmental Hazards – Transportation	Drought	Hailstorm	Earthquake
	2.4	**2.4**	**2.3**	**2.2**	**1.9**	**1.9**	**1.8**	**1.8**	**1.6**
Logan Township	=	=	=	=	=	=	=	=	=
Mapleton Borough	=	=	=	=	=	=	=	=	=
Marklesburg Borough	=	=	=	=	=	=	=	=	=
Mill Creek Borough	=	=	=	=	=	=	=	=	=
Miller Township	=	=	=	=	=	=	=	=	=
Morris Township	=	=	=	=	=	=	=	=	=
Mount Union Borough	=	=	=	=	=	=	=	=	=
Oneida Township	=	=	=	=	=	=	=	=	=
Orbisonia Borough	=	=	=	=	=	=	=	=	=
Penn Township	=	=	=	=	=	=	=	=	=
Petersburg Borough	=	=	=	=	=	=	=	=	=
Porter Township	=	=	=	=	=	=	=	=	=
Rockhill Borough	=	=	=	=	=	=	=	=	=
Saltillo Borough	=	=	=	=	=	=	=	=	=
Shade Gap Borough	=	=	=	=	=	=	=	=	=
Shirley Township	=	=	=	=	=	=	=	=	=
Shirleysburg Borough	=	=	=	=	=	=	=	=	=
Smithfield Township	=	=	=	=	=	=	=	=	=
Springfield Township	=	=	=	=	=	=	=	=	=
Spruce Creek Township	=	=	=	=	=	=	=	=	=

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk									
IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR									
JURISDICTION	Blighted Properties/Structure Collapse	Terrorism	Levee Failure	Fire and Explosion	Environmental Hazards – Fixed Facility	Environmental Hazards – Transportation	Drought	Hailstorm	Earthquake
	2.4	**2.4**	**2.3**	**2.2**	**1.9**	**1.9**	**1.8**	**1.8**	**1.6**
Tell Township	=	=	=	=	=	=	=	=	=
Three Springs Borough	=	=	=	=	=	=	=	=	=
Todd Township	=	=	=	=	=	=	=	=	=
Union Township	=	=	=	=	=	=	=	=	=
Walker Township	=	=	=	=	=	=	=	=	=
Warriors Mark Township	=	=	=	=	=	=	=	=	=
West Township	=	=	=	=	=	=	=	=	=
Wood Township	=	=	=	=	=	=	=	=	=

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk		
IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR		
JURISDICTION	Civil Disturbance	Ice Jam
	1.2	**1.0**
Alexandria Borough	=	=
Barree Township	=	=
Birmingham Borough	=	=
Brady Township	=	=
Broad Top City Borough	=	=
Carbon Township	=	=
Cass Township	=	=
Cassville Borough	=	=
Clay Township	=	=
Coalmont Borough	=	=
Cromwell Township	=	=
Dublin Township	=	=
Dudley Borough	=	=
Franklin Township	=	=
Henderson Township	=	=
Hopewell Township	=	=
Huntingdon Borough	=	=
Jackson Township	=	=
Juniata Township	=	=
Lincoln Township	=	=

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk		
IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR		
JURISDICTION	Civil Disturbance	Ice Jam
	1.2	**1.0**
Logan Township	=	=
Mapleton Borough	=	=
Marklesburg Borough	=	=
Mill Creek Borough	=	=
Miller Township	=	=
Morris Township	=	=
Mount Union Borough	=	=
Oneida Township	=	=
Orbisonia Borough	=	=
Penn Township	=	=
Petersburg Borough	=	=
Porter Township	=	=
Rockhill Borough	=	=
Saltillo Borough	=	=
Shade Gap Borough	=	=
Shirley Township	=	=
Shirleysburg Borough	=	=
Smithfield Township	=	=
Springfield Township	=	=
Spruce Creek Township	=	=

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk		
IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR		
JURISDICTION	Civil Disturbance	Ice Jam
	1.2	**1.0**
Tell Township	=	=
Three Springs Borough	=	=
Todd Township	=	=
Union Township	=	=
Walker Township	=	=
Warriors Mark Township	=	=
West Township	=	=
Wood 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 Huntingdon 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 Huntingdon County municipality is outlined in section 4.3.4 of the flooding hazard profile.

MCM Consulting Group, Inc. conducted a countywide flood study using the Hazards U.S. Multi-Hazard (HAZUS-MH) software that is provided by the Federal Emergency Management Agency. This software is a standardized loss estimation software deriving economic loss, building damage, content damage and other economic impacts that can be used in local flood mitigation planning activities.

Using HAZUS-MH, total building-related losses from a 1%-annual-chance flood in Huntingdon County are estimated to equal 118.49 million with 85.1% of that coming from residential homes. Total economic loss, including replacement value, content loss, functional loss, and displacement cost, from a countywide 1%-annual-chance flood are estimated to equal $118,490,000 million.

4.4.4. Future Development and Vulnerability

The 2020 census population for Huntingdon County is 45,145 which is 685 fewer than the 2010 census. There was an overall decrease of 1.50% in population based on the data. Twenty-three municipalities have seen population increases while the remaining twenty-four had decreases in the period between 2010 and the 2020, except for Jackson Township which had no reported population change as identified in *Table X – 2010 – 2020 Population Change.*

Table X – 2010 – 2020 Population Change

Population Change in Huntingdon County from 2010-2020			
Municipality	**2010 Census**	**2020 Census**	**Percent of Change 2010-2020**
Alexandria Borough	397	389	-2.02
Barree Township	541	548	1.30
Birmingham Borough	102	120	17.65
Brady Township	1,285	805	**-37.35**

Population Change in Huntingdon County from 2010-2020			
Municipality	**2010 Census**	**2020 Census**	**Percent of Change 2010-2020**
Broad Top City Borough	325	463	**42.46**
Carbon Township	412	275	**-33.25**
Cass Township	1,241	1,110	**-10.56**
Cassville Borough	189	127	**-32.80**
Clay Township	1,029	881	**-14.38**
Coalmont Borough	59	43	**-27.12**
Cromwell Township	1,195	1,426	**19.33**
Dublin Township	1,248	1,282	**2.72**
Dudley Borough	153	188	**22.88**
Franklin Township	516	404	**-21.71**
Henderson Township	727	944	**29.85**
Hopewell Township	482	578	**19.92**
Huntingdon Borough	7,067	6,950	**-1.66**
Jackson Township	808	808	**0.00**
Juniata Township	524	326	**-37.79**
Lincoln Township	286	297	**3.85**
Logan Township	676	736	**8.88**
Mapleton Borough	572	363	**-36.54**
Marklesburg Borough	202	374	**85.15**
Mill Creek Borough	260	337	**29.62**
Miller Township	410	428	**4.39**
Morris Township	524	641	**22.33**
Mount Union Borough	2,553	2,249	**-11.91**
Oneida Township	1,228	1,050	**-14.50**
Orbisonia Borough	786	449	**-42.88**
Penn Township	899	862	**-4.12**
Petersburg Borough	537	379	**-29.42**
Porter Township	2,011	1,577	**-21.58**
Rockhill Borough	368	348	**-5.43**
Saltillo Borough	319	355	**11.29**
Shade Gap Borough	78	124	**58.97**
Shirley Township	2,520	2,366	**-6.11**
Shirleysburg Borough	118	161	**36.44**
Smithfield Township	4,415	5,453	**23.51**
Springfield Township	705	550	**-21.99**

Population Change in Huntingdon County from 2010-2020			
Municipality	**2010 Census**	**2020 Census**	**Percent of Change 2010-2020**
Spruce Creek Township	266	199	**25.19**
Tell Township	664	619	**-6.78**
Three Springs Borough	371	592	**59.57**
Todd Township	1,010	892	**-11.68**
Union Township	1,058	810	**-23.44**
Walker Township	1,828	2,255	**23.36**
Warriors Mark Township	1,910	1,948	**1.99**
West Township	437	484	**10.76**
Wood Township	519	580	**11.75**
Huntingdon County	**45,830**	**45,145**	**-1.50**
Source: United States Census Bureau (2024), 2020 Census Data			

The 2019 census estimates indicates that there are approximately 21,035 housing units in Huntingdon County, Pennsylvania. Of those, 78.5% 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 would 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 Huntingdon 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 Huntingdon 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 Huntingdon 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 forty-eight 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 Huntingdon County, and its municipalities have the capacity to do and provides an understanding of what must be changed to mitigate loss.

Huntingdon 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 forty-eight municipalities in Huntingdon 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 Huntingdon 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 Huntingdon 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 ordinance 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 Huntingdon 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 Huntingdon County adhere to the standards of the Pennsylvania Uniform Code (Act 45). Four of the forty-eight municipalities in Huntingdon County have opted-in on building code enforcement, although all municipalities enforce their own code enforcement.

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 forty-eight municipalities in Huntingdon County, some have subdivision/land use ordinances, some have zoning regulations – some have both and some have neither (Huntingdon 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. All municipalities in Huntingdon County have adopted the county's stormwater management plan.

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 considering storm drainage and floodplain management.

In 2018, Southern Alleghenies Planning and Development Commission (SAP&DC) Cambria, Somerset, Blair, Bedford, Fulton and Huntingdon created a multi-county Comprehensive Plan.

Article III of the MPC enables municipalities to prepare a comprehensive plan: however, development of a comprehensive plan is voluntary. Thirteen of the forty-eight municipalities in Huntingdon County have adopted their own comprehensive plans.

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 but two of Huntingdon County's forty-eight municipalities have floodplain regulations in place that meet requirements set forth by the NFIP. Currently, no municipalities have completed or started to complete the CRS program. 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 Huntingdon County that have not submitted NFIP surveys during this hazard mitigation planning process.

Additional National Flood Insurance Program and Floodplain Management Information:

Barree Township:

The floodplain management ordinance for Baree Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Broad Top City Borough:

The floodplain management ordinance for Broad Top City Borough was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Brady Township:

The floodplain management ordinance for Brady Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Carbon Township:

The floodplain management ordinance for Carbon Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Cromwell Township:

The floodplain management ordinance for Cromwell Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Dublin Township:

The floodplain management ordinance for Dublin Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Dudley Borough:

The floodplain management ordinance for Dudley Borough was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Henderson Township:

The floodplain management ordinance for Henderson Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Hopewell Township:

The floodplain management ordinance for Hopewell Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Huntingdon Borough:

The floodplain management ordinance for Huntingdon Borough was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Jackson Township

The floodplain management ordinance for Baree Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Juniata Township:

The floodplain management ordinance for Juniata Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Lincoln Township:

The floodplain management ordinance for Lincoln Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Logan Township:

The floodplain management ordinance for Logan Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Marklesburg Borough:

The floodplain management ordinance for Marklesburg Borough was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Miller Township:

The floodplain management ordinance for Miller Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Morris Township:

The floodplain management ordinance for Morris Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Mount Union Borough:

The floodplain management ordinance for Mount Union Borough was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Orbisonia Borough:

The floodplain management ordinance for Orbisonia Borough was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Penn Township:

The floodplain management ordinance for Penn Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Petersburg Borough:

The floodplain management ordinance for Petersburg Borough was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Porter Township:

The floodplain management ordinance for Porter Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Rockhill Borough:

The floodplain management ordinance for Rockhill Borough was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Shade Gap Borough:

The floodplain management ordinance for Shade Gap Borough was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Shirley Township:

The floodplain management ordinance for Shirley Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Shirleysburg Borough:

The floodplain management ordinance for Shirleysburg Borough was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Springfield Township:

The floodplain management ordinance for Springfield Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Spruce Creek Township:

The floodplain management ordinance for Spruce Creek Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Tell Township:

The floodplain management ordinance for Tell Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Warriors Mark Township:

The floodplain management ordinance for Warriors Mark Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

West Township :

The floodplain management ordinance for West Township was not available to the local planning team or submitted as part of the hazard mitigation planning process.

Wood Township:

The floodplain management ordinance for Wood 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 eighteen boroughs, thirty townships, and zero cities within Huntingdon 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 Huntingdon 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 Huntingdon 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 by a Huntingdon County 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 Huntingdon County and its municipalities to have an emergency management coordinator.

The Huntingdon County Department of Emergency Services 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. A majority of Huntingdon 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. Based on survey results, few municipalities within the county perceive fiscal capability to be moderate. 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 Huntingdon County Planning and Development 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 Huntingdon 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:

https://www.facebook.com/HuntingdonPlanning

https://www.huntingdoncounty.net/departments/planning-and-development

The Huntingdon County GIS Department website has an education and outreach capability, particularly with the county map viewer, which could be updated to include hazard mitigation data. The websites of the Huntingdon County Planning and Development Department and the Huntingdon County Emergency Management Agency also post information to educate residents, particularly in disaster preparedness, floodplain management, and zoning requirements. The Huntingdon County Planning and Development Department 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 Huntingdon 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.

Huntingdon County Comprehensive Plan

Overview

Comprehensive plans establish the overall vision, goals, and objectives for a community's growth. The Huntingdon County Multi-County Comprehensive Plan was adopted by the Huntingdon County Commissioners on July 3, 2018.The plan is a collaborative effort between the six counties in the Southern Allegheny region and contains both regional priorities and action plans for each county in the region. 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 2007 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 2020 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 Huntingdon 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 Huntingdon County Comprehensive Plan update. The Huntingdon County Comprehensive Plan also ties into the Huntingdon 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 Huntingdon County.

Recommendations for Continued and Future Integration

There are several opportunities to integrate hazard mitigation into the county's Active Transportation Plan. The plan could discuss hazards that may potentially impact the county's transportation system, such as extreme weather and other natural hazards. The plan could also inventory vulnerable assets, identify evacuation routes, and discuss the need for redundancy in the transportation network in the event of hazard or hazard event. The goals and objectives highlighted above could also be revised to address additional goals and objectives related to mitigation and added to the next update of the plan. Additionally, hazard mitigation could be discussed in more detail in the environmental mitigation chapter of the plan. Instead of solely discussing mitigation of environmental impacts of transportation projects in this section, this section could also describe how reducing impacts on the environment can mitigate hazards. For example, integrating stormwater management improvements into roadway projects not only reduces pollution in nearby waterways, but it can also alleviate the impacts of floods. Likewise, mitigating hazard impacts will help preserve transportation infrastructure throughout Huntingdon County.

Integration of Hazard Mitigation into Local Mechanisms

Integration of hazard mitigation principles into local mechanisms can be efficient for Huntingdon County. With forty-eight municipalities, local mitigation mechanisms can directly interface with the Huntingdon 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 Huntingdon 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 Huntingdon 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 Huntingdon County.

Further discussion on plan integration can be found in section 7.3 of this hazard mitigation plan.