Cameron County 2022 Hazard Mitigation Plan

Prepared for:

Cameron County Office of Emergency Service

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Certification of Annual Review Meetings

YEAR	DATE OF MEETING	PUBLIC OUTREACH ADDRESSED? *	SIGNATURE
2022			
2023			
2024			
2025			
2026			

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

Record of Changes

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

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Acronyms

AACT: American Academy of Clinical Toxicology

ACHA: American College Health Association

ACMT: American College of Medical Toxicology

AHJ: Authority Having Jurisdiction

AMD: Acid Mine Drainage

ANSI: American National Standards Institute

ASAM: American Society of Addiction Medicine

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

ASIRT: Association for Safe International Road Travel

BFE: Base Flood Elevation

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

CDC: Centers for Disease Control and Prevention

CERT: Community Emergency Response Team

CFR: Code of Federal Regulations

CFS: Commodity Flow Study

CHSN: College Health Surveillance Network

CCIDRAP: Center for Infectious Disease Research and Policy

CRS: Community Rating System

DCNR: Department of Conservation and Natural Resources

DDAP: Department of Drug and Alcohol Programs

DEA: Drug Enforcement Administration

DFIRM: Digital Flood Insurance Rate Map

DMA: Disaster Mitigation Act

DPS: Department of Public Safety

EF: Enhanced Fujita

EIA: Energy Information Administration

EMA: Emergency Management Agency

EMPG: Emergency Management Performance Grant

EMS:	Emergency Medical Services
EOP:	Emergency Operations Plan
EPA:	Environmental Protection Agency
EPCRA:	Emergency Planning and Community Right-To-Know Act
EPZ:	Emergency Planning Zone
FBI:	Federal Bureau of Investigations
FEMA:	Federal Emergency Management Agency
FMA:	Flood Mitigation Assistance Grant Program
FRA:	Federal Railroad Association
GIS:	Geographic Information Systems
HAZUS:	Hazards U.S. Software
HMA:	Hazard Mitigation Assistance
HMEP:	Hazardous Material Emergency Planning Grant
HMGP:	Hazard Mitigation Grant Planning
HMP:	Hazard Mitigation Plan
HMRF:	Hazardous Material Response Fund
HSCA:	Hazardous Sites Cleanup Act
HSGP:	Homeland Security Grant Program
HVE:	Homegrown Violent Extremist
ICC:	International Code Council
IES:	Illuminating Engineering Society
LEPC:	Local Emergency Planning Committee
LGBTQ:	Lesbian, Gay, Bisexual, Trans & Queer
LPT:	Local Planning Team
MAT:	Medication-Assisted Treatment
MPC:	Municipalities Planning Code
NARM:	Notification and Resource Manual
NAS:	Neonatal Abstinence Syndrome
NCDC:	National Climatic Data Center
NCEI:	National Centers for Environmental Information

NFIP: National Flood Insurance Program

NFPA: National Fire Protection Association

NIH: National Institute of Health

NLD: National Levee Database

NOAA: National Oceanic and Atmospheric Administration

NTP: Narcotic Treatment Program

NWS: National Weather Service

OIH: Opioid-Induced Hyperalgesia

OUD: Opioid Use Disorder

PA DCED: Pennsylvania Department of Community and Economic Development

PA DEP: Pennsylvania Department of Environmental Protection

PA DOA: Pennsylvania Department of Agriculture

PA GWIS: Pennsylvania Groundwater Information System

PA HART: Pennsylvania Helicopter Aquatic Rescue Team

PAWNVCP: Pennsylvania West Nile Virus Control Program

PDMP: Prescription Drug Monitoring Program

PDSI: Palmer Drought Severity Index

PEMA: Pennsylvania Emergency Management Agency

PennDOT: Pennsylvania Department of Transportation

PHMSA: Pipeline and Hazardous Materials Safety Administration

PISC: Pennsylvania Invasive Species Council

POD: Points of Dispensing

PWSA: Public Water Service Area

RF: Risk Factor

SARA: Superfund Amendments and Reauthorization Act

SFHA: Special Flood Hazard Area

TRI: Toxic Release Inventory

UCC: Uniform Construction Code

US HHS: United States Department of Health and Human Services

USACE: Untied States Army Corp of Engineers

USDA: United States Department of Agriculture

USDA FS: United States Department of Agriculture Forest Service

USGS: United States Geological Survey

WL: Working Level

WMD: Weapon of Mass Destruction

WUI: Wildland Urban Interface

Executive Summary

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

In 2021, the Cameron County Office of Emergency Services contracted the services of a consulting agency to revise and update the Cameron County Hazard Mitigation Plan. The plan was successfully updated in accordance with the requirements set forth by PEMA and FEMA. The updated Cameron County Hazard Mitigation Plan was adopted by the Cameron County Commissioners in 2022. All seven municipalities adopted the 2017 Cameron County Hazard Mitigation Plan as the municipal hazard mitigation plan, and it is anticipated that all participating municipalities will adopt the 2022 Cameron County Hazard Mitigation Plan Update.

The Cameron County Commissioners secured a grant to complete the 2022 update to the Cameron County Hazard Mitigation Plan. MCM Consulting Group, Inc. was hired to assist the county with the update of the plan. The planning kick-off meeting was conducted on June 10th, 2021.

The planning process for the 2022 Cameron County Hazard Mitigation Plan Update consisted of the following:

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

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

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

Natural Hazards:

- Drought
- Earthquake
- Extreme Temperature
- Flooding, Flash Flooding, and Ice Jam Flooding
- Hurricane / Tropical Storm
- Invasive Species
- Landslides
- Pandemic and Infectious Disease
- Radon Exposure
- Subsidence and Sinkholes
- Tornadoes and Windstorms
- Wildfire
- Winter Storm

Human Caused Hazards:

- Blighted Properties
- Civil Disturbance
- Dam and Levee Failure
- Disorientation
- Environmental Hazards
- Opioid Epidemic
- Structure Fire
- Terrorism/Cyber-Terrorism
- Transportation Accidents
- Utility Interruptions

A total of twenty-three hazards have been identified in the 2022 Cameron County Hazard Mitigation Plan. A total of twenty-one hazards were listed in the previous 2017 plan update. The two new hazards for the 2022 plan are blighted properties and opioid epidemic.

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

- Reduce potential injury/death and damage to existing community assets due to floods, flash floods, and ice jams.

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

Mitigation actions are specific projects and activities that help achieve goals. A total of thirty-one actions were developed for this plan update as they pertain to hazards identified by the local planning team. The 2017 Cameron County Hazard Mitigation Plan consisted of twenty-one total actions. The individual objectives and actions that will be implemented are shown in Section 6.4. Each municipality was provided the opportunity to submit new project opportunity forms for this update. A total of eleven project opportunity forms were submitted during the 2017 HMP update. Municipalities were asked to indicate the current status of these projects submitted in 2017, of which zero indicated any completed projects. A total of fourteen project opportunities were submitted for this plan update.

The 2022 Cameron County Hazard Mitigation Plan is the cornerstone to reducing Cameron County's vulnerability to disasters. It is the commitment to reducing risks from hazards and serves as a guide for decision makers as they commit resources to reducing the effects of hazards. Hazard mitigation is the only phase of emergency management specifically dedicated to breaking the cycle of damage, reconstruction, and repeated damage.

The 2022 Cameron County Hazard Mitigation Plan is a living document that reflects ongoing hazard mitigation activities and requires monitoring, evaluating, and updating to ensure the mitigation actions are implemented. To facilitate the hazard mitigation planning process and adhere to regulatory requirements, the plan will be reviewed annually, and any major revisions will be incorporated into the five-year update.

1. Introduction

1.1. Background

The Cameron County Board of Commissioners in response to the Disaster Mitigation Act of 2000 (DMA 2000), organized a countywide hazard mitigation planning effort to prepare, adopt, and implement a multi-jurisdictional Hazard Mitigation Plan (HMP) for Cameron County and all of its seven municipalities. Cameron County Office of Emergency Services was charged by the County Board of Commissioners to prepare the 2022 plan. The 2017 HMP has been utilized and maintained during the five-year life cycle.

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

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

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

1.2. Purpose

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

- Protect life, safety, and property by reducing the potential for future damages and economic losses that result from hazards.
- Qualify for additional grant funding in both pre-disaster and post-disaster environment.
- Speed recovery and redevelopment following future disaster events.

- Demonstrate a firm local commitment to hazard mitigation principles.
- Comply with both state and federal legislative requirements for local hazard mitigation plans.

1.3. Scope

This Cameron County Multi-Jurisdictional Hazard Mitigation Plan serves as a framework for saving lives, protecting assets, and preserving the economic viability of the seven municipalities in Cameron County. The HMP outlines actions designed to address and reduce the impact of a full range of natural hazards facing Cameron County, including drought, earthquakes, flooding, tornadoes, hurricane/tropical storms, and severe winter weather. Human-caused hazards such as transportation accidents, dam and levee failures, hazardous material spills, and fires are also addressed.

A multi-jurisdictional planning approach was utilized for the Cameron County HMP update, thereby eliminating the need for each municipality to develop its own approach to hazard mitigation and its own planning document. Further, this type of planning effort results in a common understanding of the hazard vulnerabilities throughout the county, a comprehensive list of mitigation projects, common mitigation goals and objectives, and an evaluation of a broad capabilities assessment examining policies and regulations throughout the county and its municipalities.

1.4. Authority and References

Authority for this plan originates from the following federal sources:

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

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

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

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

- FEMA 386-1: Getting Started, September 2002

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

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

- PEMA: Hazard Mitigation Planning Made Easy!
- PEMA Mitigation Ideas: Potential Mitigation Measures by Hazard Type: A Mitigation Planning Tool for Communities. March 6, 2009
- PEMA: All-Hazard Mitigation Standard Operating Guide, 2020.

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

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

2. Community Profile

2.1. Geography and the Environment

Cameron County covers approximately 397 square miles and is located in the north-central portion of Pennsylvania. Located in the Allegheny Highlands of the northern Appalachian Mountains within the western Susquehanna River Valley, it is one of the smallest and least populous counties within Pennsylvania. It is bordered by McKean County and Potter County to the north, Elk County to the west, Clearfield County to the South, and Clinton County to the east.

The terrain includes areas of wooded hills with sharp ridge lines and small plateaus, narrow valleys, and winding streams. Elevations range from 760 feet above sea level along the Sinnemahoning Creek at the Cameron County / Clinton County line, to 2,380 feet above sea level along the eastern continental divide between the left branch of Eighteen Hollow and Havens Brook in the northern part of the county. The major waterway in Cameron County is the Sinnemahoning Creek. The Sinnemahoning Creek Basin empties into the Susquehanna River, which in turn drains into the Chesapeake Bay. This creek basin creates a broad spectrum of recreational opportunities, natural habitats, and scenic views. The major branches are Driftwood, First Fork Branch, and the Bennett Branch. The Driftwood Branch provides a large amount of fishing opportunities in the local area. A portion of the Driftwood Branch is designated by the Pennsylvania Fish and Boat Commission as a Delayed Harvest Fly Fishing Only Area. In addition to the Sinnemahoning, the many streams and creeks of Cameron County sustain wildlife and provide for many recreational activities such as fishing, canoeing, and hiking.

The major water features located in Cameron County are:

- Sinnemahoning Creek
- First Fork Branch (Sinnemahoning Creek)
- Driftwood Branch (Sinnemahoning Creek)
- Bennett Branch (Sinnemahoning Creek)
- West Creek
- Sinnemahoning Portage Creek
- George B. Stevenson Reservoir

There are 288 small watersheds and three large watersheds in Cameron County. The largest watershed is the Sinnemahoning watershed. *Figure 4 - Cameron County Watersheds* illustrates the watersheds within the county.

The Köppen-Geiger Climate Areas map classifies Cameron County and the rest of Pennsylvania as Humid Continental (See *Figure 2 – Köppen-Geiger Climate Map*). While the counties of Pennsylvania share many weather similarities, there are also a few unique characteristics to the area.

Of the county's 254,208 acres, 130,800 acres are State Forest land. The forests of Cameron County are mature northern hardwoods, large thickets to mountain laurel, areas of second-growth timber and clear cuts, isolated stands of pine and hemlock, and a few herbaceous openings.

Wildlife inhabiting the county is typical for the mix of land uses. Songbirds and small mammals, such as skunk, raccoon, porcupine, woodchuck, rabbit, squirrel, and moles are frequently observed in their natural habitat. Mink and kingfishers can also be observed along the creek, along with heron, mallards, hawks, turkey, grouse, fox, white-tailed deer, elk, and bear. Poisonous snakes, including the Timber Rattlesnake and the Copperhead, can be encountered on hiking and biking trails within the county. The large variety of wildlife is a draw for tourists in Cameron County during the summer and fall months. Hunting is a draw in the winter.

2.2. Community Facts

Cameron County was established from portions of Clinton, Elk, McKean, and Potter counties on March 29th, 1860. The county is named for United States Senator Simon Cameron, a representative from Pennsylvania from 1845 until 1865.

Cameron County is rural in character. The core communities of Cameron County are Emporium Borough and Shippen Township. Emporium Borough is the county seat and the most populous urban area in the county. Emporium Borough also contains the largest concentration of business and residential investment in Cameron County. Shippen Township, which is located just outside of Emporium Borough, is primarily residential in nature but also includes a broad mix of business development. The majority of manufacturing in Cameron County is located in Emporium Borough and can be broken down into two major types of businesses. The two types of manufacturing are machine shops, including tool and die shops, and sintered metals, also known as the powder metal sector. Located in a region with one of the world's best hardwood stands, there is also logging, lumber, and furniture manufacturing firms in Cameron County. Tourism is a large draw for Cameron County. Tourism is large in the summer when wildlife is active, and the creeks are a large draw for kayaking and canoeing. Hiking and biking is also a popular pastime for tourists in Cameron County. Tourism is not limited to the summer months in Cameron County. There are many seasonal hunting camps that see a majority of use in the winter months for the hunting season in the Commonwealth. There are no institutions of higher learning in Cameron County.

As of August 2021, Cameron County has 2,000 people in the civilian labor force, with 1,800 employed. There was an unemployment rate of 6.9% at the time of the previous plan in 2017. The COVID-19 pandemic increased the unemployment rate in Cameron County, the Commonwealth of Pennsylvania, and the United States of America. The peak unemployment rate for Cameron County came during the COVID-19 pandemic when 27.9% of the population of the county was unemployed during the spring months of 2020. This can be contributed to the temporary closing of businesses, including bars and restaurants, and cutbacks at companies in their workforce. The most impacted industries during the downturn of the economy during the COVID-19 pandemic were the service industries, i.e., retail, food service, tourism, and entertainment. The most recent data provided from the state shows the unemployment percentage for Cameron County at 7.3% for the month of July 2021. The minimum unemployment percentage in the last ten years was 4.8% in Cameron County. The tourist industry that is the major source of income for the county was significantly impacted by travel restrictions and social distancing regulations brought about by the pandemic. These measures have proven essential to stop the spread of COVID-19 but have also severely hurt the industries and businesses that rely upon tourists. *Table 1 – Top Employers in Cameron County* illustrates the top fifty employers of the workforce of Cameron County based on 2021 data.

Table 1 - Top Employer in Cameron County

Cameron County Top 50 Employers			
Rank	**Name of Employer**	**Rank**	**Name of Employer**
1	GKN Sinter Metals LLC	26	Cameron County Ambulance Services LLC
2	Cameron County School District	27	Emporium Borough
3	Emporium Hardwoods	28	Emporium Powdered Metals Inc.
4	State Government	29	Superior Tooling Technologies
5	Embassy Powdered Metals Inc.	30	Buttonwood Restaurant
6	Wabtec US Rail Inc.	31	Lumber Township
7	Guy and Mary Felt Manor	32	Shippen Township
8	Cameron County Commissioners	33	Cameron County Vets Club
9	Keystone Rural Health Consortia Inc.	34	Federal Government
10	Kepple Industries Incorporated	35	JSH Enterprises Inc.
11	Teutech LLC	36	Christabelle Club Inc.
12	Northern Tier Community Action Corp	37	Emporium Forging Inc.
13	PSM BrownCo	38	St. Marks Church
14	Sheetz Inc.	39	Tubby’s Tavern
15	Emporium Food Store LLC	40	The Willows Bar
16	Lewis & Hockenberry Inc.	41	Emporium Moose Lodge
17	STA of Pennsylvania Inc.	42	Emporium Secondaries Inc.
18	Gerg Tool & Die Inc.	43	Onix II Inc.
19	Pizza Palace Plus	44	Sinnemahoning Sportsmen’s Club
20	Seneca Highlands Intermediate Unit	45	Dolgencorp LLC
21	Caldwell Corporation	46	Northwest Bank
22	Fox’s Pizza Den	47	Pratts East End Beverage LLC
23	Rite Aid of Pennsylvania Inc.	48	Smokers Logging Inc.
24	Cabin Kitchen	49	United Refining Company of PA
25	Keystone Automatic Technologies Inc.	50	B & R Tool & Die Inc.
Source: Department of Labor & Industry, 2021			

2.3. Population and Demographics

Cameron County recorded a population of 5,085 during the 2010 U.S. Census, ranking the county in sixty-seventh out of Pennsylvania's sixty-seven counties. This is a decrease of 889 residents from the 2000 U.S. Census, which was 5,974: and a drop from sixty-sixth position in 2000. Cameron County recorded an estimated population based on trends of 4,611 people in 2019. Population change demographics can be found in *Table 2 – Municipal Population Data*.

From 1990 to 2000, Census figures show a one percent increase in population, making Cameron County the twenty-sixth slowest growing county during that timeframe. The county's population density in 2010 was approximately twelve people per square mile. The population estimate for 2015 was 4,732 persons. *Figure 5 – Cameron County Population Density* illustrates areas of the county that have a high population density. These areas are around Emporium Borough and Driftwood Borough in Cameron County.

With a land area of 397.5 square miles, Cameron county is the second smallest county in Pennsylvania. The county has five townships and two boroughs.

These municipalities are:

- Driftwood Borough
- Emporium Borough
- Gibson Township
- Grove Township
- Lumber Township
- Portage Township
- Shippen Township

Shippen Township is the largest township in square miles and has the largest population for the county with 2,232 people. Emporium Borough, the county seat, is the second most densely populated area of the county with 2,073 people and it is the smallest in terms of square miles. *Table 2 – Municipal Population Data* provides a distribution of county population per municipality obtained from the United States Census Bureau, Population Estimates Program. This table also depicts the population change for each municipality from the past two released U.S. Census. Unless otherwise indicated, the 2019 population estimates are used for various assessments throughout this hazard mitigation plan update.

Table 2 – Municipal Population Data

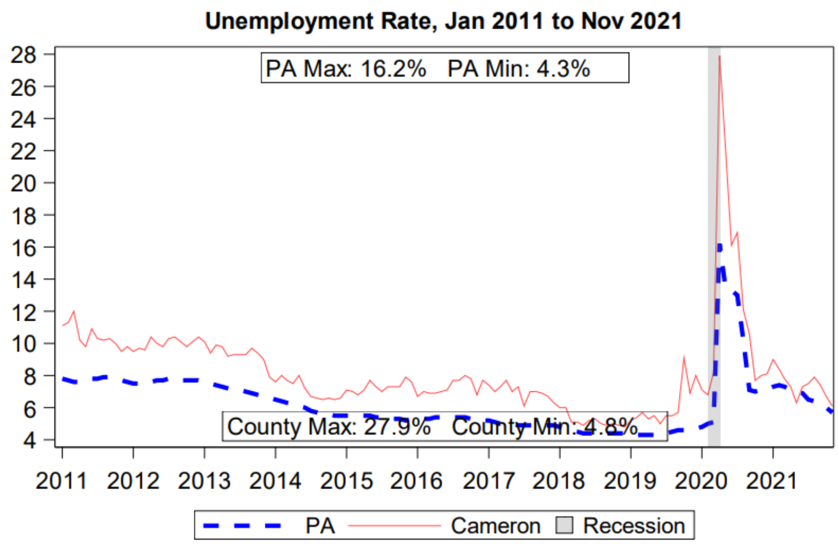
Municipal Population Data					
Municipality	**Square Miles**	**Acreage**	**2000 Population**	**2010 Population**	**2019 Population**
Driftwood Borough	1.8	1,152	103	67	32
Emporium Borough	0.7	448	2,526	2,073	2,056
Gibson Township	94.5	60,480	222	164	137
Grove Township	73.5	47,040	129	183	141
Lumber Township	51.4	32,896	241	195	131
Portage Township	18.1	11,584	258	171	149
Shippen Township	157.2	100,608	2,495	2,232	1,965
Total:	**397.5**	**254,208**	**5,974**	**5,085**	**4,611**
Source: United States Census Bureau, 2000, 2010, 2019					

The median household income in Cameron County is $41,157. This is approximately $12,000 less than the national median income (U.S. Census, 2014). Based on 2019 estimates of Cameron County, 15.3% of the Cameron County population lived in poverty; 27.4% of related children under eighteen are below the poverty line, compared with 8.3% of people sixty-five years or older.

According to the 2010 census, the population for the entire United States grew at a faster rate in the older ages than in the younger ages. During the 2000 census the median age of the population of Cameron County was 42.3 years old with 24.5% of the population under the age of eighteen years old and 19.8% aged sixty-five years old or older. The median age in Cameron County based off of 2019 estimates is fifty-two years old. This is almost twelve years higher than the Pennsylvania median age of 40.8 years old. The vast majority (83.4%) of Cameron County is between the ages of eighteen and sixty-five.

Based on 2019 estimates from the United States Census Bureau there are a total of 4,429 housing units in Cameron County. This is a decrease of twenty-six housing units from the 2010 Census number of 4,455 housing units. In 2000 Census 74% percent of the 4,592 housing units in the county were single-unit, owner-occupied structures. The percentage of housing units that were vacant or unoccupied in Cameron County (including seasonal units) was 46% of the total. 98% of the county's population is White, 0.4% is Black or African American, 0.6% is Hispanic, and 0.1% is Asian (U.S. Census, 2009). There are two assisted rental housing units in Cameron County, Maple Street Apartments and Emporium Arms. The rental housing units totaled 107 units, of which 98.1% are assisted elderly units and 1.9% are assisted special needs units.

Figure 1 - Unemployment Rate Jan. 2011 to Nov. 2021



2.4. Land Use and Development

The majority of Cameron County's total land area is undeveloped and is largely devoted to forestland and some agricultural uses. Most of Cameron County is devoted to either state forest or state game lands. A substantial part of the Elk State Forest lies within Cameron County's boundary. This 200,0000-acre forest, also partially situated in Elk County, is available for primitive camping, licensed hunting and fishing, and other recreational pursuits. Bucktail State Park Natural Area is also located in Cameron County.

There is approximately 473 acres of land dedicated to general farming according to the Cameron County Comprehensive Plan – 2009. The county's total of twenty-six farms in the second smallest number of farms among Pennsylvania's counties. The average size of a farm in Cameron County is 143 acres. The small acreage of land use dedicated to general farming is due to the rugged terrain of much of the county's land. Due to the rugged terrain, there is approximately 240,000 acres of wooded land. Development constraints of floodplains and wetlands also make up the acreage of wooded areas within the county.

There are approximately 109 miles of state-maintained roads in the county. Cameron County is one of nine counties located in PennDOT Engineering District 2-0. State Route 120 is the major highway artery in Cameron Count and connects Cameron County to the Borough of Renovo located in Clinton County and the City of St. Marys in Elk County. State Route 46 provides access to Smethport, the county seat of McKean County, to the north. State Route 120 is the only transportation corridor in the county that attracts major commercial and economic development.

Development along State Route 120 is occurring at a moderate pace and has resulted in minimal agricultural land conversion. A map of the county is provided in *Figure 6 – Cameron County Land Cover*. Cameron County also has forty-three linear miles that are maintained by other state and federal agencies. Along with that additional state and federal mileage Cameron County has 124 miles that are maintained by local municipalities and local governments.

According to the Cameron County Comprehensive Plan – 2009, single-family residential land use comprised of approximately 1,309 acres, multi-family residential dwellings (to include apartment buildings and duplexes) represented approximately thirteen acres, and seasonal residential housing units represented approximately 1,641 acres. The 2019 Cameron County Comprehensive Plan does not list total acreage for single-family homes or residential housing. Seasonal housing units represented the largest residential land use due to seasonal hunting camps and recreational opportunities.

Commercial and industrial land uses represented 118 acres and 125 acres respectfully in the Cameron County Comprehensive Plan – 2009. Commercial and industrial activities occur primarily in Emporium Borough and Shippen Township

Public and semi-public land use in Cameron County includes Elk State Forest, covering approximately 137,848 acres and State Game Land #14, which covers approximately 14,228 acres of land in Shippen Township. Public land use is classified as governmental function reserved for public use (i.e., state game lands, state forests, borough halls, county courthouses, fire houses, post offices, and schools). Semi-public are lands developed by a limited group of people for their own use (i.e., churches, private schools, and cemeteries). Portions of Sinnemahoning State Park (Grove Township) and Sizerville State Park (Portage Township) are located on 1,567 acres. The Lyme Timber Sterling Run Tract is an area of land owned by the state due to a conservation easement for public assess and recreation rights. The Lyme Timber Sterling Run Tract is approximately 9,150 acres and is also working commercial forestland.

Cameron County has approximately 112 acres dedicated to recreational land use. The only are classified as recreational in the county is the Emporium Country Club golf course. *Figure 6 – Cameron County Land Cover* illustrates the extent of different land cover values in Cameron County. *Figure 7 – Cameron County Recreational Opportunities* shows potential recreational areas including but not limited to state parks, state game lands, and state forest.

2.5. Data Sources

This community profile and the entire hazard mitigation rely upon a large number of sources for information, data, and vulnerability information. The list of sources included below is comprehensive and lists governmental resources at the local, state, and federal level.

- Cameron County 2019 Comprehensive Plan
- Cameron County 2019 Commodity Flow Study

- Cameron County Corvena Knowledge CenterTM
- National Oceanic and Atmospheric Administration (NOAA), NOAA National Centers for Environmental Information (NCEI) Storm Events Database
- United States Department of Agriculture (USDA) Census
- United States Geological Survey (USGS)
- United States Environmental Protection Agency (EPA) Hazardous Materials
- United States Environmental Protection Agency (EPA) Geospatial Data
- United States Department of Labor and Industry (DLI) Center for Workforce Information and Analysis
- Pennsylvania Department of Conservation and Natural Resources (DCNR)
- Pennsylvania Ground Water Information System (PaGWIS)
- Center for Disease Control and Prevention (CDC)
- United States Army Corp of Engineers (USACE) National Inventory of Dams
- United States Army Corp of Engineers (USACE) Levee Inventory
- Pennsylvania Spatial Data Access (PASDA)
- Pennsylvania Emergency Management Agency (PEMA)

Geographic Information Systems (GIS) Data

GIS data was utilized in the risk assessment, estimation of loss, and the development of map products for the hazard mitigation plan update. A core foundation of data was available from the Cameron County GIS data already in use by the county. Some data was downloaded from the Pennsylvania Spatial Data Access (PASDA) and utilized for map creation.

HAZUS calculations were based on depth grid analysis through the FEMA HAZUS-MH software. These loss estimations were completed as part of the HAZUS scenario processing and represent both the above-mentioned FEMA depth grids and the general building stock information from FEMA's general building stock.

The following is a list of existing GIS data that was utilized in the plan update process and a list of new GIS data that was developed to complete the 2022 hazard mitigation plan update:

Existing Cameron County GIS Data Used:

- Site Structure Address Points
- Road Centerlines
- Municipality Boundaries
- Fire Stations, Police Stations, and EMS Stations

New GIS Data Developed and Used for Planning Process:

- Cameron County Airports

- Cameron County Blighted Properties
- Cameron County Dam Inventory
- Cameron County Land Use
- Cameron County Levee Inventory
- Cameron County Well Information (Domestic Wells)
- Conventional Oil and Gas Wells
- Critical Infrastructure Facilities
- Gas Stations
- Large Historic Streams
- Mobile Home Data
- Public Water Supply Area
- Tornado Paths
- Traffic Information (Average Daily Traffic)
- Unconventional Oil and Gas Wells

Data Limitations:

There were very few data limitations during the 2022 Cameron County Hazard Mitigation Plan Update process. The most significant data limitation was the lack of some historical data for previous storm events within the Commonwealth of Pennsylvania. Many of the counties within Pennsylvania are moving to a new web-based emergency incident software platform and away from previously used sources. This has resulted in some counties, such as Cameron County, that have a gap in previous occurrence data for hazards such as flooding, flash flooding, urban fire, and winter storm.

Another large data limitation that affected the planning process was the limitations of the 2020 Census. A large portion of the plan utilizes census data from the United States Census Bureau, but the 2020 census was interrupted by the COVID-19 pandemic in 2020 and 2021. The 2020 census was delayed, and the information received during the census was spread out due to social distancing and the limiting of field workers and census takers going door to door to gather information. This limitation was out of the control of the planning team during the planning process, but all possible information that was available at the time of writing were included in the plan.

The following maps provide a comprehensive understanding of Cameron County and display specific information about the county.

Figure 2 - Köppen-Geiger Climate Map

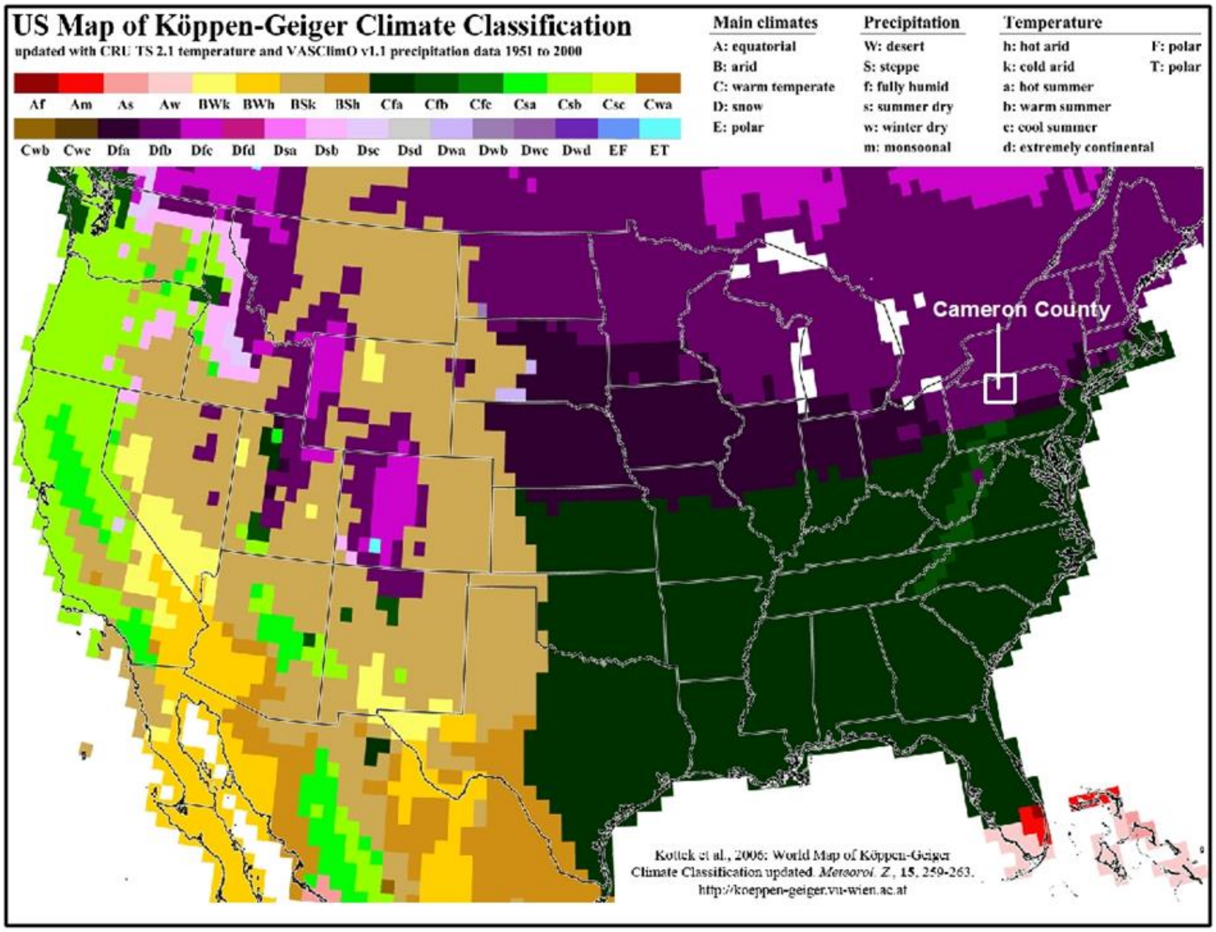


Figure 3 - Cameron County Base Map

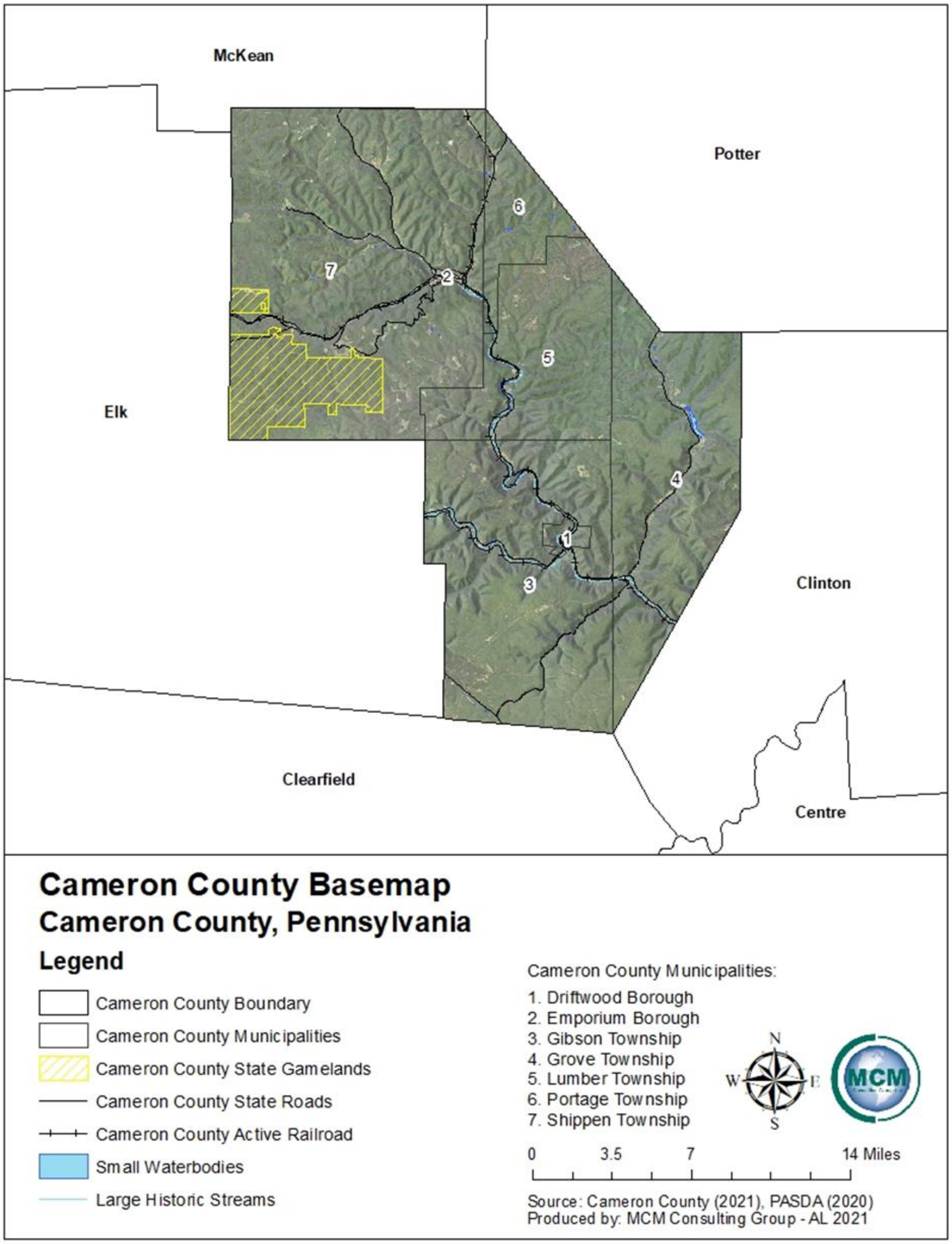


Figure 4 - Cameron County Watersheds

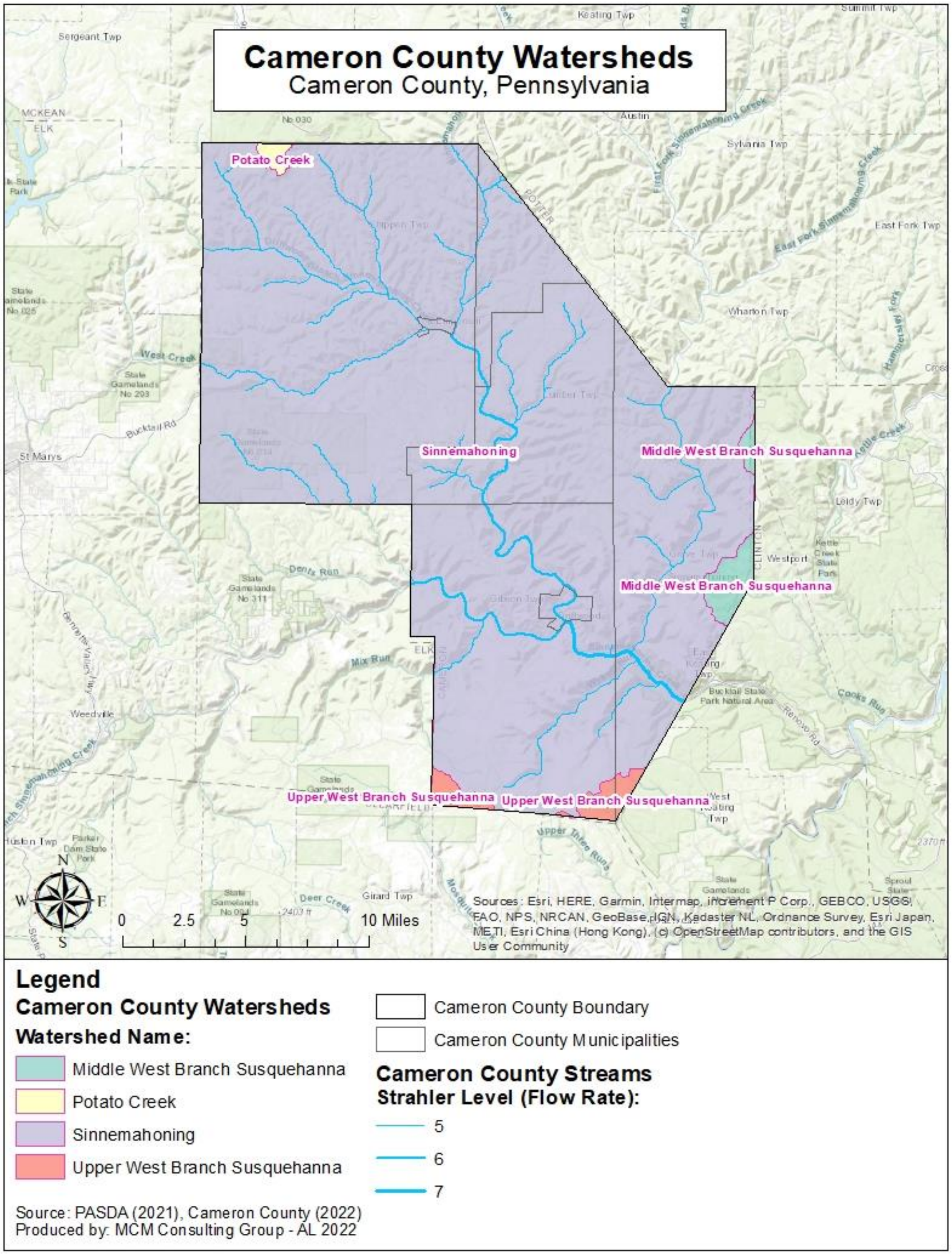


Figure 5 - Cameron County Population Density

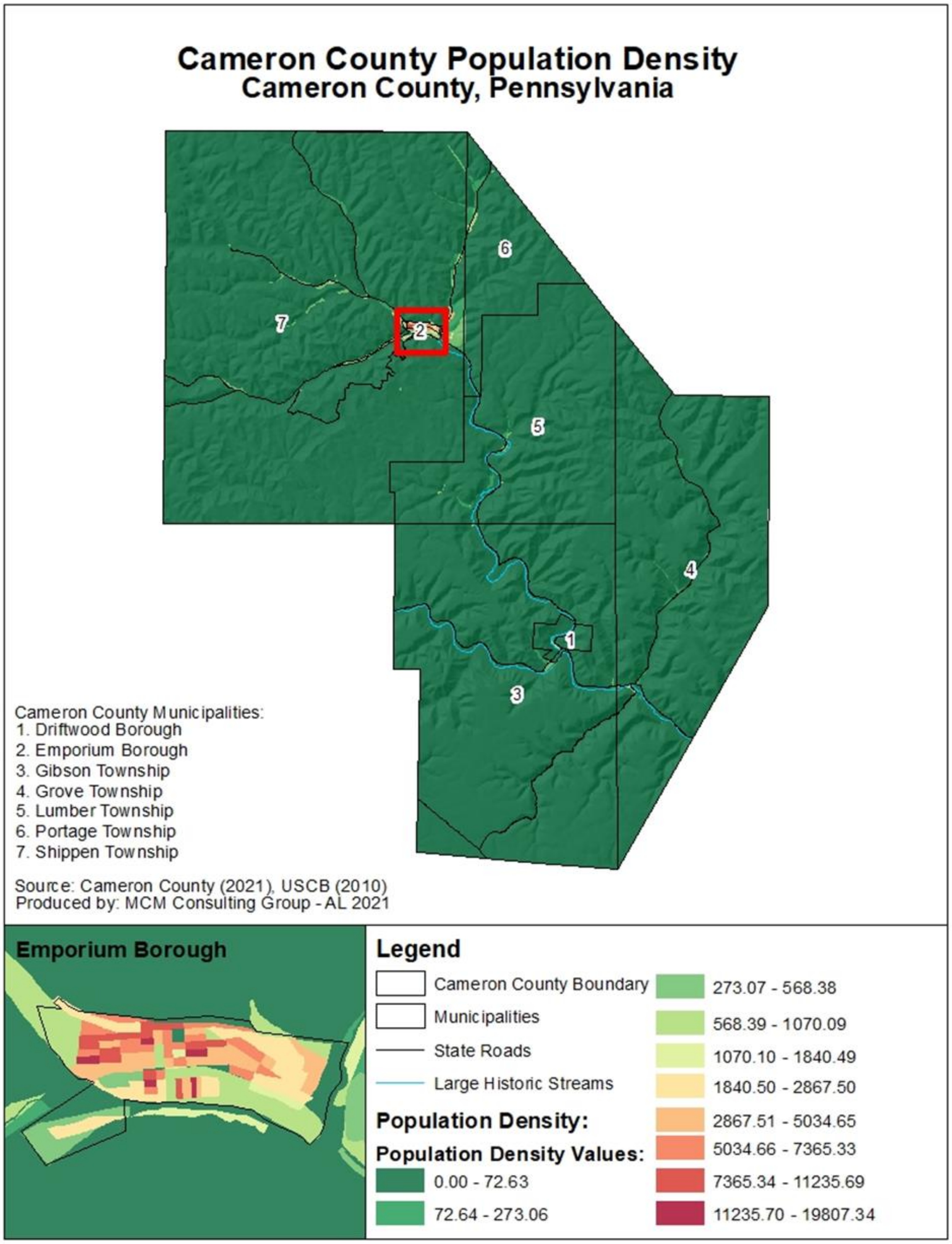


Figure 6 - Cameron County Land Cover

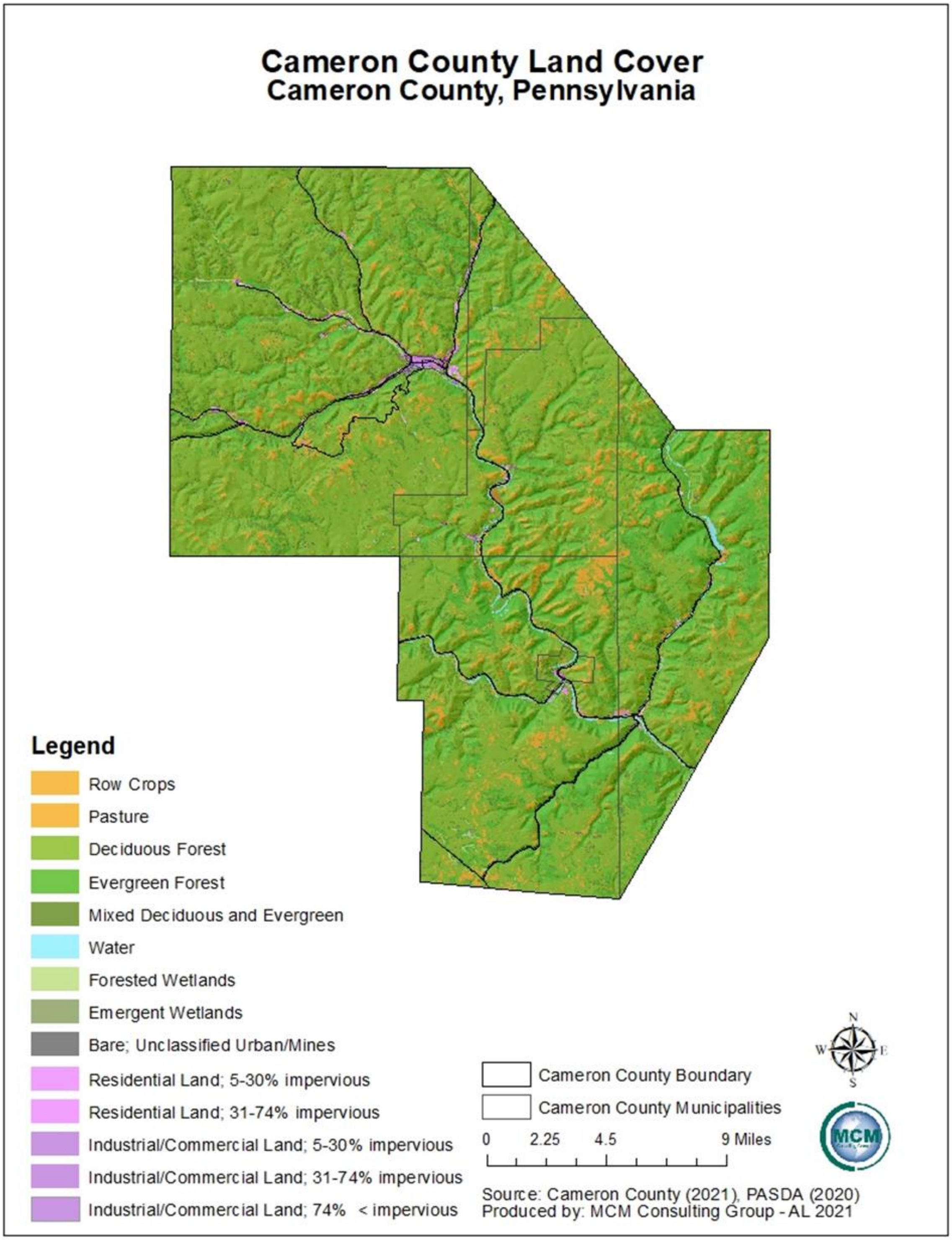
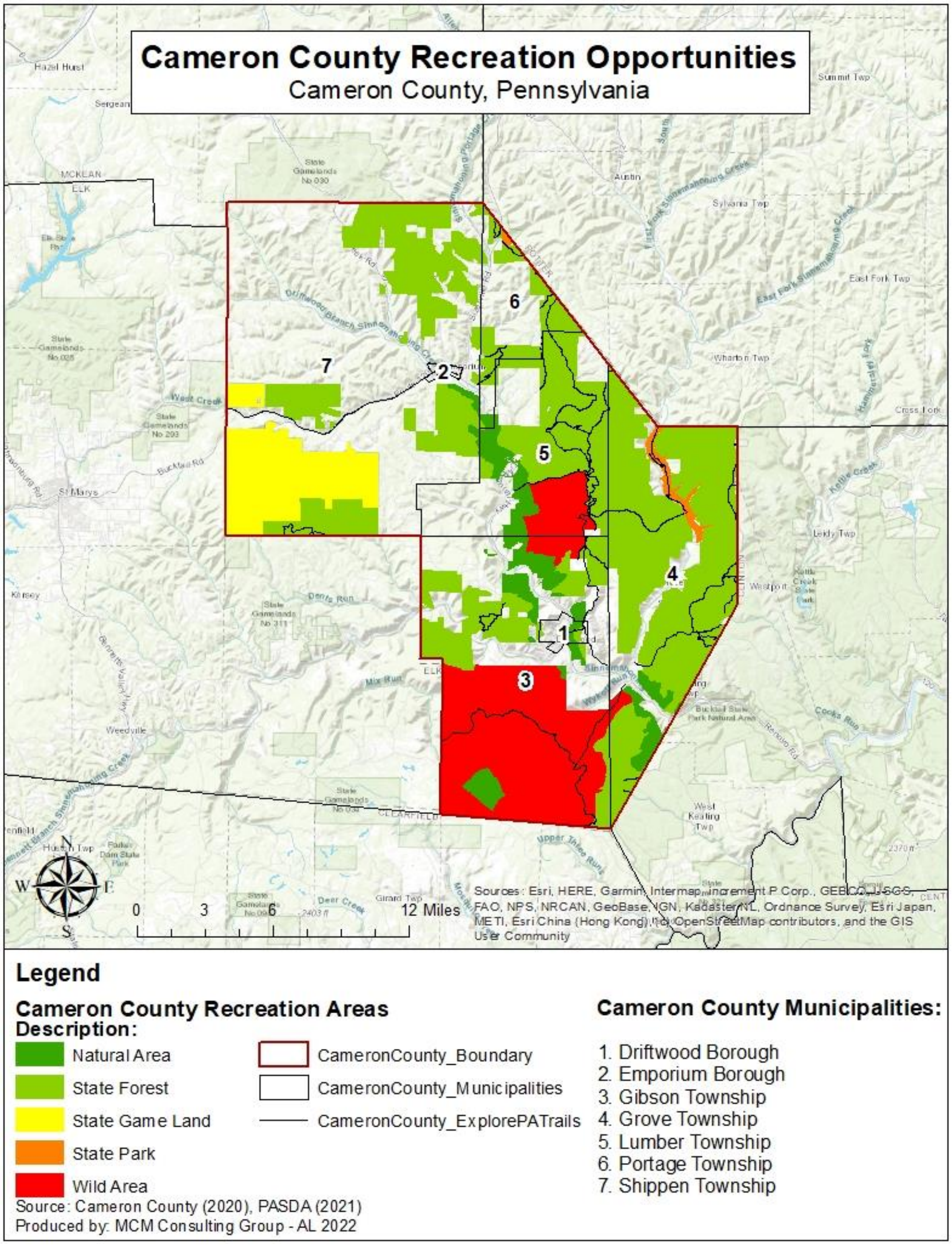


Figure 7 - Cameron County Recreational Opportunities



3. Planning Process

3.1. Update Process and Participation Summary

The Cameron County Hazard Mitigation Plan update began June 10, 2021. The Cameron County Commissioners were able to secure a hazard mitigation grant to start the process. The Cameron County Emergency Management Agency was identified as the lead agency for the Cameron County Hazard Mitigation Plan update. The planning process involved a variety of key decision makers and stakeholders within Cameron County. Cameron County immediately determined that the utilization of a contracted consulting agency would be necessary to assist with the plan update process. MCM Consulting Group, Inc. was selected as the contracted consulting agency to complete the update of the hazard mitigation plan. The core hazard mitigation team, which was referred to as the steering committee, included officials from Cameron County Emergency Management Agency, Cameron County Commissioners, and MCM Consulting Group, Inc. (MCM).

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

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

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

The HMP planning process consisted of:

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

The 2022 Cameron County HMP was completed in June, 2022. The 2022 plan follows an outline developed by PEMA which provides a standardized format for all local HMPs in the Commonwealth of Pennsylvania. The 2022 HMP is consistent with the PEMA recommended format. The 2022 Cameron County HMP has additional hazard profiles that were added to the HMP, and these additional profiles increased the subsections in section 4.3 of the HMP.

3.2. The Planning Team

The 2022 Cameron County Hazard Mitigation Plan update was led by the Cameron County Steering Committee. The Cameron County Steering Committee provided guidance and leadership for the overall project. The steering committee assisted MCM Consulting Group, Inc. with dissemination of information and administrative tasks. *Table 3 – Steering Committee* outlines the individuals that comprised this team.

Table 3 - Steering Committee

Cameron County Hazard Mitigation Plan Update Steering Committee		
Name	**Organization**	**Position**
Adam Johnson	Cameron County Office of Emergency Services	Director
Laura Narby	Cameron County Office of Emergency Services	Deputy Director
Michael Rearick	MCM Consulting Group, Inc.	Senior Consultant
Adam Leister	MCM Consulting Group, Inc.	Consultant

In order to represent the county, the Cameron County Steering Committee developed a diversified list of potential local planning team (LPT) members. Members that participated in the 2017 hazard mitigation plan were highly encouraged to join the 2022 team. The steering committee then provided invitations to the prospective members and provided a description of duties to serve on the LPT. The invitations for members of the LPT were disseminated by the Cameron County Emergency Management Agency utilizing letters, email, and telephone calls. The LPT worked throughout the process to plan and hold meetings, collect information, and conduct public outreach.

The stakeholders listed in *Table 4 – Local Planning Team* served on the 2022 Cameron County Hazard Mitigation Local Planning Team, actively participated in the planning process by attending meetings, completing assessments, surveys, and worksheets and/or submitting comments.

Table 4 - Local Planning Team

Cameron County Hazard Mitigation Plan Local Planning Team		
Name	**Organization**	**Position**
Brandie Sherry	Driftwood Borough/Grove Township	Elected or Appointed Official
Donald Reed	Emporium Borough	Elected or Appointed Official
Scott Strayer	Gibson Township	Elected or Appointed Official
Ed Uzdale	Lumbar Township	Elected or Appointed Official
Paul Gabor	Portage Township	Elected or Appointed Official
Brandy Ferraro	Shippen Township	Elected or Appointed Official
Craig Hudson	Shippen Township	Elected or Appointed Official
Adam Johnson	Cameron County Office of Emergency Services	Director
Cliff Clark	Cameron County IDA/Planning Commission	Director
James Moate	Cameron County Commissioners	Commissioner
Jim Zoschg	Cameron County Conservation District	Conservation Resource Technician
Laura Narby	Cameron County Office of Emergency Services	Deputy Director
Lori Reed	Cameron County Commissioners	Commissioner
Matt Streich	PA DCNR / Sinnemahoning State Park	Elected or Appointed Official
Tina Solak	Cameron County Chamber of Commerce	Elected or Appointed Official
Vincent Hornung	Mountaineer Search and Rescue	Elected or Appointed Official

3.3. Meetings and Documentation

Meetings with local elected officials and the local planning team were held as needed. At each of the meetings, municipal officials were strongly encouraged to submit hazard mitigation project opportunity forms, complete their respective portions of the capability assessment, review and eventually adopt the multi-jurisdictional HMP. *Table 5 – HMP Process Timeline* lists the meetings held during the HMP planning process, which organizations and municipalities attended and the topic that was discussed at each meeting. All meeting agendas, sign-in sheets, presentation slides, and other documentation is in Appendix C.

The draft plan was made available for public review on January 26, 2022. The draft was advertised on Cameron County's social media page and was made available digitally on the Cameron County website at: https://www.cameroncountypa.com/index.php

The public comment period remained open until February 23, 2022. All public comments were submitted via an online survey or in writing to Adam Johnson at the Cameron County Office of Emergency Services. No public comments were received during the public comment period. Therefore, no public comments were included in Appendix C of this hazard mitigation plan update.

Table 5 - HMP Process Timeline

Cameron County HMP Process Timeline		
Date	**Meeting**	**Description**
06/10/2021	Cameron County Hazard Mitigation Plan (HMP) Kick-off Meeting	Identified challenges and opportunities as they relate to fulfilling the DMA 2000 requirements. Identified existing studies and information sources relevant to the hazard mitigation plan. Identified stakeholders, including the need to involve local officials. Presentation on hazard identification and capability assessment worksheets.
08/19/2021	Municipal kick-off meeting	Defined hazard mitigation planning and identified roles and responsibilities. Discussed the 2017 hazard mitigation plan and defined a timeline to complete the 2022 update.
08/19/2021	Local Planning Team Meeting – Selection of New Hazards	Select hazards for the 2022 hazard mitigation plan.
10/06/2021	Local Planning Team Meeting – 2017 Mitigation Strategy Review	Cameron County Local Planning Team met in-person to discuss and review the 2017 Mitigation Goals, Objectives, and Actions.

Cameron County HMP Process Timeline		
Date	**Meeting**	**Description**
11/03/2021	Local Planning Team Meeting – 2022 Mitigation Goals and Objectives	Cameron County Local Planning Team met in-person to discuss and develop 2022 Mitigation Strategy Goals and Objectives.
11/03/2021	Risk Assessment Public Meeting	A public meeting was held at the Emporium Borough building to go over the 2022 Risk Assessment Section. A recorded presentation was made at a later date for viewing.
11/17/2021	Steering Committee Meeting – 2022 Mitigation Action Plan Draft Review	Cameron County Steering Committee met via Microsoft Teams to discuss the finalization of the 2022 goals, objectives, and actions for mitigation strategy development.
01/26/2022	Local Planning Team meeting – Draft Plan review	Cameron County Local Planning Team was given the Draft Hazard Mitigation plan for review. All were invited to submit any changes to the document.
01/26/2022 – 02/23/2022	Cameron County Hazard Mitigation Plan – Draft Plan public review	The draft HMP presentation was held in-person, and via Zoom. The presentation was also made available in digital format. All members of the public were invited to submit any comments via an online survey or provide comments to the Cameron County Office of Emergency Services.

3.4. Public and Stakeholder Participation

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

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

1. Risk Assessment Hazard Identification and Risk Evaluation Worksheet: Capitalizes on local knowledge to evaluate the change in the frequency of occurrence, magnitude, or impact and/or geographic extent of existing hazards and allows communities to evaluate hazards not previously profiled using the Pennsylvania Standard List of Hazards.
2. Capability Assessment Survey: Collects information on local planning, regulatory, administrative, technical, fiscal, and political capabilities that can be included in the countywide mitigation strategy.
3. Municipal Project Opportunity Forms and Mitigation Actions: Copies of the 2017 mitigation opportunity forms that were included in the current HMP were provided to the municipalities for review and amendment. These opportunities are located in Appendix G. The previous mitigation actions were provided and reviewed at update meetings. New 2022 municipal project opportunity forms are included as well, located in Appendix G.

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

Cameron County invited all contiguous counties to review the 2022 draft hazard mitigation plan. A letter was sent to the emergency management coordinator in Clearfield, Clinton, Elk, McKean, and Potter counties in Pennsylvania, on February 24th, 2022. Copies of these letters are included in Appendix C Multi-Jurisdictional Planning.

3.5. Multi-Jurisdictional Planning

Cameron County used an open, public process to prepare this HMP. Meetings and letters to municipal officials were conducted to inform and educate them about hazard mitigation planning and its local requirements. Municipal officials provided information related to existing codes and ordinances, the risk and impacts of known hazards on local infrastructure and critical facilities and recommendations for related mitigation opportunities. The pinnacle to the municipal involvement process was the adoption of the final plan. *Table 6 – Worksheets, Surveys, and*

Forms Participation reflects the municipalities participation by completing worksheets, surveys, and forms

Table 6 - Worksheets, Surveys, and Forms Participation

Cameron County HMP Worksheets, Surveys, and Forms Participation				
Municipality	**Capability Assessment Survey**	**Risk Assessment Hazard Identification and Risk Evaluation Worksheet**	**NFIP**	**Hazard Mitigation Opportunity Form Review and Updates**
Driftwood Borough	X	X	X	X
Emporium Borough	X			X
Gibson Township	X	X	X	X
Grove Township	X	X	X	X
Lumber Township	X	X		X
Portage Township	X	X	X	X
Shippen Township	X	X	X	X
Cameron County	X	X	X	X

All seven of the seven municipalities within Cameron County adopted the 2017 Cameron County Hazard Mitigation Plan as the municipal hazard mitigation plan. The goal of the Cameron County Local Planning Team is to have 100 percent participation by municipalities in adopting the 2022 Cameron County Hazard Mitigation

4. Risk Assessment

4.1. Update Process Summary

A key component to reducing future losses 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 the 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 manmade hazards and describes each hazard in terms of its frequency, severity, and the impact of said hazard on the county. 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 Cameron County risk assessment provides in-depth knowledge of the hazards and vulnerabilities that affect Cameron 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 Cameron County Emergency Operations Plan (EOP), local EOPs, and other public and private emergency management plans.

The Cameron 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 over time.

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 run-off and other related factors. Therefore, limiting the risk assessment to past events is myopic and inadequate.

The Cameron County Local Planning Team reviewed and assessed the change in risk for all natural and manmade hazards identified in the 2017 hazard mitigation plan. The mitigation planning team then identified hazards that were outlined within the Pennsylvania Hazard Mitigation Plan but not included in the 2017 Cameron County Hazard Mitigation Plan that could impact Cameron County. The team utilized the Hazard Identification and Risk Evaluation worksheet that was provided by the Pennsylvania Emergency Management Agency.

The Cameron County Project Team met with municipalities and provided guidance on how to complete the municipal hazard identification and risk evaluation worksheet. All seven municipalities 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 manmade 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 Cameron County assessment data to estimate loss to particular hazards. Risk factor was then assessed to each profiled hazard 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 7 – Presidential & Gubernatorial Disaster Declarations presents a list of all Presidential and Governor’s Disaster Declarations that have affected Cameron County from 1972 through 2014, according to the Pennsylvania Emergency Management Agency.

Table 7 - Presidential and Gubernatorial Disaster Declarations and Proclamations

Presidential Disaster Declarations and Gubernatorial Declarations and Proclamations		
Date	**Hazard Event**	**Action**
September, 1955	Drought	Gubernatorial Declaration
January, 1966	Heavy Snow	Gubernatorial Declaration
February, 1972	Heavy Snow	Gubernatorial Declaration
June, 1972	Flood (Agnes)	Presidential Disaster Declaration
February, 1974	Truckers Strike	Gubernatorial Declaration
January, 1978	Heavy Snow	Gubernatorial Declaration
February, 1978	Blizzard	Gubernatorial Declaration
March, 1993	Blizzard	Presidential Emergency Declaration
January, 1994	Severe Winter Storms	Presidential Disaster Declaration
September, 1995	Drought	Gubernatorial Declaration
January, 1996	Severe Winter Storms	Presidential Disaster Declaration
January, 1996	Flooding	Presidential Disaster Declaration
July, 1999	Drought	Gubernatorial Declaration

Presidential Disaster Declarations and Gubernatorial Declarations and Proclamations		
Date	**Hazard Event**	**Action**
September, 1999	Hurricane Floyd	Presidential Disaster Declaration
December, 1999	Drought	Gubernatorial Declaration
September, 2003	Hurricane Isabel/Henri	Presidential Disaster Declaration
September, 2004	Tropical Depression Ivan	Presidential Disaster Declaration
September, 2005	Hurricane Katrina*	Presidential Emergency Declaration
September, 2005	Hurricane Katrina	Gubernatorial Proclamation of Emergency
September, 2006	Tropical Depression Ernesto	Gubernatorial Proclamation of Emergency
February, 2007	Severe Winter Storms	Gubernatorial Proclamation of Emergency
February, 2007	Waive Regulations /Commercial Drivers	Gubernatorial Proclamation of Emergency
April, 2007	Severe Storm	Gubernatorial Declaration
April, 2007	Severe Winter Storm	Gubernatorial Proclamation of Emergency
February, 2010	Severe Winter Storm	Gubernatorial Proclamation of Emergency
October, 2010	Hurricane Sandy	Presidential Emergency Declaration
January, 2011	Severe Winter Storm	Gubernatorial Proclamation of Emergency
September, 2011	Severe Storms and Flooding (Lee / Irene)	Gubernatorial Proclamation of Emergency
April, 2012	Spring Winter Storms	Gubernatorial Proclamation of Emergency
October, 2012	Hurricane Sandy	Gubernatorial Proclamation of Emergency
June, 2013	High Winds, Thunderstorms	Gubernatorial Proclamation of Emergency
February, 2014	Severe Winter Storm	Presidential Disaster Declaration
January, 2016	Severe Winter Storm	Presidential Disaster Declaration
October, 2016	Severe Storms and Flooding	Presidential Disaster Declaration
June, 2018	Severe Weather Event	Gubernatorial Proclamation of Disaster Emergency
August, 2018	Severe Storms and Flooding	Presidential Disaster Declaration

Presidential Disaster Declarations and Gubernatorial Declarations and Proclamations		
Date	**Hazard Event**	**Action**
January, 2019	Severe Weather Event	Gubernatorial Proclamation of Disaster Emergency
January, 2020	COVID-19 Pandemic	Presidential Disaster Declaration
March, 2020	Coronavirus (COVID-19)	Gubernatorial Proclamation of Disaster Emergency
May, 2020	Civil Disturbance	Gubernatorial Proclamation of Disaster Emergency
October, 2020	Civil Disturbance	Gubernatorial Proclamation of Disaster Emergency
December, 2020	Winter Weather	Gubernatorial Proclamation of Disaster Emergency
February, 2021	Winter Weather	Gubernatorial Proclamation of Disaster Emergency
April, 2021	Civil Disturbance	Gubernatorial Proclamation of Disaster Emergency
*to render mutual aid and to receive and house evacuees		

4.2.2. Summary of Hazards

The Cameron County Local Planning Team (LPT) was provided the Pennsylvania Standard List of Hazards to be considered for evaluation in the 2022 Hazard Mitigation Plan Update. Following a review of the hazards considered in the 2017 Hazard Mitigation Plan and the standard list of hazards, the local planning team decided that the 2022 Hazard Mitigation Plan should identify, profile, and analyze twenty-six hazards. These hazards include all of the hazards profiled in the 2017 Hazard Mitigation Plan. The list below contains the twenty hazards that have the potential to impact Cameron County as identified through previous risk assessments, the Cameron County Hazard Vulnerability Analysis, and input from those that participated in the 2022 Hazard Mitigation Plan Update. Hazard Profiles are included in Section 4.3 for each of these hazards.

Identified Natural Hazards:

Drought

Drought is a natural climatic condition which occurs in virtually all climates, the consequence of a natural reduction in the amount of precipitation experienced over a long period of time, usually a season or more in length. High temperatures, prolonged winds, and relatively low relative humidity can exacerbate the severity of drought. This hazard is of particular concern in Pennsylvania due to the presence of farms as well as water-dependent industries and recreation across the Commonwealth of Pennsylvania. A prolonged drought could severely impact these sectors of the local economy, as well as residents who depend on wells for drinking water and other personal uses. Droughts increase the risk of other hazards, like wildfires, flash floods, and landslides or debris flows.

Earthquake

An earthquake is the motion or trembling of the ground produced by the sudden displacement of rock usually within the upper ten to twenty 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. Most property damage and earthquake-related deaths are caused by the failure and collapse of structures die to ground shaking, which is dependent upon the amplitude and duration of the earthquake. (FEMA, 1997).

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 (two to three days) of high heat and humidity with temperatures above 90 degrees Fahrenheit. Extremely cold air comes every winter in at least some portions 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.

Flood, Flash Flood, Ice Jam

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 give river basin for an extended period of time. 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 mush of the ground is covered by impervious surfaces. The severity of a flood event is dependent upon a combination of stream and river basin topography and physiography, hydrology, precipitation and weather patterns, present soil moisture conditions, the degree of vegetative clearing as well as the presence of impervious surfaces in and around flood-prone areas. Winter flooding can include ice jams 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.

Hurricane, Tropical Storm, Nor'easter

Hurricanes, tropical storms and Nor'easters are classified as cyclones and are any closed circulation developing around a low-pressure center in which the winds rotate counterclockwise (in the Northern Hemisphere) and whose diameter averages ten to thirty miles across. While most of Pennsylvania is not directly affected by the devastating impacts cyclonic systems can have on coastal regions, many areas in the state are subject to the primary damaging forces associated with these storms including high-level sustained winds, heavy precipitation and tornados. Areas in southeastern Pennsylvania could be susceptible to storm surge and tidal flooding. The majority of hurricanes and tropical storms form in the Atlantic Ocean, the Caribbean Sea, and the Gulf of Mexico during the official Atlantic hurricane season (June through November). (FEMA, 1997).

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 or environmental harm or harm to human health. These species can be any type of organism: plant, fish, invertebrate, mammal, bird, disease, or pathogen. Infestations may not necessarily impact human health but can create a nuisance or agricultural hardships by destroying crops, defoliating populations of native plant and tree species, or interfering with ecological systems (Governor's Invasive Species Council of Pennsylvania, 2009).

Landslide

A landslide is the downward and outward movement of slope-forming soil, rock and vegetation reacting to the force of gravity. Landslides may be triggered by both natural and human-caused changes in the environment, including heavy rain, rapid snow melt, steepening of slopes due to construction or erosion, earthquakes and changes in groundwater levels. Mudflows, mudslides, rock falls, rockslides, and rock topples are all forms of landslide. Areas that are generally prone to landslide hazards include previous landslide areas, the bases of steep slopes, the bases of drainage channels, developed hillsides and areas recently burned by forest and brush fires. (Delano & Wilshusen, 2001).

Pandemic and Infectious Diseases

A pandemic occurs when infection from a new strain of a certain disease, to which mist humans have no immunity, substantially exceeds the number of expected cases over a given period of time. Such a disease may or may not be transferable between humans and animals. An epidemic describes a smaller scale infectious outbreak, within a region or population, that emerges at a disproportional rate. Infectious disease outbreaks may be widely dispersed geographically, impact large numbers of the population, and could arrive in waves lasting months at a time.

Radon Exposure

Radon is a cancer-causing natural radioactive gas that has no odor, color, or taste. It is a large component of the natural radiation that humans are exposed to and can pose a serious threat to public health when it accumulates in poorly ventilated residential and occupational settings. According to the United States Environmental Protection Agency, radon is estimated to cause about 21,000 lung cancer deaths per year, second only to smoking as the leading cause of lung cancer. An estimated 40% of the homes in Pennsylvania are believed to have elevated radon levels.

Subsidence and Sinkhole

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

Tornado, Windstorm

A winds storm can occur during a severe thunderstorm, winter storms, coastal storms, or tornados. Straight-line winds such as downbursts have the potential to cause wind gusts that exceed 100 miles per hour. Based on forty years of tornado history and over 100 years of hurricane history, FEMA identifies western and central Pennsylvania as being more susceptible to higher winds than eastern Pennsylvania. A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornados are most often generated by thunderstorm activity when cool, dry air intersects and overrides a layer of warm, moist air forcing the warm air to rise rapidly. The damage caused by a tornado is a result of high wind velocities and wind-blown debris. According to the National Weather Service, tornado wind speeds can range between thirty to more than 300 miles per hour. Tornados are most likely to occur in the spring and summer months, most commonly in March through June. Tornados also form more commonly in the afternoon and early evenings. Most tornados are approximately a few dozen yards wide and touch down briefly, but even small, short-lived tornados can inflict tremendous damage. Destruction ranges from minor to catastrophic depending on the intensity, size, and duration of the storm. Structures made of light materials such as mobile homes are most susceptible to damage. Waterspouts are weak tornados that form over warm water and are relatively uncommon in Pennsylvania. Each year, an average of over 800 tornados are reported nationwide, resulting in an average of eighty deaths and 1,500 injuries. Base on the NOAA Storm Prediction Center Statistics, the number of recorded F3, F4, and F5 tornados between 1950 and 1998 ranges from less than one to fifteen events per 3,700 square mile area across Pennsylvania.

Wildfire

A wildfire is a raging, uncontrolled fire that spreads rapidly through vegetative fuels, exposing and possibly consuming structures. Wildfires often begin unnoticed and can spread quickly, creating dense smoke that can be seen for miles. Wildfires can occur at any time of the year, but mostly occur during long, dry hot spells. Any small fire in a wooded area, if not quickly detected and suppressed, can get out of control. Most wildfires are caused by human carelessness, negligence, and ignorance. However, some are precipitated by lightning strikes and in rare instances, spontaneous combustion. Wildfires in Pennsylvania can occur in fields, grass, brush, and forests. A disproportional number of wildfires (98%) are a direct result of human activity, often caused by burning garbage and debris in the open.

Winter Storm

Winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. 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. Many winter storms are accompanied by low temperatures and heavy and/or blowing snow, which can severely impair visibility and disrupt transportation. The Commonwealth of Pennsylvania has a long history of severe winter weather.

Identified Human-caused Hazards:

Blighted Properties

Blighted properties are properties that generally pose a danger to their community, are unsuitable for occupation, or are an eye sore to the community in which they reside. Blighted properties can be either abandoned or demolished but are generally not remediated beyond that point. Blighted properties can cause a danger to human health if hazardous materials were previously stored there or if dangerous building materials are exposed after the property has become blighted.

Civil Disturbance

Civil disturbance hazards encompass a set of hazards emanating from a wide range of possible events that cause civil disorder, confusion, strife, and economic hardship. Civil disturbance hazards include the following:

- Famine: a widespread scarcity of food leading to malnutrition and increased mortality
- Economic Collapse: economic recession or market negative growth or slow development
- Misinformation: erroneous information spread unintentionally
- Civil Disturbance: public unrest, mass hysteria, riot or group acts of violence against property and individuals
- Strike: labor dispute or controversies related to the terms and conditions of employment

Dam Failure

A dam is a barrier across flowing water that obstructs, directs, or slows down water flow. Dams provide benefits such as flood protection, power generation, drinking water, irrigation, and recreation. Failure of these structures results in an uncontrolled release of impounded water. Failures are relatively rare, but immense damage and loss of life is possible in downstream communities when such events occur. Aging infrastructure, hydrologic, hydraulic, and geologic characteristics, population growth and design, and maintenance practices should be considered when assessing dam failure hazards. The failure of the South Fork Dam, located in Johnstown, Pennsylvania, was the deadliest dam failure ever experienced in the United States. The dam failure took place in 1889 and resulted in the Johnstown Flood which claimed 2,209 lives (FEMA, 1997). Today there are approximately 3,200 dams and reservoirs throughout Pennsylvania.

Disorientation

Large numbers of people are attracted to Pennsylvania's rural areas for recreational purposes such as hiking, camping, hunting, and fishing. As a result, people can become lost or trapped in remote and rugged wilderness areas. Search and rescue may be required for people who suffer from medical problems or injuries and those who become accidentally or intentionally disoriented. Search and rescue efforts are focused in and around state parks, state forests, and state game lands.

Environmental Hazards

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

Environmental hazards include the following:

- Hazardous material release: hazardous material release at fixed facilities or as such materials are in transit and including toxic chemicals, infectious substances, biohazardous waste and any material that are explosive, corrosive, flammable, or radioactive.
- Air or Water Pollution: the release of harmful chemical and waste materials into water bodies or the atmosphere.
- Superfund Facilities: hazards originating from abandoned hazardous waste sites listed in the National Priorities List
- Manure Spills: involving the release of stored or transported agricultural waste
- Product Defect or Contamination: highly flammable or otherwise unsafe consumer products and dangerous foods

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 so as to provide protection from temporary flooding. Levee failures or breaches occur when a levee fails to contain the floodwaters for which it is designed to control, or floodwaters exceed the height of the constructed levee. Fifty-one of the sixty-seven counties in the Commonwealth of Pennsylvania have been identified as having at least one levee.

Opioid Epidemic

The opioid epidemic is the rapid increase in the use of prescription and non-prescription opioid drugs in the United States beginning in the late 1990's and continuing throughout the first two decades of the 2000's. Opioids are a diverse class of moderately strong painkillers, including oxycodone, hydrocodone, and a very strong painkiller, fentanyl, which is synthesized to resemble other opiates such as opium-derived morphine and heroin. The potency and availability of these substances, despite their high risk of addiction and overdose, have made them popular both as formal medical treatments and as recreational drugs. Due to their sedative effects on the part of the brain which regulates breathing, opioids in high doses present the potential for respiratory depression and may cause respiratory failure and death.

The Commonwealth of Pennsylvania along with other states in the nation has enacted legislation to curb the prescription and distribution of these drugs to try to prevent addiction rising from abuse as a painkiller. This includes but is not limited to prescribing to minors, quantity limits, a prescription database with entry requirements, and other limits to its availability.

Structure Fire

Structure fires are a major hazard in urban and built-up areas around a region. A structure fire can result in subsequent fires if it moves from connected structure to connected structure.

Terrorism / Cyber-Terrorism

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 bombing, cyber-attacks, and the use of chemical, biological, nuclear, and radiological weapons.

Cyber-terrorism refers to acts of terrorism committed using computers, networks, and the internet. The most widely cited definition of cyber-terrorism comes from Denning's testimony before the Special Oversight Panel on Terrorism: "Cyber-attack/cyber-terrorism… is generally understood to mean unlawful attacks or 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 cyber-terrorism/cyber-attack, an attack should result in violence against persons or property, or at least cause enough harm to generate fear".

Transportation Accidents

Transportation accidents can result from any form of air, rail, water, or road travel. It is unlikely that small accidents would significantly impact the larger community. However, certain accidents could have secondary regional impacts such as a hazardous materials release or disruption in critical supply/access routes, especially if vital transportation corridors or junctions are present. Traffic congestion in certain circumstances can also be hazardous. Traffic congestion is a condition that occurs when traffic demand approaches or exceeds the available capacity of the road network. This hazard should be carefully evaluated during emergency planning since it is a key factor in timely disaster or hazard response, especially in areas with high population density.

Utility Interruption

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

Utility interruption hazards include the following:

- Geomagnetic Storms; including temporary disturbances of the Earth's magnetic field resulting in disruptions of communication, navigation, and satellite systems
- Fuel or Resource Shortage; resulting from supply chain breaks or secondary to other hazard events
- Electromagnetic Pulse; originating from an explosion or fluctuating magnetic field and causing damaging current surges in electrical and electronic systems
- Information Technology Failure; due to software bugs, viruses, or improper use of system
- Ancillary Support Equipment; electrical generating, transmission, system-control and distribution-system equipment for the energy industry

- Public Works Failure; damage to or failure of highways, flood control systems, deep-water ports and harbors, public buildings, bridges, and dams
- Telecommunications System Failure; damage to data transfer, communications and processing equipment
- Transmission Facility or Linear Utility Accident; liquified natural gas leakages, explosions, facility problems
- Major Energy Power or Utility Failure; interruptions of generation and distribution, power outages

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 global. Human activity such as the large-scale consumption of fossil fuels and deforestation 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 mass extinction. The corresponding rise of average atmospheric temperatures is intensifying many natural hazards, and further threatening biodiversity. The effects of climate change on these hazards is 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 temperatures. As average atmospheric temperatures rise, extreme high temperatures become more threatening, with record high temperatures outnumbering record low temperatures two to one 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. Less immediately apparent, climate change could increase the prevalence of the West Nile Virus. Some studies show increased insect activities during a similar rapid warming event in Earth's history (Curano et al., 2008). 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 and West Nile Virus, potentially increasing the risk that the disease poses (Harrigan et al., 2014).

Climate change is likely to increase the risk of droughts. Higher average temperatures means 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. 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. However, the southwest United States is at a greater risk of this increased drought and wildfire activity than Cameron 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. As previously mentioned, 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, increasing the risk of flooding 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 could form and develop. 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 have been previously recorded.

Climate change is contributing to the introduction of new invasive species. 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 to reduced emissions and species losses.

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 be subject to drought conditions. 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 Cameron 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 drought:

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 of time without rainfall that has an adverse effect on streams, lakes, and groundwater levels, potentially impacting agriculture.

Leaving areas with little moisture, droughts are often one of the leading contributing factors to wildfires.

Droughts can have adverse effects on farms and other water-dependent industries. This can result in a local economic loss. Areas with extensive agriculture uses are particularly vulnerable to drought; 5,278 acres of Cameron County, or roughly two percent, of the 254,208 total land acreage are held in farms (United States Department of Agriculture [USDA], 2017 Census). Acreage for farming has decreased by 15% since the 2012 USDA Census and eight farm owners are new and beginning enterprisers.

The majority of the county is covered in forest with clear waterways that provide habitat for bald eagles, elk, deer, bear, turkey, other wildlife, and a variety of fish. Each spring, fishermen converge on the streams in the county for the opening of trout season and throughout the year the cold mountain waters provide some of the best fly-fishing in the state. In autumn, hunters come to Cameron County’s mountains in search of plentiful wild game and to enjoy camp life. All of this recreation and influx of commerce are at risk in a drought.

When consumable water is not available, nor water for fire protection and emergency services, public safety is an issue.

4.3.1.2 Range of Magnitude

The county's average annual rainfall is 43 inches. Average annual snowfall for the county is 39 inches and four months of the year have significant snowfall. Rural farming areas of Cameron County are most at risk when a drought occurs. A drought can be a significant financial burden (especially on families as 100% of Cameron County farms are family-owned and run) and approximately 69% of the county farmland use is devoted to crop cultivation and 31% to livestock and poultry. (U.S. Census of Agriculture, 2017). Wildfires are often the most severe secondary effect associated with drought. Wildfires can devastate wooded and agriculture areas, threatening natural resources, structures near high wildfire loads, and farm production facilities. 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.

Table 8 - Drought Preparation Phases shows the FEMA-defined levels of drought severity along with suggested actions, requests, and goals. Drought can cause municipalities to enforce water rationing and distribution.

Table 8 - 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.	Reduce water use by 15%.
Source: PA DEP, 2017				

Local Water Rationing: Although not a drought phase, local municipalities may, with the approval of the Pennsylvania Emergency Management Council, implement local water rationing to share a rapidly dwindling or severely depleted water supply in designated water supply service areas. These individual water rationing plans, authorized through provisions of 4 PA Code Chapter 120, will require specific limits on individual water consumption to achieve significant reductions in use. Under both mandatory restrictions imposed by the commonwealth and local water rationing, procedures are provided for granting of variances to consider individual hardships and economic dislocations.

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. Cameron County also has a growing agritourism business that would be threatened by long-term drought.

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 record); and
- Soil moisture via the Palmer Drought Index (See *Table 9 – Palmer Drought Severity Index*) - a soil moisture algorithm calibrated for relatively homogeneous regions which measures dryness based on recent precipitation and temperature.

Table 9 - Palmer Drought Severity Index

Palmer Drought Severity Index	
Severity Category	**PDSI**
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

Palmer Drought Severity Index	
Severity Category	**PDSI**
Incipient dry spell	-0.5 to -0.99
Severity Category	**PDSI**
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
Source: NOAA, 2020	

Hydrologic drought events result in a reduction of stream flows, reduction of lake/reservoir storage, and a lowering of groundwater levels. These events have adverse impacts on public water supplies for human consumption, rural water supplies for livestock consumption and agricultural operations, water quality, natural soil water or irrigation water for agriculture, soil moisture, conditions conducive to wildfire events, and water for navigation and recreation.

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

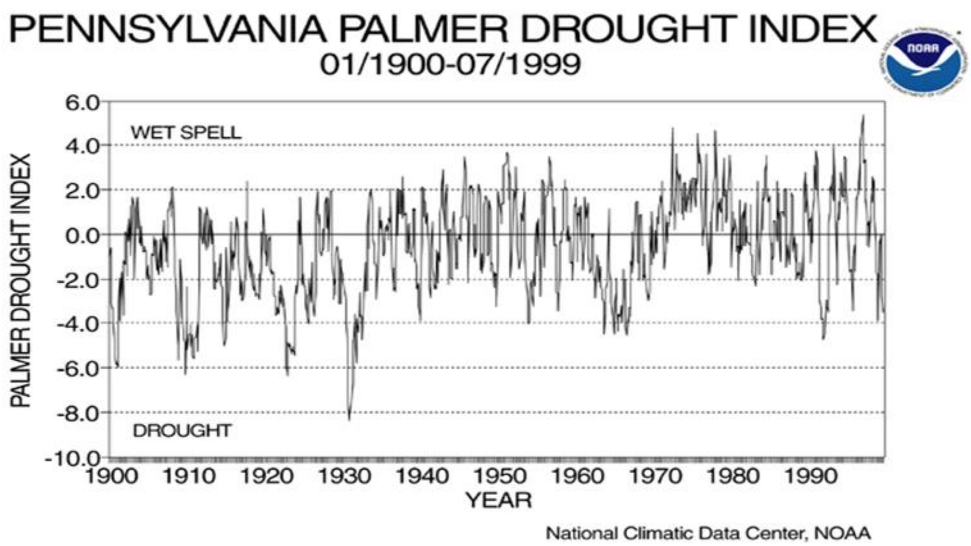
- Hydrologic effects – Lower water levels in reservoirs, lakes, and ponds; reduced stream flow; loss of wetlands; estuarine impacts; groundwater depletion and land subsidence; and effects on water quality, such as increases in salt concentration and water temperature.
- Damage to animal species – Lack of feed and drinking water; disease; loss of biodiversity, migration, or concentration; and reduction and degradation of fish and wildlife habitat.
- Damage to plant communities – Loss of biodiversity and loss of trees from urban landscapes and wooded conservation areas.
- Increased number and severity of fires.
- Reduced soil quality.
- Air quality effects – Dust and pollutants; and
- 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 10 - Past Drought Events in Cameron 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 8 - Pennsylvania Palmer Drought Index 1900-1999*.

Figure 8 - 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 Cameron County occurred in the summer of 1999. Extended dry weather spurred Governor Ridge to declare a drought emergency in fifty-five counties, including Cameron. During this event, precipitation deficits for that summer averaged 5 to 7 inches; the Susquehanna River hit record low flows, streams were empty, and wells dried up. Crop damages indicated losses of over $500 million and those crop losses totaled 70% to 100% statewide. There were also additional losses from the decline of milk production due to the drought (National Climatic Data Center [NCDC], 2011). Additionally, during this event, the state asked municipal and private water suppliers to cut local water use.

Figure 10 - Palmer Drought Severity Index shows that Cameron County has experienced severe drought (PDSI ≤ -3) between 5 and 10 percent of time from 1895-1995, which gives a good idea of how often Cameron County has been affected by drought events.

Table 10 - Past Drought Events in Cameron County (PA DEP, 2021)

Past Drought Events in Cameron County					
Start Date	**Duration**	**Drought Status**	**Start Date**	**Duration**	**Drought Status**
Sept 1955		Emergency*	11/18/1980	1 year 5 months 3 days	Emergency
04/26/1985	7 months 24 days	Watch	07/07/1988	1 month 18 days	Watch
08/24/1988	3 months 19 days	Warning	03/03/1989	2 months 13 days	Watch
06/28/1991	27 days	Warning	07/24/1991	8 months 28 days	Emergency
04/20/1992	2 months 4 days	Warning	06/23/1992	2 months 20 days	Watch
09/01/1995	20 days	Warning	09/20/1995	1 month 20 days	Emergency**
11/08/1995	1 month 11 days	Warning	07/17/1997	3 months 28 days	Watch
12/03/1998	14 days	Warning	12/16/1998	3 months	Emergency
03/15/1999	2 months 27 days	Watch	07/20/1999	2 months 11 days	Emergency**
06/10/1999	1 month 11 days	Warning	09/30/1999	4 months 27 days	Warning
02/25/2000	2 months 11 days	Watch	08/24/2001	8 months 20 days	Watch
09/05/2002	2 months 3 days	Watch	04/11/2006	2 months 20 days	Watch
08/06/2007	6 months 10 days	Watch	11/07/2008	2 months 20 days	Watch
09/16/2010	1 month 26 days	Watch	08/05/2011	29 days	Warning
09/02/2011	1 month 12 days	Watch	08/02/2016	3 months 7 days	Watch
08/21/2020	4 months 7 days	Watch			

Past Drought Events in Cameron County					
Start Date	**Duration**	**Drought Status**	**Start Date**	**Duration**	**Drought Status**
**Gubernatorial Disaster Declaration. Source: PA DEP, 2021					

Pennsylvania had its warmest July on record in 2020, and sixteen counties, including Cameron County, entered Drought Watch status on August 21, 2020. The drought watch ended for all counties in early February 2021. At the writing of this plan, however, dry conditions were again beginning to occur in the eastern region of commonwealth as seen in *Figure 9 – Drought Index for Pennsylvania*.

4.3.1.4 Future Occurrence

It is difficult to forecast the exact severity and frequency of future drought events and the future of climate change will lead to increased uncertainty and extremity of climate events, suggesting that it is best to be prepared for potentially adverse conditions. As Cameron County has experienced severe drought between 5% - 10% of the time between 1895 and 1995 (a 100-year data collection as seen in *Figure 10 - Palmer Drought Severity Index*), the report can be used to make a rough estimate of the future probability of drought in Cameron 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 (Sheffield & Wood, 2008; EPA, 2016).

The potential for a drought to occur in Cameron County is, nevertheless, high. Given the frequency of drought watches issued for Cameron County and its municipalities, the county can reasonably expect to be under a drought watch at least once per year. While some form of drought condition frequently exists in Cameron County, the impact depends on the duration of the event, severity of conditions, and area affected. The map at *Figure 9 -Drought Index for Pennsylvania*, shows that Cameron County and most of Pennsylvania is currently in normal (non-drought) conditions.

4.3.1.5 Vulnerability Assessment

Drought vulnerability depends on the duration and area of impact. However, other factors contribute to the severity of a drought. Unseasonably high temperatures, prolonged winds, and low humidity can heighten the impact of a drought.

Extended periods of drought can lead to lowered stream levels, altering the delicate balance of riverine ecosystems. Certain tree species are susceptible to fungal infections during prolonged periods of soil moisture deficit. Fall droughts pose a particular threat because groundwater levels are typically at their lowest following the height of the summer growing season.

Wildfire is the most severe secondary effect associated with drought. Wildfires can devastate wooded and agricultural areas, threatening natural resources and farm production facilities.

Prolonged drought conditions can cause major ecological changes, such as increases in scrub growth, flash flooding, and soil erosion.

Droughts can have adverse effects on farms and other water-dependent industries. This can result in a local economic loss. The 2017 U.S. Census of Agriculture lists over 5,000 acres of prime agricultural land in Cameron County and there are thousands of acres of forest, many first-class fishing streams, hundreds of seasonal camps, and multiple recreational sites across the county dependent on consistent water sources and replenishment. From a societal perspective, public safety is an issue in terms of consumable water not being available, as well as water for fire protection and emergency services.

The most significant losses resulting from drought events are typically found in the agriculture and aquaculture sectors. The 1999 Gubernatorial Proclamation was issued in large part due to significant crop damage. Preliminary estimates by the Pennsylvania Department of Agriculture indicated possible crop losses across the Commonwealth in excess of $500 million. This estimate did not include a 20% decrease in dairy milk production which also resulted in million-dollar losses (NCDC, 2009).

While these were statewide impacts, they illustrate the potential for droughts to severely impair the local economy in more agricultural communities. The 2017 Census of Agriculture reports there were thirty-seven farms in Cameron County, at an average size of 143 acres. All thirty-seven farms are family farms, meaning a drought in Cameron County can have a high negative impact on this tightly knit community. The farms of Cameron County rank sixty-sixth of sixty-seven counties in the Commonwealth for agricultural production, totaling just over $523,000 annually (USDA, 2017). Agricultural production from crops, including nursery and greenhouse crops, accounts for $363,000 in commerce annually. Production from livestock, poultry, and their products accounts for $160,000 annually.

Driftwood Borough completed a project opportunity that was outlined in the 2017 Hazard Mitigation Plan Update to add a supplemental water source for use during drought conditions. The project consisted of the reconstruction of an existing water well adjacent to the current filter plant for use in drought conditions.

Public or municipal water supplies are also vulnerable to the effects of drought because supply sources include rivers, reservoirs, and groundwater. Public water service areas cover only some of the land area in the county, as depicted in *Figures 11* and *12 – Drought-Vulnerable Land Use and Public Water Supply and Domestic Well Locations - Cameron County*. The majority of the county relies on domestic wells for their fresh drinking water. Residents or water authorities that use private domestic wells are more vulnerable to droughts because their drinking water can literally dry up. There is a total of 351 domestic water wells in the county. It is important to note that the well data was obtained from the Pennsylvania Groundwater Information System (PaGWIS). PaGWIS relies on voluntary submissions of well record data by well drillers; as a result, it is not a complete database of all domestic wells in the county. This is the most complete dataset of domestic wells available.

Through 2017 the USGS conducted many baseline water quality studies throughout Pennsylvania, but one for Cameron County is not yet completed. In the spring of 2018, the county did submit an application for a grant to assist with completion of the study, but it was not awarded. The studies comprise a useful reference to get a general sense of the water quality and challenges associated with domestic water wells in the Commonwealth.

The EPA has provided a guide published in October 2017 for water utilities to aid in drought response and recovery. The guide outlines what goes into a good drought response plan, how to manage water supply and demand during a drought, best practices for communication and partnerships with other local utilities and provides case studies to discuss examples of drought management practices (EPA, 2017). The guide may be found here:

https://www.epa.gov/sites/production/files/2017-10/documents/drought_guide_final_508compliant_october2017.pdf.

Figure 9 - Drought Index for Pennsylvania

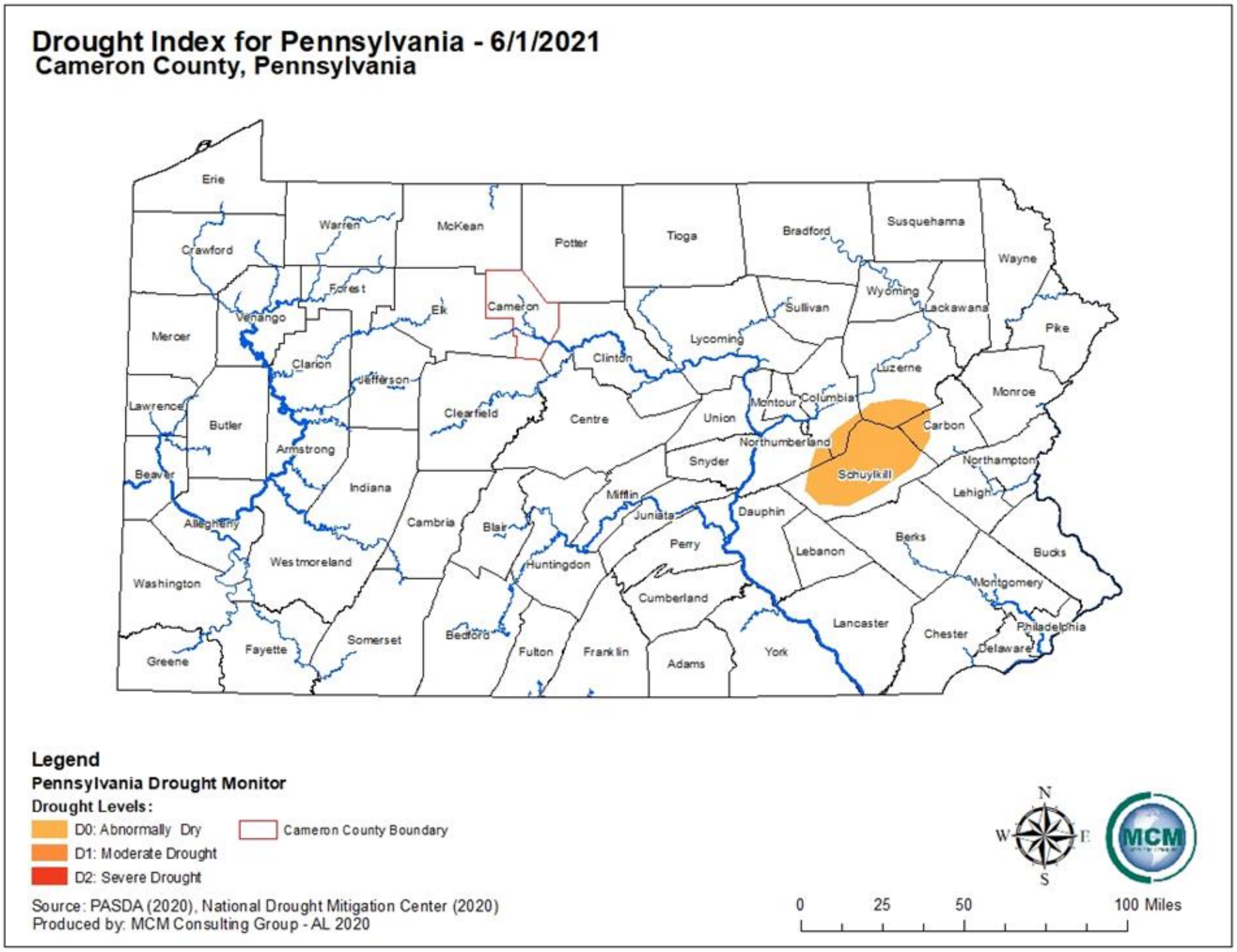


Figure 10 - Palmer Drought Severity Index

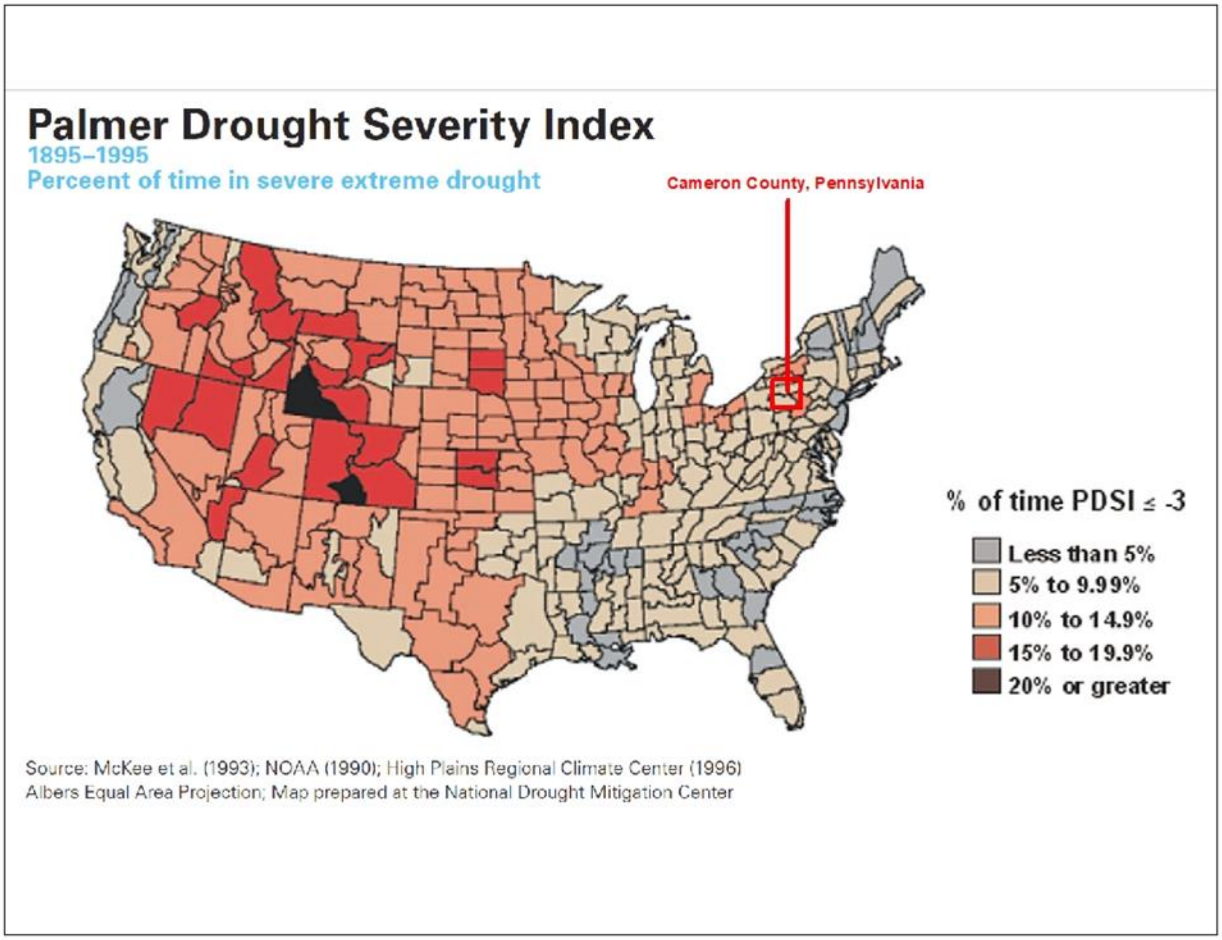


Figure 11 - Drought Vulnerable Land Use and Public Water Supply

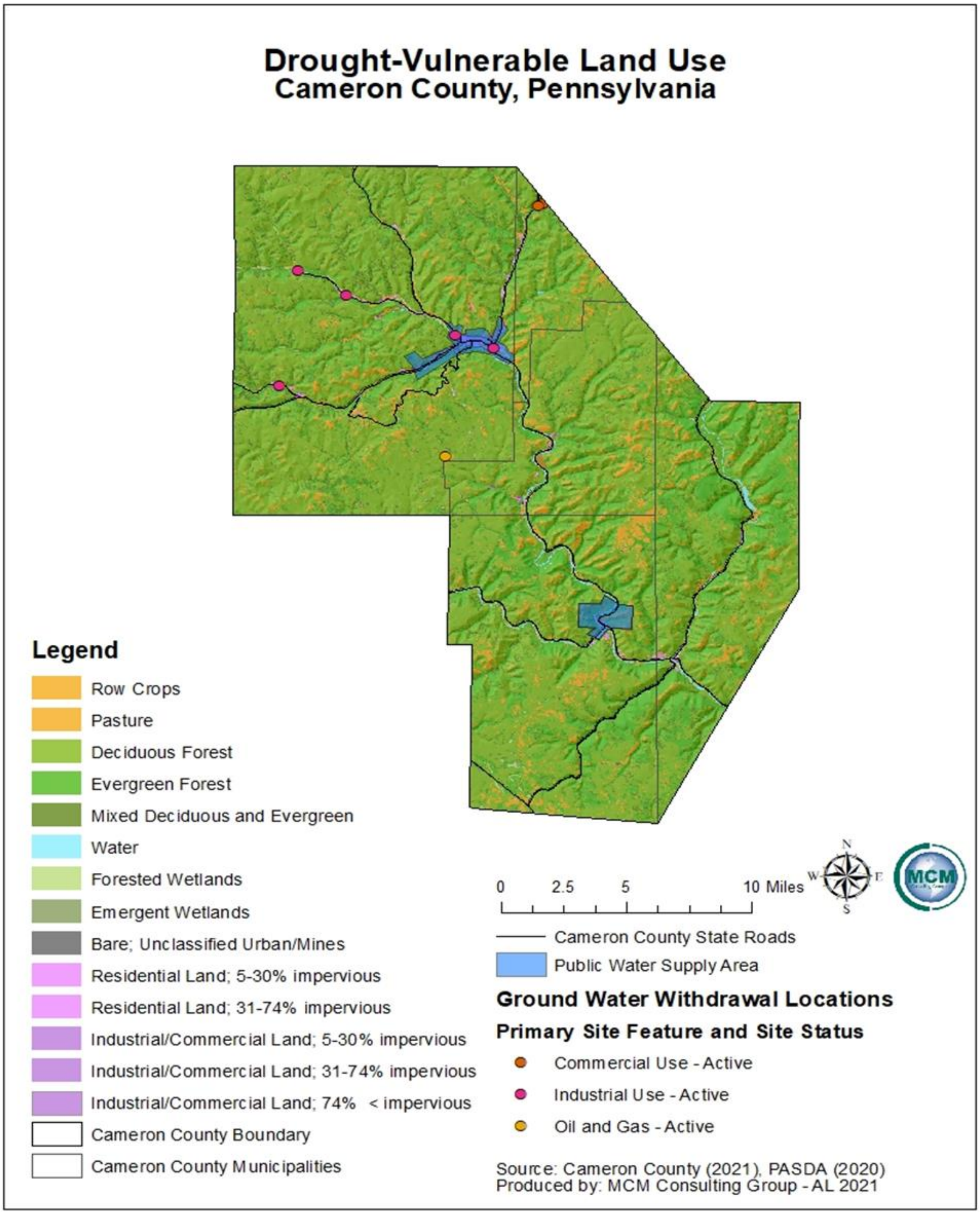
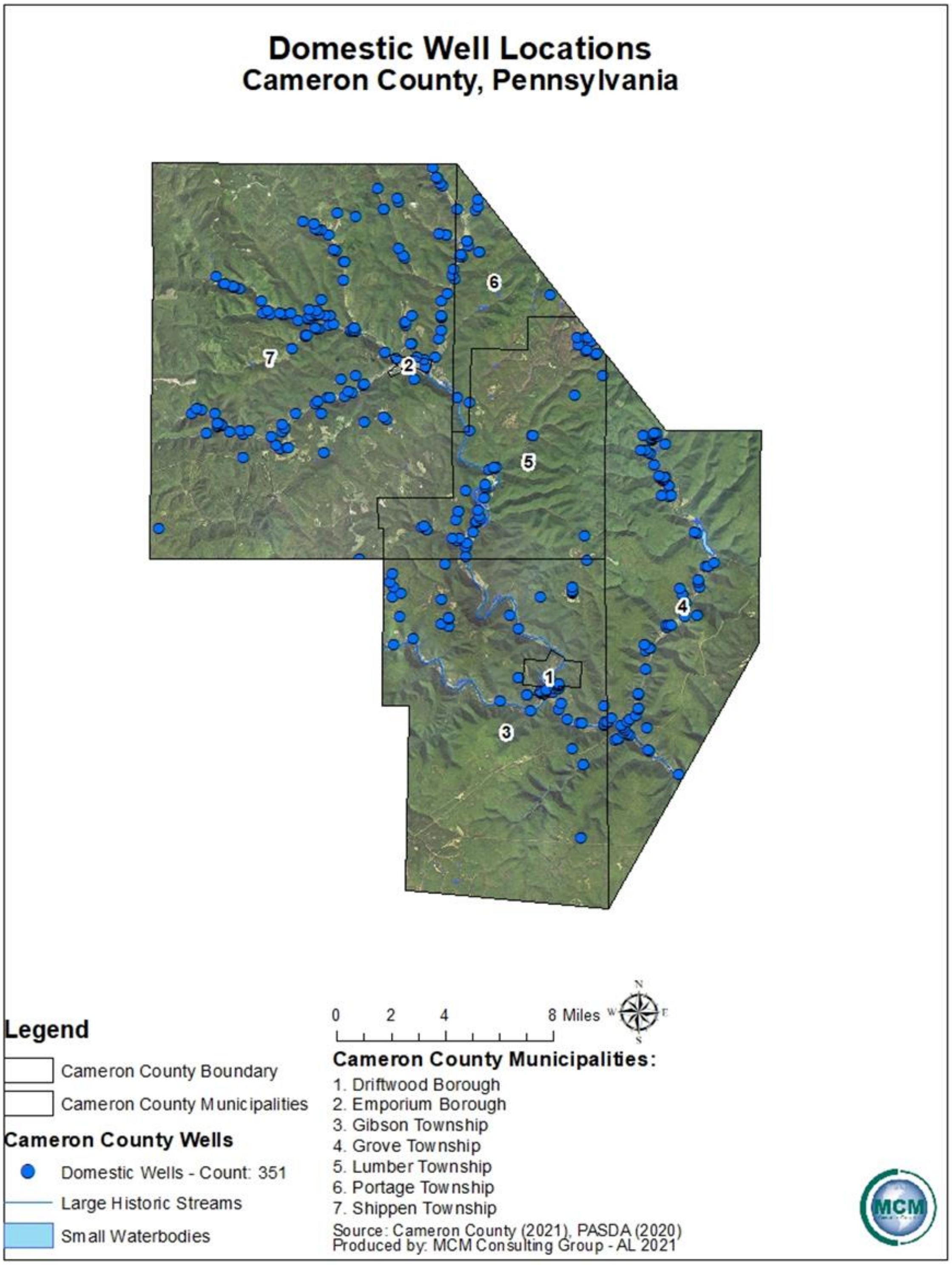


Figure 12 - Domestic Well Locations - Cameron County



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. The impact of earthquakes can extend up to hundreds of thousands of square miles. Earthquakes are also known to cause fatalities, and substantial loss and injury including property damages of tens of billions of dollars, while disrupting the social and economic functioning of the affected area. Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to the ground shaking, which is dependent upon amplitude and duration of the earthquake. Considering only the eastern half of North America, Pennsylvania has experienced fewer and more mild earthquakes than most other states. Nevertheless, earthquakes do occur in the Commonwealth, and Pennsylvania may be subject to the effects of earthquakes that have epicenters located outside of the Pennsylvania border. Earthquake events in Pennsylvania, including Cameron County, are usually mild events, impacting areas no greater than sixty-two miles in diameter from the epicenter.

The upper ten to twenty miles of the Earth's crust is typically where earthquakes occur. 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 Cameron 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, as seen in *Figure 13 - Ramapo Fault System*. This fault system is associated with some small earthquakes, and it is thought unlikely to produce significant disruption.

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 of the faults would be an idealistic 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 Cameron County is to conduct a probabilistic earthquake-hazard analysis with the earthquakes that have already happened in and around the county as seen in *Figure 14 - Pennsylvania Earthquake Hazard Zones*. Nevertheless, the United States Geological Survey (USGS) indicates that Cameron County has a low earthquake risk, and no historical earthquake events have occurred.

Natural gas extraction of the Marcellus/Utica Shale formation, as seen in *Figure 15 – Cameron County 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 increase seismic activity in a region. However, fracking does not appear to be linked to the increased rate of magnitude three and larger earthquakes. 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 Cameron 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 11 - Richter Scale Magnitudes and Associated Earthquake Size Effects* summarizes Richter Scale magnitudes as they relate to the spatial extent of impacted areas. The Modified Mercalli Intensity Scale, as seen in *Table 12 - Modified Mercalli Intensity Scale with Associated Impacts*, is an alternative measure of earthquake intensity that is scaled by the impacts of the earthquake event.

As the concept of magnitude came to be used worldwide and had to be calculated from many different types of seismographs, new ways of defining the magnitude were introduced, so that today several different magnitude numbers might be found for the same earthquake. There is no upper or lower limit to the Richter Scale, but as a matter of historical fact, no magnitude greater than about 9.5 has ever been calculated for an earthquake. Earthquakes in eastern North America seldom have magnitude greater than 5.0. Earthquakes have many secondary impacts, including disrupting critical facilities, transportation routes, public water supplies and other utilities. A potential worst-case scenario would be if a magnitude 6.1 or stronger earthquake occurred near one of Pennsylvania’s nuclear facilities.

Table 11 - Richter Scale Magnitudes and Associated Earthquake Side Effects

Richter Scale Magnitudes and Associated Earthquake Size Effects	
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 12 - Modified Mercalli Intensity Scale with Associated Impacts

Modified Mercalli Intensity Scale with Associated Impacts			
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 known earthquakes have had an epicenter within Cameron County. 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 (Berks County), Pennsylvania, on July 19, 2019. Further, a 3.4 earthquake struck Mifflintown on June 13, 2019, and Bolivar 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.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 epicentral region drying up, while new springs and old wells began to flow. 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 cause of the wells drying was the increase in hydraulic conductivity or "fracking" 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 Cameron County are shown below at *Figure 16 - Earthquake Epicenters Within 200 Miles of Cameron County*. 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 14 – Pennsylvania Earthquake Hazard Zones* in 4.3.2.1 shows that Cameron County is in a low hazard zone for earthquake activity according to the USGS, 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 13 - Recent Earthquake Trends in Central and Eastern United States*. This uptick in seismicity is considered to be due to hydraulic fracturing activities, and specifically occurs as a result of wastewater from the fracking process being injected into the earth. 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. It is important to note that seismicity can occur even after wells become inactive and injection rates decline.

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. 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 approximately a one in 200 chance in any given year.

Table 13 - Recent Earthquake Trends in Northeastern United States

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

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 Cameron County, this could include surface faulting, ground shaking, landslides, liquefaction, dried up 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 Cameron County. Risk to public safety and loss of life from an earthquake is dependent upon the severity and proximity of the event. Injury or death to those inside buildings, or people walking below building ornamentation and chimneys is a higher risk to Cameron County's general public during an earthquake. Infrastructure is more at risk on the east coast than the west coast because its buildings are older.

FEMA's HAZUS software was used to estimate the relative vulnerability to earthquakes across the state. The calculation algorithms quantify the potential losses associated with seismic hazards using information about shake probabilities, soil characteristics, and other parameters. HAZUS was used to calculate two kinds of economic losses: 1) direct building losses, and 2) business interruption losses. Direct building losses consist of the damage to structures and their contents, while business interruption losses consist of the relocation expenses, employee wage loss, business income loss, and rental income loss that accrue during the time that businesses remain inoperable. Specifically, for Cameron County, the potential direct building losses from earthquake hazards include building loss of $8.9 million, contents loss of $2.4 million, and total direct building losses for $11.4 million. The potential business interruption losses for Cameron County from earthquake hazards include income loss of $0.2 million, wage loss of $0.3 million, and total business interruption losses for $1.8 million.

Figure 13 - Ramapo Fault System

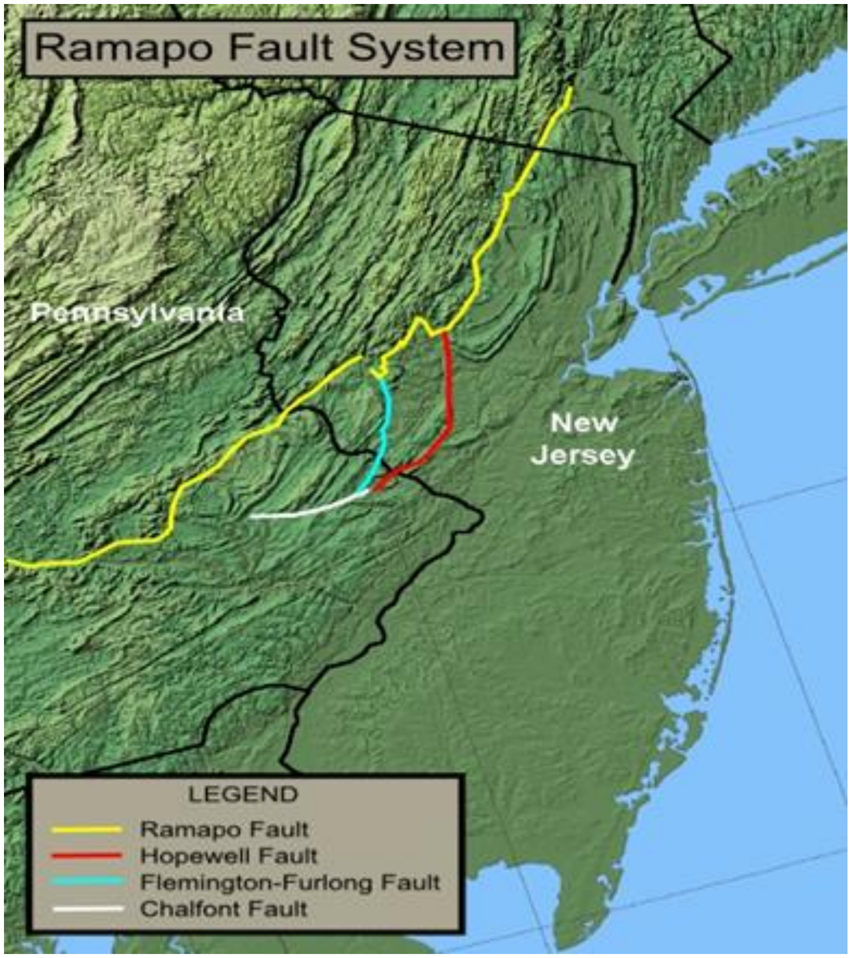


Figure 14 - Pennsylvania Earthquake Hazard Zones

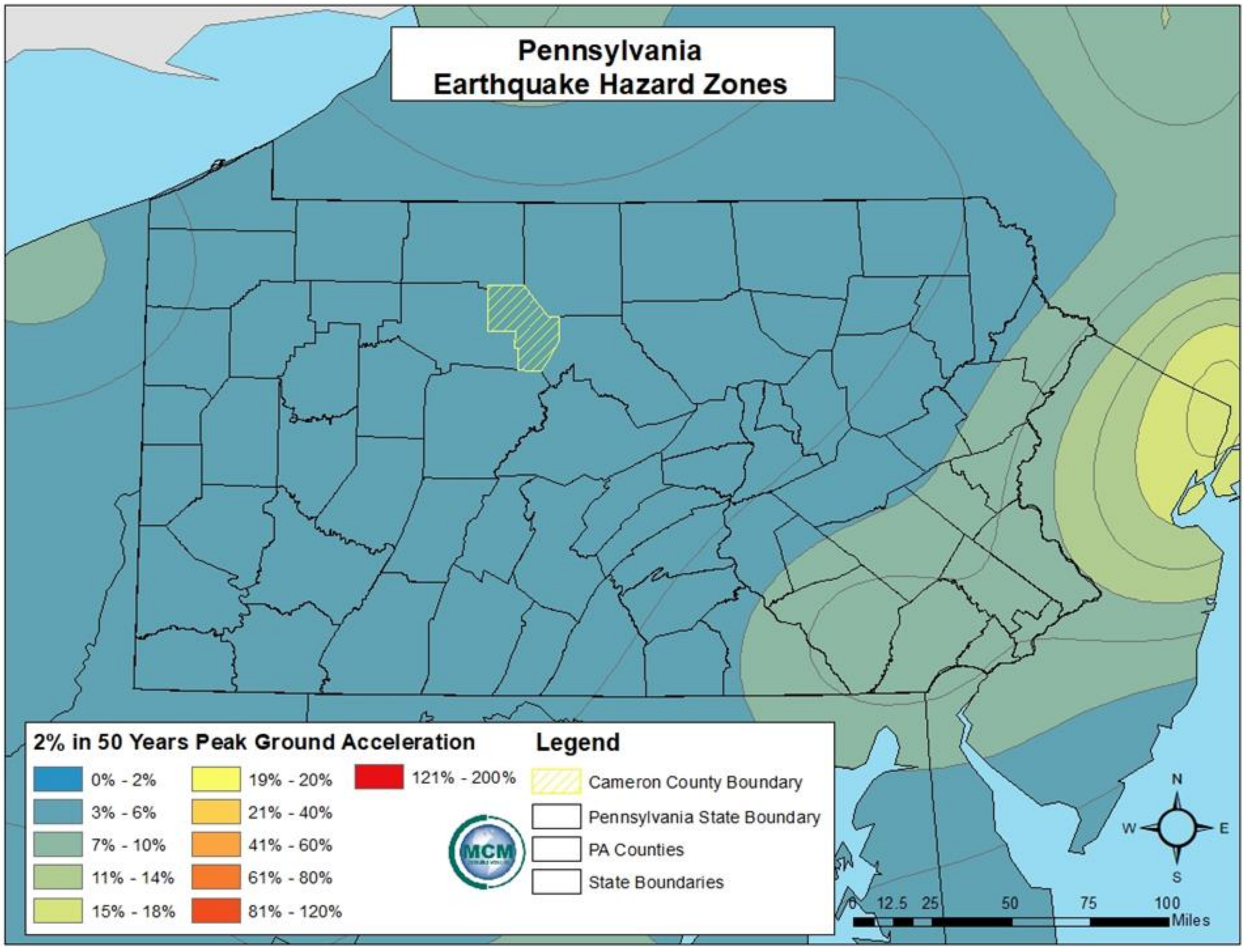


Figure 15 - Cameron County Oil and Gas Geology

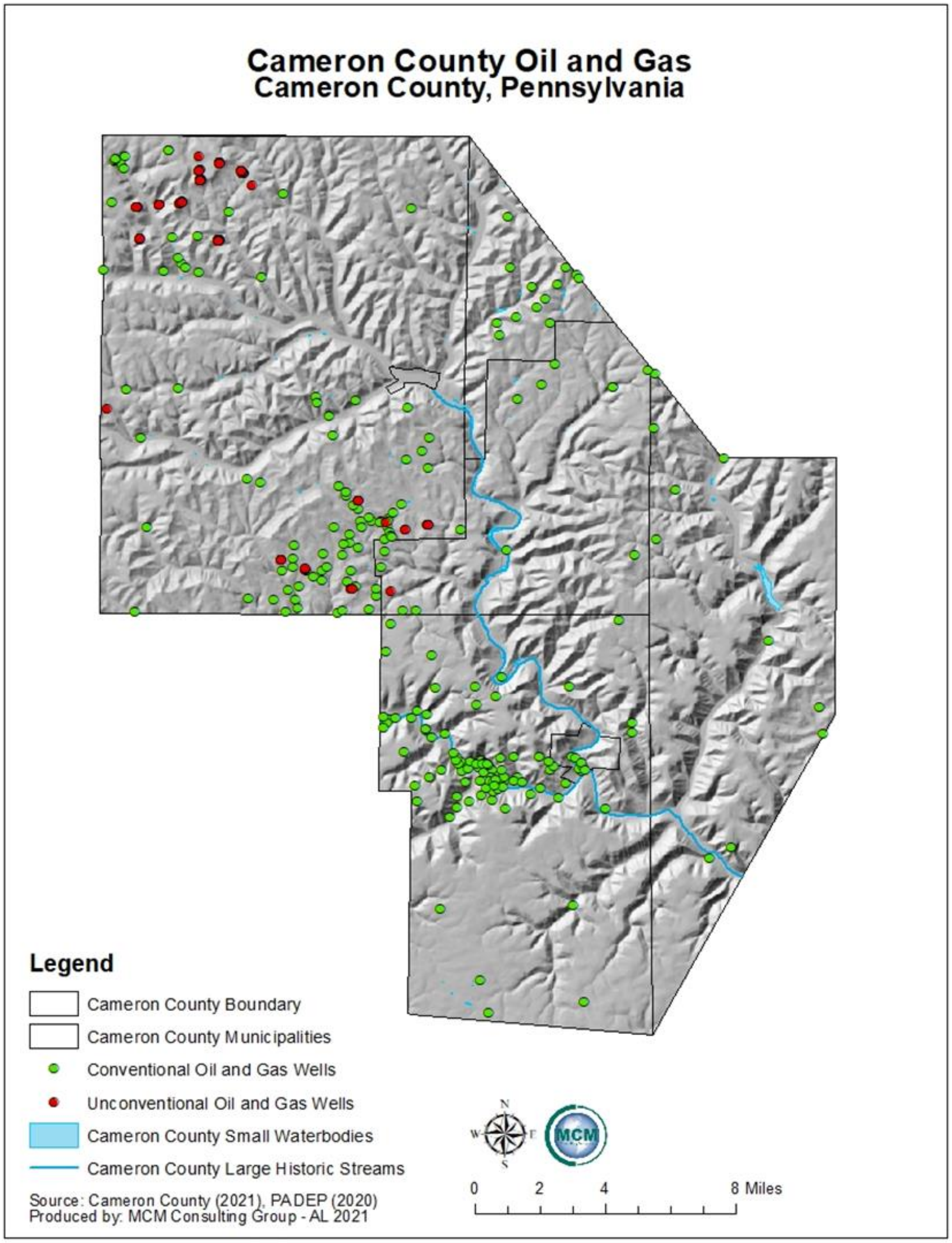
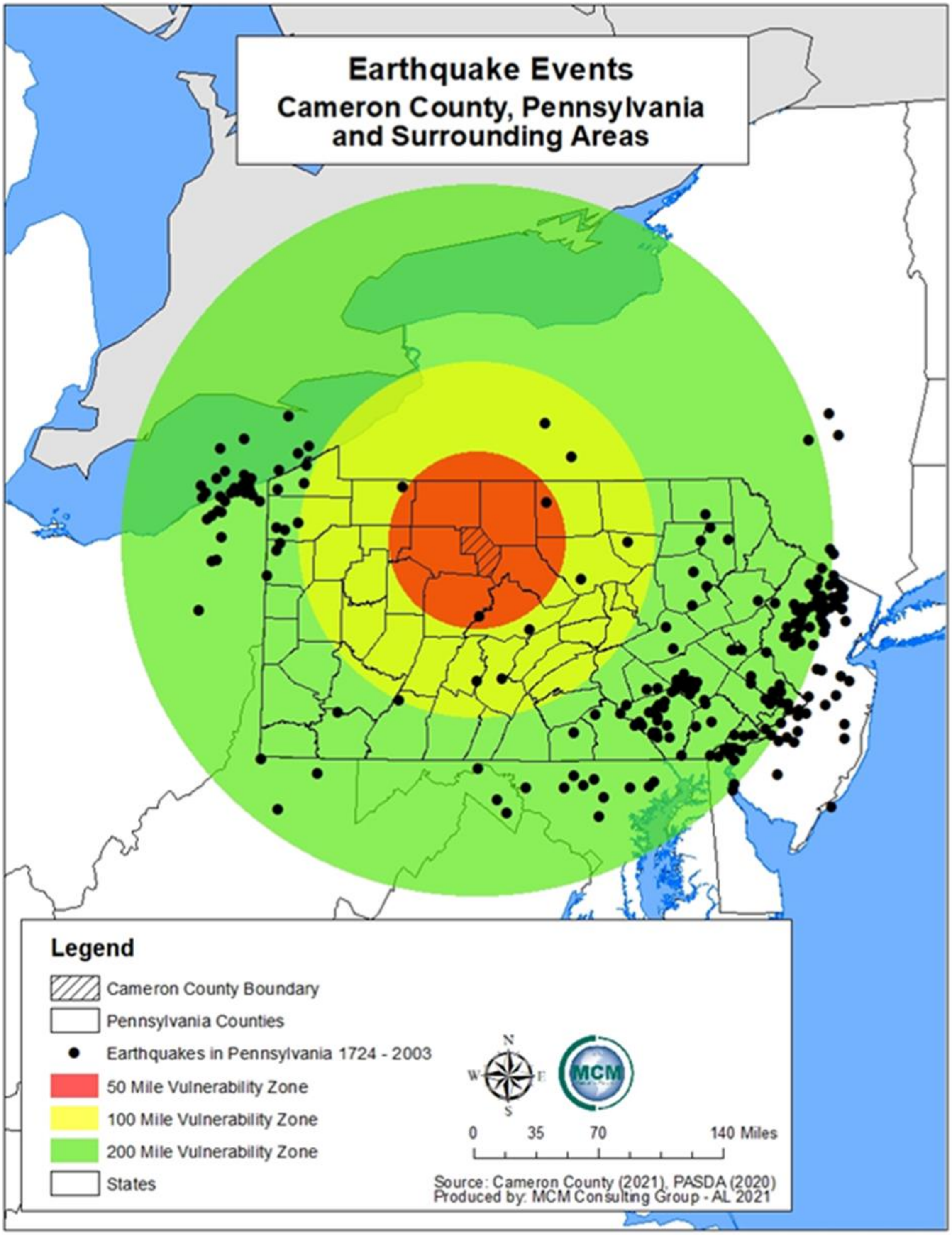


Figure 16 - Earthquake Epicenters Within 200 Miles of Cameron County



4.3.3. Extreme Temperature

4.3.3.1 Location and Extent

The entire Commonwealth of Pennsylvania can experience many different temperature extremes throughout the course of a calendar year. High temperatures occur about ten days per year at any given location in Pennsylvania, however, the southern parts of the state experience more than twice this amount in the same time frame. Freezing temperatures occur on an average of 100 or more days per year with the longest freeze-free period at near sea level locations within the Commonwealth. Cameron County typically has a longer freeze period than areas closer to the coastal regions near New Jersey and Delaware. Extreme temperatures can be devastating. Extreme heat can cause multiple issues including but not limited to, sunburn, heat cramps, heat exhaustion, heat strokes, and dehydration. Extreme cold temperatures can cause hypothermia and frostbite. Both of these extremes in temperature can cause long-lasting disabilities to people who are exposed to either, or both, for long durations of time. January is typically the coldest month for Cameron County and July is typically the warmest month for Cameron County. *Figure 20 – Average Minimum Temperature Trends for Pennsylvania* shows the average minimum temperatures in Pennsylvania with Cameron County identified. *Figure 21 – Average Maximum Temperature Trends for Pennsylvania* shows the average maximum temperatures in Pennsylvania with Cameron County identified. Temperatures can vary in Cameron County based on topography and season.

4.3.3.2 Range of Magnitude

When extreme temperature events occur, they typically impact the entirety of a region or a county. Extreme heat is described as temperatures that hover at least 10˚F 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 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 will attain or exceed 105˚F and are issued within twelve hours of the onset of said event. 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 scenario for extreme temperature would be widespread areas of the Commonwealth experiencing 90˚F or higher temperatures for an extended number of days. The excessive heat in a worst-case scenario could overwhelm the power grid and cause widespread blackouts, thus cutting off vital HVAC services for residents. This event could create crisis management issues for senior citizens on fixed incomes and the homeless population of the Commonwealth. The heat index is a measurement that considers both the temperature and relative humidity and is calculated as shown in *Figure 17 – National Weather Service's Heat Index Matrix*.

Figure 17 - National Weather Service's Heat Index Matrix

Temperature (°F)

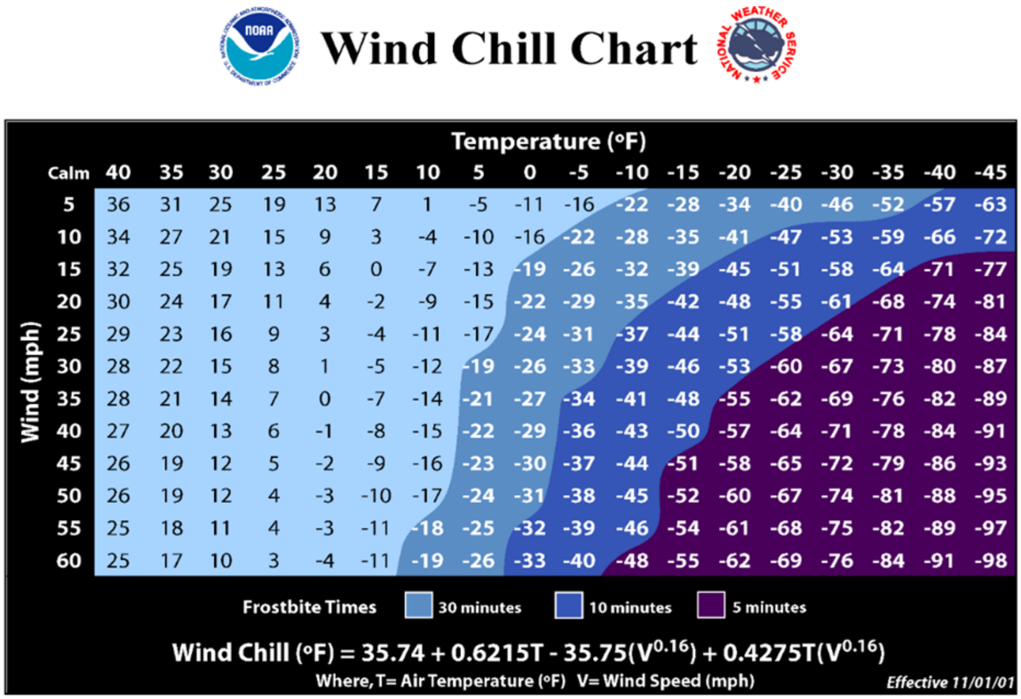
Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	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 apparent temperatures drop further, and exposure to such extreme cold temperatures can cause hypothermia, frost bite, and death. Wind chill warnings are issued when the wind chill drops 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 the wind chill drops to between -10˚F and -24˚F. Wind chill advisories are issued in the southern-central to northern regions of the Commonwealth when wind chill drops to between -15˚F and -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 18 – National Weather Service's Wind Chill Matrix*.

Figure 18 - National Weather Service's Wind Chill Matrix



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

4.3.3.3 Past Occurrence

Cameron County has had more past occurrences of extreme cold incidents than extreme heat due to the geographic location of the county. *Table 14 – Past Extreme Temperature Occurrences for Cameron County* shows the past occurrence events associated with extreme temperature (cold and extreme cold) that have occurred in Cameron County. The data in the table was reported from 2007 to the year 2019. Due to the source used, no further events have been documented since 2019, however, events most likely occurred without being documented. There have been a total of eighteen cold and extreme cold events in Cameron County in the above time frame. There were no reported deaths or injuries related to the occurrences listed in the table below. There most likely were a variety of heat related events for the past extreme occurrences in Cameron County but none of those were reported to the NOAA NCEI Storm Database. Due to the high number of sources available with information, the total number of events in Cameron County could vary slightly.

Data from the National Climatic Data Center reports that there have been a total of 732 extreme temperature episodes in Pennsylvania from 2000 to present, resulting in a total of ninety-six deaths and 103 injuries. Out of the total number of events, 238 events were excessive heat events, and the remaining 494 events were extreme cold or wind chill events. The biggest event that affected the Commonwealth occurred on June 21st, 2011, which had a significant effect on large portions of Pennsylvania. There were a total of twenty-five deaths and sixty injuries within one day. Record-breaking heat temperatures were experienced in nineteen different counties.

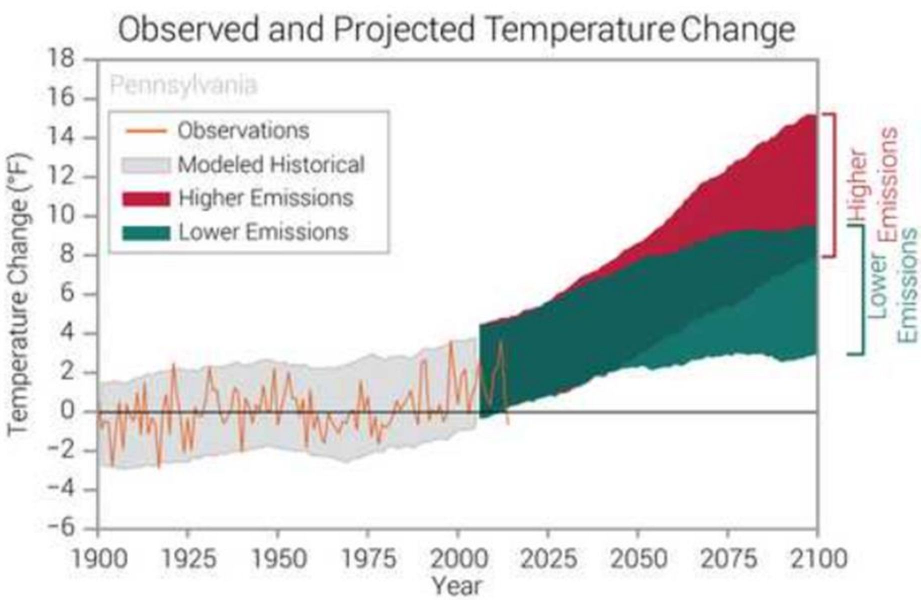
Table 14 - Past Extreme Temperature Occurrences for Cameron County

Past Extreme Temperature Occurrences for Cameron County		
Location	**Date**	**Type**
Cameron County (entire county)	12/20/2004	Cold / Wind Chill
Cameron County (entire county)	01/26/2007	Extreme Cold / Wind Chill
Cameron County (entire county)	02/03/2007	Extreme Cold / Wind Chill
Cameron County (entire county)	02/07/2007	Extreme Cold / Wind Chill
Cameron County (entire county)	03/06/2007	Extreme Cold / Wind Chill
Cameron County (entire county)	01/19/2008	Extreme Cold / Wind Chill
Cameron County (entire county)	02/10/2008	Extreme Cold / Wind Chill
Cameron County (entire county)	12/21/2008	Extreme Cold / Wind Chill
Cameron County (entire county)	01/15/2009	Extreme Cold / Wind Chill
Cameron County (entire county)	03/02/2009	Extreme Cold / Wind Chill
Cameron County (entire county)	01/06/2014	Extreme Cold / Wind Chill
Cameron County (entire county)	01/28/2014	Extreme Cold / Wind Chill
Cameron County (entire county)	02/14/2015	Extreme Cold / Wind Chill
Cameron County (entire county)	02/19/2015	Extreme Cold / Wind Chill
Cameron County (entire county)	02/23/2015	Extreme Cold / Wind Chill
Cameron County (entire county)	01/05/2018	Extreme Cold / Wind Chill
Cameron County (entire county)	01/20/2019	Extreme Cold / Wind Chill
Cameron County (entire county)	01/30/2019	Extreme Cold / Wind Chill
Source: NOAA NCEI, 2021		

4.3.3.4 Future Occurrence

Extreme temperatures will continue to impact Cameron 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 2021 compared to the period 1901 to 1960 and temperatures are expected to continue rising. *Figure 19 – 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. 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 2050. While there may be fewer extreme cold events, those that do occur are expected to reach record-setting low temperatures more often. Historically, Cameron County has had more extreme cold events than extreme heat events due to the geographic location of the county. That balance is expected to shift as climate change continues to affect the globe.

Figure 19 - Observed and Projected Temperature Change for Pennsylvania



Source: NOAA National Centers for Environmental Information

4.3.3.5 Vulnerability Assessment

Extreme temperatures are usually a regional hazard when they occur. The very old and the very young are the 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 to consumers. The increased expense can make it difficult for the consumer to afford the service. 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 puts a large population at risk. Extreme temperature events can also drastically increase the volume of emergency calls, potentially overwhelming the public safety answering point. Extreme heat events can also contribute to drought conditions, which in turn increase the risk of wildfires.

Figure 20 - Average Minimum Temperature Trends for Pennsylvania

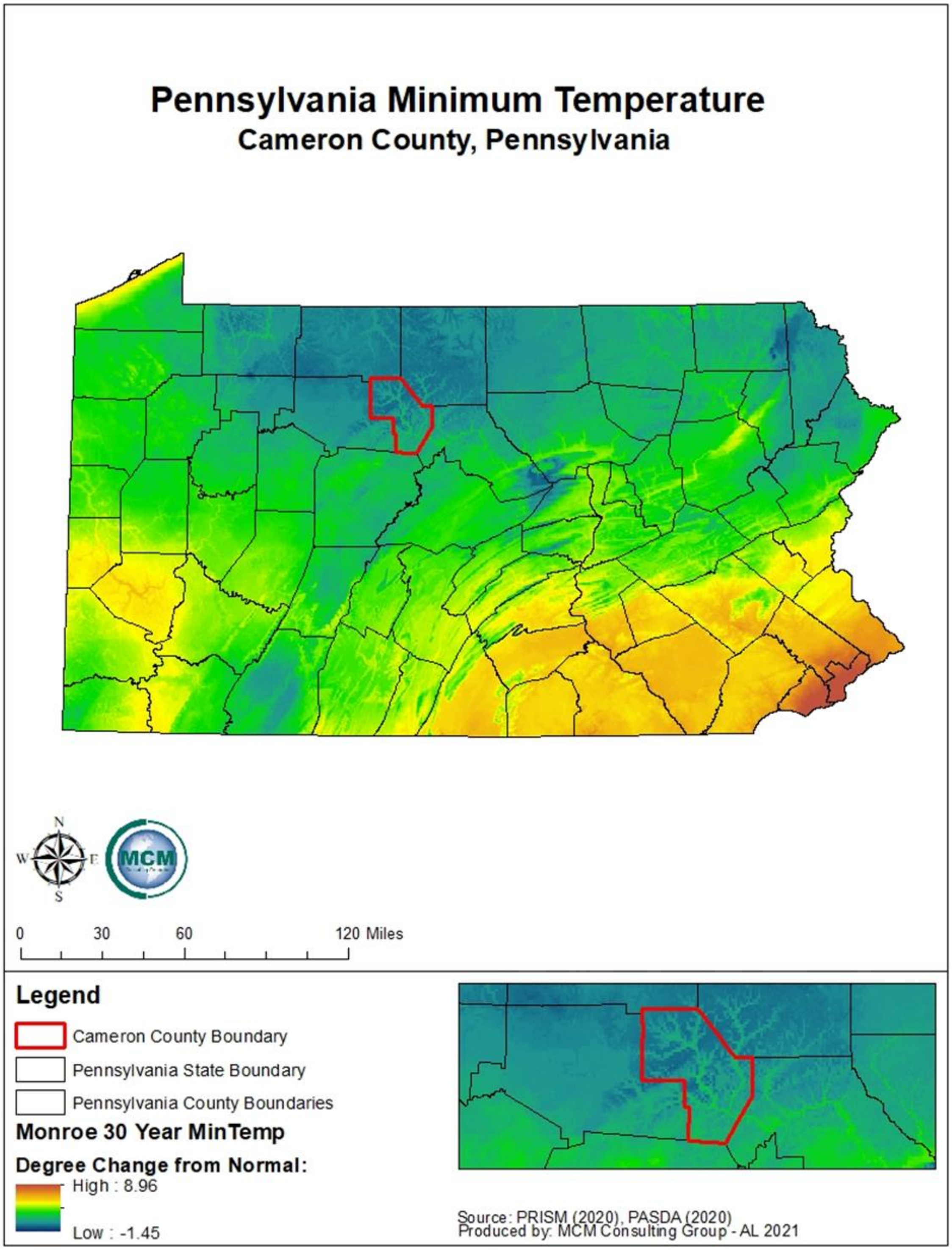
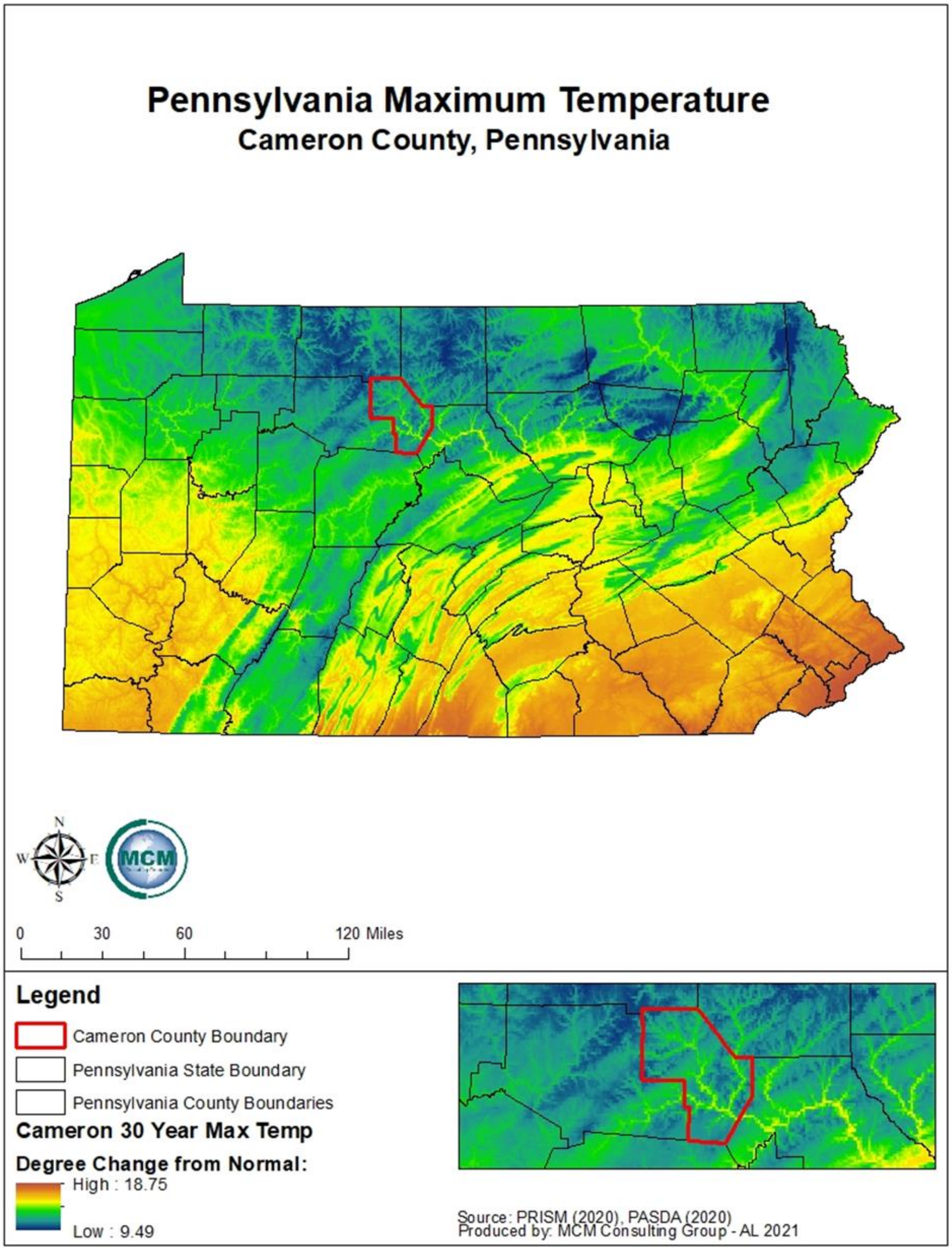


Figure 21 - Average Maximum Temperature Trends for Pennsylvania



4.3.4. Flooding, Flash Flooding, and Ice Jam Flooding

4.3.4.1 Location and Extent

Flooding is the temporary condition of partial or complete inundation on normally dry land and it is the most frequent and costly of all hazards in Pennsylvania. Flooding events are generally the result of excessive precipitation. General flooding is typically experienced when precipitation occurs over a given river basin for an extended period of time. Flash flooding is usually a result of heavy localized precipitation falling in a short time period over a given location, often along mountain streams and in urban areas where much of the ground is covered by impervious surfaces. The severity of a flood event is dependent upon a combination of stream and river basin topography and physiography, hydrology, precipitation and weather patterns, present soil moisture conditions, the degree of vegetative clearing as well as the presence of impervious surfaces in and around flood-prone areas. Winter flooding can include ice jams, 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. 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 the floodplain associated with a flood that has a 0.2% annual chance of occurring.

The National Flood Insurance Program (NFIP) publishes digital flood insurance rate maps (DFIRMs). These maps identify the 1% annual chance of flood areas. Special Flood Hazard Area (SFHA) and Base Flood Elevations (BFE) are developed from the 1% annual chance flood event, as seen in *Figure 22 – Flooding and Floodplain Diagram*. Structures located in the SFHA have 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 Cameron County local governments. Federal floodplain management regulations and mandatory flood insurance purchase requirements apply to the following high risk special flood hazard areas in *Table 15 – Flood Hazard High Risk Zones* (FEMA, 2016). Appendix D of this hazard mitigation plan includes a flooding vulnerability map for each municipality in Cameron County with vulnerable structures and critical facilities identified using the most current DFIRM data for Cameron County.

Cameron County is located largely in the Sinnemahoning Watershed. 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 critical 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 and/or store hazardous materials. A flood could potentially release and transport hazardous materials out of these areas. As water recedes it would spread hazardous materials throughout the area. Most flood damage to property and structures located in the floodplain is caused by water exposure to the interior, high velocity water and debris flow.

Figure 22 - Flooding and Floodplain Diagram

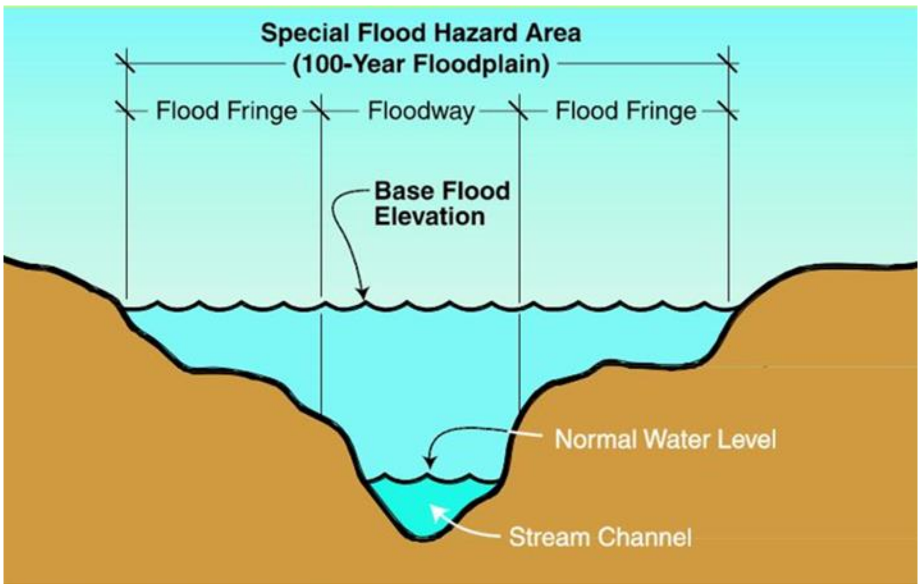


Table 15 - Flood Hazard High Risk Zones

Flood Hazard High Risk Zones	
Zone	**Description**
A	Areas subject to inundation by the 1% annual chance flood event. Because detailed hydraulic analysis have 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. Base Flood Elevations 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. Base Flood Elevations 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.

Flood Hazard High Risk Zones	
Zone	**Description**
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, 2016	

4.3.4.2 Range of Magnitude

The West Branch of the Susquehanna River Basin has caused significant flooding in Cameron County, specifically on the following streams, creeks, and their tributaries:

- Sinnemahoning Creek
- Driftwood Branch – Sinnemahoning Creek
- Bennett Branch – Sinnemahoning 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 Cameron County can cause more severe floods as runoff reaches receiving water bodies more rapidly over steep terrain. 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 floods. Additionally, small amounts of rain can cause floods in locations where the soil is frozen, saturated from a previous wet period, or if the area is rife with impermeable surfaces such as large 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.

In the winter months, local flooding could be exacerbated by ice jams in rivers, Ice jam floods occur on rivers that are totally or partially frozen. A rise in stream level will break up a totally frozen river and create ice flows that can pile up on channel obstructions such as shallow riffles, log jams, or bridge piers. The jammed ice creates a dam across the channel over which the water and ice mixture continues to flow, allowing for more jamming to occur.

Severe flooding can cause injuries and deaths and can have long-term impacts on the health and safety of the citizens. Severe flooding can also result in significant property damage, potentially disrupting the regular function of critical facilities and have long-term negative impacts on local economies. Industrial, commercial, and public infrastructure facilities can become inundated with flood waters, threatening the continuity of government and business. The special needs population must be identified and located in flooding situations, as they are often home bound. Mobile homes are especially vulnerable to high water levels. Flooding can have significant environmental impacts when flood waters release and/or transport hazardous materials and can also result in spreading disease. Severe flooding also comes with many secondary effects that could have long lasting impacts on the population, economy, and infrastructure of Cameron 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. Critical infrastructure, such as sewage and water treatment facilities, can be severely damaged, having significant effect on public health. High flood waters can cause sewage systems to fail and overflow, contaminating groundwater and drinking water. Flooding also has the potential to trigger other hazards, such as landslides, hazardous material spills, and dam failures.

The most severe flooding in Central Pennsylvania has been associated with the Susquehanna River Basin. The greatest magnitude of county wide flooding impacts was reported as the 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. The average rainfall associated with this event was 8 ½ inches of rain reported over most areas. The 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.

The maximum threat of flooding in Cameron County is estimated by looking at potential loss data and repetitive loss data, both analyzed in the risk assessment portion 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 Cameron County and there were no failed reaches within the scenario. The FEMA 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 16 – 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 17 – HAZUS Business Interruption Economic Loss Figures*. *Figure 23 – Loss by Occupancy Type* illustrates the breakdown of economic losses by either residential, commercial, industrial, or other use type.

Table 16 - HAZUS Building Loss Figures

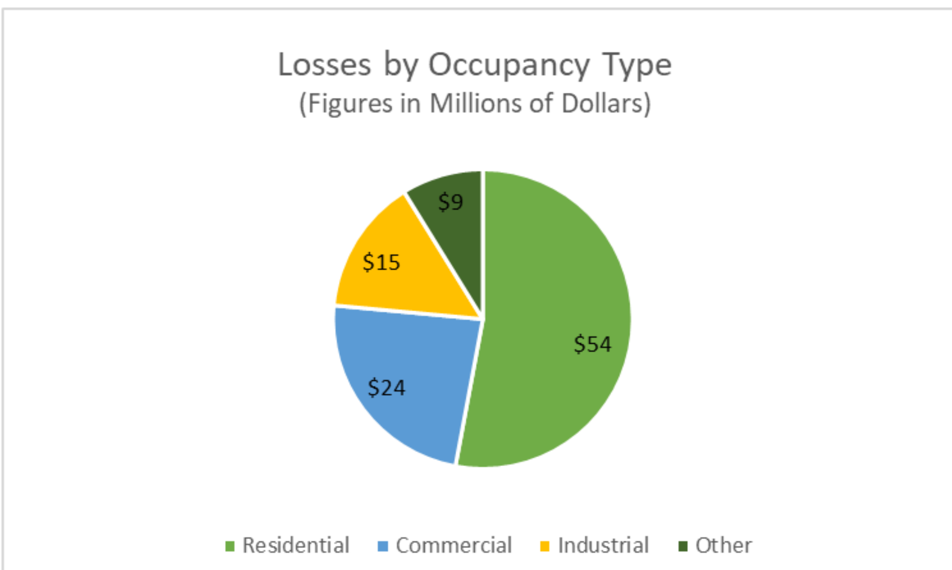
HAZUS Building Economic Loss Figures					
	Residential	**Commercial**	**Industrial**	**Other**	**Total**
Building:	$27,690,000.00	$2,610,000.00	$3,380,000.00	$190,000.00	$33,880,000.00
Content:	$12,040,000.00	$7,540,000.00	$8,830,000.00	$1,060,000.00	$29,470,000.00

HAZUS Building Economic Loss Figures					
	Residential	**Commercial**	**Industrial**	**Other**	**Total**
Inventory:	$0	$220,000.00	$1,080,000.00	$10,000.00	$1,310,000.00
Subtotal:	**$39,730,000.00**	**$10,370,000.00**	**$13,290,000.00**	**$1,260,000.00**	**$64,650,000.00**
Source: HAZUS, 2021					

Table 17 - HAZUS Business Interruption Economic Loss Figures

HAZUS business Interruption Economic Loss Figures					
	Residential	**Commercial**	**Industrial**	**Other**	**Total**
Income:	$160,000.00	$4,380,000.00	$910,000.00	$290,000.00	$5,730,000.00
Relocation:	$10,390,000.00	$1,350,000.00	$460,000.00	$220,000.00	$12,420,000.00
Rental Income:	$3,250,000.00	$980,000.00	$120,000.00	$80,000.00	$4,430,000.00
Wage:	$370,000.00	$6,520,000.00	$560,000.00	$6,900,000.00	$14,340,000.00
Subtotal:	**$14,160,000.00**	**$13,230,000.00**	**$2,040,000.00**	**$7,490,000.00**	**$36,920,000.00**
Source: HAZUS, 2021					

Figure 23 - 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 sediment 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 can contaminate habitats after flood events.

4.3.4.3 Past Occurrence

Cameron County has experienced numerous flooding, flash flooding, and ice jam flooding events in the past. The flooding and flash flooding was caused by a variety of heavy storms, tropical storms, ice jams, and other issues. A summary of flood event history for Cameron County is found in *Table 18 – Past Flood and Flash Flood Events*.

Table 18 - Past Flood and Flash Flood Events

Past Flood and Flash Flood Events (NCEI NOAA)			
Event Location	**Event Date**	**Event Type**	**Property Damage Estimate**
Cameron County (entire county)	1936	Flood	$200,000.00*
Cameron County (entire county)	1942	Flood	$1,000,000.00*
Cameron County (entire county)	06/22/1972	Flood	$0*
Cameron County (entire county)	06/20/1989	Flood	$0*
Sinnemahoning	11/28/1993	Flood	$0*
Cameron County (entire county)	08/18/1994	Flood	$0*
Cameron County (entire county)	01/19/1996	Flood	$0*
Cameron County (entire county)	01/19/1996	Flash Flood	$0*
Cameron County (entire county)	02/20/1996	Flash Flood	$0*
Emporium Borough	05/11/1996	Flash Flood	$0*
Emporium Borough	08/09/2003	Flash Flood	$50,000.00*
Cameron County (entire county)	11/19/2003	Flood	$0*
Emporium Borough	11/19/2003	Flash Flood	$0*
Cameron County (entire county)	09/08/2004	Flood	$0*
Cameron County (entire county)	09/17/2004	Flood	$0*
Cameron County (entire county)	09/18/2004	Flood	$0*
Lumber Township	03/09/2009	Flood	$0*
Cameron County (entire county)	01/25/2010	Flood	$0*
Shippen Township	12/01/2010	Flood	$200,000.00*
Cameron County (entire county)	02/28/2011	Flood	$0*
Cameron County (entire county)	09/29/2015	Flood	$0*
Cameron County (entire county)	06/18/2019	Flood	$0*
Cameron County (entire county)	11/05/2019	Flood	$0*
Cameron County (entire county)	08/18/2021	Flood	$0*
		Total:	**$1,450,000.00***
*Property Damage Values are estimated and are not exact figures. Data from NCEI and Corvena Knowledge Center			

The National Flood Insurance Program 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 make value of the structure at the time of each such flood event; and at the time of the second incidence of flood related damage, the contract for flood insurance contains increased cost of compliance coverage. *Table 19 – Repetitive Loss Properties* and *Table 20 – Summary of Type of 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 eight repetitive properties in Cameron 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 buildings payments exceed the property value. There are no severe repetitive loss properties in Cameron County.

Most municipalities in Cameron County participate in the NFIP. Information of each participating municipality can be found in *Table 21 – Municipal NFIP Policies & Vulnerability*.

Table 19 - Repetitive Loss Properties

Repetitive Loss Properties						
Community Name	**Community Number**	**Cumulative Building Payment**	**Cumulative Contents Payment**	**Sum of Total Paid**	**Losses**	**Properties**
Gibson Township	421130	$63,175.31	$33,643.18	$96,818.49	4	2
Grove Township	421128	$107,622.52	$23,211.93	$130,834.45	8	3
Lumber Township	421129	$34,644.62	$1,355.90	$36,000.52	6	2
Shippen Township	421103	$4,380.57	$11,630.78	$16,011.35	2	1
	Total:	**$**	**$**	**$**		
Source: PEMA, 2021						

Table 20 - 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**
Gibson Township	0	0	2	0	0
Grove Township	1	0	2	0	0
Lumber Township	0	0	2	0	0
Shippen Township	0	0	1	0	0
Totals:	**1**	**0**	**7**	**0**	**0**
Source: PEMA, 2021					

Table 21 - Municipal NFIP Policies & Vulnerability

Municipal NFIP Policies					
Community Name	**Community Number**	**Contract Count**	**Policy Count**	**Total Coverage**	**Premium and Policy Fee**
Driftwood Borough	420245	3	3	$156,700.00	$1,875.00
Emporium Borough	420246	10	10	$2,163,300.00	$27,192.00
Gibson Township	421130	4	4	$313,900.00	$4,240.00
Grove Township	421128	3	3	$423,000.00	$1,456.00
Lumber Township	421129	8	8	$696,500.00	$10,594.00
Portage Township	421132	7	7	$636,200.00	$7,386.00
Shippen Township	421103	70	70	$5,214,300.00	$57,034.00
	Total:	**105**	**105**	**$9,603,900.00**	**$109,777.00**
Source: PEMA 2020					

4.3.4.4 Future Occurrence

Flooding is a frequent problem throughout Pennsylvania. The probability of a flooding event impacting Cameron County is highly likely. Cameron 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 or 100-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 over a given year or is likely once every 100 years.

The digital flood insurance rate maps (DFIRMs) are used to identify areas subject to the 1% annual-chance 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 water way. The ten-year flood zone is an area that 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. It designates the probability of a flood of this magnitude 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 22 – Flood Probability Summary*.

Table 22 - 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, 2016	

4.3.4.5 Vulnerability Assessment

Riverine and Stream Flooding:

Cameron County is vulnerable to flooding events. Flooding puts the entire population at some level of risk, whether through the flooding of homes, businesses, places of employment, or the road, sewer, and water infrastructure. There are critical infrastructures that are located in the SFHA as outlined by FEMA in Cameron County. Critical infrastructure located in Emporium or close to the Portage or Sinnemahoning Creeks are the most vulnerable to the effects of flooding. Appendix D of this hazard mitigation plan includes a flooding vulnerability map for each municipality in Cameron County with vulnerable structures and critical infrastructure identified. *Table 24 – County Structures Within Special Flood Hazard Area* lists the number of site structure address points that are located in FEMA's Special Flood Hazard Area as well as critical infrastructure and functional needs facilities. *Figure 24 – Special Flood Hazard Area* illustrates the Special Flood Hazard Area in Cameron County.

Table 23 – 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 is a single facility that is estimated to be at least moderately damaged by a 100-year flooding event in the HAZUS level two scenario that was completed for Cameron County. That facility is one police station and could experience a loss of use. With this in mind, the police station in question should review emergency operations plans and relocation plans, and if one is not available, one should be developed.

Table 25 – Critical Infrastructure and Functional Needs Additional Information illustrates the additional information including name, the municipality, and the type of facility for each critical infrastructure and functional needs facilities that fall within the Special Flood Hazard Area for Cameron County. This information was compiled using the Cameron County GIS data provided at the beginning of the planning period.

Table 23 - 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	3	0	0	0
Hospitals	0	0	0	0
Police Stations	3	1	0	1
Schools	2	0	0	0

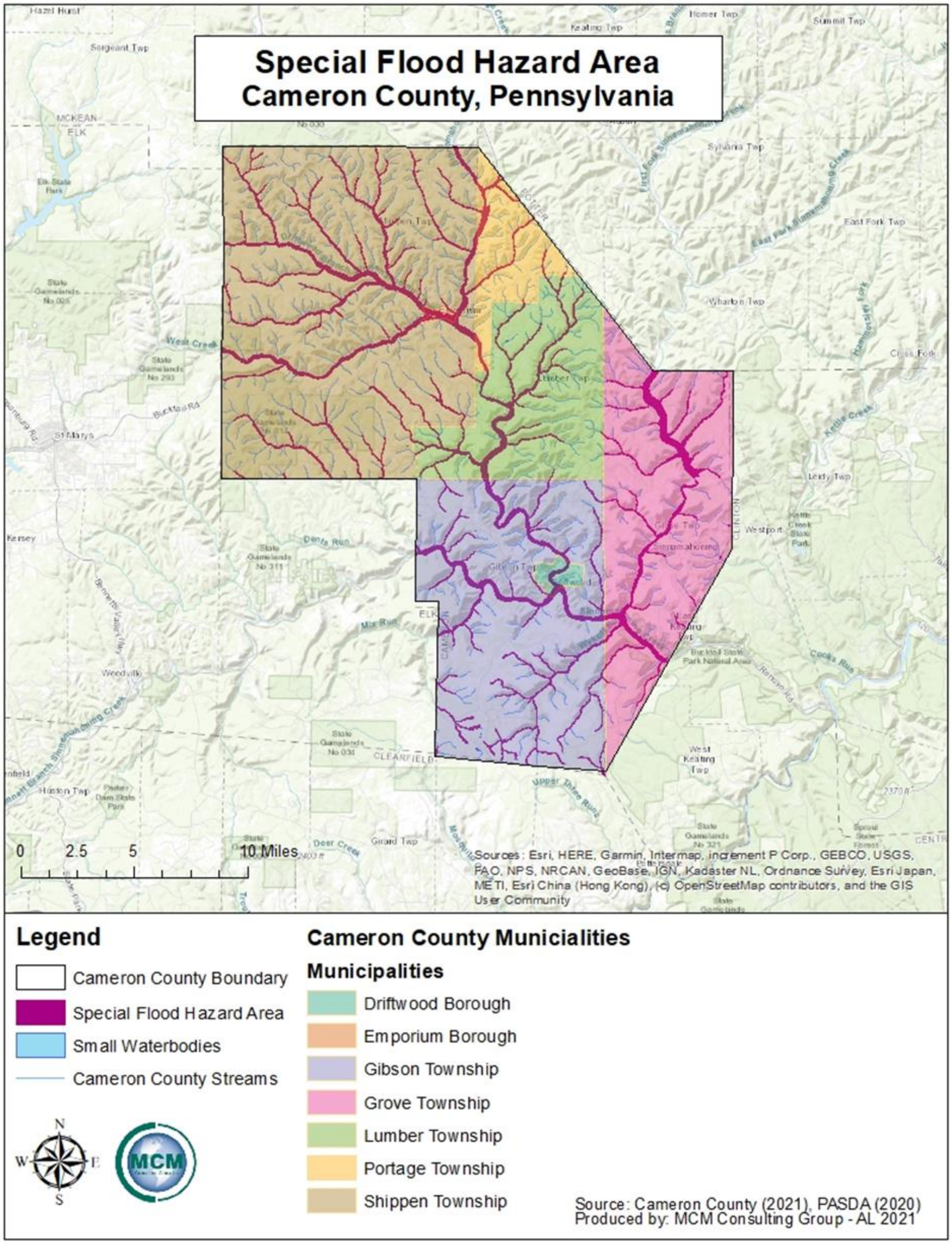
Table 24 – County Structures Within Special Flood Hazard Area

County Structures Within Special Flood Hazard Area			
Municipality	**Site Structure Address Points Within Flood Area**	**Critical Infrastructure Within Flood Area**	**Functional Needs within Flood Area**
Driftwood Borough	62	0	0
Emporium Borough	502	2	2
Gibson Township	171	0	0
Grove Township	185	1	0
Lumber Township	123	0	0
Portage Township	80	0	0
Shippen Township	518	1	0
Total:	**1,641**	**4**	**2**

Table 25 - Critical Infrastructure and Functional Needs Additional Information

Critical Infrastructure and Functional Needs Additional Information in Special Flood Hazard Area		
Type of Facility:	**Facility Name:**	**Municipality:**
Critical Infrastructure		
Ambulance Stations	Emporium Ambulance Agency	Emporium Borough
Fire Departments	Emporium Volunteer Fire Department	Emporium Borough
	Sinnemahoning Volunteer Fire Department	Grove Township
Police Stations	Pennsylvania State Police	Shippen Township
Functional Needs Facilities		
Schools/Education Facilities	Cameron County Family Center	Emporium Borough
	Cameron County Junior / Senior High School	Emporium Borough

Figure 24 - Special Flood Hazard Area



4.3.5. Hurricane and Tropical Storm

4.3.5.1 Location and Extent

Cameron 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 mph and 74 mph. When wind speeds exceed 74 mph, the system is considered a hurricane. Tropical storms systems (i.e., hurricanes, tropical storms, and tropical depressions) impacting Cameron County develop in tropical or sub-tropical waters found in the Atlantic Ocean, Caribbean Sea, or Gulf of Mexico. Another type of tropical storms are nor'easters, which are large cyclones that rotate clockwise and are 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 Cameron County is located about 250 miles inland of the Atlantic Coast of the United States, tropical storms can track inland and cause heavy rainfall and strong winds. Cameron County is located just inland of the East Coast region, designated by FEMA, as being Hurricane-Susceptible (see *Figure 26 – Pennsylvania Wind Zones*). Cameron County falls within the wind zone III as shown in *Figure 26 – Pennsylvania Wind Zones*. Zone III for Cameron suggests that shelters and critical facilities should be able to withstand a three second gust of wind up to 110 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 season typically lasts from June to November in any given year. All communities within Cameron County are equally subject to the impacts of hurricanes and tropical storms that track near the county. Areas in Cameron County which are subject to flooding, wind, and winter storm damage are particularly vulnerable.

4.3.5.2 Range of Magnitude

The impact tropical storm or hurricane events have on an area is typically measured in terms of wind speed. Intense precipitation and wind resulting in flood and wind damage are the most common impacts associated with the coastal storm systems in Pennsylvania. However, it is not uncommon for tornadoes to develop during the events. Flood damage results from intense precipitation and wind, typically from coastal storms, which impact Cameron County. Expected damage from hurricane force winds is measured using the Saffir-Simpson Scale (*Table 26 - 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. A category one storm results in very dangerous winds with some damage, while a category two storm results in extremely dangerous winds with extensive damage. However, category three storms result in devastating damage and category four/five storms result in catastrophic damage. While 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 Cameron County, wind impacts from tropical events include downed trees and utility poles to cause utility interruptions. Wind impacts are an additional issue associated with mobile homes due to structures not being well-anchored. Additionally, these storms can produce high volumes of rainfall in Cameron County that cause flash flooding initially and then follow with stream and river flooding. The risk assessment and associated impact for flooding events is included Section 4.3.4.5.

Table 26 - Saffir-Simpson Scale

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

4.3.5.3 Past Occurrence

Table 27 - History of Coastal Storms Impacting Cameron County lists all coastal storms that have impacted Cameron County from 1952 to 2021. *Figure 25 – Historic Tropical Storms/Hurricanes in Pennsylvania* identifies some past hurricanes that had an inland path through Pennsylvania. *Figure 27 – Past Hurricane Impacts for Cameron County* indicates past hurricane events that have affected specifically Cameron County rather than the whole Commonwealth itself. As stated, even if a storm did not pass-through Cameron County, the

wind and rain from the storm could have still impacted the county. Hurricane Agnes was a severe coastal storm event in June 1972 that impacted Cameron 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 throughout the state. Pennsylvania incurred $2.8 billion in damages and fifty deaths statewide. However, in Cameron County, the most significant effects of Hurricane Agnes were due to severe flooding rather than winds. 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. Other tropical cyclones which did not tract through Pennsylvania but caused significant damage to communities in the Commonwealth include Sandy (2012), Lee/Irene (2011), Ivan (2004), Floyd (1999), and Eloise (1975).

Table 27 - History of Coastal Storms Impacting Cameron County

History of Coastal Storms Impacting Cameron County			
Year	**Name of Coastal Storm**	**Year**	**Name of Costal Storm**
1952	Able	2005	Katrina
1954	Hazel	2006	Ernesto
1955	Diane	2011	Lee
1955	Connie	2011	Irene
1959	Gracie	2012	Sandy
1972	Agnes	2016	Matthew
1979	Frederic	2017	Harvey
1992	Danielle	2017	Irma
1994	Beryl	2017	Nate
1999	Dennis	2018	Florence
1999	Floyd	2020	Isaias
2004	Ivan	2021	Ida
Source: HomeFacts, 2018; USGS, 2020			

4.3.5.4 Future Occurrence

Although hurricanes and tropical storms can cause flood events consistent with 100- and 500-year flood levels, the probability of occurrence of hurricanes and tropical storms is measured relative to wind speed. One approach to determining the future probability of hurricanes is to examine the frequency and spatial distribution of past hurricanes which is applied in developing its National Risk Index (NRI). To determine the spatial distribution of hurricane hazard, FEMA calculated the maximum number of hurricane paths overlapping each census tract over the available period of record. *Table 28 - Annual Probability of Wind Speeds* shows the annual probability of winds that reach the strength of tropical storms and hurricanes in Cameron County and the surrounding areas based on a sample period of forty-six years. According to FEMA, there is a high probability each year that Cameron County will experience winds from coastal storms that could cause minimal to moderate damages (*Table 28 - Annual Probability of Wind Speeds*). The future probability of a tropical storm or hurricane will be approximately once every five years, or 20% chance annually. The probability of winds exceeding 118 mph is less than 0.1% annually.

Table 28 - Annual Probability of Wind Speeds

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

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

Climate change is causing atmospheric temperatures to rise, which corresponds to a rise in ocean surface temperatures, resulting in warmer and moister conditions where tropical storms develop. However, the relationship between climate change and hurricanes can be complex due to the many other factors that are associated with hurricane development which include wind shear and air pollution. Warmer oceans store more energy and are capable of fueling stronger storms and it is projected that Atlantic hurricanes will become more intense and produce more precipitation as ocean surface temperatures rise. The storms associated with the tropical storms/hurricanes can also linger for a longer period of time in a given place due to 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 the increased frequency of the 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 which may impact the future of Cameron County.

Tropical cyclone intensities are expected to increase with warming, as both theory and models suggest an increase in intensity with a warmer atmosphere, but models disagree about an increase in frequency. Some suggest an increase in frequency of category four and five cyclones with an overall slight reduction in frequency (it is likely the total number of tropical cyclones will stay the same or decrease). It is likely that precipitation rates and maximum sustainable winds associate with tropical cyclones will increase globally, however, regional projections are more uncertain due to differences in circulation patterns and sea surface temperature increases. Therefore, the frequency of intense (stronger and with heavier rainfall) tropical storms is likely to increase.

4.3.5.5 Vulnerability Assessment

The impacts of climate change are no longer hypothetical concepts set in the future, but rather tangible and hazardous realities. Tropical storms tracking nearby Cameron County can not only cause high winds but can also cause 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 Cameron County. which can cause great loss and damage to buildings and structures as well. The assessment for flood-related vulnerability is addressed in Section 4.3.4.5. and discussion of wind related vulnerability is addressed in Section 4.3.11.5. Due to the impact of the devastating hurricanes and tropical storms, the vulnerability for Cameron County is high. Flooding is primarily confined to areas that are near rivers, streams, and creeks.

Figure 25 - Historic Tropical Storms/Hurricanes in Pennsylvania

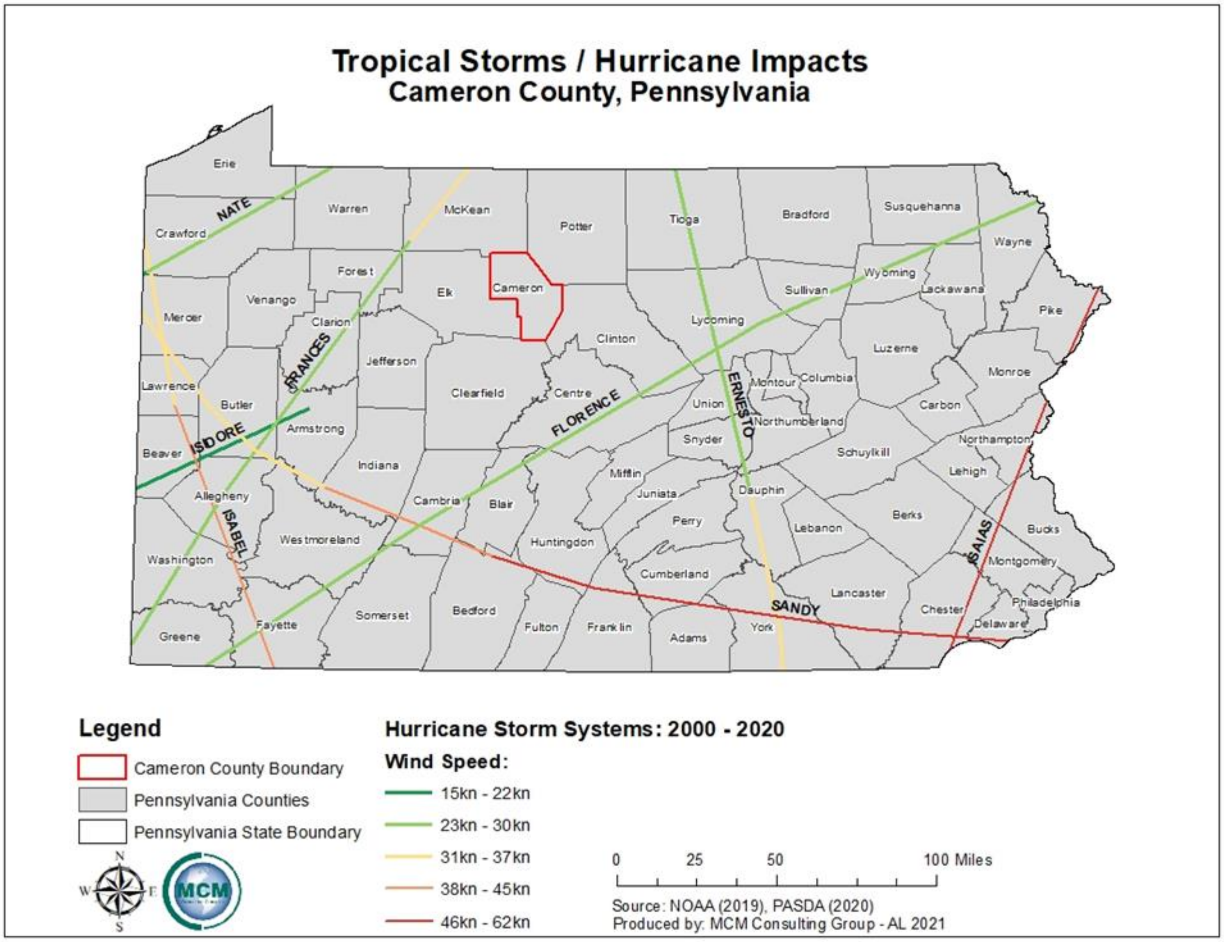


Figure 26 - Pennsylvania Wind Zones

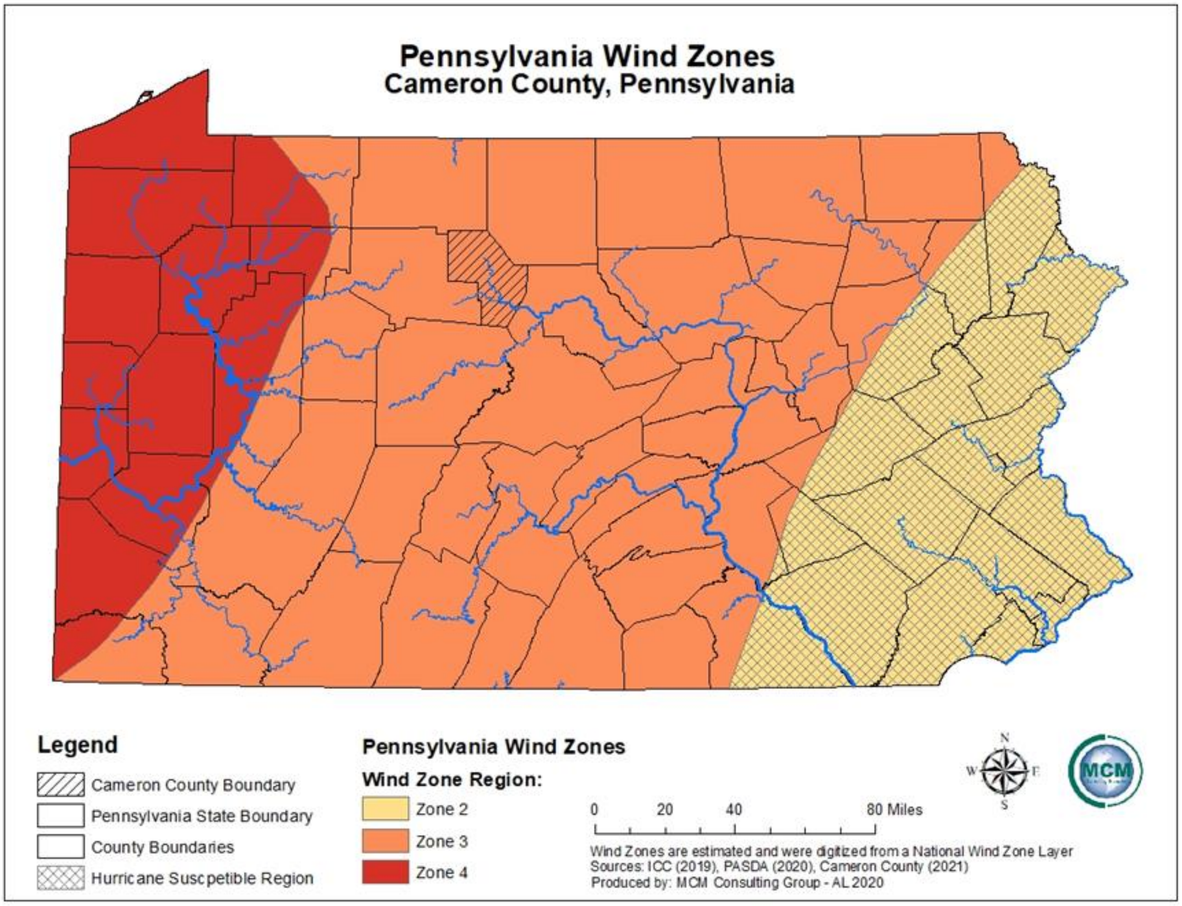
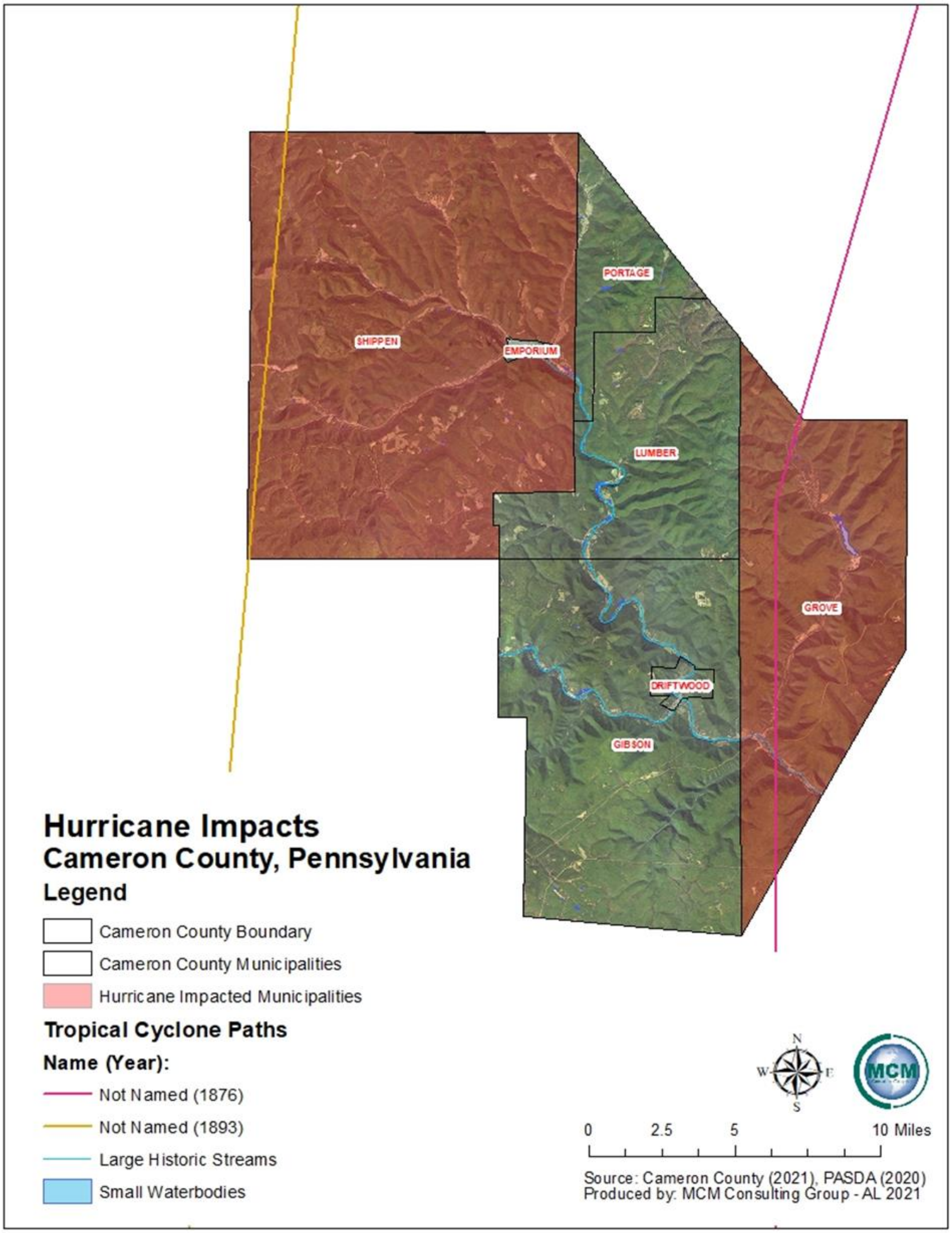


Figure 27 - Past Hurricane Impacts for Cameron County



4.3.6. Invasive Species

4.3.6.1 Location and Extent

An invasive species is a species that is not indigenous to a given ecosystem and that, when introduced to a non-native environment, tends to thrive. The spread of an invasive species often alters ecosystems, which can cause environmental and economic harm and pose a threat to human health. Often, an invasive species spreads and reproduces quickly. They 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 occurrence of invasive species is due to 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 has been limited by state agency activity, like the spotted lanternfly. First discovered in Berks County in 2014, this Asian plant hopper was placed under a quarantine by the Pennsylvania Department of Agriculture in thirteen counties, which later had an effect on Cameron County. *Table 29 - Prevalent Invasive Species* lists invasive species that have been found in Cameron County.

4.3.6.2 Range of Magnitude

The magnitude of invasive species threats ranges from nuisance to widespread killer. Some invasive species are not considered agricultural pests, and do not harm humans or cause significant ecological problems. For example, Brown Marmorated Stink Bugs are not considered to be 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 causes a 99% mortality rate for 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 is the success of the Emerald Ash Borer in Cameron County and the surrounding region. The Emerald Ash Borer has already become established in Cameron County (see *Figure 28 - Emerald Ash Borer Infestation in Pennsylvania*) and the surrounding region, and there is a high mortality rate for trees associated with this pest. The Emerald Ash Borer infestation is still very active in Pennsylvania and in Cameron County where it continues to be an issue for conservation efforts. Large portions of the ash stands in Cameron County are being adversely affected by the Emerald Ash Borer Beetle. The dying ash stands have also caused an increase in safety hazards throughout the county. Dead ash trees have collapsed on roads leading into and out of Cameron County. There has also been a large number of traffic accidents caused by dead and dying ash trees falling on cars, trucks, and personal vehicles.

Another example of a negative 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 was most likely introduced into the northeastern United States in the 1950s and it was first discovered in Pennsylvania in 1967. This insect has been damaging hemlock ever since and it is spreading. To date, sixty-four counties in Pennsylvania, including Cameron County, have been infested with this insect. See *Figure 29 - Hemlock Woolly Adelgid Infestation in Pennsylvania*. Eastern hemlock (Pennsylvania's state tree) and Carolina hemlocks (found further south in the Smoky Mountain sections of the Appalachians) are more susceptible to hemlock woolly adelgid damage than Asian and western hemlock trees due to feeding tolerance and predators that protect the latter species. Hemlock woolly adelgid sucks fluid from the base of hemlock needles. It may also inject toxins into the tree as it feeds, accelerating needle drop and branch dieback. Although some trees die within four years, trees often persist in a weakened state for many years. Hemlocks that have been affected by hemlock woolly adelgid often have a grayish-green appearance (hemlocks naturally have a shiny, dark green color).

A final example of an invasive species is the Spotted Lanternfly. The Spotted Lanternfly is a harmful invasive pest with a healthy appetite for our plants which can negatively impact the quality of life and enjoyment of the outdoors. According to the Penn State Extension, the Spotted Lanternfly is a significant threat to Pennsylvania agriculture, landscapes, and natural ecosystems, including grape, tree-fruit, hardwood, and nursery industries, which collectively are worth nearly $18 billion to the state's economy, outdoor recreation, and biodiversity. The Spotted Lanternfly is undoubtedly traveling west as the State Department of Agriculture announced on March 3, 2020, that an additional twelve counties in Pennsylvania were added to the quarantine area. As of March 2021, eight more counties have been added to the quarantine list which brings the total of counties up to thirty-four. The additional eight counties include Cambria, Cameron, Franklin, Lackawanna, Montour, Pike, Wayne, and Westmoreland. Cameron County was added to the Pennsylvania's Spotted Lanternfly quarantine zone list in March 2021. The Pennsylvania Department of Agriculture indicates the insect was found in the Driftwood area of Cameron County. The Tree-of-Heaven is an invasive tree, and the favored habitat of the spotted lantern fly. The Cameron County Conservation District and Bucktail Watershed Association are currently conducting outreach to landowners who have the Tree-of-Heaven on their properties and are seeking permission to work to eradicate this invasive tree. Cameron County is the only county in this region of the state that is included in the quarantine area. *Figure 30 – Pennsylvania Spotted Lanternfly Infestation* illustrates the counties in Pennsylvania that are in the quarantine zone for this pest.

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

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

4.3.6.3 Past Occurrence

Invasive species have been entering Pennsylvania since the arrival of European settlers, but not all occurrences required government action. Cameron County is known for its great number of geographic features. There are various State Game Lands (SGL) around Cameron County and one State Game Land within the county. SGL 014 is located in Cameron and Elk Counties and contains a total of 14,947 acres between the two counties. In 2017, additional land in Cameron County was added to the state game land system. This new State Game Land is State Game Land 293. The terrain is mountainous and wooded. The other well-known areas in the county that have significant amounts of forest and lakes available for species to invade are three Pennsylvania state parks that are partly in Cameron County. These state parks include Bucktail State Park Natural Area which is a 75-mile scenic route along Pennsylvania Route 120 from Lock Haven in Clinton County to Emporium, the county seat, in Cameron County, Sinnemahoning State Park, and Sizerville State Park. Both Sinnemahoning and Sizerville State Park straddle the Cameron and Potter County line. Due to the vast area of forests, there are many invasive terrestrial species that have been widespread in Cameron County and are common problems throughout the Commonwealth. Some of the most popular problematic species in Cameron County include:

- Asiatic Clam
- Emerald Ash Borer
- Hemlock Woolly Adelgid
- Goatsrue
- Japanese Knotweed
- Mile-a-Minute Weed
- Spotted Lanternfly
- Tree-Of-Heaven

Many of the extreme problematic species have been around for many years. However, the most recent problematic species are the Emerald Ash Borer and Hemlock Wooly Adelgid. In Cameron County, the Emerald Ash Borer was identified in 2013 while the Hemlock Wooly Adelgid was identified much earlier, sometime between 1979 to 2011. Cameron County was added to the quarantine zone list for the Spotted Lantern Fly in 2021.

Table 29 - Prevalent Invasive Species lists problematic non-native species that are established in Cameron County. While all species listed here are not native to Cameron County, those species highlighted in red are considered to pose a more severe ecological threat than some of the others (Rank 1), species highlighted in yellow are considered to pose a significant ecological threat but

not considered to spread as easily and aggressively (Rank 2), and species highlighted in green are considered to pose a lesser ecological threat (Rank 3).

Table 29 - Prevalent Invasive Species

Prevalent Invasive Species		
Scientific Name	**Common Name**	**Type**
Corbicula fluminea	Asiatic Clam	Animal
Lonicera spp	Bush Honeysuckle	Plant
Cirsium vulgare	Bull Thistle	Plant
Cirsium arvense	Canada Thistle	Plant
Veronica officinalis	Common Speedwell	Plant
Tanacetum vulgare	Common Tansy	Plant
Agrilus planipennis	Emerald Ash Borer	Insect
Alliaria petiolata	Garlic Mustard	Plant
Fallopia sachalinensis	Giant Knotweed	Plant
Galega officinalis	Goatsrue	Plant
Lymantria dispar	Gypsy Moth	Insect
Adelges tsugae	Hemlock Woolly Adelgid	Insect
Berberis thunbergii	Japanese Barberry	Plant
Polygonum cuspidatum	Japanese Knotweed	Plant
Microstegium vimineum	Japanese Stiltgrass	Plant
Persicaria perfoliata	Mile-A-Minute Vine	Plant
Lonicera morrowii	Morrow's Honeysuckle	Plant
Rosa multiflora	Multiflora Rose	Plant
Celastrus orbiculata	Oriental Bittersweet	Plant
Lythrum salicaria	Purple Loosestrife	Plant
Lycroma delicatula	Spotted Lanternfly (Lycorma)	Insect
Ailanthus altissima	Tree-of-Heaven	Plant
Elaeagnus umbellata	Autumn Olive	Plant
Cryptococcus fagisuga	Beech Bark Disease	Disease
Cichorium intybus	Chicory	Plant
Tussilago farfara	Colt's-foot	Plant
Verbascum thapsus	Common Mullein	Plant
Hesperis matronalis	Dames rocket	Plant
Popillia japonica	Japanese Beetle	Insect
Poa pratensis	Kentucky Bluegrass	Plant
Phalaris arundinacea	Reed Canary Grass	Plant
Centaurea stoebe ssp. micranthos	Spotted Knapweed	Plant

Prevalent Invasive Species		
Scientific Name	**Common Name**	**Type**
Anthoxanthum odoratum	Sweet Vernal Grass	Plant
Myosotis scorpioides	True Forget-me-not	Plant
Cronartium ribicola	White Pine Blister Rust	Disease
Pastinaca sativa	Wild parsnip	Plant
Ophiognomonia clavigignenti-juglandacearum	Butternut Canker	Disease
Stellaria media	Common Chickweed	Plant
Hypericum perforatum	Common St. John's-wort	Plant
Holcus lanatus	Common Velvetgrass	Plant
Achillea millefolium	Common Yarrow	Plant
Discula destructiva	Dogwood Anthracnose	Disease
Convolvulus arvensis	Field Bindweed	Plant
Pristiphora erichsonii	Larch Sawfly	Insect
Hieracium aurantiacum	Orange Hawkweed	Plant
Source: EDDMaps, 2021; iMapInvasives, 2021; PA DCNR, 2019		

4.3.6.4 Future Occurrence

According to the Pennsylvania Invasive Species Council (PISC), the probability of future occurrence for invasive species threats is growing due to the increasing volume of transported goods, increasing efficiency and speed of transportation, and expanding international trade agreements. Expanded global trade has created opportunities for many organisms to be transported to and establish themselves in new counties and regions. In 2017, Pennsylvania alone imported over $83 billion in goods from abroad, including agricultural, forestry, and fishery goods that commonly carry unknow pests. Climate change is contributing to the introduction of new invasive species. As maximum and minimum seasonal temperatures change, pests can establish themselves in previously inhospitable climates. This also gives introduced species an earlier start and increases the magnitude of their growth, possibly shifting the dominance of ecosystems in the favor of non-native species. In order to combat the increase in future occurrences, the PISC released the Invasive Species Management Plan in April 2010 and updated the plan in 2017. The plan outlines the Commonwealth's goals for managing the spread of nonnative invasive species and creates a framework for responding to threats through research, action, 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 Cameron County but have not yet been detected inside the county (see *Table 30 – 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 meaning prevention is very important. The species that are labeled in red are listed as a Rank 1 species, which indicates a severe ecological threat to the environment. Therefore, Common Carp, Common Reed, Eurasian Watermilfoil, Glossy Buckthorn, Japanese Honeysuckle, Japanese Hop, Jetbead, and Poison Hemlock are all widespread and highly problematic in nearby counties but have not been reported in Cameron County (as shown highlighted in red in *Table 30 – Future Vulnerable Species*). The development of appropriate plans will assist the county in reducing the possibility of a future encounter with any of these species. It would be beneficial to the forests of Cameron County to work toward keeping these species out of the area.

Table 30 - Future Vulnerable Species

Future Vulnerable Species		
Scientific Name	**Common Name**	**Type**
Cyprinus carpio	Common Carp	Animal
Phragmites australis ssp. australis	Common Reed	Plant
Brassica nigra	Black Mustard	Plant
Centaurea jacea	Brown Knapweed	Plant
Halyomorpha halys	Brown Marmorated Stink Bug	Insect
Bromus tectorum L.	Cheatgrass	Plant
Potamogeton crispus L.	Curly-leaved Pondweed	Plant
Linaria dalmatica	Dalmatian Toadflax	Plant
Myriophyllum spicatum	Eurasian Watermilfoil	Plant
Frangula alnus	Glossy Buckthorn	Plant
Lonicera japonica	Japanese Honeysuckle	Plant
Humulus japonicus	Japanese Hop	Plant
Rhodotypos scandens	Jetbead	Plant
Euphorbia esula	Leafy Spurge	Plant
Artemisia vulgaris	Mugwort	Plant
Harmonia axyridis	Multicolored Asian Lady Beetle	Insect
Carduus nutans	Musk Thistle	Plant
Polygonum caespitosum	Oriental Lady's-thumb	Plant
Conium maculatum	Poison Hemlock	Plant
Ligustrum spp.	Privet	Plant
Cytisus scoparius L.	Scotch Broom	Plant

Future Vulnerable Species		
Scientific Name	**Common Name**	**Type**
Rorippa nasturtium-aquaticum	Watercress	Plant
Salix alba	White Willow	Plant
Euonymus fortunei	Winter Creeper	Plant
Iris pseudacorus	Yellow Iris	Plant
Source: EDDMaps, 2021; PA DCNR, 2019; iMapInvasives, 2021		

4.3.6.5 Vulnerability Assessment

Cameron 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 Cameron 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 Cameron County, there is a risk of future damage from invasive species that are present in the area. If an invasive species were to invade the popular terrestrial areas or waterways in Cameron, great devastation could occur. An 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 Cameron 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 Cameron 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, and plants like the Tree-of-Heaven which have all been identified red in *Table 29 - Prevalent Invasive Species* for priority species in Cameron 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 Cameron County but not yet present in the county (priority species in *Table 30 – Future Vulnerable Species*). Public outreach and education are important for 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.

Figure 28 - Emerald Ash Borer Infestation in Pennsylvania

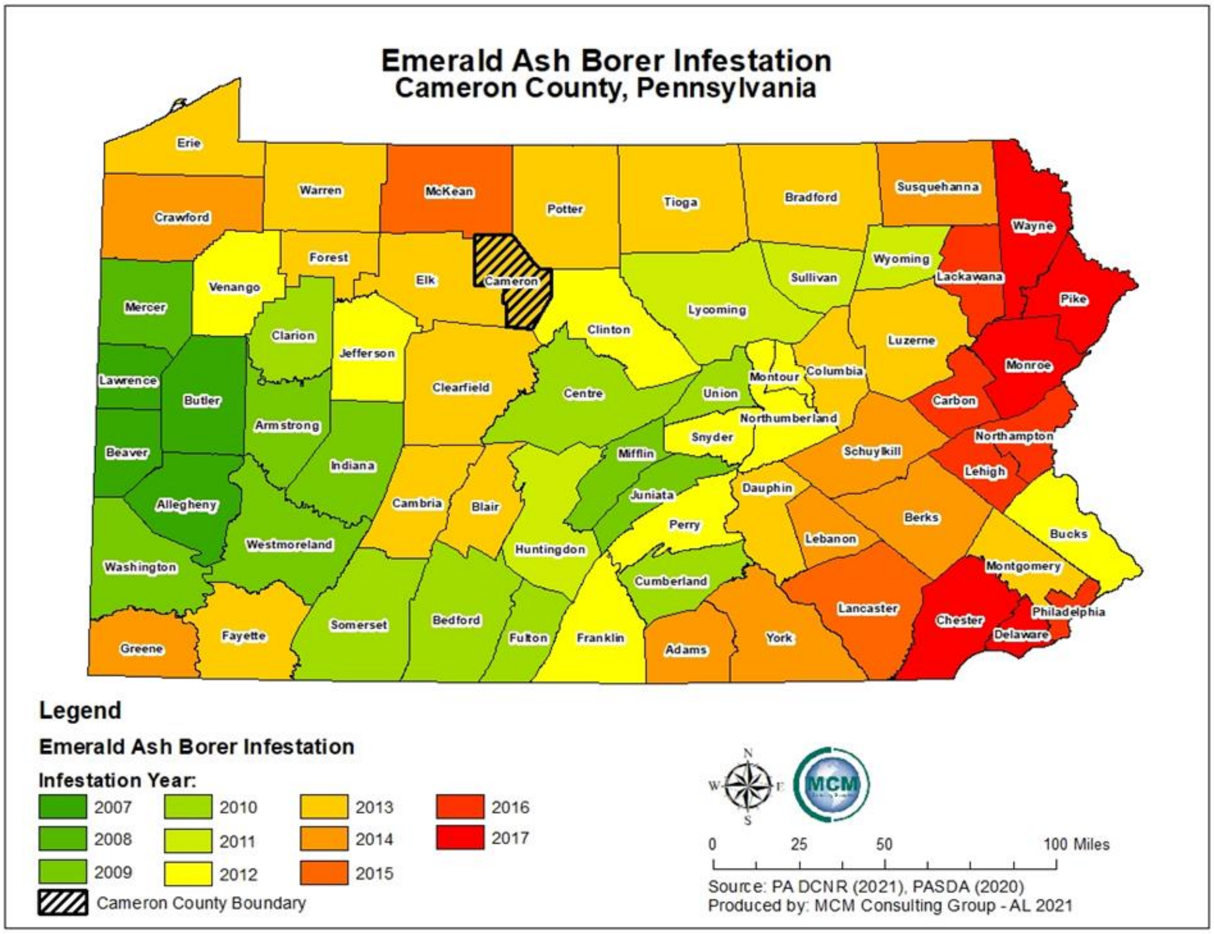


Figure 29 - Hemlock Woolly Adelgid Infestation in Pennsylvania

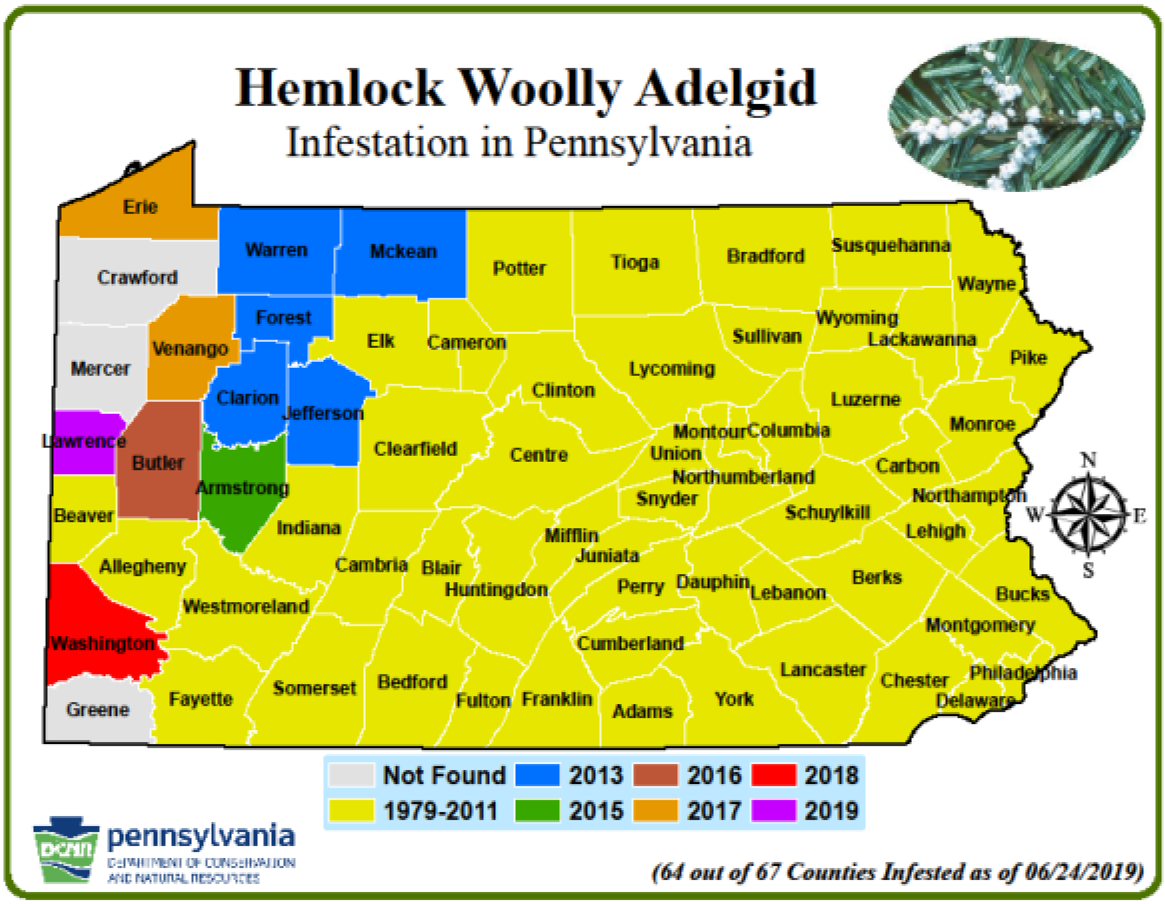
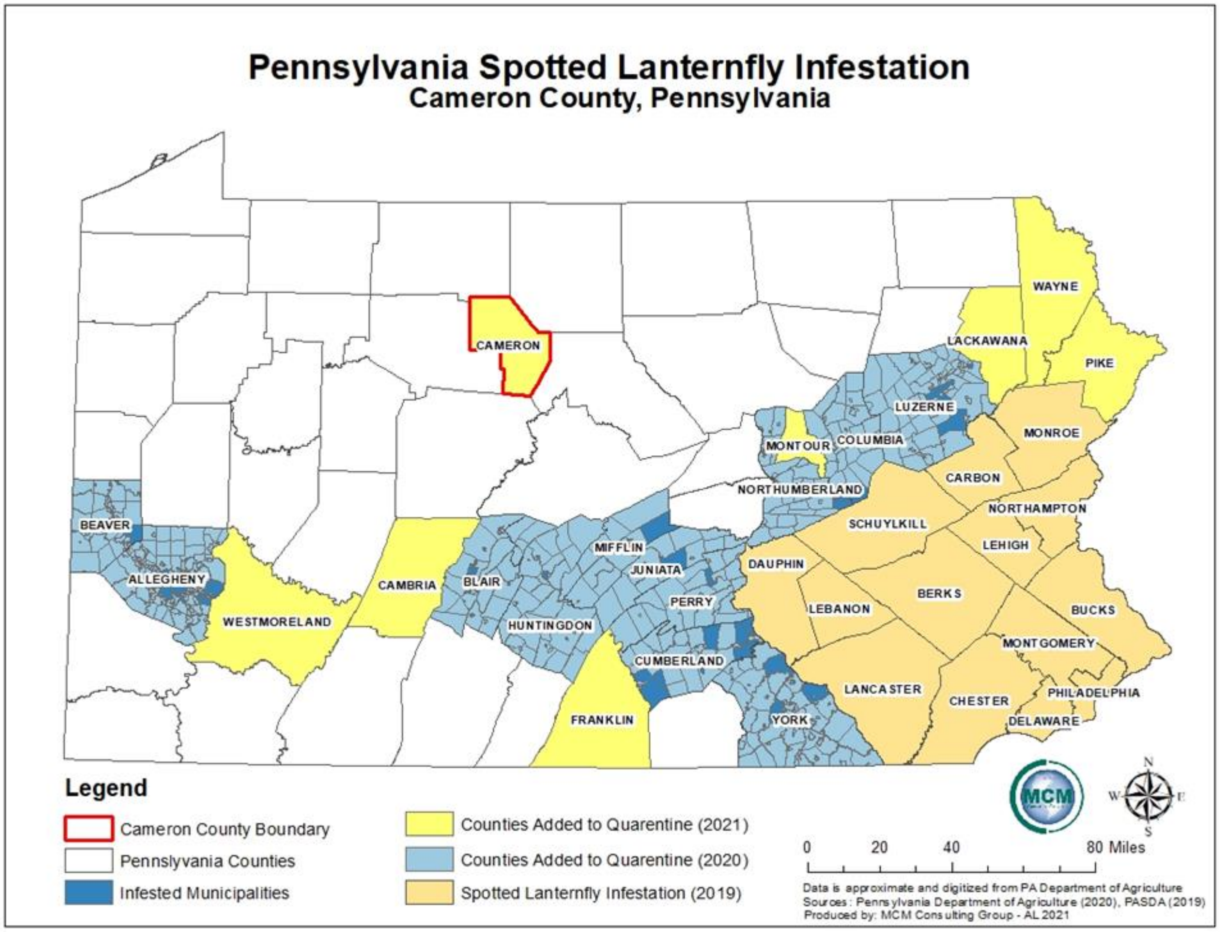


Figure 30 - Pennsylvania Spotted Lanternfly Infestation



4.3.7. Landslides

4.3.7.1 Location and Extent

Rock falls and other slope failures can occur in areas of Cameron County with moderate to steep slopes. Many slope failures are associated with precipitation events – periods of sustained above-average precipitation, specifically rainstorms, or snowmelt events. Rockfalls, rockslides, rock topples. block glides, debris flows, mud flows, and mud slides are all forms of landslides. Areas experiencing erosion, decline in vegetation coverage 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 Cameron County as generally moderate but include local areas of "combo-high". "Combo-high" is described by the DCNR as high susceptibility to land sliding and moderate incidence. *Figure 31 – Landslide Hazard Areas* shows areas of landslide susceptibility in Cameron County. The majority of Cameron County, including populated areas such as Emporium Borough and Shippen Township, have generally low susceptibility, but do have local areas of moderate to high susceptibility. There are larger areas of moderate to high susceptibility, such as the western and southern portions of the county.

4.3.7.2 Range of Magnitude

Landslides cause damage to transportation routes, utilities, and buildings. They can also create travel delays and other side effects. Fortunately, deaths and injuries due to landslides are rare in Pennsylvania. Almost all of the known deaths due to landslides have occurred when rock falls or other slides along highway have involved vehicles. Storm-induced debris flows are the only other type of landslide likely to cause and 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 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.

The 2013 Pennsylvania Hazard Mitigation Plan records Cameron County as having a low ranking for landslides with a risk factor of 1.3. The average risk factor for counties in Pennsylvania is 1.6, making Cameron County below average risk for landslides.

4.3.7.3 Past Occurrence

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

Landslides occur often along Route 120 south of Emporium to the Clinton County line, usually resulting in road closures lasting several days. One landslide resulted in the death of a driver on Route 120 near Sinnemahoning. Landslides also occasionally occur on Route 555 in the Mix Run area. Past landslide events may have occurred in Cameron County and were not recorded or observed, so this list and estimate should not be viewed as comprehensive.

Based on USGS landslide and related feature maps for Emporium Borough, there are thirty-eight areas of previously recorded landslides in and around Emporium Borough. This is a moderate amount of previously recorded landslide events for a given borough in the Commonwealth of Pennsylvania.

4.3.7.4 Future Occurrence

Based on historical events, significant landslide events are likely in the county, occurring on average once every three years. Mismanaged intense development in steeply sloped areas could increase their 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 has an Erosion and Sediment (E & S) program that sets requirements for which development projects of a certain scale are intended to mitigate erosion, which are similar practices to prevent causing landslides.

According to the 2018 Pennsylvania Hazard Mitigation Plan, Cameron County has lower risk of vulnerability to landslide events in the future then other counties in the Commonwealth.

4.3.7.5 Vulnerability Assessment

Landslides are often precipitated by other natural hazards such as earthquakes or floods, and a serious landslide can cause millions of dollars in damages. Continued enforcement of floodplain management and proper road and building construction helps to mitigate the threat of 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 fractures could lead to unexpected flood events.

A comprehensive database of land highly prone to erosion and landslides is difficult to come by. Construction projects in Cameron County should be wary of erosion and the potential for landslides. There are several general factors that can be indicators of a landslide prone area. These include:

- 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 of the municipalities in Cameron County are vulnerable to landslides. *Table 31 – Structure Vulnerability Data* illustrates the number of structure address points per municipality and the number of structures in high slope areas in the high slope areas. Critical facilities located along Route 120 and Route 555 are most vulnerable to the effects of landslides. 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 may be uniquely vulnerable to landslide hazards. 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.

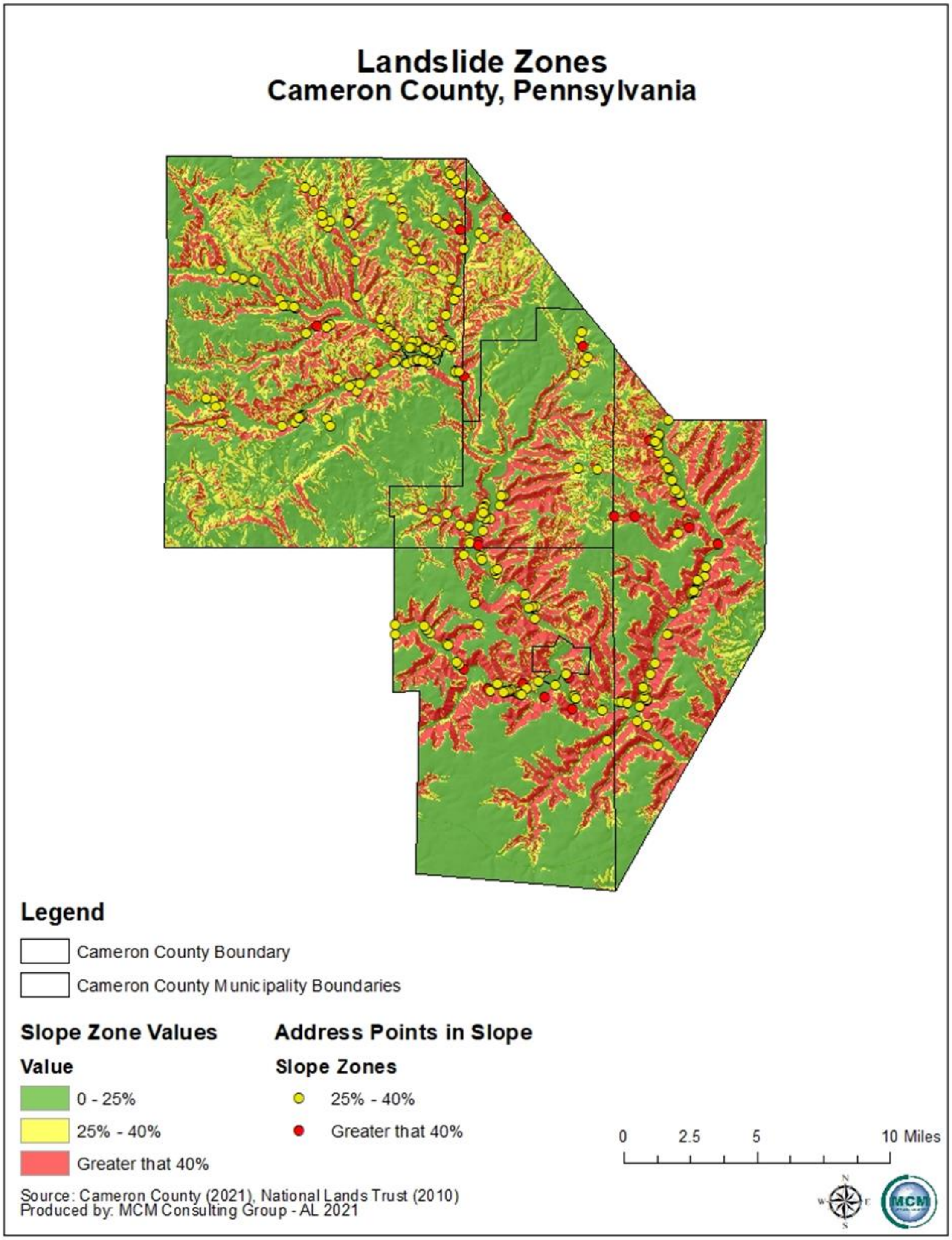
According to the 2018 Pennsylvania Hazard Mitigation Plan, there are zero structures that were vulnerable to landslide events in Cameron County. This information was compiled in 2018 and updated in 2019. The information in the table below is based on areas increased slope degree.

Table 31 - Structure Vulnerability Data

Structure Vulnerability Data		
Municipality	**Number of Addressable Structures Per Municipality**	**Number of Structures in Slope Area**
Driftwood Borough	113	1
Emporium Borough	1,102	36
Gibson Township	600	57
Grove Township	747	74
Lumber Township	406	31
Portage Township	149	4

Structure Vulnerability Data		
Municipality	**Number of Addressable Structures Per Municipality**	**Number of Structures in Slope Area**
Shippen Township	1,637	119
Totals:	**4,754**	**322**

Figure 31 - Landslide Hazard Area



4.3.8. Pandemic and Infectious Disease

4.3.8.1 Location and Extent

Pandemic & Epidemic

An epidemic is when an infectious disease spreads more quickly than experts expect. It is characterized by very widespread growth or extent that spreads quickly and affects many individuals at the same time. When an epidemic occurs, it typically impacts a larger area than an outbreak would. The rise and decline in epidemic prevalence of an infectious disease is dependent on the transfer of an effective dose of the infectious agent from an infected individual to a susceptible one. After an epidemic has subsided, the affected host population contains a small proportion of susceptible individuals that reintroduction of the infection will not result in a new epidemic. Therefore, the host population develops an immunity to the epidemic disease, which is termed as herd immunity.

A pandemic is a disease outbreak that spreads across countries or continents, which affects the population of an extensive area. Extensive regions that could potentially be affected are several countries or even continents at a time. When a pandemic is present, the event usually affects more people and takes more lives than an epidemic typically would. Pandemics are further 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 affect the United States as frequently. A pandemic is measured and defined by the spreading of a disease rather than the fatalities associated with it. There are various characteristics of a pandemic outbreak, such as large, 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. Pandemics travel more effectively than epidemics.

Each year, different strains of influenza are labeled as potential pandemic threats. Pandemics happen when novel (new) viruses emerge and can infect people easily and spread efficiently and are sustained from person to person. In the event of a pandemic taking place in the eastern United States, the entirety of Cameron County would likely be impacted. 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.

On March 11, 2020, the World Health Organization (WHO) characterized the outbreak of a coronavirus disease as a pandemic. Before the official pandemic announcement, on February 11, 2020, WHO announced an official name for the disease of “coronavirus disease 2019”, abbreviated COVID-19. The ‘CO’ stands for ‘corona’, ‘VI’ for virus, and ‘D’ for ‘disease’. The word ‘corona’ means crown which refers to the appearance that coronaviruses get from the spike proteins sticking out of them. The virus mostly attacks the respiratory tract in humans but can cause further medical issues if the patient was previously considered high risk or immunocompromised. COVID-19 most often causes respiratory symptoms that can feel much like a cold, a flu, or pneumonia, but COVID-19 can also harm other parts of the body. Both the upper respiratory tract, such as sinuses, nose, and throat, and lower respiratory tract, such as windpipe and lungs, are initially infected as a result to the disease. Lungs are typically the first targeted organ in the body for COVID-19. Other organs that could be infected by COVID-19 are the heart, brain, liver and gastrointestinal. Coronaviruses are common in humans and many different species of animals including camels, cattle, cats, and bats. The disease is believed to have started in Wuhan Province, China in late 2019 and spread around the globe. The original source of viral transmission to human remains unclear, as does whether the virus became pathogenic before or after the spillover event. The intermediate animal that passed the virus from bats to people has not been identified, however, researchers believe it to be a wild species that is sold as food in the wet markets within Wuhan at the Huanan Seafood Market. The overall origin of the virus remains uncertain during the writing of this plan. However, as the WHO digs into the origin of the COVID-19 pandemic, more clues and evidence leading to the origination of the virus is becoming clearer due to the high research and science technology available in today's medical fields. Public health officials say it is critical to determine the identification of the origin of the pandemic to take steps to avert future outbreaks and pandemics. Prevention may take many years to complete. Currently, researchers of the WHO believe it to be a zoonotic disease with origination from an animal reservoir rather than bioterrorism or a laboratory accident.

As of May 20, 2021, there have been multiple documented variants of COVID-19 identified in the United States. Information about the characteristics of these variants is rapidly emerging. Scientists are working to learn more about how easily variants spread, whether they could cause more severe illness, and whether currently authorized vaccines will protect people against them. Viruses constantly change through mutation, and new variants of a virus are expected to occur. Researchers are still monitoring multiple variants but there are currently five notable variants in the United States. The five variants include: B.1.1.7 variant detected in the US in December 2020, B.1.351 variant detected in the US end of January 2021, P.1 variant also detected in January 2021, and lastly B.1.427 and B.1.429 variants which were detected in February 2021. The B.1.1.7 variant is currently the most common variant across the country. However, these variants seem to spread more easily and quickly than other variants, which may lead to more cases of COVID-19.

On July 27, 2021, the CDC released updated guidance on the need for urgently increasing COVID-19 vaccination coverage and a recommendation for everyone in areas of substantial or high transmission to wear a mask in public indoor places, even if they are fully vaccinated. These newly updated guidelines have taken place due to the new data that began to emerge from the Delta variant of COVID-19. The Delta variant causes more infections and spreads faster than early forms of SARS-CoV-2. Some data suggests the Delta variant might cause more severe illness than previous strains in unvaccinated people. Therefore, unvaccinated people remain the greatest concern. The Delta variant is currently the predominant strain of virus in the United States.

Infectious Disease

Infectious diseases are illnesses caused by pathogenic organisms such bacteria, viruses, fungi, or parasites. There are various types of bacterial organisms that live on and within the human system but are considered harmless due to the normal flora present. Organisms become harmful and cause disease when under certain conditions. The causes of infectious diseases vary. The sources of infectious disease occur from contaminated food or waterways, infected animals/livestock, 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.

West Nile virus is contracted through a mosquito bite and is aided by warm temperatures and wet climates conducive to mosquito breeding, with most cases occurring between April and October. West Nile virus is a vector-borne disease. This means an animal, usually an insect or a tick, transmits parasitic microorganisms to people and animals, and therefore, the diseases they cause. The disease causes headaches, high fever, neck stiffness, disorientation, tremors, convulsions, muscle weakness, paralysis, and death in its most serious form.

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.

Lyme Disease, spread by the bite of infected blacklegged ticks, is a bacterial disease with symptoms including fever, headaches, and characteristic skin rash. Untreated, Lyme Disease can spread to joints, the heart, and the nervous system. To prevent the disease, it is recommended to use insect repellent, remove ticks promptly, apply pesticides, and reduce tick habitat.

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

4.3.8.2 Range of Magnitude

Pandemic & Epidemic

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 has fewer than 80% of cases that are clinically asymptomatic. Therefore, approximately 20% of the cases result in mild infection, known as West Nile fever. However, there is a small percentage of cases that will 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 disease. However, advances in medical technologies have greatly reduced the number of deaths caused by the influenza over time. In the early 1900s, flu pandemics could cause tens of millions of deaths, while the 2009 Novel H1N1, known as swine flu, caused fewer than 20,000 deaths world-wide, and many people infected with swine flu in 2009 recovered without needing medical treatment. However, the modern flu viruses are still quite dangerous. 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 are 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, the globe did not face a microbial pandemic similar in scale to the COVID-19 pandemic. The worldwide transmission of COVID-19 from human to human has spread aggressively. As of August 2021, the current worldwide data includes 205 million COVID-19 cases with more than 4.33 million patient deaths with the United States containing the most cases and India being next with rapidly increasing in case numbers; however, it is difficult to make a projection of the final outcomes with the COVID-19 pandemic. Of the six global outbreaks of viral infections, three were caused by coronaviruses (SARS, MERS, and COVID-19), of which COVID-19 is characterized by the most efficient and aggressive transmission.

High risk populations for diseases/illnesses include children, the elderly, pregnant women, and patients with reduced immune system capability. Such high-risk populations are discussed in more detail in Section 4.3.8.5. Advancements in medical technology can help with the current and future pandemics. The wireless thermometer gun has become increasingly popular and beneficial to the COVID-19 pandemic by giving opportunity to measure individual's body temperatures without being in close contact. Additionally, the wireless thermometer gun assists with pinpointing individuals that may be COVID infected if the individual has a fever, which helps reduce spread of the disease. This important medical equipment is being used in checkpoints during the pandemic at various public destinations such as hospitals, nursing home facilities, airports, etc. Other advances in medical technology instruments for COVID-19 include vaccination advancements (such as new mRNA vaccines which has been seen with the Pfizer, Moderna, and Johnson & Johnson vaccines), virus DNA sequencing, and molecular testing techniques for COVID-19 diagnosis.

Therefore, with advancements made during pandemics, such as the COVID-19 pandemic, the global effects of various outbreaks have drastically declined over the past century. While there are limited secondary hazards related to public health emergencies, an outbreak can cause a variety of general secondary effects. Civil disorder is the most likely secondary hazard to result from a public health emergency. Further potential secondary effects could include: a shortage of medical supplies and personnel; hoarding of household paper and cleaning supplies; school, business, and government closings; government restrictions on travel; low attendance at places of employment; and, slowed productivity.

The seasonal flu is still present throughout the country during a pandemic. A pandemic illness is not identical to a seasonal flu, as explained in *Table 32 – Pandemic and Seasonal Flu Differences*. The seasonal flu is less of a concern than what a pandemic potentially is. Predictability and regularity are factors into the reasoning behind less of a concern when dealing with seasonal flu. However, a pandemic is considered to be more severe than seasonal flu due to lack of these factors.

Table 32 - Pandemic and Seasonal Flu Differences

Pandemic and Seasonal Flu Differences		
	Seasonal Flu	**Pandemic**
What is it?	Influenza (flu) is a contagious respiratory illness caused by flu A and B viruses that infect the human respiratory tract.	A flu pandemic is a global outbreak of a new flu virus in people that is very different from current and recently circulating seasonal flu A viruses.
Occurrence?	Epidemics of seasonal flu happen every year. Fall and winter is the most common time for flu in the United States.	Flu pandemics happen rarely. Five have happened within the last 100 years.
Transmission?	Flu viruses are thought to spread mainly from person to person through droplets made when someone with flu coughs, sneezes, or talks near a person (within 6 feet).	Pandemic flu viruses spread in the same way as seasonal flu, but a pandemic virus is likely to infect more people because fewer people have immunity to the pandemic flu virus.
Vaccination?	Seasonal flu vaccines are made each year to vaccinate people against the seasonal flu. Typically, only one dose is	Although the U.S. government maintains a limited stockpile of pre-pandemic flu vaccines, this inventory

Pandemic and Seasonal Flu Differences		
	Seasonal Flu	**Pandemic**
	needed.	may not be widely available in the early stages of a pandemic. Two doses of pandemic flu vaccine are likely to will be needed.
High Risk Group?	Young children, people sixty-five years and older, pregnant women, and the immunocompromised are more likely to have serious flu complications.	In some past pandemics, healthy and young adults, along with the immunocompromised and elderly were at high risk for developing severe flu complications.
Source: (CDC, 2009)		

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. The time after the first pandemic wave has been elaborated into post peak and post pandemic periods. These phases are listed below in *Table 33 - Pandemic Influenza Phases*.

Table 33 - Pandemic Influenza Phases

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

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

4.3.8.3 Past Occurrence

Pandemic & Epidemic

Several pandemic influenza outbreaks have occurred over the past 100 years that not only affected Cameron County but the United States as a whole. *Table 34 - Past Pandemic Events in the United States* illustrates the various past pandemic events that have occurred since the late 1800's. 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 Cameron 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 yet.

Table 34 - 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

Past Pandemic Events in the United States	
Year(s)	**Common Name**
Sources: WHO & CDC, 2020	

Spanish Flu

Prior to the COVID-19 world-wide pandemic, the 1918 influenza (Spanish Flu) pandemic was classified as the "Mother of all Pandemics". An estimated 1/3 of the world's population was infected and had clinically apparent illnesses during the 1918 - 1919 influenza pandemic. Pennsylvania was one of the most affected states in the country because influenza effects cities more aggressively than rural areas. The Spanish Flu claimed 500,000 lives in the United States, which included Cameron County. There is a lack of sources to provide information on exact numbers of deaths in Cameron County from the Spanish Flu, however, a total of 60,000 deaths occurred in Pennsylvania from the Spanish Flu. Philadelphia had about 12,000 deaths and 47,000 reported cases in just over four weeks. In the first six months, there were about 16,000 deaths and half a million cases of the Spanish Flu in Philadelphia. Although Philadelphia had a great number of deaths, the 60,000 deaths in Pennsylvania would also include Cameron County's deaths, but the exact number is uncertain. The factors of high populations, crowded places, and unhygienic conditions are what caused higher numbers of deaths and cases across Pennsylvania. Therefore, Cameron County was significantly affected by the Spanish Flu Pandemic.

Swine Flu/H1N1

Cameron County was impacted by the H1N1 virus during 2009. The Pennsylvania Department of Health set up clinics throughout the county to administer vaccines. There is a lack of sources when determining the exact number of cases and deaths from swine flu in Cameron County. However, Pennsylvania had a total had 10,940 cases and 78 deaths from this pandemic. Within the total cases and deaths of Pennsylvania, Cameron County's numbers were included although exact numbers are uncertain.

COVID-19

This is an on-going pandemic at the time of the writing of this plan, so credible websites are used to provide the most up-to-date statistics. As of June 2021, Pennsylvania had an estimated 1.24 million total cases and 27,914 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 Cameron County was on March 28th, 2020, and the first COVID-19 death did not occur in Cameron County until much later on December 7th, 2020. As numbers increased around the state, Cameron County remained isolated, and the numbers were not significant. Around December 15th, 2020 case rates and deaths started to increase within Cameron County. However, Cameron County continues to have one of the lowest rates of

COVID-19 cases and deaths. Although the numbers in Cameron County are significantly lower than neighboring counties, there is still a need for caution due to the lack of a local hospital in the county. Currently, Cameron County has the lowest number of COVID-19 cases and deaths out of the sixty-seven counties that are in Pennsylvania. As of August 2021, Cameron County had a total of 319 COVID-19 cases and ten deaths, which is significantly lower than the other counties. The county with the second lowest case rate is Sullivan County with 446 COVID-19 cases and twenty-one deaths. A total of 1,184 negative COVID-19 tests results have occurred in county. The cases and deaths in Cameron County are slowly increasing and may continue to increase even more due to the new information regarding the Delta variant. Therefore, exact numbers of deaths and cases are constantly changing.

As of August 2021, Pennsylvania was still in vaccination Phase 2, which included any individual in Pennsylvania of the age twelve or older. Phase 1A included long-term care facility residents, health care personnel, individuals of ages 65 or older, and the high-risk individuals. Phase 1B included educational workers, U.S. Postal Service workers, manufacturing workers, and public transit workers. Phase 1C included food service workers, construction workers, legal services, any government worker, public safety personnel, and more. As of August 2021, between the three approved vaccines of Pfizer-BioNTech, Moderna, and Johnson & Johnson (newly approved vaccine) a total of 6.8 million (53.1%) fully vaccinated people had been detected in Pennsylvania alone. This made Pennsylvania the fifth most vaccinated state out of the fifty states within the United States. Additionally, the Pfizer-BioNTech vaccine was in the process of becoming FDA approved. With Cameron County specifically, a total of 2,141 individuals had been partially vaccinated which indicates that the person has received at least one COVID-19 vaccine but has not yet received the necessary number of vaccines at the recommended time intervals to be fully covered. At present, all COVID vaccines, except for the Johnson & Johnson vaccine, under EUA require two dosages. Therefore, partially covered individuals have received only one dose in the two-dose series.

Meanwhile 1,984 individuals in Cameron County have been fully vaccinated which indicates that the person has received the necessary number of COVID vaccines at the recommended time in intervals. This indicates that a total of 4,125 (54.7%) vaccinations have been administered within Cameron County. The age group in Cameron County with the highest partial vaccination rate is the age group 40 – 44. The age group with the highest full vaccination rate is the age group 65 – 69.

Although exceedingly rare, there have been reported adverse reactions to the COVID-19 mRNA vaccines. As reported by the Center for Disease Control and Prevention, there are four major side effects that are most common when reported to the Vaccine Adverse Event Report System (VAERS). The four major side effects are listed below as well as a brief description from the CDC webpage for Reported Adverse Events:

- **Anaphylaxis (Rare):** Anaphylaxis has occurred in approximately 2 to 5 people per million vaccinated in the United States.
- **Thrombosis with thrombocytopenia syndrome (TTS) (Rare):** The CDC and the FDA identified 54 confirmed reports of people who received the Johnson & Johnson / Janssen COVID-19 Vaccine and later developed TTS.
- **Guillain-Barré Syndrome (Rare):** There have been around 268 preliminary reports for (GBS) identified in VAERS as of November 24, 2021.
- **Myocarditis and pericarditis (Rare):** As of November 24, 2021, VAERS has received 1,949 reports of myocarditis or pericarditis among people ages 30 and younger who have received a COVID-19 vaccine.

Source: Center for Disease Control and Prevention: Reported Adverse Events, Dec. 1st, 2021

https://www.cdc.gov/coronavirus/2019-ncov/vaccines/safety/adverse-events.html

To see more updated information, follow here: https://www.health.pa.gov/topics/disease/coronavirus/Pages/Cases.aspx.

Infectious Disease

Not only has Cameron County experienced past pandemic events, but the county has also experienced past infectious disease events. The two major infectious disease events experienced across Cameron County and Pennsylvania as a whole are the West Nile Virus and Lyme Disease. Due to large rural and wooded areas within the county, these infectious diseases thrive in Cameron County. Both diseases are transmitted by the biological vector of an insect which are 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. Cameron County is one of the counties that has no current surveillance of the virus in the county. Although no surveillance of the West Nile Virus is found in Cameron County, county residents should still be on high alert because neighboring counties have had cases of West Nile Virus. Monitoring West Nile Virus is done through a comprehensive network that includes trapping mosquitoes, collecting dead birds, and monitoring horses, people and, in past years, sentinel chickens that might have been exposed to and contracted West Nile Virus. *Table 35 - West Nile Virus Control Program in Cameron County Since 2015* outlines the West Nile Virus within Cameron County from 2015 to 2020.

Table 35 - West Nile Virus Control Program in Cameron County Since 2015

West Nile Virus Control Program in Cameron County Since 2015				
Year	Total Positives	Human Positives	Mosquito Positives	Bird Positives
2015	0	0	0	0
2016	0	0	0	0
2017	0	0	0	0
2018	0	0	0	0
2019	0	0	0	0
2020	0	0	0	0
Source: PA Department of Environmental Protection, 2020				

Lyme Disease

Lyme Disease has been present in the United States and Cameron County for many years. More wooded areas, such as Cameron County, have higher cases due to ticks being the main biological vector. Lyme disease is found in all sixty-seven counties within Pennsylvania. Cameron County has had an estimated overall 3,120 true confirmed cases of Lyme disease. Cameron County as a whole has very low positive numbers for Lyme Disease in the county, especially over the past couple years. Cameron County experienced the highest number of positive cases in 2016 at twenty-eight cases, compared to the lowest number of cases in 2018 at fifteen cases. However, Lyme disease case counts are alarming and consistently rising over the past several years. Although, it should be noted that information represented for each county “may vary with respect to the resources they have to devote to investigation of Lyme cases”. It should also be noted that these figures represent a rough estimate of the Lyme disease burden in Cameron County. *Table 36 - Lyme Disease Data for Cameron County* outlines the Lyme Disease within Cameron County since 2013 to 2018. Data after 2018 was not available in this report.

Table 36 - Lyme Disease Data for Cameron County

Lyme Disease Data for Cameron County	
Year	Total Positives
2013	21
2014	23
2015	21
2016	28
2017	22
2018	15
Source: PA Department of Environmental Protection, 2018	

4.3.8.4 Future Occurrence

Pandemic & Epidemic

The probability of a widespread pandemic public health emergency is every ten years or less with varying degrees of severity. Minor outbreaks of less serious communicable disease, such as influenza, occur much more frequently. Exact timing of pandemic influenza outbreaks is unpredictable, and complete avoidance of the events is nearly impossible. Therefore, future occurrences of pandemics and infectious disease are unclear. Future pandemics may also emerge from other diseases, especially invasive pathogens for which Cameron County and Pennsylvania as a whole lack natural immunity which adds to the uncertainty of future occurrences. With the current pandemic of COVID-19, the future is still unknown in regard to the disease due to the novelty of the virus. Recently, the three approved COVID-19 vaccines of Pfizer-BioNTech, Moderna, and Johnson & Johnson have been offered to millions of Americans across the country, including Cameron County. The vaccination rollout will help COVID-19 transition from a pandemic to an endemic phase in the near future. However, the future of the COVID-19 pandemic is still unknown, and researchers believe that COVID-19 will be similar to the influenza virus that re-emerges every year in a slightly different form due to mutation events. The future of the COVID-19 pandemic is, in part, relying on the vaccination rates across the commonwealth. As mentioned, the Delta variant is creating some alarming concerns and could potentially cause more restrictions and guidelines in the future due to the variant's capability of easier transmission and increased infection rates, especially among the unvaccinated.

Infectious Disease

Pandemic future occurrences have several unknown circumstances; however, future infectious disease occurrences are likely to occur. Infectious diseases such as West Nile Virus, Influenza, and Lyme Disease have been present in Cameron County for many years and are expected to continue to be present in Cameron County.

West Nile Virus

The best defense against West Nile virus in the future is to remove mosquito breeding locations, such as stagnant water sources. Another defensive measure to prevent insect bites is wearing shoes, socks, long pants, and a long-sleeved shirt when outdoors for long periods of time, or when mosquitoes are most active. Also, mosquito repellent can be used whenever people are outside.

Influenza

It is estimated that 5% - 25% of Pennsylvanians get the flu each year, and 120 - 2,000 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.

Lyme Disease

Lyme disease is best combated using insect repellent, removing ticks promptly, applying pesticides, and reducing tick habitat to decrease the number of future populations. Once a person realizes they have been bitten by a tick, they should seek medical attention, as undetected Lyme Disease can seriously damage a body's musculoskeletal and nervous systems or result in death.

4.3.8.5 Vulnerability Assessment

Cameron County is considered to be a highly vulnerable county to COVID-19 due to many factors. However, it is extremely difficult to predict a pandemic or an epidemic. The severity of the next pandemic cannot be predicted, but modeling studies suggest the impact of a pandemic on the United States could be substantial. In the absence of any control measures (vaccination or drugs), it is estimated that a "medium-level" pandemic could cause 89,000 - 207,000 deaths, 314,000-734,000 hospitalizations, 18 to 42 million outpatient visits, and another 20 - 47 million sick people in the United States. Between 15% - 35% of the U.S. population could be affected by a pandemic, and the economic impact could range between $71.3 - $166.5 billion. This data for the current COVID-19 pandemic has fluctuated widely but, at the time of the writing of this plan, was on pace for greater than a "medium level" pandemic. The COVID-19 pandemic has severely affected populations over the age of sixty-five, especially those in nursing homes – disproportionately; it has also severely affected different races disproportionately, e.g., non-Hispanic American Indian and Black people. The CDC reports that long-standing systemic health and social inequities have put some members of racial and ethnic minority groups at increased risk of getting COVID-19 or experiencing severe illness, regardless of age.

Elderly individuals, children and immune deficient individuals are most vulnerable to disease. Nursing facilities, personal care facilities, daycares, schools, and hospitals are considered more vulnerable since there are normally groups of these functional-needs population present at the facilities. The spread of disease has increased due to the vulnerability and density of these populations. 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 suffered staggering numbers of cases and deaths and several county jails and state correctional institutions reported wide community spread. Specifically, in Cameron County, nursing and personal care home facilitates were critically affected by COVID-19. One long-term care facility in Cameron County has had confirmed COVID-19 cases. The long-term care facility Guy and Mary Felt Manor, Inc. in Emporium Borough had thirty-six cases among the residents, ten cases among the employees, and three deaths in total.

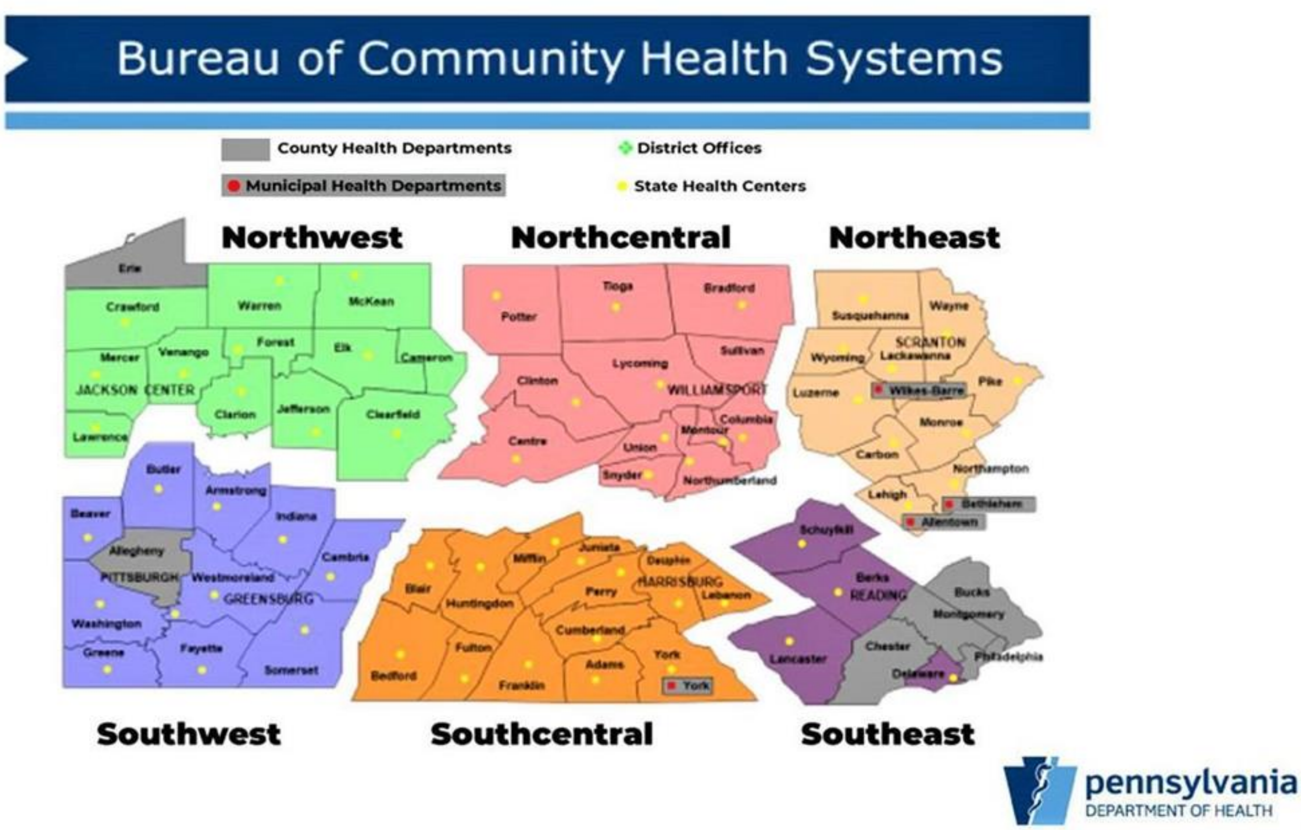
Health-care workers and those working in direct-care situations (such as correctional institutions or those who cannot social distance due to their jobs) are more likely to be exposed to a pandemic disease. Those that work outdoors for extended periods of time in warm months may be more vulnerable to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

The number of hospitals and beds present in a county can affect the vulnerability impact on the county as well. The number of hospitals within the county and number of beds within the hospital determines the amount of care vulnerable and sick patients will receive in times of need. If sick and vulnerable patients are higher in number than beds available, the vulnerability rates within the county will rise. Within Cameron County there are no major hospitals. The only major hospital that is located near Cameron County is the Charles Cole Memorial Hospital located in adjacent Potter County, Pennsylvania. Charles Cole Memorial Hospital contains a total of 121 beds within the facility. Due to the low number of hospitals and beds near the county, the vulnerability of the residents could potentially be very high if mass amounts of Cameron County residents become sick. It is important to plan preparedness activities that will permit a prompt and effective public health response.

During a public health emergency, the Pennsylvania Department of Health (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 32 - Pennsylvania Department of Health Districts*). Cameron County is in the northwest district. At the time of the writing of this plan, POD planning for mass vaccinations against COVID-19 were occurring and hundreds of locations were offering the vaccinations of Pfizer, Moderna, and Johnson & Johnson vaccines.

Figure 32 - Pennsylvania Department of Health Districts



Source: PA Department of Health, 2019

4.3.9. Radon Exposure

4.3.9.1 Location and Extent

Radon is an airborne noble gas that naturally occurs from the radioactive decay of uranium into radium. The radium further breaks down into a gas referred to as radon. Like other noble gases, 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. This is not long enough to pose a significant threat to humans. The 222Rn isotope has a half-life of 3.8 days, which is long enough to pose a hazard 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. Sources of radon include soil and rock beneath homes and foundations, well water, and building materials. In its natural form as a gas, radon is tasteless, odorless, colorless, and considered extremely toxic.

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 1980's that the wide geographic distribution of elevated values in houses and the possibility of extremely high radon levels 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. Radon in the air is considered ubiquitous and can be found in both indoor and outdoor environments. There is no known safe level of exposure to radon. For most people, the greatest risk of exposure to radon is within their home in rooms that are below, directly in contact with, or immediately above the ground. As stated above, 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 content of the air in the surrounding soils. The flow dynamics of air inside of most homes is low and 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:

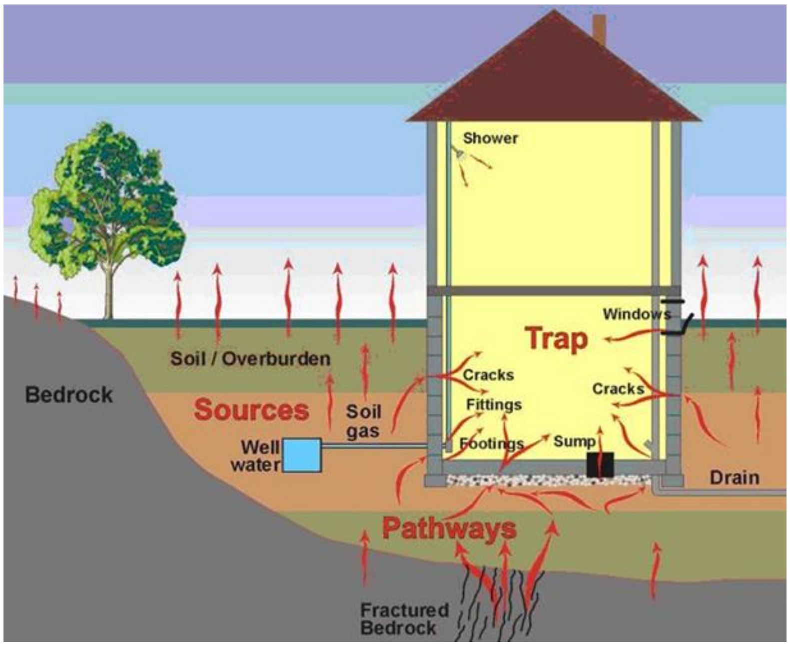
- Proximity to elevated uranium rich deposits (>50ppm), areas within a few hundred feet of such deposits are the most at risk. Such deposits are rare in the Commonwealth of Pennsylvania.
- Some more common rocks have higher than average uranium content (5 to 50ppm), and proximity to such rocks also increase 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 ad 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 case (like in State College in Centre County, PA) even with underlying bedrock having normal uranium concentrations, the vast majority if locations built on limestone-dolomite soils exceed radon concentrations of 4 pCi/L, and many exceeded 20 pCi/L.

The following three sources of radon in homes are now recognized and are the most common (see *Figure 33 – 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.
- Radom emanating from uranium-rick building materials (e.g., concrete blocks or gypsum wallboard); this is rarely a problem in Pennsylvania.

Figure 33 - 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 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 Cameron County. The majority of Cameron County has high radon level test results. This area and test result are shown in more detail in the Past Occurrence section.

4.3.9.2 Range of Magnitude

Radon is a proven carcinogen and its effect on humans is the development of lung cancer. According to EPA, about 21,000 lung cancer deaths each year in the United States are related to radon and it is the second leading cause of lung cancer after smoking. Radon exposure is the number one cause of lung cancer among non-smokers in the United States. Risks for developing cancer are associated with different levels of radon in the air and measured in Pico Curies per Liter (pCi/L). Radon causes lung cancer by continuing to 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 their continued radioactive decay.

The maximum level of radon recorded in the county has been 82.0 pCi/L and the minimum was 0.1 pCi/L in several instances. This information implies a high occurrence of exposure to radon at unsafe levels, in certain parts of the county. *Table 37 – Radon Risk for Smokers and Non-smokers* illustrates the risks associated with certain levels of radon exposure and potential health effects for those exposure levels.

Table 37 - Radon Risk for Smokers and Non-smokers

Radon Risk for Smokers and Non-smokers			
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	

Radon Risk for Smokers and Non-smokers

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			
2	About 32 people could get lung cancer	6 times the risk of dying from poison	Consider fixing structure between 2-4 pCi/L
1.3	About 20 people could get lung cancer	(average indoor radon level)	Reducing radon levels below 2 pCi/L is difficult
0.4	About 3 people could get lung cancer	(average outdoor radon level)	
Non-smokers			
20	About 36 people could get lung cancer	35 times the risk of drowning	Fix Structure
10	About 18 could get lung cancer	20 times the risk of dying in a home fire	
8	About 15 could get lung cancer	4 times the risk of dying in a fall	
4	About 7 could get lung cancer	The risk of dying in a car crash	
2	About 4 could get lung cancer	The risk of dying from posion	Consider fixing between 2-4 pCi/L
1.3	About 2 could get lung cancer	(average indoor radon level)	Reducing radon levels below 2 pCi/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-03-033).
- **Comparison data calculated using the Centers for Disease Control and Prevention’s 1999-2001 National Center for Injury Prevention and Control Reports

Source: EPA, 2010

4.3.9.3 Past Occurrence

In 1984, the Pennsylvania Radon Bureau responded to the newly detected high radon levels with a massive radon monitoring, education, and remediation effort. In the start of November 1986, over 18,000 homes have 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 2,600 pCi/L.

The Pennsylvania Department of Environmental Protection provides information for homeowners about how to test for radon in their homes, and when the 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 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 986 zip codes. The missing zip codes that report in the database are returned as "N/A" for insufficient data and had fewer than thirty test results or no test results at all. *Table 38 – Radon Level Test Results in Cameron County* shows that there is a total of twelve zip codes in Cameron County where tests were reported for the PA DEP to report their findings. Six of the twelve zip codes did not have a sufficient amount of data based on the DEP's web reports for zip codes. The highest radon level was for zip code 15857 with an average of 13.1 pCi/L within the locations of the basements. All of the zip codes that offered reporting data to the DEP were above the maximum suggested action level by the EPA of 4 pCi/L.

Table 38 - Radon Level Test Results in Cameron County

Radon Level Test Results in Cameron County				
Zip Code	**Location**	**Number of Tests**	**Max Result (pCi/L)**	**Average Result (pCi/L)**
15821	Basement	N/A	N/A	N/A
	First Floor	N/A	N/A	N/A
15832	Basement	N/A	N/A	N/A
	First Floor	N/A	N/A	N/A
15834	Basement	166	161.4	9.9
	First Floor	N/A	N/A	N/A
15857	Basement	707	452.2	13.1
	First Floor	46	33.9	4.3
15861	Basement	N/A	N/A	N/A

Radon Level Test Results in Cameron County				
Zip Code	**Location**	**Number of Tests**	**Max Result (pCi/L)**	**Average Result (pCi/L)**
	First Floor	N/A	N/A	N/A
15870	Basement	N/A	N/A	N/A
	First Floor	N/A	N/A	N/A
16720	Basement	45	65.9	12.4
	First Floor	N/A	N/A	N/A
16749	Basement	72	107.7	5.0
	First Floor	N/A	N/A	N/A
16836	Basement	N/A	N/A	N/A
	First Floor	N/A	N/A	N/A
16871	Basement	N/A	N/A	N/A
	First Floor	N/A	N/A	N/A
17764	Basement	61	49.2	5.9
	First Floor	N/A	N/A	N/A
17778	Basement	N/A	N/A	N/A
	First Floor	N/A	N/A	N/A
Source: PA DEP, 2021				

4.3.9.4 Future Occurrence

Radon exposure is inevitable given the geologic and geomorphic conditions in Cameron County. The Environmental Protection Agency and the United States Geological Survey have mapped radon potential in the United States 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 35 – Radon Exposure Risk in Pennsylvania*.

Radon Hazard Zones in Pennsylvania are broken down into three areas and each zone reflects the average short-term measurement of radon that can be expected in a building without radon controls:

- Zone 1 has the highest potential and readings can be expected to exceed the 4 pCi/L recommended limit.

- Zone 2 has a moderate potential for radon with levels expected to be between 2 and 4 pCi/L.
- Zone 3 has a low potential with levels expected to be less than 2 pCi/L.

Cameron County is located in Zone 1. Although corrective measures are needed above 4 pCi/L, the levels between 2 – 4 pCi/L are still deemed dangerous by the Environmental Protection Agency and remediation should be considered.

Due to the great likelihood of future occurrences, 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 means as radon gas. *Table 39 – 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 39 - Suggested Actions and Time Frame for Exposure to Radon Daughters

Suggested Actions and Time Frame for Exposure to Radon Daughters		
Exposure Level*	**Suggested Action****	**Time Frame 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 to 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

*Assumes continuous 24-hour exposure in living area. **Home testing should be conducted at the end of the indicated time frame to determine if remedial action has reduced the exposure levels of the radon daughters below the indicated value. If remedial action has not been successful, residents should be aware of the risks associated with continuous exposure at the indicated levels. ***Work levels of exposure to radon daughters. Source: PA DEP, 2020

4.3.9.5 Vulnerability Assessment

Proper testing for radon levels should be completed across Cameron County, especially in the areas of higher incidence levels and for those individuals and households that face 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.

Currently, the Environmental Protection Agency determines that an average radon mitigation system costs approximately $1,200. The EPA also asserts that the current state survey shows one in five homes have elevated radon levels. Using this methodology, radon loss is factored by assuming 20% of buildings would be affected by radon at a mitigation average cost of $1,200. There is not additional information related to vulnerability assessment of radon exposure in the Pennsylvania Hazard Mitigation Plan.

Cameron County's classification of being in Zone 1 as well as the high average reported radon tests around the Emporium Borough areas means that there is a high risk for radon exposure. All homes are recommended to be tested for radon gas exposure. *Figure 34 – Radon Vulnerability for Cameron County* shows the best available data from the EPA about the percentage of homes with radon levels at or above the EPA action level.

Figure 34 - Radon Vulnerability for Cameron County

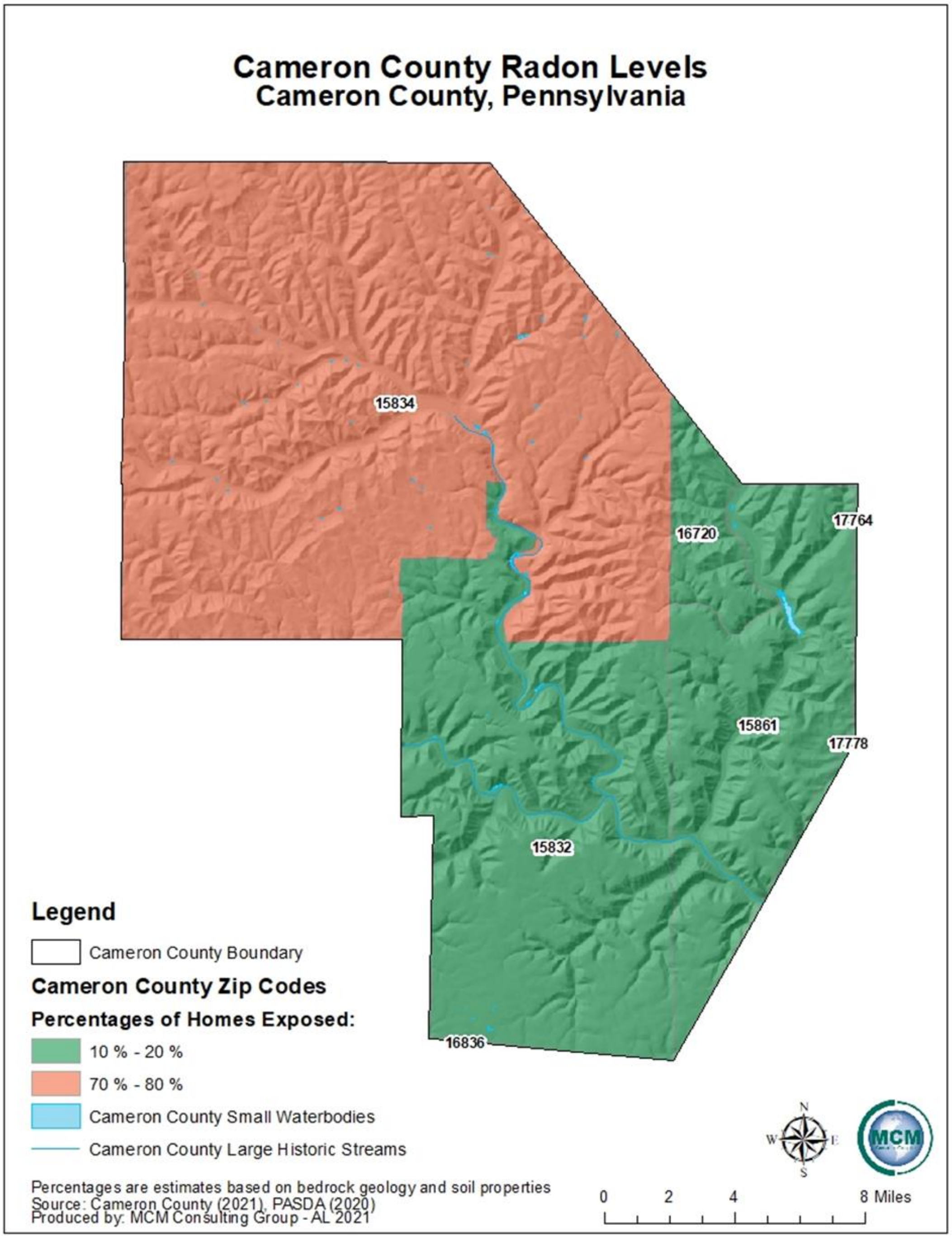
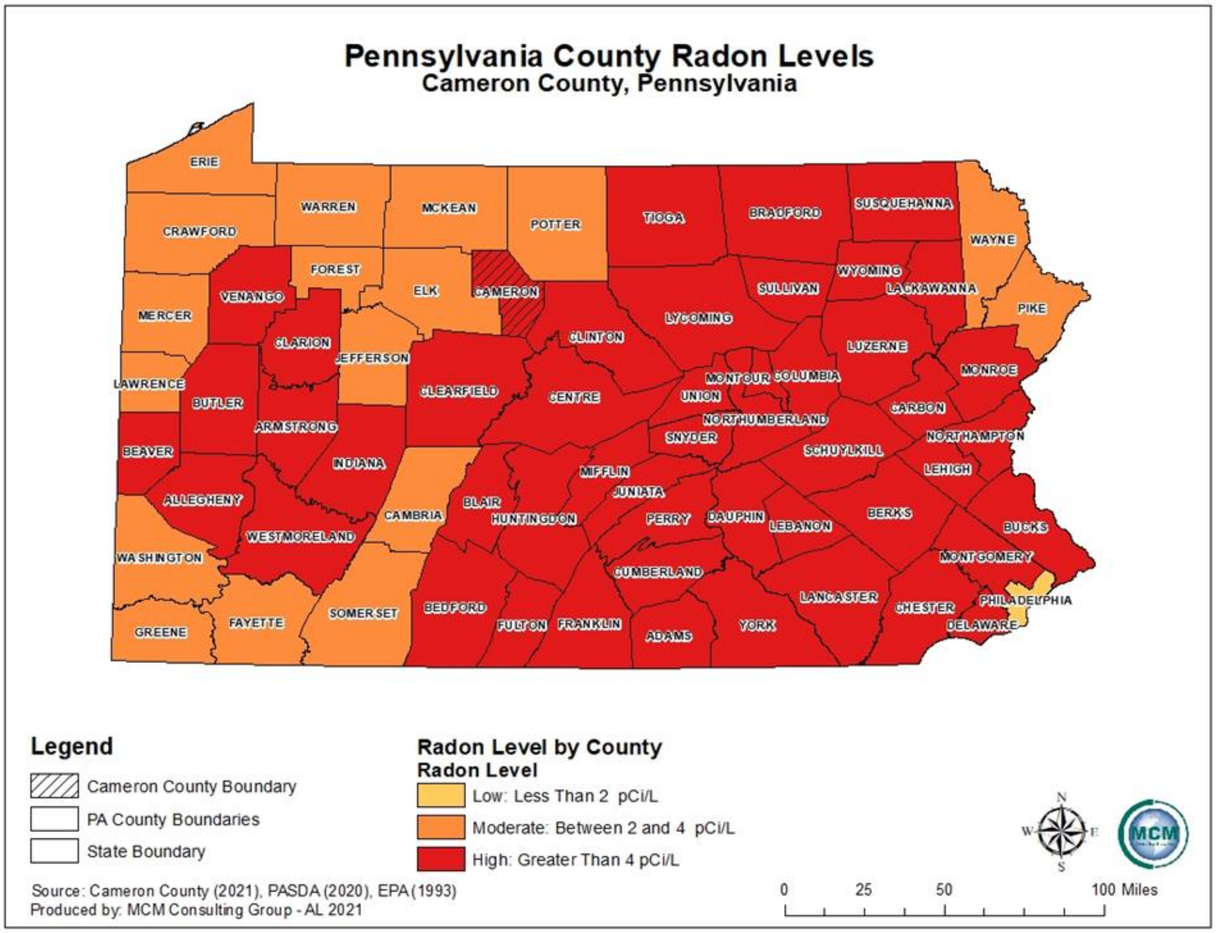


Figure 35 - Radon Exposure Risk in Pennsylvania



4.3.10. Subsidence and Sinkholes

4.3.10.1 Location and Extent

Subsidence is the sinking movement of the earth's surface; the result of this movement is commonly referred to as a sinkhole. There are two common causes of subsidence in Pennsylvania: 1) dissolution of carbonate rock such as limestone or dolomite and 2) mining activity. In the first case, water passing through naturally occurring factures 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 occurs only after a large amount of activity, or when a heavy burden is placed on the overlying material. The bedrock geology is found mostly in the south-central and eastern portions of the Commonwealth of Pennsylvania, and it is not a main component of Cameron County. Subsidence in the county is primarily a result of mining activity. Cameron County is not underlain by carbonate bedrock, and therefore this plan will primarily address mine-related subsidence. Cameron County has a history of subsidence due to past mining activities, although this activity is rare and can be considered apocryphal.

Subsidence potential in Cameron County is primarily associated with mining and ground excavation activities. Deep mining techniques in areas underlain by coal or other minerals can result in susceptibility to subsidence. Poor engineering practices at the time of withdrawal, or progressive degradation in geological stability additionally contribute to subsidence. Isolated incidents throughout the large coal regions of the Commonwealth of Pennsylvania have contributed to structure damage, roadway closures, and community risk. Natural subsidence has not occurred in Cameron County.

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

4.3.10.2 Range and Magnitude

No two subsidence areas or sinkholes are exactly alike. Variations in size and shape, time period under which they occur (i.e., gradually, or abruptly), and the proximity to development ultimately determines 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.

Based on the limited history of mining in Cameron County, subsidence and sinkhole events are not likely to occur. However, events could result in minor elevation changes or deep, gaping holes in the ground. Subsidence and sinkhole events can cause severe damage in urban environments, although gradual events can be addressed before significant damage occurs. If long-term subsidence or sinkhole formation is not recognized and mitigation measures are not implemented, fractures or complete collapse of building foundations and roadways may result.

The Cameron County local planning team assigned a Risk Factor Assessment Score of 1.3 to subsidence and sinkhole formation. This places the hazard at a low risk factor.

Limited data beyond reports of secondary road cave-ins was available for the worst-case scenario of subsidence in Cameron County. A possible worst-case scenario would be the cave-in of the county's most traveled transportation routes and roadways. These include Route 120, Route 46, and Route 155. A worst-case scenario of a mine subsidence for Cameron County would be a small number of homes or properties being damaged by the subsidence of the land that the buildings are constructed on with the potential for injuries, or deaths. The Pennsylvania Department of Environmental Protection responded to the subsidence by filling the mine voids at a cost of between $3 million and $7 million. If mitigation measures are not taken, the cost to fill in and stabilize any potential sinkholes can be significant. Even limited sinkholes can require a significant amount of remediation.

Figure 36 – 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. Cameron County is not one of these counties.

4.3.10.3 Past Occurrence

The previous Hazard Mitigation Plan, that was completed in 2017, states that there have been two subsidence events resulting in secondary road cave-ins within Cameron County. The events are recorded as having occurred, but no further information is provided in documentation for Cameron County. There is no information related to the geographic location of these events. There have been no deaths or injuries resulting from subsidence or sinkhole formations.

There is no comprehensive list of mine subsidence events in Cameron County. Additionally, the Pennsylvania Department of Environmental Protection staff indicated that small sinkholes occur several times per week and cause limited damage. Many of these are related to failing infrastructure like water main breaks or collapsed pipes.

4.3.10.4 Future Occurrence

There is currently no reliable information regarding the probability of future occurrences of mine subsidence. One way of estimating probability of future occurrences would be to project the historical trends into the future, but there is no comprehensive documentation of previous occurrences for mine subsidence in Cameron County. The Pennsylvania Department of Environmental Protection indicated that mine subsidence events are constant, though they vary in intensity and damage. However, based on the geological conditions and current mining activity in Cameron County, the annual occurrence of subsidence and sinkhole events in the county where mining occurs is considered likely. Although precise locations of future occurrences is difficult to predict due to the site-specific conditions that contribute to sinkhole development, there are several signs that can signal potential development.

The signs include:

- Slumping of 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 the lack of large-scale mining operations, subsidence events are not likely to occur in Cameron County. However, if land development and mining where to occur in an area that is unstable or unsafe, a subsidence event or sinkhole is likely to form. *Figure 38 – Unsuitable Areas for Mining in Pennsylvania* illustrates the areas of Pennsylvania where mining could potentially cause a subsidence event or a sinkhole. A significant number of these areas that are unsuitable for mining are located in counties that are adjacent to Cameron County.

4.3.10.5 Vulnerability Assessment

Areas of the county where commercial mining operations take place are the most vulnerable to subsidence hazards. Natural subsidence and sinkholes have never been reported in Cameron County. A mined area may be differentially prone to subsidence based on its geology and depth of coal seam, but reliable information about the different locations of varying depths of coal seam is not available. Geologists agree that all areas that are mined are prone to subsidence; therefore, the coal mined areas are shown as vulnerable to mine subsidence. Most of the mining that has occurred in Cameron County was superficial mining of natural resources. The mine sites that were abandoned after extraction can potentially become areas susceptible to subsidence events. This is illustrated in *Figure 37 – Abandoned Mined Sites in Cameron County*. The frequency of subsidence incidents occurring in the county is expected to remain low. However, considering the past mining activity that occurred in the county, subsidence cannot be ruled out as a potential hazard. There are not state or county critical infrastructure facilities at risk in the county due to sinkholes.

Table 40 – Infrastructure within 500 Yards of Abandoned Mine Polygons illustrates the different infrastructure items that are within a vulnerability zone of 500-yards of the abandoned mine inventory locations within Cameron County. The abandoned mine inventory locations can be broken down into two categories. These categories are Coal Surface Mine and Spoil Area. Based on GIS processing, no critical infrastructure, functional needs facilities, or transportation assets occur in areas around Cameron County where there are abandoned mine locations.

Table 40 - Infrastructure within 500 Yards of Abandoned Mine Polygons

Infrastructure within 500-Yards of Abandoned Mine Areas		
Infrastructure Type:	**Name:**	**Subsurface Type:**
Critical Infrastructure		
No Critical Infrastructure within 500 yards of Abandoned Mine Polygons.		
Functional Needs		
No Functional Needs within 500 yards of Abandoned Mine Polygons.		
Transportation		
No Transportation assets within 500 yards of Abandoned Mine Polygons.		

Figure 36 - Sinkhole Susceptibility in Pennsylvania

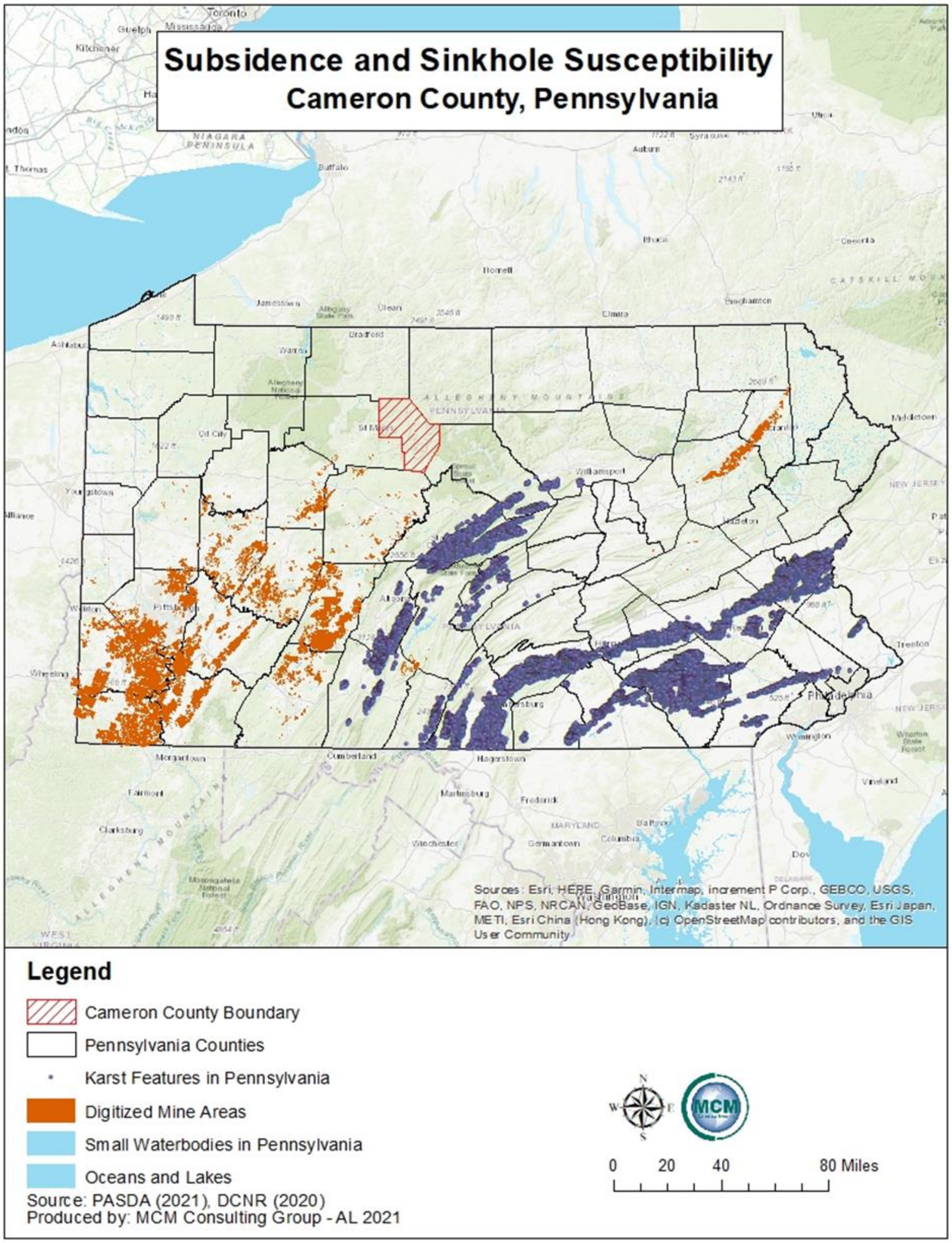


Figure 37 - Abandoned Mined Sites in Cameron County

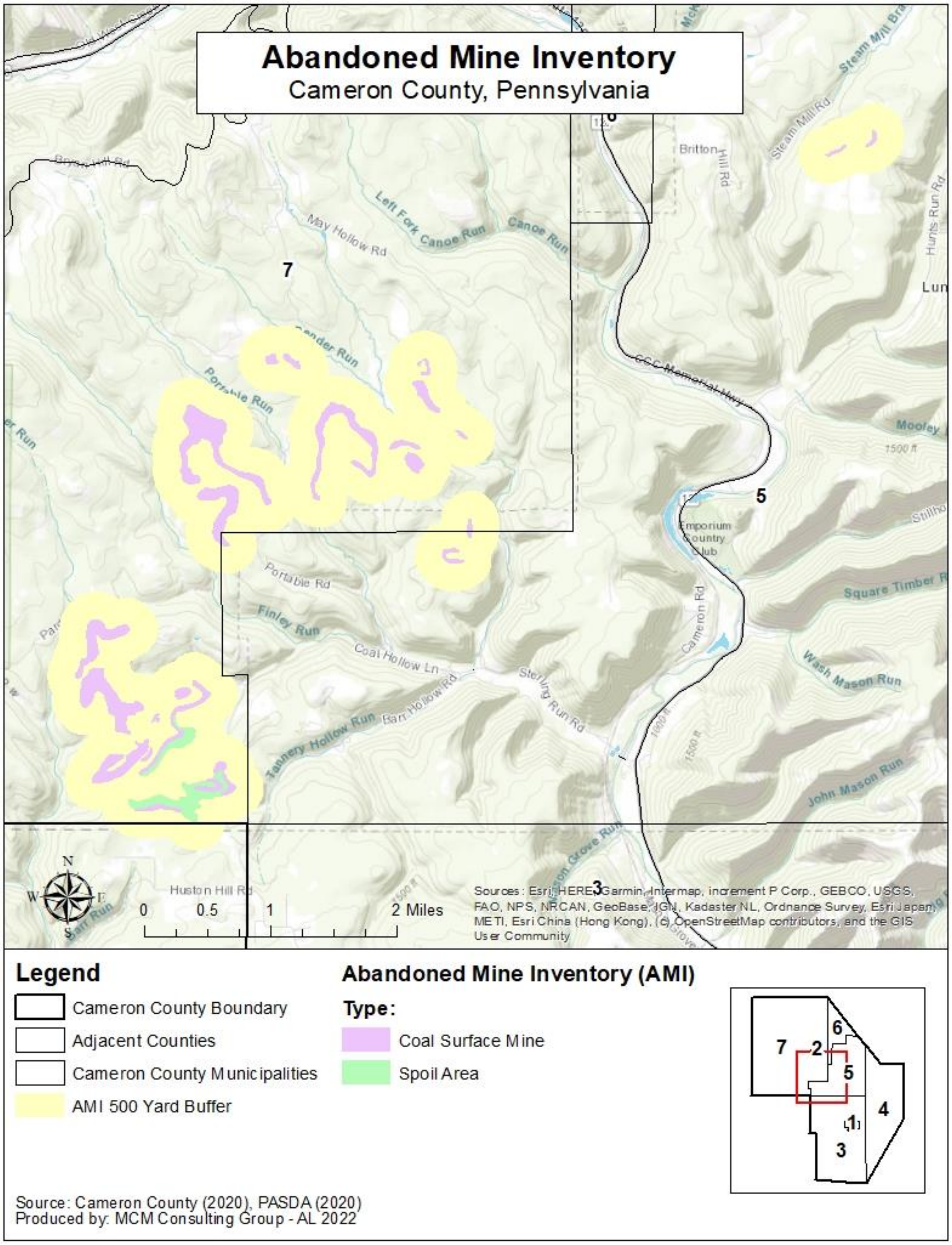
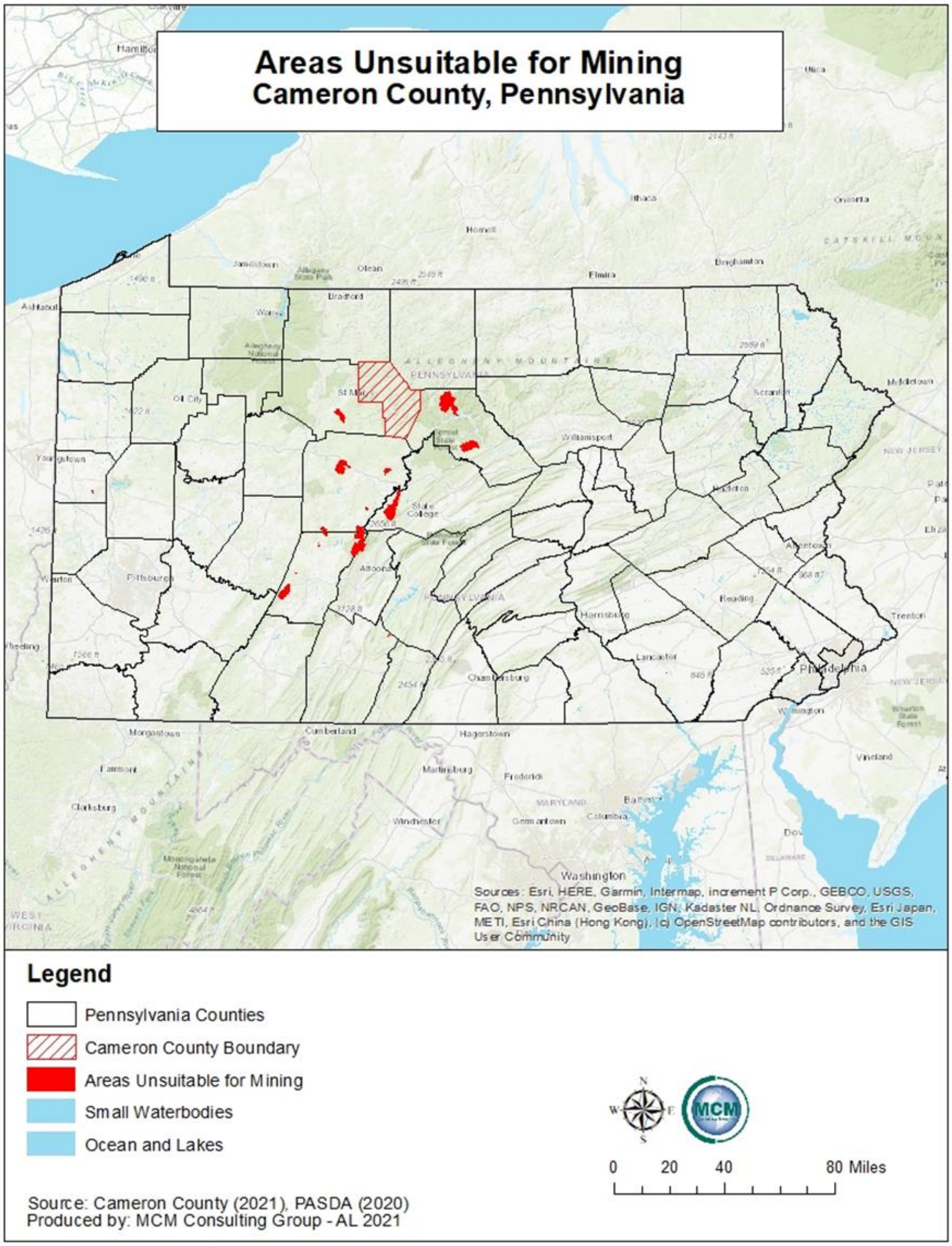


Figure 38 - Unsuitable Areas for Mining in Pennsylvania



4.3.11. Tornados and Windstorms

4.3.11.1 Location and Extent

Tornadoes and windstorms can occur throughout Cameron County, though incidents are usually localized. Severe thunderstorms may result in conditions favorable for the formation of numerous or long-lived tornadoes. Tornadoes are nature's most violent storm and can cause fatalities and devastation to neighborhoods within the county. Tornadoes can occur at any time during the day or night but are most frequent during late afternoon into early evening, the warmest hours of the day, and most likely during the spring and early summer months of March through June. Tornado movement is characterized in two ways: direction/speed of spinning winds and forward movement of the tornado, also known as the storm track. The rotational wind speeds can range from 100 to more than 250 mph. The speed of forward motion can range from 0 mph to 50 mph. On estimate, the maximum velocity of tornadoes is about 300 mph. Forward motion of the tornado path can be a few to several hundred miles in length. Widths of tornados vary from less than 100 feet to more than a mile wide. 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 distances", which explains why one house may be completely demolished by a tornado and a neighboring house could be untouched. Some tornadoes never touch the ground and are short lived, while others may touch the ground several times.

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 flowing in, the tornado is formed. The other type of tornado is categorized as non-supercell, which is not as commonly found. 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. These types of tornadoes are weaker and more short-lived compared to super cell thunderstorms. However, the QLCS are more difficult to detect effectively. Another type of non-supercell tornado is a landspout. These tornadoes are narrow and rope-like funnels that form when the thunderstorm cloud is still growing with no rotating updraft which causes the spinning motion to appear near the ground more. Waterspouts are similar non-supercell tornadoes to the landspout but not likely to be found within Cameron County.

Windstorms may be caused by thunderstorms, hurricanes, and tornadoes, but the most frequent cause of windstorms in Pennsylvania is thunderstorms. 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 Cameron County: straight-line wind, downdraft, macroburst, microburst, downburst, gust front, and derecho. Straight-line winds are the most common wind event. Straight-line winds are different than tornadic winds. A downdraft is a small-scale column of air that rapidly sinks toward the ground. A macroburst is the outward burst of strong winds that are near or at the surface with horizontal dimensions greater than 2 1/2 miles. Microburst winds may begin over a smaller area and then spread out to an even 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 1/2 miles in horizontal dimension and are typically short-lived winds that last at maximum of ten minutes, with windspeeds reaching up to 100 mph. Microburst events can be wet or dry. Wet microbursts are typically associated with heavy precipitation at the surface. Dry microbursts do not have precipitation associated with them and are found in the western portion of the United States. Cameron County is more likely to experience a wet microburst instead of a dry microburst event. A downburst is typically used to describe the macro and microbursts. A gust front is the leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. The gust fronts are characterized by wind shift, temperature drop, and gusty winds out ahead of a thunderstorm. Derecho is a long-lived windstorm that is associated with a band of rapidly moving showers or thunderstorms. A typical derecho contains various downbursts and microbursts. If the wind damage is more than 240 miles and includes wind gusts of at least 58 mph, the event would then be classified as a derecho.

4.3.11.2 Range of Magnitude

Each year, tornadoes account for $1.1 billion in damages and cause over eighty deaths nationally. The number of tornado reports has increased by 14% 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.

The destruction caused by tornadoes may range from light to severe depending on the path of travel. Damages and deaths can be especially significant when tornadoes move through populated, developed areas. The destruction caused by tornadoes ranges from light to inconceivable depending on the intensity, size, and duration of the storm. Typically, tornadoes cause the greatest damages to structures of light weight construction such as mobile homes. Further discussion about the vulnerability of mobile homes can be found in section 4.3.11.5. 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 (*Table 42 - Enhanced Fujita Scale*). Although F Scale has been used for many years, this scale has limitations associated with it. Limitations of the F-Scale include lack of damage indicators (DI), no account of construction quality and variability, and no definitive correlation between damage and wind speeds. The limitation is what led to a more accurate scaling method of the EF- Scale. The EF-

Scale became effective on February 1st, 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 42 - Enhanced Fujita Scale* shows F-Scale categories with corresponding EF-Scale wind speeds.

Figure 41 - Pennsylvania Wind Zones identifies wind speed zones across the state. The figure identifies wind speeds that could occur across the state to 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 design wind speeds for shelters and critical facilities should be able to withstand a three-second gust of up to 200 mph, regardless of whether the gust is the result of a tornado, hurricane, tropical storm, or windstorm incident. The western portion of the state falls within the Zone IV which indicates shelters can withstand up to 250 mph winds, while the eastern side falls within the Zone II where shelters can withstand up to only 160 mph. *Table 41 - Wind Zones* and Counties Affected in Pennsylvania identifies which county is located in specific wind zones throughout Pennsylvania. As shown on *Figure 41* and *Table 41*, Cameron County is situated in Wind Zone III.

Table 41 - Wind Zones and Counties Affected in Pennsylvania

Wind Zones and Counties Affected in Pennsylvania	
Wind Zones with Speed	**Counties Affected**
Zone I (130 mph)	N/A
Zone II (160 mph)	Berks, Bucks, Carbon, Chester, Delaware, Lackawanna, Lancaster, Lebanon, Lehigh, Luzerne, Monroe, Montgomery, Northampton, Philadelphia, Pike, Schuylkill, Wayne, York
Zone III (200 mph)	Adams, Armstrong, Bedford, Blair, Bradford, Cambria, **Cameron**, Centre, Clearfield, Clinton, Columbia, Cumberland, Dauphin, Elk, Fayette, Franklin, Fulton, Greene, Huntingdon, Indiana, Juniata, Jefferson, Lycoming, McKean, Mifflin, Montour, Northumberland, Perry, Potter, Snyder, Somerset, Sullivan, Susquehanna, Tioga, Union,
Zone IV (250 mph)	Allegheny, Beaver, Butler, Clarion, Crawford, Erie, Forest, Lawrence, Mercer, Venango, Warren, Washington
Source: NOAA, 2019	

Since Cameron 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. Additionally, these structures should be able to withstand the wind speeds experienced in an EF3 tornado 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 can have varying secondary effects. The most common is power failure. The severe wind can dismantle power sources and cause significant structural damage. Hazardous material spills can occur if a tornado comes near a holding tank, or the spill stems from a traffic accident caused by high winds. Since tornado incidents are typically localized, environmental impacts are rarely widespread. However, where these incidents occur, severe damage to plant species is likely. This includes loss of trees and an increased threat of wildfire in areas where dead trees are not removed.

Tornadoes/windstorms of all types have caused the following problems within Cameron 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 42 - 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.

Enhanced Fujita Scale			
EF-Scale Number	**Wind Speed (MPH)**	**F-Scale Number**	**Description of Potential Damage**
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			

4.3.11.3 Past Occurrence

Cameron County has experienced two tornado events since 1994, eleven high wind incidents since 1999, and fifty-four thunderstorm wind incidents since 1985 (see *Table 43 – Cameron County Tornado History*, *Table 44 – Cameron County High Wind History*, and *Table 45 – Cameron County Thunderstorm Wind History*). Numerous sources provide information in regard to past occurrences and losses associated with tornadoes/windstorms in Cameron 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 in number. Tornado data was only available from 1994 until 1998 while windstorm data was only available from 1999 until 2019 even though more past or recent events could have occurred. Additional windstorm was requested from the county and Cameron County Office of Emergency Services stated that there were no windstorm or tornado events between 2019 and 2021. Also, thunderstorm wind data was only available from 1985 until 2020. Historically, the county has experienced both severe windstorms and tornadoes.

The most recent tornado event between the two events that occurred in Cameron County was on May 31st, 1998, when an F1 tornado tore through the Sinnemahoning part of the county. This tornado event had a length of about three miles and an approximate width of fifty yards wide.

This F1 tornado touched down just south of Sinnemahoning near Wykoff Run Road. The storm moved southeast along Sinnemahoning Creek and Route 120 crossing into Clinton County, before ending along Montour Road. Trees were blown over or tops were damaged along the path, but no damage was noted to homes in the area. The other tornado event of the two that took place in the county occurred on September 26th, 1994, when another F1 tornado occurred in Emporium. This tornado event was slightly bigger with a length of about four miles and a width of 100 yards. This tornado touched down in the Elk State Forest and caused many downed trees. At Prospect Park, golf ball-size hail was observed. Neither event had any property damage values associated.

The most recent high wind incident in Cameron County occurred on February 24th, 2019, when a 52-magnituide wind event was reported. This wind event result in very gusty west-northwest winds that developed across central Pennsylvania. Gusts over 60 mph were observed across portion of central Pennsylvania, as were scattered power outages and downed trees. The wind gusts were near 60 mph that were observed across Cameron County from February 24th to the 25th of 2019. The most damaging high wind event was on December 12th, 2000, which reported to have caused $13,900.00 in damages.

The most recent thunderstorm wind incident in Cameron County happened on August 27th, 2020, when a 52-magnitude event was recorded in the county. This recent thunderstorm wind event took place in Emporium, Cameron County. Lines of storms formed along a frontal boundary that was draped from the lower Great Lakes eastward across southern New York State during the afternoon of August 27th. These lines of storms produced numerous wind damage reports as they progressed southeastward into a moderately unstable environment over central Pennsylvania, Cameron County being one of the areas that was affected. The severe thunderstorm winds were estimated near 60 mph knocking down trees in Emporium. This particular event cause approximately $3,000.00 in property damage that occurred. The highest magnitude thunderstorm wind event in Cameron County happened on May 15th, 2018, when an 83-magnitude thunderstorm wind event went through the county. A line of severe thunderstorms developed ahead of an approaching cold front during the afternoon of May 15th. This line progresses southeastward across central Pennsylvania, producing widespread wind damage and isolated large hail. The winds from this event were estimated near 95 mph and knocked down numerous trees and wires along Route 120 in the county. The damage value from this event was $8,000.00. The highest property damage valued thunderstorm wind event in Cameron County took place on July 9th, 1999, when a windstorm event resulted in $20,000.00 worth of property damage in Emporium, Cameron County. Various trees were down in Emporium and other parts of the county.

See *Table 43 – Cameron County Tornado History*, *Table 44 - Cameron County High Wind History*, *Table 45 – Cameron County Thunderstorm Wind History*, and *Figure 40 - Past Tornado*

Occurrences in Cameron County below for reference to the past tornado and wind occurrence events and data within the county.

Table 43 - Cameron County Tornado History

Cameron County Tornado History					
Location	**Date**	**Magnitude (F/EF Scale)**	**Deaths**	**Injuries**	**Property Damage**
Emporium	09/26/1994	F1	0	0	$0.00
Sinnamahoning	05/31/1998	F1	0	0	$0.00
Totals	**-**	**-**	**0**	**0**	**$0.00**
Source: NOAA NCEI, 2021					

Table 44 - Cameron County High Wind History

Cameron County High Wind History				
Location	**Date**	**Mag. (knots)**	**Injuries**	**Property Damage**
Cameron County	09/29/1999	60 kts	0	$0.00
Cameron County	12/12/2000	-	0	$13,900.00
Cameron County	02/10/2001	-	0	$5,550.00
Cameron County	03/09/2002	50 kts	0	$0.00
Cameron County	12/01/2004	60 kts	0	$0.00
Cameron County	02/17/2006	52 kts	0	$0.00
Cameron County	12/01/2006	45 kts	0	$0.00
Cameron County	01/30/2008	50 kts	0	$0.00
Cameron County	09/14/2008	50 kts	0	$0.00
Cameron County	04/04/2018	52 kts	0	$0.00
Cameron County	02/24/2019	52 kts	0	$0.00
Total	**-**	**-**	**0**	**$19,450.00**
Source: NOAA NCEI, 2021				

Table 45 - Cameron County Thunderstorm Wind History

Cameron County Thunderstorm Wind History			
Location	**Date**	**Mag. (knots)**	**Property Damage**
Cameron County	05/31/1985	-	$0.00
Cameron County	05/31/1985	-	$0.00
Cameron County	07/20/1986	-	$0.00
Cameron County	07/20/1986	-	$0.00
Cameron County	07/16/1988	-	$0.00
Cameron County	06/29/1990	-	$0.00
Cameron County	08/28/1990	-	$0.00
Cameron County	04/30/1991	-	$0.00
Cameron County	07/23/1991	-	$0.00
Cameron County	07/10/1992	-	$0.00
Cameron County	07/10/1992	-	$0.00
Truman	08/28/1994	-	$0.00
Sizerville	06/02/1995	-	$0.00
Sterling Run	07/06/1995	-	$0.00
Emporium	07/28/1995	-	$0.00
Emporium	11/11/1995	-	$0.00
Emporium	04/12/1996	-	$1,000.00
Sinnamahoning	05/19/1997	51 kts	$0.00
Emporium	06/25/1997	51 kts	$0.00
Emporium	07/15/1997	51 kts	$0.00
Emporium	07/18/1997	51 kts	$0.00
Emporium	07/18/1997	51 kts	$0.00
Emporium	08/16/1997	51 kts	$0.00
Emporium	05/29/1998	51 kts	$0.00
Cameron County	05/31/1998	51 kts	$0.00
Emporium	06/30/1998	51 kts	$0.00
Sinnamahoning	06/30/1998	51 kts	$0.00
Emporium	08/16/1998	51 kts	$0.00
Emporium	08/24/1998	51 kts	$0.00
Emporium	09/07/1998	51 kts	$0.00
Emporium	07/06/1999	-	$10,000.00
Emporium	07/09/1999	-	$20,000.00

Cameron County Thunderstorm Wind History			
Location	**Date**	**Mag. (knots)**	**Property Damage**
Sinnamahoning	07/09/1999	-	$10,000.00
Driftwood	05/18/2000	-	$2,000.00
Emporium	06/02/2000	-	$3,000.00
Emporium	06/21/2000	-	$10,000.00
Emporium	08/16/2001	-	$5,000.00
Emporium	07/21/2003	50 kts	$0.00
Emporium	06/14/2004	50 kts	$0.00
Emporium	06/17/2004	50 kts	$0.00
Emporium	07/26/2005	50 kts	$0.00
Emporium	09/29/2005	50 kts	$0.00
Emporium	11/06/2005	50 kts	$0.00
Driftwood	06/22/2006	50 kts	$0.00
Emporium	06/08/2007	50 kts	$0.00
Emporium	04/08/2010	50 kts	$5,000.00
Truman	07/21/2010	50 kts	$5,000.00
Emporium	07/21/2010	50 kts	$5,000.00
Emporium	05/25/2011	50 kts	$5,000.00
Driftwood	05/26/2011	50 kts	$5,000.00
Emporium	07/26/2012	50 kts	$5,000.00
Sizerville	04/10/2013	61 kts	$0.00
Sizerville	06/03/2014	50 kts	$1,000.00
Rich Valley	06/11/2014	50 kts	$1,000.00
Driftwood	07/19/2015	50 kts	$1,000.00
Emporium	05/04/2018	52 kts	$5,000.00
Cameron County	05/15/2018	83 kts	$8,000.00
Sinnamahoning	05/15/2018	61 kts	$6,000.00
Beechwood	08/18/2019	52 kts	$0.00
Elk river	08/18/2019	52 kts	$0.00
Sylvan	08/18/2019	52 kts	$1,000.00
Cameron County	08/18/2019	52 kts	$0.00
Driftwood	08/18/2019	52 kts	$0.00
Sinnamahoning	08/18/2019	52 kts	$3,000.00
Sinnamahoning	06/03/2020	52 kts	$3,000.00

Cameron County Thunderstorm Wind History			
Location	**Date**	**Mag. (knots)**	**Property Damage**
Emporium	07/19/2020	52 kts	$5,000.00
Emporium	07/19/2020	52 kts	$1,000.00
Sizerville	07/19/2020	52 kts	$4,000.00
Emporium	08/27/2020	52 kts	$3,000.00
Total	-	-	**$133,000.00**
Source: NOAA NCEI, 2021			

4.3.11.4 Future Occurrence

The future probability of a disastrous tornado hitting Cameron County is ranked as possible. According to the National Weather Service, the Commonwealth of Pennsylvania has an annual average of ten tornadoes with two related deaths. While the chance of being hit by a tornado in Cameron County is small, the damage that results when the tornado arrives is 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. As the county's population continues to 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 county with hilly terrain, such as Cameron County. 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 higher. The number of days when tornadoes occur in the United States has decreased; however, there has been an increase in tornado activity on those days. The tornado season has also been lengthening, with the season starting earlier than it has historically. Pennsylvania had, for example, a record number of tornadoes in April and May 2019 compared to any other April or May on record. Climate change is causing temperatures and air moisture to increase, and it is thought that these changes could result in an increase in frequency and intensity of tornadoes and severe windstorms; however, there is somewhat low confidence in these conclusions and there is still much uncertainty. Therefore, the number of future tornado/windstorm events could potentially increase due to many factors. Based on historical incidents, there are three zones in Pennsylvania that can either experience less than one, one to four, and five to ten of EF2 or above tornadoes per 3,700 square miles. Communities in Cameron County, as shown in the *Figure 39 - Tornado Activity in Cameron County* below, are expected to have one to four tornadoes annually. The approximation of one to four tornadoes annually assists with determining the rate of future tornado occurrences within Cameron 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. Therefore, unlike tornadoes, this hazardous event has a highly likely probability for future events to occur within the county.

4.3.11.5 Vulnerability Assessment

Tornadoes can occur at any time of the year, though they are more likely during peak months, which are during the summer for the northern part of the United States, such as Pennsylvania. Factors that impact the amount of damage caused by a tornado are 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 secondary impacts of tornadoes and windstorms, including 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.

Dangers that accompany thunderstorms associated with tornadoes which increase the vulnerability of Cameron County:

- Flash floods – with 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 causes several $100 million in damages annually to property and crops.

Since high-wind incidents may affect the entire county, it is important to identify specific critical facilities and assets that are most vulnerable to the hazard. Critical facilities are highly vulnerable to high windstorms and tornado events. While many severe storms can cause exterior damage to structures, tornadoes can also completely destroy structures, along with their surrounding infrastructure and abruptly halting operations. 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. The elderly, disabled, special needs, and non-English speaking residents are at risk when faced with tornadoes. Without assistance to evacuate or difficulty understanding public information, they may be unable to prepare themselves or their homes and other possessions to safely endure the storm.

The economy of Cameron County is highly vulnerable to tornadoes. While there may be limited impact on the financial and commercial systems of the economy, these storms and the resulting damage can cause long-term business disruptions. The local economy is vulnerable due to the potential for being affected by tornadoes and windstorms and their secondary effects when buildings and supporting infrastructure are destroyed in the storm. Power outages can create work stoppages while transportation accidents and road closures can limit the transportation of goods and services. Additionally, flooding cannot be discounted as it can destroy physical structures, merchandise, and equipment essential for business operation. Cameron's environment is also vulnerable to tornado events. Most notably, hazardous materials spills can pollute ground water systems and vegetation. In the case of hazardous material spills caused by the event, the local environment can also be negatively impacted which requires extensive clean-up and mitigation efforts. Additionally, due to the abundance of forested areas in Cameron County, numerous hikers and hunters that visit the county annually are vulnerable as well. In the event of a tornado or severe storm, these tourists and hunters have limited emergency notification measures. This could affect the tourism associated with Cameron County which in turn would affect the economy as well.

While the frequency of windstorms and minor tornadoes is expected to remain relatively constant, vulnerability increases in more densely developed areas. Since high wind events may affect the entire county, it is important to identify specific critical facilities and assets that are most vulnerable to this hazard. Due to their lightweight and often unanchored design, commercial trailers and mobile homes are also extremely vulnerable to high winds/tornadoes and will generally sustain the most damage. These structures represent a reasonable percentage of the occupied structures within the county. A majority of the mobile homes are found in Shippen Township and Gibson Township, which makes these two municipalities more vulnerable to tornado events than others. Locations and numbers of mobile home parcels in Cameron County can be found in *Table 46 – Vulnerable Mobile Home Parcels in Cameron County*. While clearly an estimate, this enables the county to take a preliminary look at which jurisdictions are more vulnerable to mobile home damage.

Table 46 - Vulnerable Mobile Home Parcels in Cameron County

Vulnerable Mobile Home Parcels in Cameron County		
Municipality	**# Mobile Homes**	**Total Value**
Driftwood Borough	11	$61,495
Emporium Borough	6	$88,820
Gibson Township	134	$1,841,935
Grove Township	98	$522,650
Lumber Township	58	$453,892
Portage Township	24	$247,045
Shippen Township	219	$3,111,763
Total:	**550**	**$6,327,600**
Source: Cameron County GIS, 2021		

Figure 39 - Tornado Activity in Cameron County

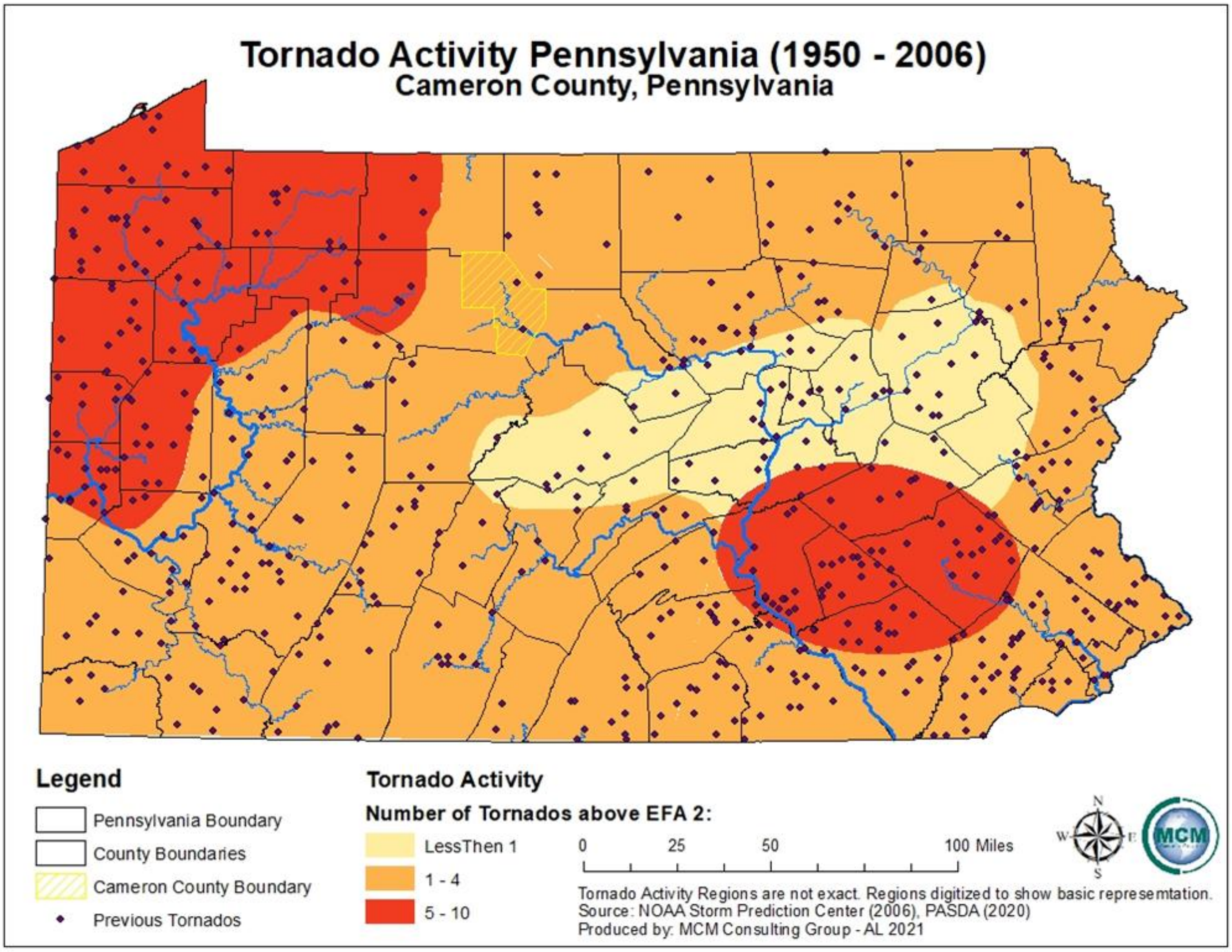


Figure 40 - Past Tornado Occurrences in Cameron County

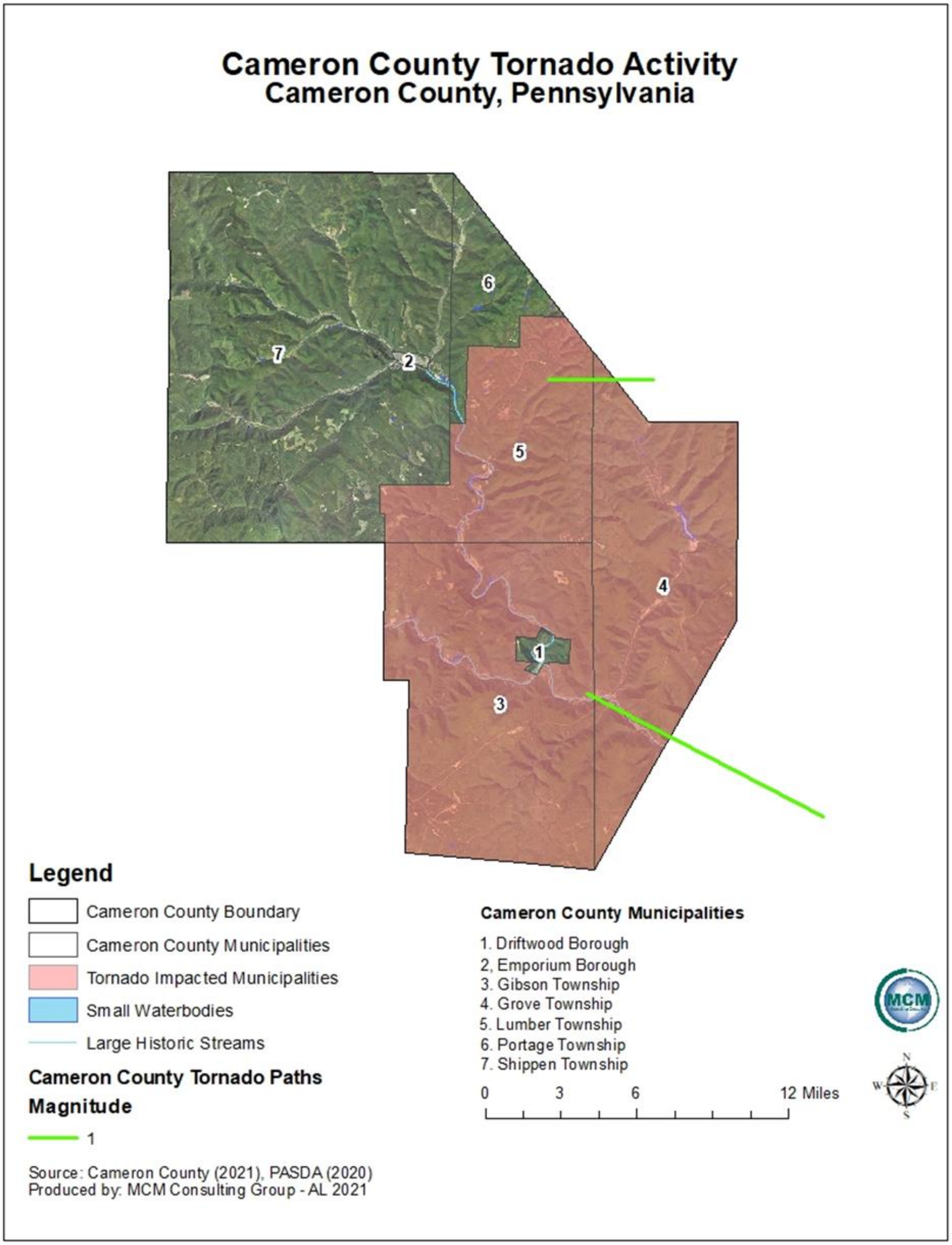
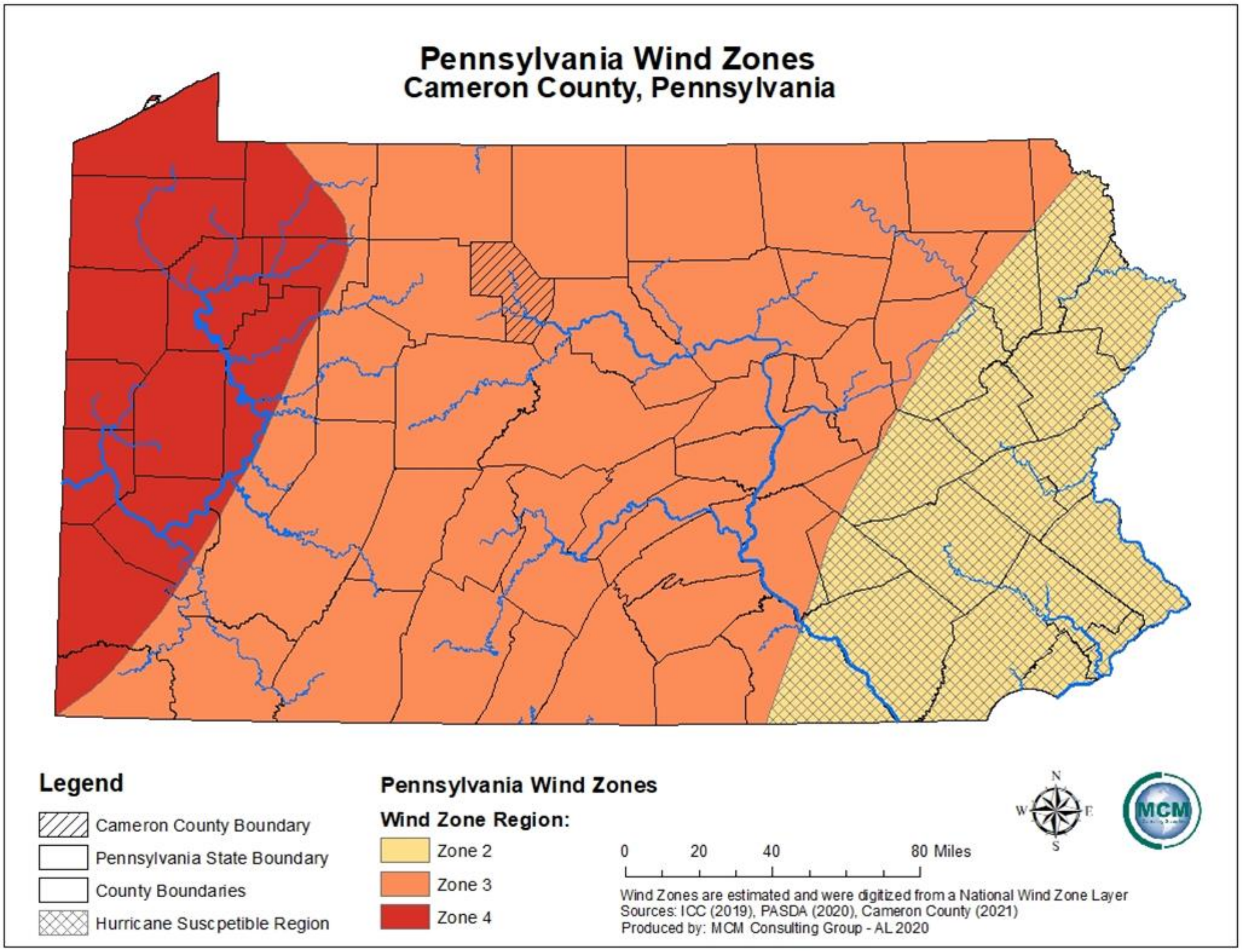


Figure 41 - Pennsylvania Wind Zones



4.3.12. Wildfire

4.3.12.1 Location and Extent

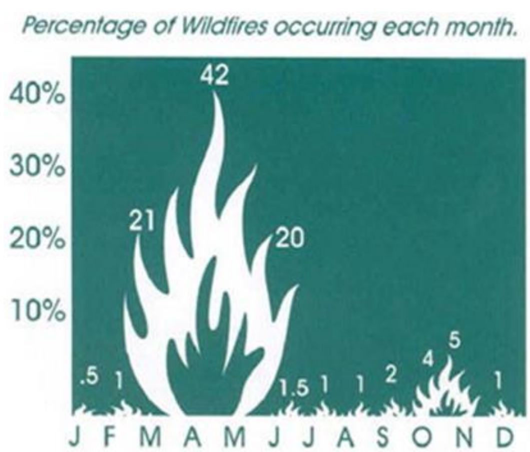
Most wildfires are caused by human carelessness, negligence, and ignorance. However, some are precipitated by lightning strikes and, in rare instance, spontaneous combustion. Lightning-caused wildfires in Pennsylvania are relatively rare. The Pennsylvania Department of Conservation and Natural Resources (PA DCNR) reports that 98% of wildfires are caused by people.

Wildfires can take place in less developed or completely undeveloped areas, spreading rapidly through vegetative fuels. This type of fire occurs any time of the year, but mostly occur in the spring and fall months. The greatest potential for wildfires is in the spring months of March, April, and May, and the autumn months of October and November; 83% of all Pennsylvania wildfires occur in these two time periods. In the spring, bare trees allow sunlight to reach the forest floor, drying fallen leaves and other ground debris. In the fall, dried leaves are also fuel for fires. *Figure 42 – Seasonal Wildfire Percentage* shows the wildfire percentage occurrence during each month occurring in Pennsylvania. Any small fire, if not quickly detected and suppressed, can get out of control. Wildfires in Pennsylvania can occur in open fields, grass, dense brush, and forests.

The majority of Cameron County's land cover is forest and the potential geographic extent of wildfires in the county is large. Under dry conditions or droughts, wildfires have the potential to burn forests as wells as croplands.

Cameron County is part of the Elk State Forest District, PA DCNR District 13, and covers more than 217,000 acres in Cameron, Elk, McKean, and Potter counties. It is one of eight state forests in the Pennsylvania Wilds Region.

Figure 42 - Seasonal Wildfire Percentage



4.3.12.2 Range of Magnitude

Wildfire events can range from small fires that can be managed by local firefighters to large fires impacting many acres of land. Large events may require evacuation from one or more communities and necessitate regional or national firefighting support. The impact of a severe wildfire can be devastating. A wildfire has the potential to kill people, livestock, fish, and wildlife. Wildfires can destroy property, valuable timber, forage, and recreational and scenic values.

In addition to the risk wildfires pose to the public and property owners, the safety of firefighters is also a concern. Although loss of life among firefighters in wildfires does not occur often in Pennsylvania, it is always a risk. In October 2016, about 100 people gathered for the dedication of a State Historical Marker commemorating The Pepper Hill Fire of 1938. DCNR forestry representatives, Historical and Museum Commission officials and local firefighters gathered at the Emporium Fire Department for the ceremony. Eighty-seven years earlier, October 19, 1938, seven teenage Civilian Conservation Corps enrollees and a forestry foreman lost their lives attempting to extinguish a wildfire in Sinnemahoning. The crews fighting the fire were lacking experience and exhausted from fighting the Jerry Run Fire the day before until 5:30 am that morning.

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

Significant potential environmental impacts from wildfires include severe erosion, silting of stream beds and reservoirs, and flooding due to ground-cover loss following a fire event. Wildfire can also have a positive environmental impact in that they burn dead trees, leaves, and grasses to allow more open spaces for new vegetation to grow and receive sunlight.

The United States Forest Services utilizes the Forest Fire Assessment System to classify the dangers of a wildfire. *Table 47 – Wildland Fire Assessment System* identifies each threat classification and provides a description of the level.

Table 47 - Wildland Fire Assessment System

Wildland Fire Assessment System	
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.
Source: U.S. Forest Service	

4.3.12.3 Past Occurrences

Between 2000 and 2020, there was a total of 165 wildfire events reported to the PA DCNR Bureau of Forestry for District 13. The largest impact of wildfires in District 13 was in 2013 when only seven fires burned almost 381 acres. There were two years (2004 and 2011) when no wildfires were reported. The table below indicates a history of a low number of wildfires per year, and small – especially when compared to other Pennsylvania forestry districts. *Table 48 – List of Wildfire Events for District 13*, lists DCNR's record of wildfires in its library.

Table 48 - List of Wildfire Events for District 13

Number of Wildfire Events for District 13		
Year	**Number of Wildfire Events**	**Number of Acres in Wildfire Events**
2000	18	95.6
2001	26	112.2
2002	11	26.6
2003	7	43.1
2004	0	0
2005	3	50.5
2006	2	11.4
2007	15	19.5
2008	5	15.0
2009	10	281.3
2010	7	18.9
2011	0	0
2012	8	252.0
2013	7	380.9
2014	5	123.7
2015	3	45.6
2016	4	101.6
2017	3	0.5
2018	4	5.6
2019	5	4.4
2020	22	19.0
Total:	**165**	**1,607.4**
Source: PA DCNR, 2021		

In recent years, the number of prescribed burns in Pennsylvania has been increasing. This corresponds to an embrace of the need for fire in many natural ecosystems and management strategies for reducing vulnerability to wildfire; it also improves hunting opportunities in the Commonwealth of Pennsylvania. During 2020, 282 prescribed burns accounted for 11,748 acres of prescribed burn acres. In the spring of 2021, four prescribed burns were announced for the Elk State Forest District. In August of 2021, there were numerous prescribed burns in state-owned game lands. The Pennsylvania Game Commission Prescribed Burn Map may be found here: https://pagame.maps.arcgis.com/apps/webappviewer/index.html?id=d7ab50bde980460fab22de6316ec73ca

Table 49 – 2020 Wildfire Acreage Loss lists the causes of wildfire acreage loss in District 13 in 2020; the number of fires by cause and acres burned are also listed for each category. Far and away, the leading cause of wildfire is debris burning.

Table 49 - 2020 Wildfire Acreage Loss

Wildfire Acreage Loss		
Cause:	**Number of wildfires:**	**Acres burned:**
Campfire	71	42.2
Children	17	18.4
Debris Burning	866	1,050.1
Equipment Use	125	164.1
Fireworks	27	10.8
Incendiary	152	1,011.4
Lightning	8	8.0
Miscellaneous	103	242.1
Power Line	73	93.9
Railroad	43	372.7
Smoking	15	15.1
Structure	7	4.4

4.3.12.4 Future Occurrence

Between 2000 and 2020, 80,589 acres of state forest burned in Pennsylvania and at least 1,607.4 of those acres burned in District 13. Previous events indicate that wildfire events will continue to occur yearly. Weather conditions like drought can increase the likelihood of wildfires occurring. Any fire, without the quick response of fire fighters, forestry personnel, or visitors to the forest, has the potential to become a wildfire.

The probability of a wildfire occurring in Cameron County is highly likely in any given year, especially given the fact that debris burning is the leading cause of wildfires (see *Table 49 –*

2020 Wildfire Acreage Loss) and burning is a common allowable method of eliminating certain types of landowner and household debris. However, the likelihood of one of those fires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response.

Climate change is expected to bring an elongated wildfire season and more intense and long-burning fires (Pechony & Shindell, 2010). Unfortunately, in some regions of the United States, this is not a hypothetical concern, but a very real concern. Northern California has experienced unprecedented devastating wildfires in 2017, 2018, 2019, 2020 and 2021. The fires that have occurred 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 on by climate change are not to be ignored. 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).

4.3.12.5 Vulnerability Assessment

The size and impact of a wildfire depends on its location, climatic 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. Even though District 13 boasts small numbers of wildfires that are small in stature compared to other districts, the sheer acreage of forest and wildland in the Pennsylvania Wilds region makes it highly vulnerable to this hazard.

Uneducated or inattentive debris burners are a constant concern and a consistent vulnerability (see *Table 49 – 2020 Wildfire Acreage Loss*). Firefighters and other first responders can encounter life-threatening situations due to forest fires 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 humans 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.

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 of the WUI housing noted above illustrates this. *Figure 43 – Wildland Urban Interface* shows the extent of Cameron County and the critical infrastructure facilities, functional needs facilities, and fire stations. A 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 two fire departments in Cameron County. 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. The likelihood that some fire stations and services will fail is a real threat to county communities' safety. *Figure 44 – Fire Station Locations* illustrates the position of fire stations and the location of state game lands, state forests, and natural areas within Cameron County. Many communities have already experienced the unfortunate fact that services have failed in the past. It is recommended that each municipality assess their own vulnerabilities by maintaining and building a relationship with their local providers to make the determination and begin to plan accordingly if a local service were to shut down its operation. The statistics, response times, and call times associated with all units dispatched are easily obtainable from the local 911 center.

These departments must be supported to create and/or discover new ways to not only recruit but retain volunteers. If left unattended, the issues will continue to devolve and worsen, and the lack of response will grow, leaving the community more vulnerable to loss of life and loss of property to the threats of wildfires.

Table 50 – Buildings in Wildfire Hazard Areas shows the total Cameron County addressable structures and critical facilities that are located in, near, adjacent to or among state game lands, state parks, state forests, local parks, and other locations designated by the Wildland Urban Interface. Wildfire hazard is defined based on conditions that affect wildfire ignition and/or behavior such as fuel, topography, and local weather. Cells in the chart that have a zero numerical entry had zero structures within the specified area.

Table 50 - Buildings in Wildfire Hazard Areas

Buildings in Wildfire Hazard Areas						
Municipality	**Wildland Urban Interface**			**Wildland Urban Intermix**		
	High Density	**Medium Density**	**Low Density**	**High Density**	**Medium Density**	**Low Density**
Driftwood Borough	5	49	2	0	8	30
Emporium Borough	643	340	0	38	66	5
Gibson Township	0	84	6	0	80	172

Buildings in Wildfire Hazard Areas						
Municipality	**Wildland Urban Interface**			**Wildland Urban Intermix**		
	High Density	**Medium Density**	**Low Density**	**High Density**	**Medium Density**	**Low Density**
Grove Township	36	102	11	17	224	287
Lumber Township	0	41	21	1	54	207
Portage Township	0	25	15	0	49	24
Shippen Township	9	375	8	0	283	399
Totals:	**693**	**1,016**	**63**	**56**	**764**	**1,124**

It is recommended that the entire community and county be educated on the perpetual need associated with providing these services. In addition, continued efforts to inform the state legislature could prove to be paramount in assuring these services remain in operation into the future. At the time of this writing, a flurry of bills had been introduced to both the House of Representatives and the Senate as the result of a two-year study initiated by Senate Resolution (SR 6). The resolution may be found here:

http://pehsc.org/wp-content/uploads/2014/05/SR-6-REPORT-FINAL.pdf .

Figure 43 - Wildland Urban Interface

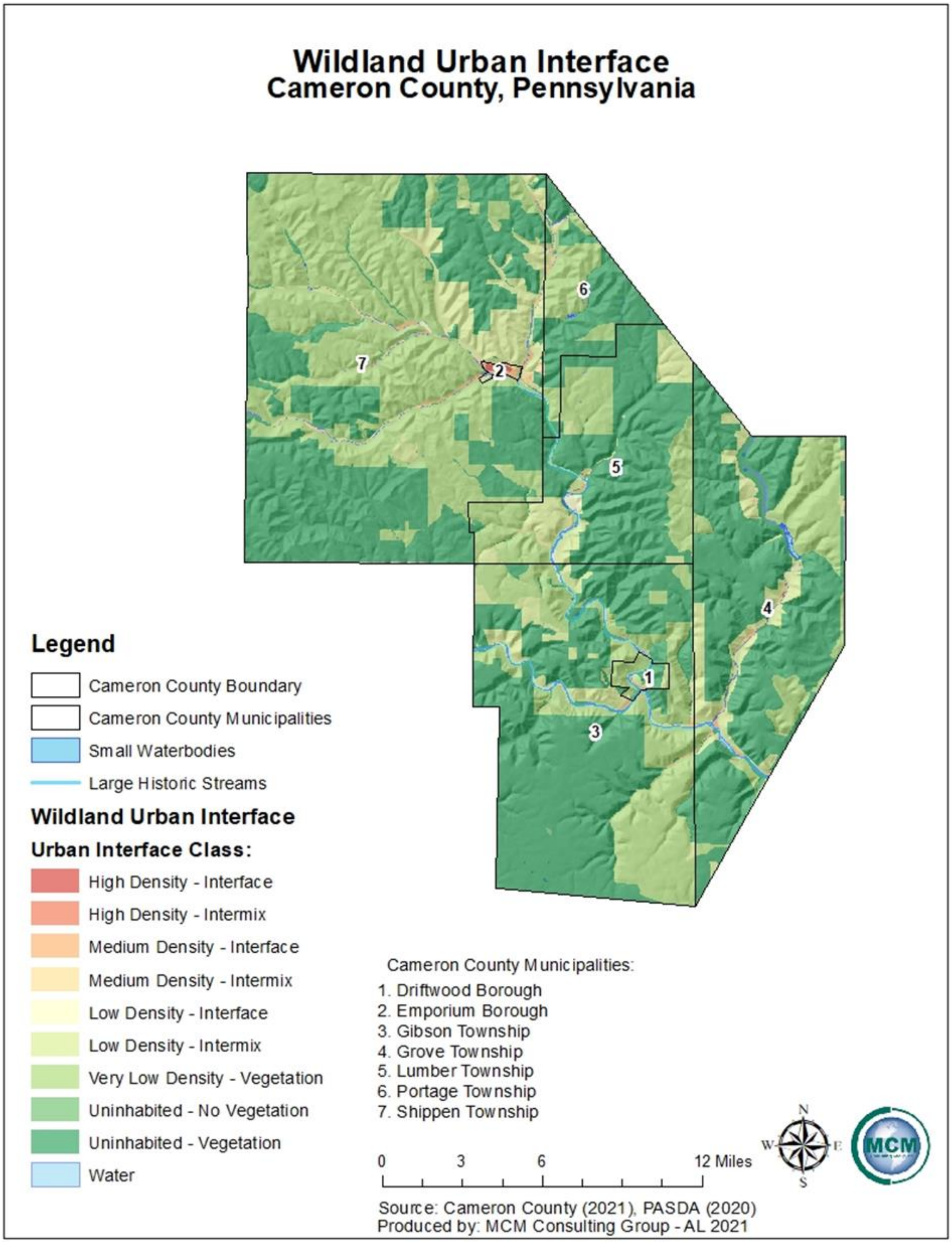
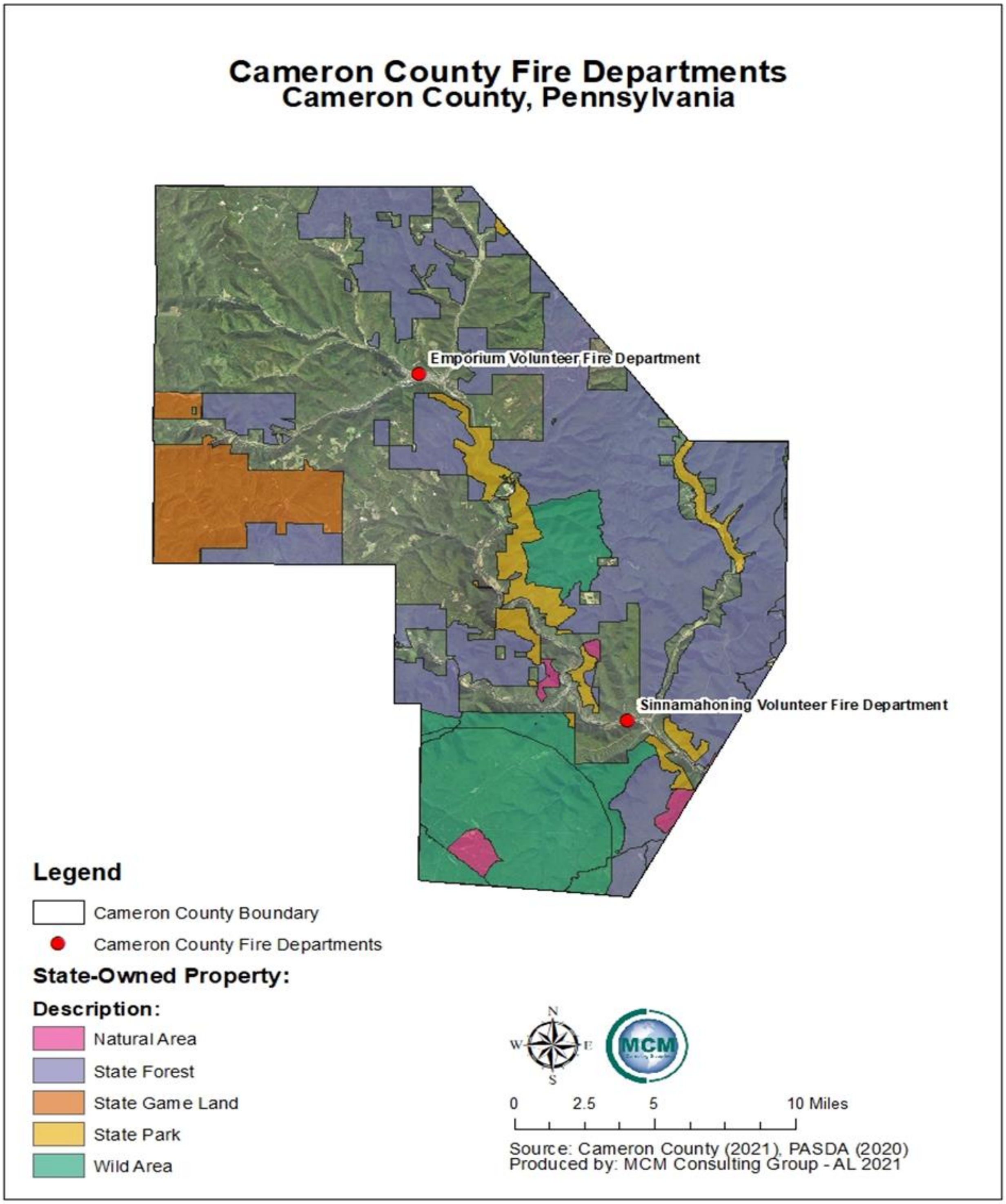


Figure 44 - Fire Station Locations



4.3.13. Winter Storms

4.3.13.1 Location and Extent

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

- **Heavy Snow:** According to the National Weather Service (NWS), heavy snow is generally snowfall accumulating to four inches or more in depth in twelve hours or less; or snowfall accumulating to six inches or more in depth in twenty-four hours or less. A snow squall is an intense but limited duration, period of moderate to heavy snowfall, also known as a snowstorm, accompanied by strong, gusty surface winds and possibly lightning.
- **Blizzard:** Blizzards are characterized by low temperatures, wind gusts of thirty-five miles per hour (mph) or more and falling and/or blowing snow that reduces visibility to 1/4-mile or less for an extended period of time (three or more hours).
- **Sleet of Freezing Rainstorm:** Sleet is defined as pellets of ice composed of frozen or mostly frozen raindrops or refrozen partially melted snowflakes. These pellets of ice usually bounce after hitting the ground and other hard surfaces. Freezing rain is rain that falls as a liquid but freezes into glaze upon contact with the ground.
- **Ice Storm:** An ice storm is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice pull down trees and utility lines resulting in loss of power and communication. These accumulations of ice make walking and driving extremely dangerous and can create extreme hazards to motorists and pedestrians.
- **Extra-Tropical Cyclone:** Sometimes called mid-latitude cyclones, are a group of cyclones defined as synoptic scale, low pressure, weather systems that occur in the middle latitudes of the Earth. These storms have neither tropical nor polar characteristics and are connected with fronts and horizontal gradients in temperature and dew point otherwise known as "baroclinic zones". Extra-tropical cyclones are everyday weather phenomena which, along with anticyclones, drive the weather over much of the Earth. These cyclones produce impacts ranging from cloudiness and mild showers to heavy gales and thunderstorms. Tropical cyclones often transform into extra-tropical cyclones at the end of their tropical existence, usually between 30˚ and 40˚ latitude, where there is

insufficient force from upper-level shortwave troughs riding the westerlies (weather systems moving west to east) for the process of extra-tropical transition to begin. A shortwave trough is a disturbance in the mid or upper part of the atmosphere which induces upward motion ahead of it. During an extra-tropical transition, a cyclone begins to tilt back into the colder air mass with height, and the cyclone's primary energy source converts from the release of latent heat from condensation to baroclinic processes.

- **Nor'easter (abbreviation of Northeaster):** Nor'easters are named for the strong northeasterly winds that blow in from the ocean ahead of the storm and over coastal areas. They are also referred to as a type of extra-tropical cyclones (mid-latitude storms, or Great Lake storms). Wind gusts associated with Nor-easters contain a cold core of low barometric pressure that forms in the mid-latitudes. Their strongest winds are close to the Earth's surface and often measure several hundred miles across. Nor-easters may occur at any time of the year but are more common during the fall and winter months.

4.3.13.2 Range of Magnitude

The magnitude or severity of a severe winter storm depends on several factors including a region's susceptibility to snowstorms, snowfall amounts, snowfall rates, wind speeds, temperatures, visibility, storm duration, topography, and time of occurrence during the day (e.g., weekday versus weekend), and time of season. The extent of a severe winter storm can be classified by meteorological measurements, such as those above, and by evaluating its societal impacts. The Northeast Snowfall Impact Scale (NESIS) categorizes snowstorms, including Nor'easter events, 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 51 – 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.

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. Cameron County receives an average of about forty inches of snowfall a year. Most areas of Cameron 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 46 - Pennsylvania Annual Snowfall 1981 – 2010* illustrates the long-term trends for snowfall accumulation in Pennsylvania over three decades.

Table 51 - 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).
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			

4.3.13.3 Past Occurrence

Emporium Borough holds the Pennsylvania state record for the greatest 5-day, 6-day, and 7-day snowfall totals. The unnamed storm system ended on December 29th, 1944 and the final snowfall total was fifty-seven inches. *Figure 45 – Winter Storm Events by County in Pennsylvania* shows the number of winter storm events from 1950 – 2013 for the

Commonwealth of Pennsylvania. Cameron County had sixty such events. *Table 52 – Recent Annual Snowfall Estimates* shows recent annual snowfall measurements as stated by NOAA. The estimated snowfall for 2010 to 2011 and 2013 through 2015 was increased compared to the estimated snow amounts for the 198 through 2010 period. Only 2011 through 2012 and 2015 through 2016 periods were slightly decreased. Overall, Cameron County has experienced an increase on the annual estimated average of snowfall. On average, the annual snowfall totals have increased in the time periods from 2017 to 2020. A list of additional Cameron County winter storms, and other related events is outlined in *Table 53 – Cameron County Winter Strom History*.

Table 52 - Recent Annual Snowfall Estimates

Recent Annual Snowfall Estimates	
Time Span	**Snowfall Estimates (inches)**
1981 – 2010	41 – 60
2010 – 2011	52 – 90
2011 – 2012	20 – 55
2012 – 2013	40 – 68
2013 – 2014	60 – 70
2014 - 2015	54 – 70
2015 – 2016	12 – 33
2016 – 2017	36 – 48
2017 – 2018	48 – 60
2018 – 2019	36 - 60
2019 – 2020	24 – 36
2020 – 2021	48 – 72
Source: NOAA, 2021	

Table 53 - Cameron County Winter Weather History

Cameron County Winter Weather History		
Location	**Date**	**Event Type**
Cameron County (entire county)	01/02/1996	Heavy Snow
Cameron County (entire county)	03/07/1996	Heavy Snow
Cameron County (entire county)	11/28/1996	Heavy Snow
Cameron County (entire county)	03/14/1997	Ice Storm
Cameron County (entire county)	11/14/1997	Heavy Snow
Cameron County (entire county)	12/10/1997	Heavy Snow
Cameron County (entire county)	01/15/1998	Ice Storm

Cameron County Winter Weather History		
Location	**Date**	**Event Type**
Cameron County (entire county)	01/02/1999	Winter Storm
Cameron County (entire county)	01/08/1999	Winter Storm
Cameron County (entire county)	01/14/1999	Winter Storm
Cameron County (entire county)	02/13/2000	Ice Storm
Cameron County (entire county)	02/18/2000	Winter Storm
Cameron County (entire county)	12/13/2000	Winter Storm
Cameron County (entire county)	03/04/2001	Heavy Snow
Cameron County (entire county)	01/06/2002	Heavy Snow
Cameron County (entire county)	12/05/2002	Heavy Snow
Cameron County (entire county)	12/10/2002	Ice Storm
Cameron County (entire county)	12/13/2002	Heavy Snow
Cameron County (entire county)	12/25/2002	Heavy Snow
Cameron County (entire county)	01/01/2003	Ice Storm
Cameron County (entire county)	12/14/2003	Heavy Snow
Cameron County (entire county)	01/04/2004	Ice Storm
Cameron County (entire county)	01/14/2004	Heavy Snow
Cameron County (entire county)	02/03/2004	Heavy Snow
Cameron County (entire county)	02/06/2004	Ice Storm
Cameron County (entire county)	03/16/2004	Heavy Snow
Cameron County (entire county)	12/20/2004	Cold/Wind Chill
Cameron County (entire county)	01/05/2005	Winter Storm
Cameron County (entire county)	01/22/2005	Winter Storm
Cameron County (entire county)	02/21/2005	Winter Storm
Cameron County (entire county)	03/01/2005	Heavy Snow
Cameron County (entire county)	10/25/2005	Heavy Snow
Cameron County (entire county)	12/16/2005	Winter Storm
Cameron County (entire county)	01/26/2007	Extreme Cold/Wind Chill
Cameron County (entire county)	02/03/2007	Extreme Cold/Wind Chill
Cameron County (entire county)	02/07/2007	Extreme Cold/Wind Chill
Cameron County (entire county)	02/13/2007	Heavy Snow
Cameron County (entire county)	02/16/2007	Extreme Cold/Wind Chill
Cameron County (entire county)	03/06/2007	Extreme Cold/Wind Chill
Cameron County (entire county)	03/16/2007	Heavy Snow
Cameron County (entire county)	12/09/2007	Ice Storm
Cameron County (entire county)	12/13/2007	Winter Storm
Cameron County (entire county)	01/19/2008	Extreme Cold/Wind Chill
Cameron County (entire county)	02/01/2008	Winter Storm
Cameron County (entire county)	02/10/2008	Extreme Cold/Wind Chill

Cameron County Winter Weather History		
Location	**Date**	**Event Type**
Cameron County (entire county)	02/28/2008	Heavy Snow
Cameron County (entire county)	12/19/2008	Winter Storm
Cameron County (entire county)	12/21/2008	Extreme Cold/Wind Chill
Cameron County (entire county)	01/06/2009	Ice Storm
Cameron County (entire county)	01/10/2009	Winter Storm
Cameron County (entire county)	01/15/2009	Extreme Cold/Wind Chill
Cameron County (entire county)	01/27/2009	Winter Storm
Cameron County (entire county)	03/02/2009	Extreme Cold/Wind Chill
Cameron County (entire county)	10/15/2009	Winter Storm
Cameron County (entire county)	02/01/2011	Winter Storm
Cameron County (entire county)	02/05/2011	Ice Event
Cameron County (entire county)	02/20/2011	Heavy Snow
Cameron County (entire county)	04/22/2012	Heavy Snow
Cameron County (entire county)	12/26/2012	Winter Storm
Cameron County (entire county)	11/26/2013	Winter Storm
Cameron County (entire county)	12/14/2013	Heavy Snow
Cameron County (entire county)	01/06/2014	Extreme Cold/Wind Chill
Cameron County (entire county)	01/28/2014	Extreme Cold/Wind Chill
Cameron County (entire county)	02/04/2014	Winter Storm
Cameron County (entire county)	02/01/2015	Winter Storm
Cameron County (entire county)	02/14/2015	Extreme Cold/Wind Chill
Cameron County (entire county)	02/19/2015	Extreme Cold/Wind Chill
Cameron County (entire county)	02/23/2015	Extreme Cold/Wind Chill
Cameron County (entire county)	02/15/2016	Winter Storm
Cameron County (entire county)	01/05/2018	Extreme Cold/Wind Chill
Cameron County (entire county)	11/15/2018	Winter Storm
Cameron County (entire county)	01/18/2019	Winter Storm
Cameron County (entire county)	01/19/2019	Winter Storm
Cameron County (entire county)	01/20/2019	Extreme Cold/Wind Chill
Cameron County (entire county)	01/30/2019	Extreme Cold/Wind Chill
Cameron County (entire county)	11/01/2019	Winter Weather
Cameron County (entire county)	12/16/2020	Winter Storm
Cameron County (entire county)	02/15/2021	Winter Storm
Source: NOAA NCEI, 2021		

4.3.13.4 Future Occurrence

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

4.3.13.5 Vulnerability Assessment

Severe winter storms are of significant concern to Cameron 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 wind driven 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 Cameron County (4,447) is exposed to severe winter storm events. The elderly are considered to be the most susceptible to this hazard due to their increased risk of injury and death from falls, overexertion, and or attempts to clear ice and snow. The elderly population is also more vulnerable to utility outages in winter, especially when they are paired with winter storm events. *Table 54 – Utility Outages in Cameron County in Winter* shows the number of power outages, phone outages, and 911 outages, that have occurred in the county during winter months.

Residents with low incomes may not have access to housing or their housing may be less able to withstand cold temperatures (e.g., homes with poor insulation and heating supply).

Table 54 - Utility Outages in Cameron County in Winter

Utility Outages in Cameron County in Winter		
Location	**Date**	**Event**
Cameron County (entire county)	01/30/2008	Power Outage
Shippen Township	02/11/2008	Power Outages
Cameron County (entire county)	12/12/2008	General & 911 Outages
Shippen Township	01/11/2009	Power Outage
Driftwood Borough	03/11/2009	Power Outage
Emporium Borough	12/14/2009	Power Outage
Cameron County (entire county)	02/28/2011	Radio Outage
Shippen Township	02/28/2011	Power Outage
Driftwood Borough	01/03/2012	Phone & 911 Outages
Cameron County (entire county)	12/11/2013	Phone Outage
Cameron County (entire county)	02/02/2018	Phone Outage
Cameron County (entire county)	02/14/2019	Radio Outage
Cameron County (entire county)	11/13/2019	Planned Power Outage
Source: Corvena Knowledge Center™, 2021		

The entire general building stock inventory in Cameron County is exposed and vulnerable to the severe winter storm hazard. In general, structural impacts include damage to rood and building frames, rather than building content. There was no historic information available that identified property damages within Cameron County due to a single severe winter storm event. Current modeling tools are not available to estimate specific losses for this hazard. 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 presented in the flood profile due to snow and ice melt. Generally, losses from flooding associated with severe winter storms should be less than that 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, Cameron County is generally well-prepared for snow and ice removal each season.

Figure 45 - Winter Storm Events by County in Pennsylvania

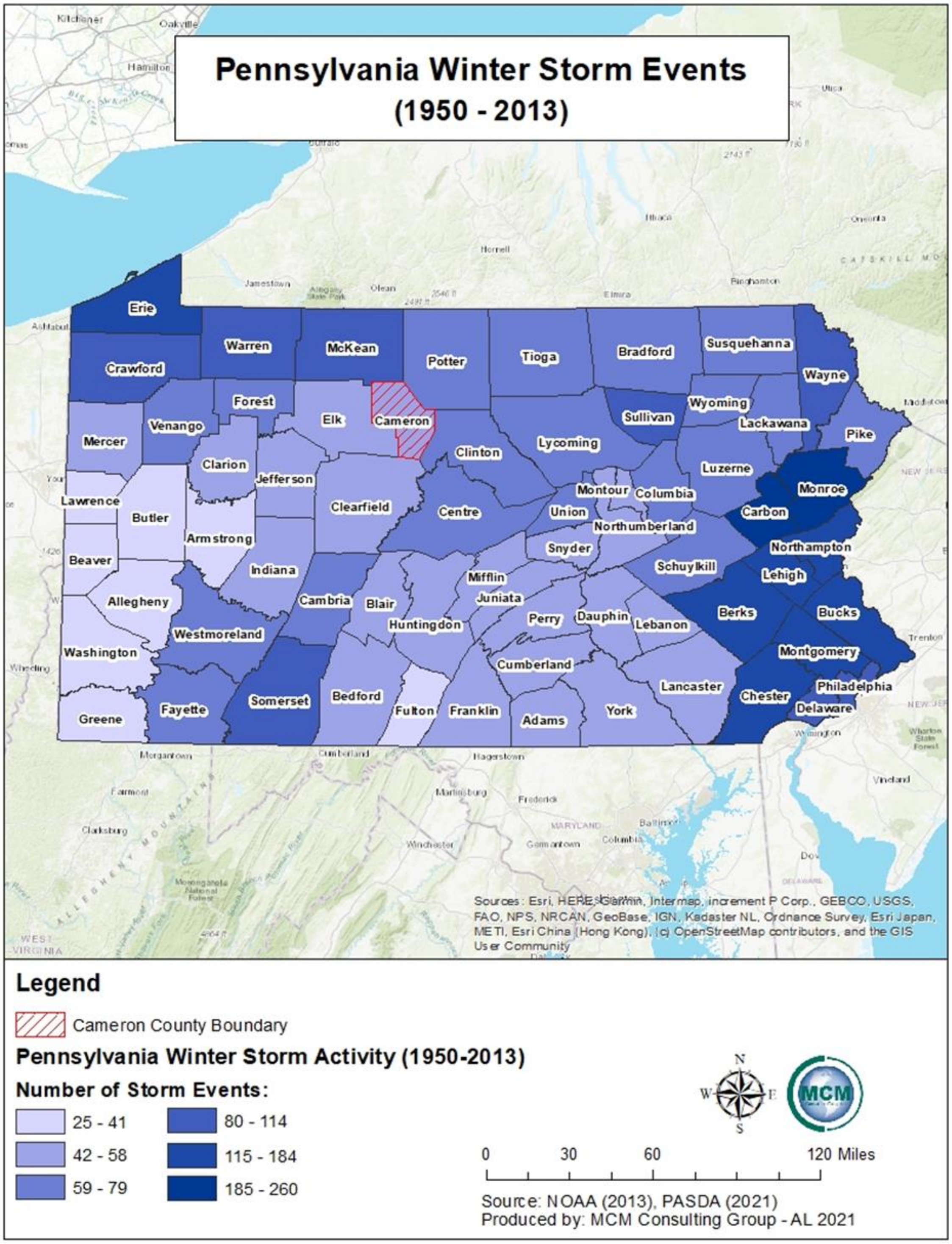
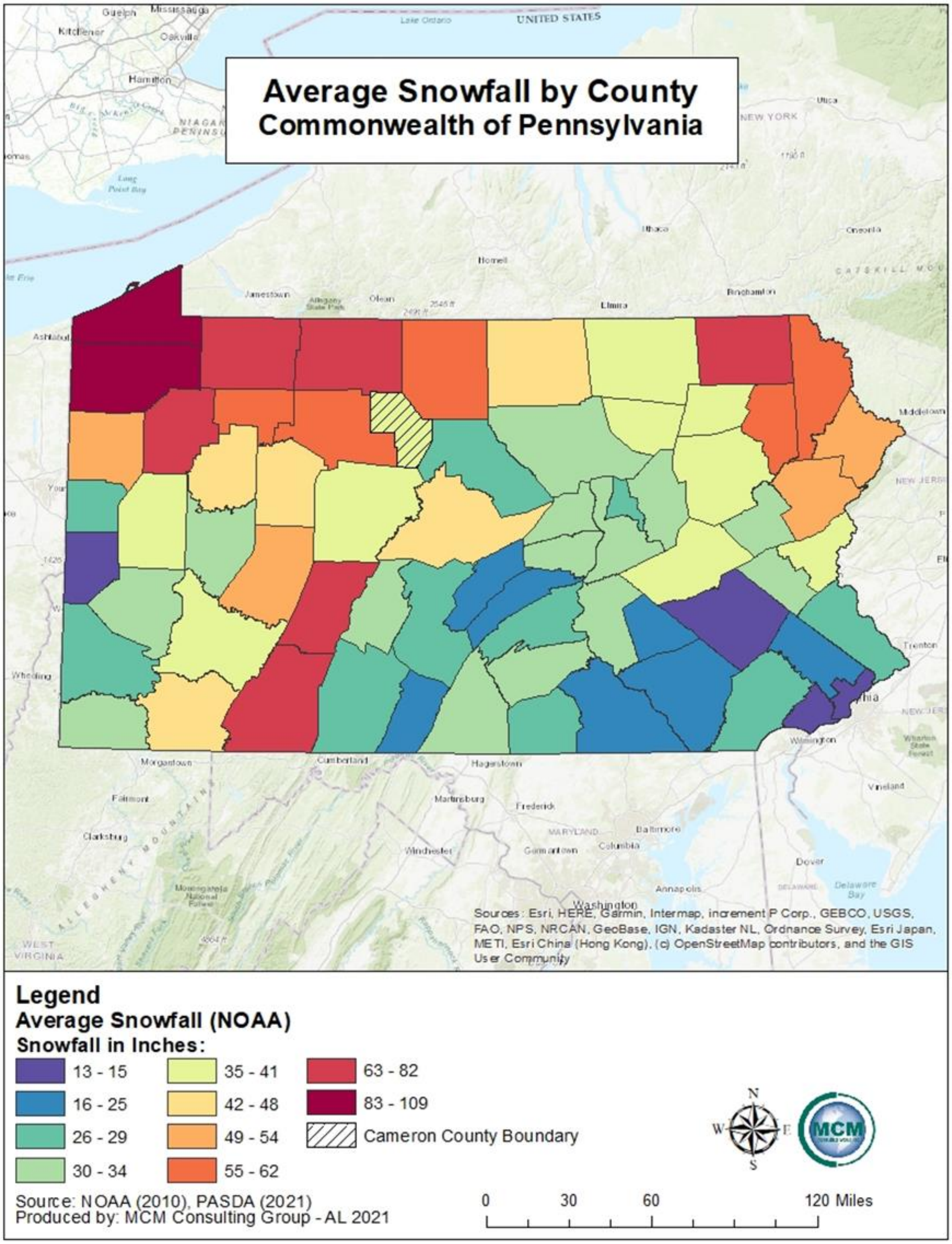


Figure 46 - Pennsylvania Annual Snowfall 1981 – 2010



4.3.14. Blighted Properties

4.3.14.1 Location and Extent

The presence of blighted properties in Cameron 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, sewerage, 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 of neglect of 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 form the appropriate code enforcement agency.
9. Any abandoned property.

4.3.14.2 Range of Magnitude

Cameron County has a total of 280 structures that are considered to be blighted based on the data collected by the Cameron County Office of Community and Economic Development. Of those 280 structures that were determined to be blighted properties, approximately eighty were cluttered with debris but otherwise occupied structures. The remainder of the 200 properties were vacant properties, of which some had already collapsed at the time of this writing. Some blighted properties in Cameron County continue to be at risk of collapse. Most of the blighted properties in Cameron County are unsecured and highly unsafe due to one or more of the following issues: structure rot, infestation from vermin, and occupation by squatters. These properties create a risk for the county because they are unsafe for occupation.

Of those 280 properties, 147 of those properties were plotted using Geographic Information Systems (GIS) in order to incorporate into the county mapping and data. The large majority of blighted properties in Cameron County are abandoned camps that were once used as vacation homes in the summer or hunting camps in the late fall/early winter. *Figure 47 – Blighted Properties in Cameron County* illustrates the extent of the blighted properties in Cameron County.

The presence of blighted properties is not an issue that is isolated to one area of the county. *Figure 48 – Number of Blighted Properties per Municipality in Cameron County* illustrates the municipalities that contain the largest number of blighted properties by analyzing GIS data and visualization techniques. Shippen Township has the largest number of blighted properties of all of the municipalities in Cameron County. Alternatively, Grove Township has no blighted properties based on data collected from observations within that municipality. The true nature of the density of blighted properties can be seen in *Figure 49 – Density of Blighted Properties in Cameron County*. The density heat map featured in *Figure 49 – Density of Blighted Properties in Cameron County* was created using the point density function in ArcMap 10.5.1 with the Spatial Analyst Extension.

The quantifying of blighted properties in Cameron County was completed by in-person spot checks of structures within the county and each municipality. The Director of the Cameron County Office of Community and Economic Development periodically checks trouble structures within the county to determine the status of blighted or potentially blighted structures.

The breakdown of descriptions for blighted properties in Cameron County is varied and the properties fall into a large number of categories for sorting and analysis. These categories and the number of properties in each category can be found in *Table 55 – Cameron County Blighted Properties by Type*.

Table 55 - Cameron County Blighted Properties by Type

Cameron County Blighted Properties by Type	
Description Type:	**Number of Properties:**
Abandoned Property	42
Burned Property	1
Damaged Property	46
Damaged Transportation	6
Destroyed Property	2
Dilapidated Property	3
Empty	1
Fallen Structure	8
Junk/Junked Property	32
Other	3
Scrap	2
Shack Property	1
Source: Cameron County Office of Community and Economic Development, 2021	

Structure Collapse due to blighted properties:

Structure collapse is a large issue when blighted properties become structurally unsound or are no longer safe for human occupation. Structure collapse from blighted properties is most likely to occur in those blighted properties that are falling down, have degraded foundations or supports, or are being reclaimed by vegetation and nature. All of the blighted properties in Cameron County are at risk of structure collapse.

A collapse could be the direct result of the structural integrity of the blighted property, or it could be the result of a secondary event such as a thunderstorm, winter storm, blizzard, or flooding event. The ground topography in Cameron County also can be a contributing factor the collapse of a blighted property. Emporium Borough and Driftwood Borough have a higher probability of a structure collapse, but those municipalities also have a smaller number of blighted properties than other areas of the county (Shippen Township).

4.3.14.3 Past Occurrence

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

4.3.14.4 Future Occurrence

Cameron County has initiated a program to install a countywide code enforcement officer for the purposes of inspecting buildings, enforcing code standards, and citing code violations through the entire county. With this program in mind, the number of blighted properties in Cameron County is likely to decrease in the near future (i.e., within the next two to five years.)

With an increase in code enforcement, Cameron County will be able to maintain the infrastructure of the county without it falling into disrepair and ruin. Another option for keeping blighted properties from spreading is the acquisition of property by the county itself if it can be purchased for a minimal amount. The number of blighted properties in Cameron County is liable to decrease in the future. Further discussion of actions can be found in the Mitigation Strategy section of this plan.

4.3.14.5 Vulnerability Assessment

Blighted properties are a significant concern when the health and safety of the citizens of Cameron County are impacted. Blighted properties, while being an eye sore, are also a threat to the health safety of individuals. Buildings that are blighted often can be unsafe due to building materials being 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 is exposed, and people breath in those particles because the property has become 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 a blighted property 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 and streams and creeks, thus polluting the water features.

Blighted properties also offer a 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 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 Cameron County are adjacent to or near critical facilities and functional need locations. 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 Cameron County. If blighted properties flourish in the county, people who travel to Cameron County for pleasure, whether that be summer vacations or seasonal hunting, might reconsider that travel due to the presence of blighted properties.

Figure 47 - Blighted Properties in Cameron County

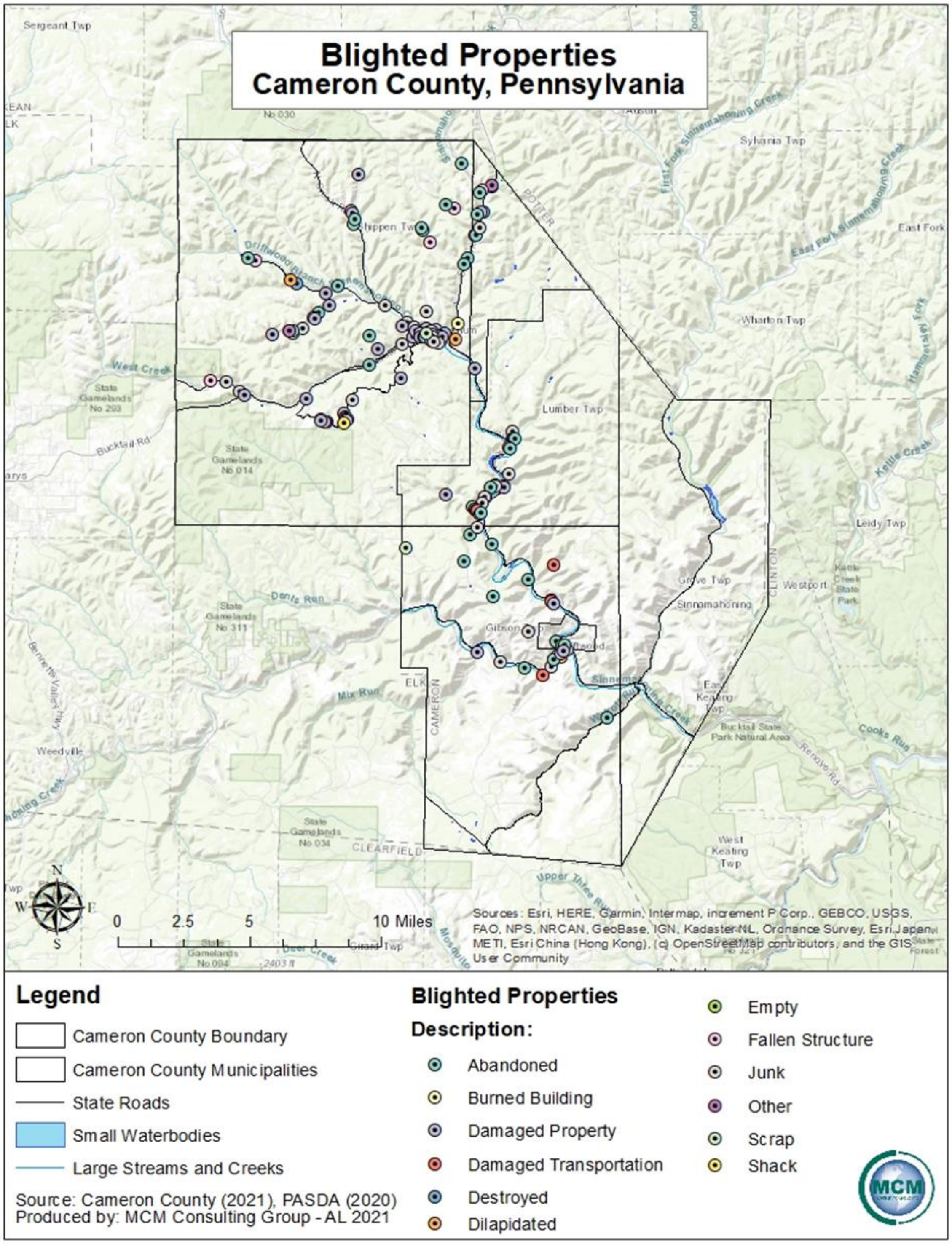


Figure 48 - Number of Blighted Properties per Municipality in Cameron County

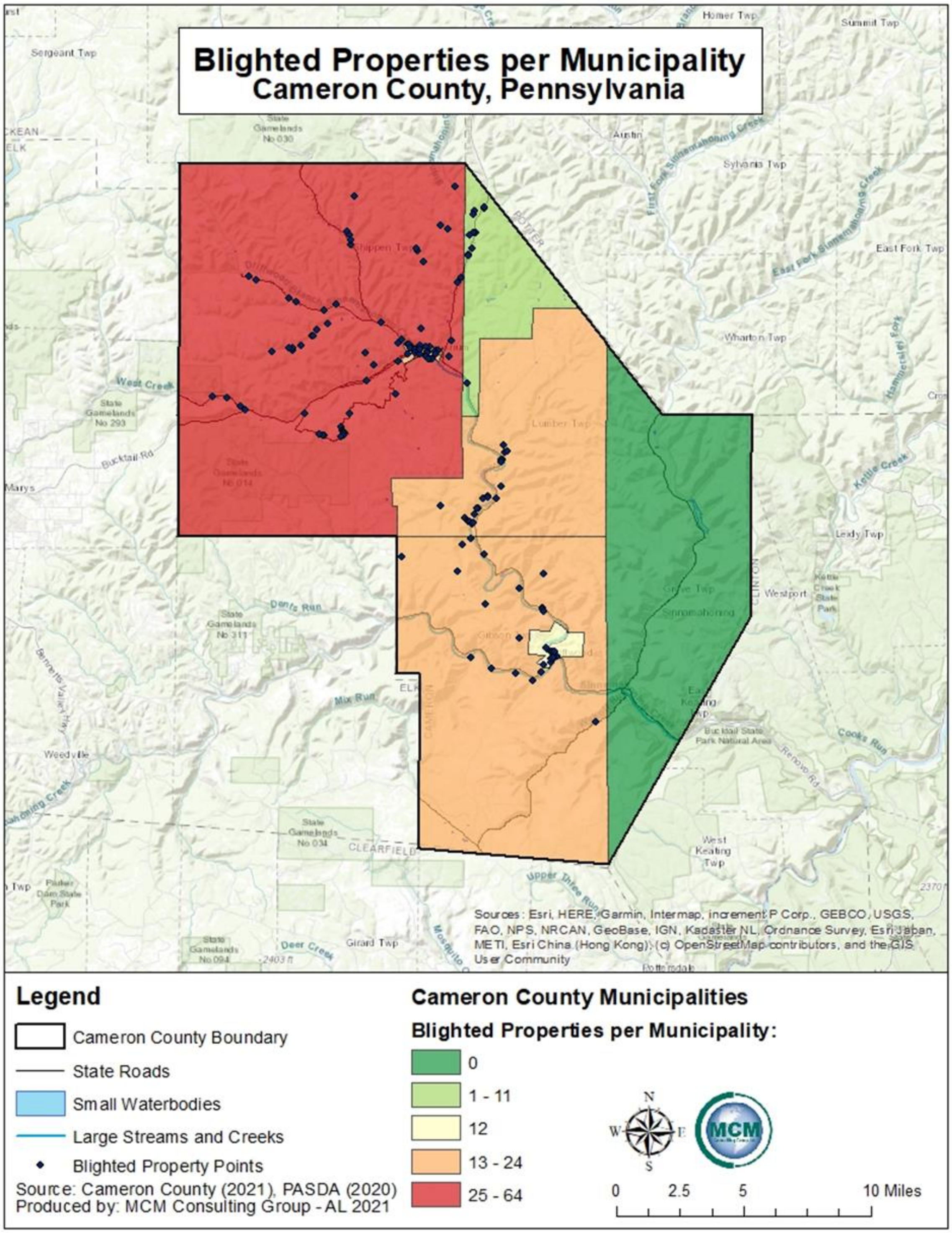
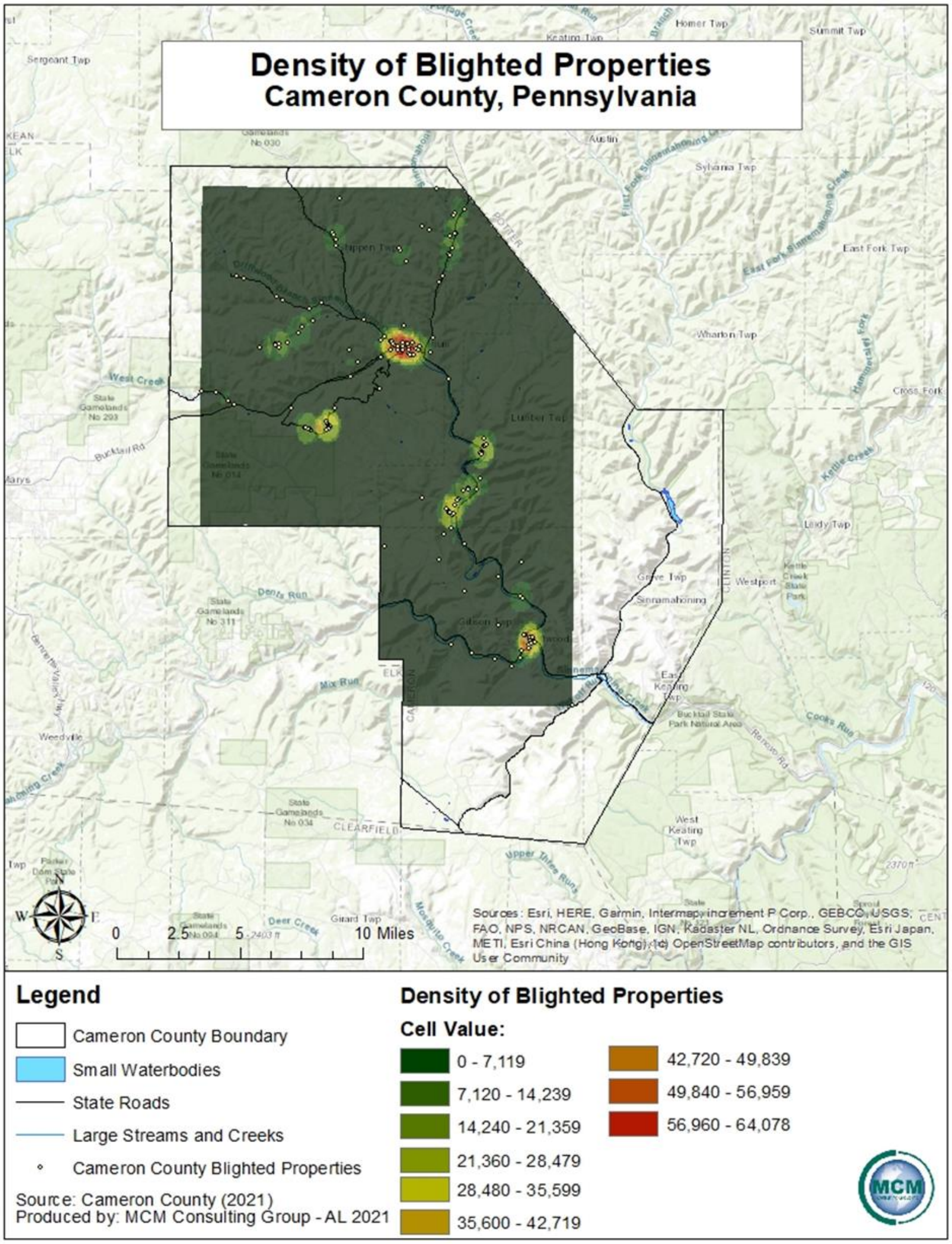


Figure 49 - Density of Blighted Properties in Cameron County



4.3.15. Civil Disturbance

4.3.15.1 Location and Extent

The scale and scope of civil disturbance events varies widely. However, government facilities, local landmarks, prisons, and universities are common sites where crowds and mobs may gather. The presidential election of 2020 and the death of George Floyd in Minneapolis in the spring of 2020 are events which prompted widespread civil unrest across the country. There is no evidence to support that it reached into Cameron County.

4.3.15.2 Range of 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. Like 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 is attempting 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 significant civil disorder, 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 because 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.

Some common causes of civil disorder or unrest are:

- Reaction to court decisions
- Political motivations
- Terrorism and foreign agitators
- Natural disasters
- Financial collapse

There is no known history of civil disturbance in Cameron County. A possible worst-case scenario would be an aggressive mob demonstrating in Emporium Borough and/or Shippen Township, the two most populated municipalities in the county.

4.3.15.3 Past Occurrence

Recorded events of civil disturbances for Cameron County are rare. There were three events in 2012 involving school lockdowns. One was a planned event: a K-9 search for drugs; another was a drug related lockdown; the third was an event where a student brought a BB gun to school to show a classmate. These events occurred in Emporium Borough. There are no other recorded events of civil disturbances in Cameron County.

4.3.15.4 Future Occurrence

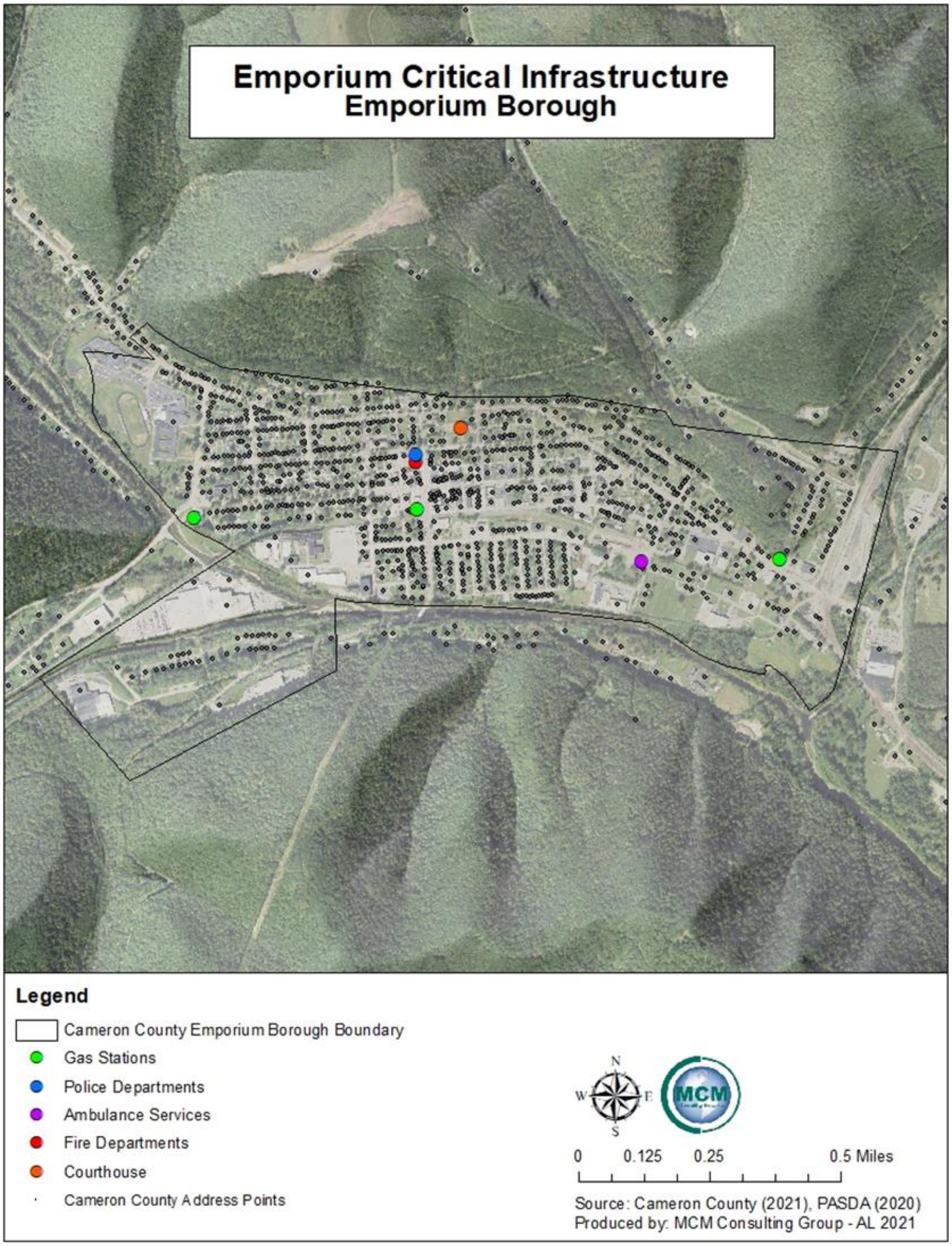
Minor civil disturbances may occur in Cameron County, but it is not possible to accurately predict the probability of future occurrence for civil disturbance events over the long-term. However, it may be possible to recognize the potential for an event to occur in the near-term. The most likely occurrence of civil disorder in Cameron County would be a labor strike.

4.3.15.5 Vulnerability Assessment

All seven municipalities in Cameron County are vulnerable to civil disturbance.

Critical facilities located in Emporium (*Figure 50 - Critical Facilities in Emporium Borough* - shows those facilities that are at risk) are most vulnerable to civil disturbances due to the relatively high population density. However, most civil disturbance events, should they occur, would have minimal impact. Adequate law enforcement at these locations minimizes the chances of a small assembly of people turning into a civil disturbance.

Figure 50 - Critical Facilities in Emporium Borough



4.3.16. Dam and Levee Failure

4.3.16.1 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, recreation, 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 dam failure. 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 considered 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 failures. The Pennsylvania Department of Environmental Protection (PA DEP) and the United States Army Corps 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 twenty-five feet in height or that impound fifty-acre-feet or more of water (an acre-foot is equal to 325,851 gallons of water); it includes structure above six 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 two high-hazard dams located in Cameron County that are both publicly and privately owned and are registered with the USACE in the NID. There are two dams that are high-hazard and require an emergency action plan. *Table 56 – Cameron County Dam Inventory* illustrates the dams located in Cameron County. *Table 57 – High-Hazard Dams Municipal Summary* summarizes the high-hazard dams in Cameron County by municipality. The municipalities not listed do not have high-hazard dams. *Table 58 – Dam Name and Purpose* lists the dams located in Cameron County and their purpose code and the description of the purpose based on Pennsylvania DEP codes.

Table 56 - High Hazard Municipality Summary

High-Hazard Dams – Municipal Summary	
Municipality	**Number of High Hazard Dams**
Grove Township	1
Portage Township	1
Total:	**2**
Source: PA DEP, 2021	

Table 57 - Cameron County Dam Inventory

Cameron County Dams							
Dam Name	**River or Tributary**	**Owner Name**	**Year Completed**	**Dam Height**	**Drainage Area (acres)**	**Hazard**	**EAP**
George B. Stevenson Dam	First Fork Branch Sinnemahoning Creek	PA DCNR	1956	166’	243	H	Y
Salt Run Reservoir Dam	Salt Run	Emporium Water Company	1911	44’	5.9	H	Y
Source: NID, 2021							

Table 58 - Dam Name and Purpose

Cameron County Dams and Purposes		
Dam Name	**Purpose Code**	**Purpose Code Description**
George B. Stevenson Dam	S	Public Water Supply
Salt Run Reservoir Dam	S	Public Water Supply
Source: PA DEP, 2019 & NID, 2021		

The PA DEP 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.

Levees

Levee failures have the potential to place large numbers of people and properties 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. Cameron County has two levees, which are detailed in *Table 59 – Cameron County Levee Inventory*.

Table 59 - Cameron County Levee Inventory

Cameron County Levee Inventory				
Levee Name	**Flood Source**	**Levee Type**	**Levee Bank Side**	**Levee Length**
Emporium Borough Levee	Driftwood Branch Sinnemahoning Creek	Earthen Mainline	Left descending bank	1.7
Genessee River Spoil Levee	Sinnemahoning Portage Creek	Earthen Mainline	N/A	0.6
Source: National Levee Database, 2021				

4.3.16.2 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 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 51 – Cameron County Dams* shows the location of dams within Cameron County. A dam failure at the George P. Stevenson Dam along the Sinnemahoning Creek would cause catastrophic damage to large portions of Cameron County, but mostly damaging Grove Township, where the dam is located. The magnitude of a rapid dam failure is difficult to estimate, as no dam failure has occurred.

Levees

Levee failures 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 52 – Cameron County Levee Locations* and *Figure 53 – Cameron County Leveed Areas – Emporium Borough* illustrate the areas protected by the Cameron County levee systems.

A levee failure or breach causes flooding in landward areas adjacent to the structure. The failure of a levee or other flood protection structure could be devastating, depending on the level of flooding for which the structure is designed and the amount of landward development present. 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.

There are approximately 711 structures that are present in Emporium Borough and Shippen Township that are roughly protected by the Cameron County Levee System.

4.3.16.3 Past Occurrence

Dams

There have been no past occurrences of dam failure or major incidence occurring at the locations of dams within Cameron County. Smaller incidences 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 failure or major incidents occurring in Cameron County.

4.3.16.4 Future Occurrence

Dams

Although dam failures can occur at any time, given the right circumstances, the likelihood of a dam failure in Cameron 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 Pennsylvania Department of Environmental Protection inventories and regulates all the dams that meet or exceed the following criteria:

- Impound water from a drainage 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 categories such as slope stability, undermining seepage, and spillway adequacy. With the restrictions and procedures in place for dam maintenance, the future security of Cameron County dams is considered strong and as mentioned above, the likelihood of a dam failure is unlikely.

Levees

Although levee failures can occur at any given time, given the right circumstances, the future occurrence of levee failures in Cameron County can also 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.

4.3.16.5 Vulnerability Assessment

Property and populations located downstream from any dams are vulnerable to dam failures. The Pennsylvania Code ((§105.91 Classification of dams and reservoirs) classifies both dams by size and the amount of loss of life and economic loss expected in a failure event. *Table 60 – 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 reference indicator, since that will indicate the level of potential substantial loss of life and excessive economic loss.

Table 60 - Dam Classification

Dam Classification		
Dam Size Classification		
Class	**Impoundment Storage (Acre-Feet)**	**Dam Height (Feet)**
A	Equal to or greater than 50,000	Equal to or greater than 100
B	Less than 50,000 but greater than 1,000	Less than 100 but greater than 40

C	Equal to or less than 1,000	Equal to or less than 40
Dam Damage Classification		
Category	**Loss of Life**	**Economic Loss**
1	Substantial	Excessive
2	Few	Appreciable
3	None Expected	Minimal
Source: PA Code, 1980		

Dams

Dam failures can cause significant 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 impacts from damage and recovery ranges from minimal to severe, depending on the magnitude and scale of the 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 to list to notify downstream at-risk populations. Emergency action plan exercises are held every five to seven years depending on local policy.

Of the two dams in Cameron County, the George B. Stevenson Dam has the largest drainage area with a total drainage of 243 acres. The George B. Stevenson Dam was constructed in 1956 and the Salt Run Reservoir Dam was constructed in 1911. The George B. Stevenson Dam also is the highest dam in the county with a height of 166 feet. The George B. Stevenson Dam is owned by the Pennsylvania Department of Conservation and Natural Resources and the Salt Run Reservoir Dam is owned by the Emporium Water Company. Both of the dams in Cameron County are owned by public companies and offer water supply to the residents of the county.

The risk of high-hazard potential dams in Cameron 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 Protections, Pennsylvania Emergency Management Agency, and the Federal Emergency Management Agency. Once these datasets have been published and inundation data is easier to acquire, this information will be used to developed more detailed risk assessment and vulnerability sections for dam failure at high-hazard potential dams.

Levees

Each section of the levee system in Cameron County is a different length and guards a different area and structures. The Emporium Borough Levee system protects the borough of Emporium from flooding events along the Sinnemahoning Creek. The Emporium Borough Levee is roughly 1.7 miles in length and protects a total of 557 buildings with an estimated value of $89.2 million. The second levee in Cameron County is the Shippen Township Levee and is approximately 0.62 miles in length and protects a total of 154 buildings with an estimated value from the National Levee Database of $35.1 million.

The vulnerability of the levees were assessed by the USACE between spring of 2018 and the summer of 2019.

As determined by the United States Army Corps of Engineers the risks to the levees in Cameron County are prioritized below:

1. (Most Risk) Overtopping
2. (Medium Risk) Seepage
3. (Low-Medium Risk) Stability
4. (Lowest Risk) Erosion

Figure 51 - Cameron County Dams

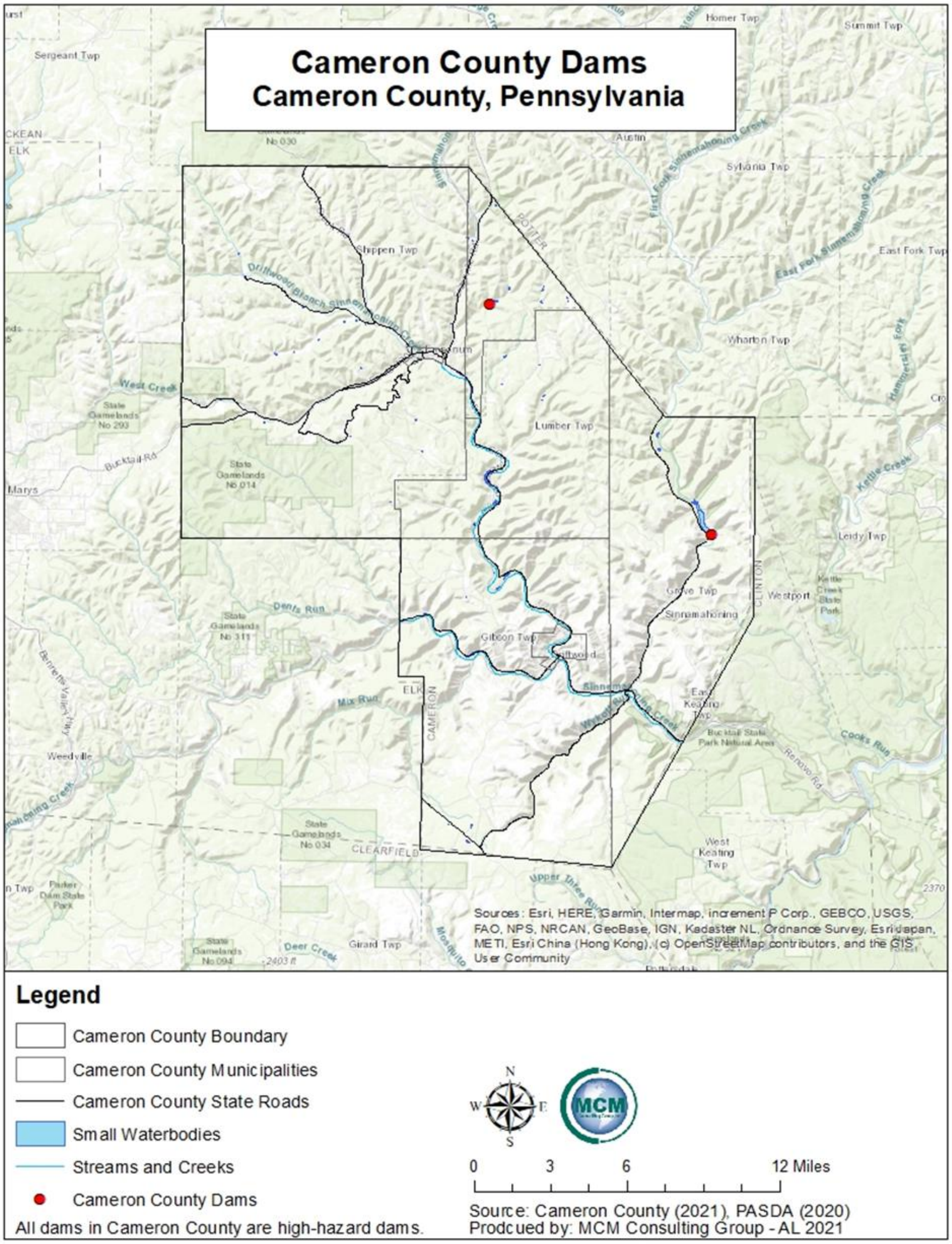


Figure 52 - Cameron County Levee Locations

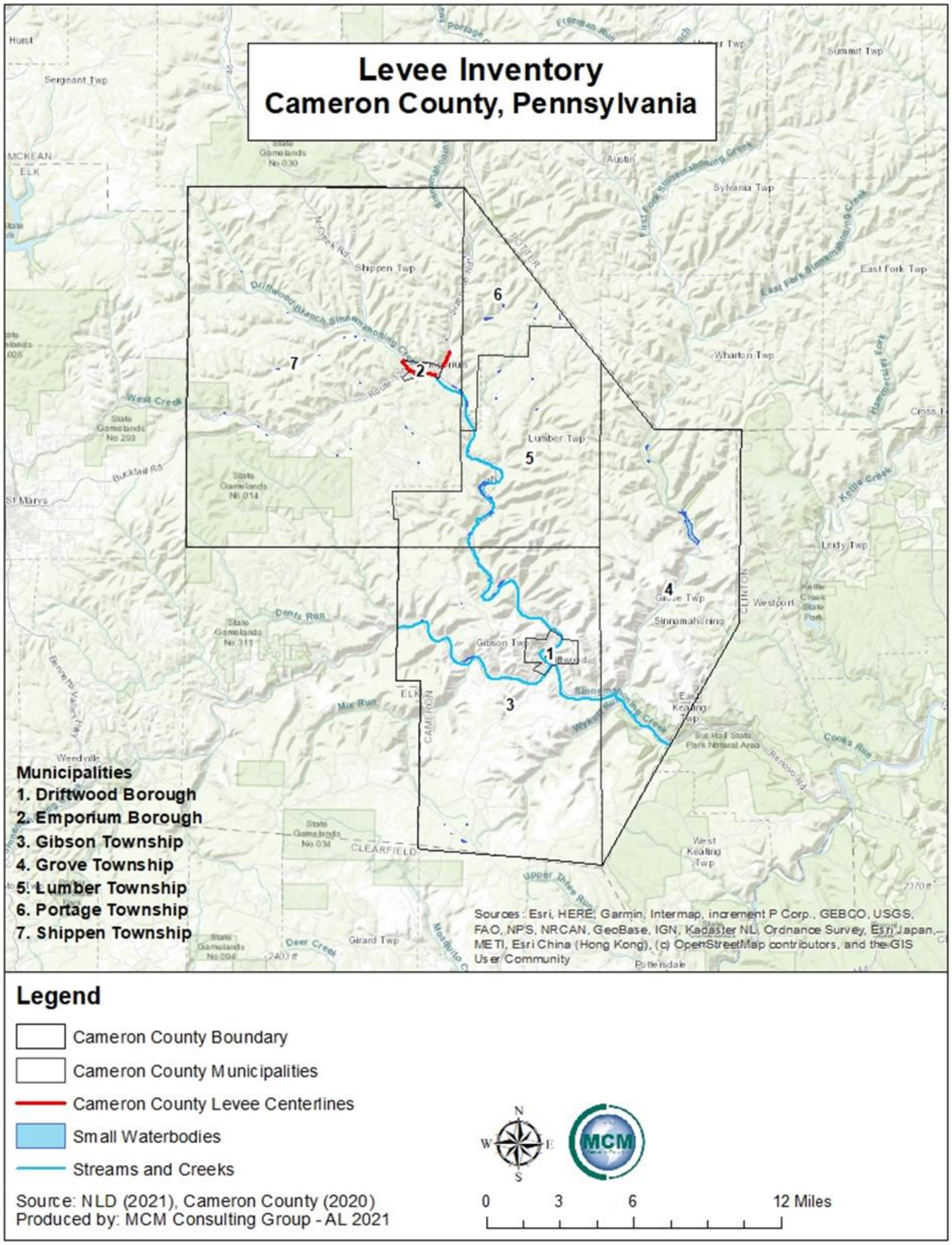
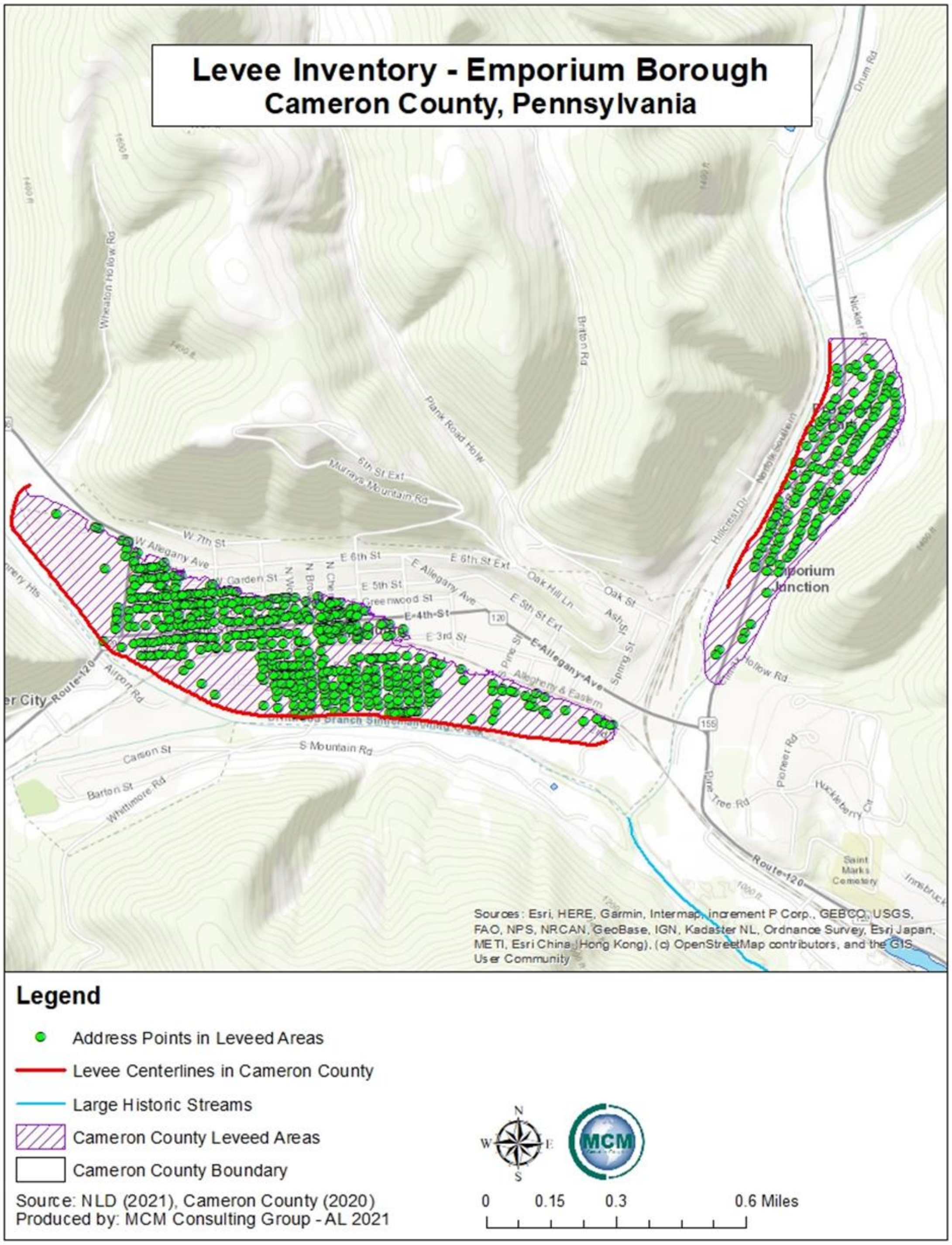


Figure 53 - Cameron County Leveed Areas - Emporium Borough



4.3.17. Disorientation

4.3.17.1 Location and Extent

Disorientation is the loss of one's sense of direction, position, or relationship with one's surroundings. Disorientation can also be described as mental confusion or impaired awareness. In Cameron County, disorientation can vary from a missing child to a lost hunter in the wooded areas of the county. Emergency services will be expected to search for missing or disoriented persons at all times of the year and in all types of conditions. Disorientation events have the potential to take place throughout the county.

Cameron County's terrain consists of wooded hills with sharp ridge lines and small, flat plateaus, along with narrow valleys and winding streams. The elevation ranges from 760 feet to 2,380 feet above sea level. Sinnemahoning Creek is the major waterway in Cameron County, and has the following branches:

- Driftwood Branch
- First Fork Branch
- Bennet Branch

A wide variety of factors can contribute to the outcome of a search and rescue mission, but the most common dangers associated with disorientation are lack of food, water, and shelter. Cameron County generally has an abundance of water during summer months, and shelter during the summer months is less of a necessity than during the winter months when extremely low temperatures can pose a larger threat. Age, physical fitness, and familiarity with the area can also have a bearing on the outcome of a search and rescue event. All ranges of the population have some vulnerability to disorientation.

4.3.17.2 Range of Magnitude

All ranges of the population, from age to social status, would be at a maximum threat to disorientation in Cameron County. Cameron County has a total land area of approximately 398 square miles. 396 of those square miles are land area and two square miles are water area within the county. Approximately 130,800 acres of land in Cameron County are used as Pennsylvania State Forest land. There is also a large number of state parks, state game lands, and natural areas. The rural setting of Cameron County attracts a large number of hunters annually. Many of the visiting and traveling hunters come from urban areas and do not always have the skills or resources to adequately navigate wooded and isolated areas. These are events that require first responders to arrive and search for lost hunters on a semi-regular basis. Search and rescue events often result in the use of extensive man-hours and resources. *Figure 54 – Cameron County Wild Areas* shows the areas in Cameron County that are used for outdoor recreation, hunting, and fishing. The selected areas in Cameron County are the most vulnerable to a disorientation event.

4.3.17.3 Past Occurrence

There have been quite a few past occurrences of disorientation where emergency service personnel were utilized for search and rescue procedures. *Table 61 – Disorientation Incidents* depicts those occurrences and provides a brief description of the event as well as date. The incidents listed below were collected from Knowledge Center statistics for various counties in the Commonwealth of Pennsylvania. The incidents listed are either lost/disoriented, escape, or suicide related. The people that were disoriented but did not require emergency service personnel to assist them are not accounted for. This introduces some uncertainty in the true number of events where disorientation has occurred but was not reported.

Table 61 - Disorientation Incidents

Disorientation Incidents in Cameron County		
Location / Municipality	**Date**	**Event**
Shippen Township	11/26/2007	Lost Hunters
Lumber Township	12/01/2008	Missing / Overdue Hunter
Shippen Township	12/04/2008	Lost Hunter
Grove Township	12/12/2008	Lost Hunter
Grove Township	04/26/2009	Missing Persons
Shippen Township	08/13/2009	Swimming Hole Search
Shippen Township	11/23/2009	Injured Hunter
Grove Township	01/18/2010	Stranded Motorist
Portage Township	07/09/2011	Missing Persons
Driftwood Borough	11/27/2011	Vehicle Accident
Cameron County	11/29/2011	Search and Rescue Deployment
Shippen Township	08/10 – 08/16/2012	Armed Abduction
Gibson Township	11/27/2012	Injured Hunter
Cameron County	11/16/2014	Search and Rescue Assist
Cameron County	11/30/2015	Lost Hunters
Emporium Borough	01/27/2016	Search and Rescue Deployment
Cameron County	08/23/2019	Missing Person
Cameron County	10/24/2019	Overdue Hunter
Shippen Township	11/30/2019	Missing Hunter
Grove Township	06/03/2020	Search and Rescue Deployment
Source: Corvena Knowledge Center, 2021		

4.3.17.4 Future Occurrence

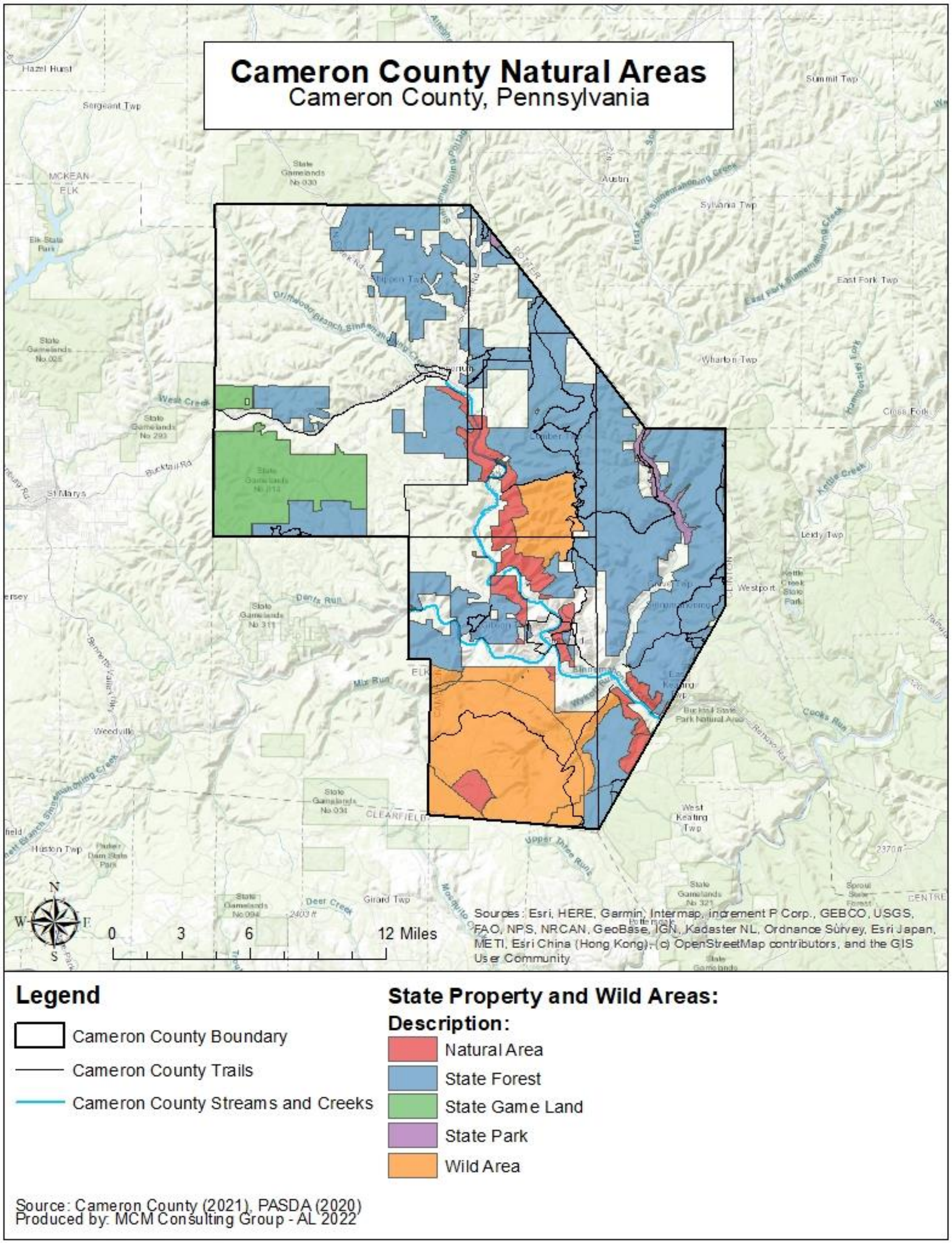
During the warm summer months, as activities such as hiking, biking, and camping increase, so does the likelihood of individuals becoming disoriented. November also has several search and rescue events due to lost hunters during the annual hunting season. Disorientation is most likely to occur in state parks and state forests where outdoor recreation is most abundant, and the forests are the densest. Medical emergencies occur regularly in the county, especially with the elderly, which could result in disorientation.

The probability of a disorientation event in Cameron County is high and will continue to be high in the future. Citizens should be aware of their surroundings, although the very young and those with mental incapacities will always be at a higher risk of disorientation. Hunters should be aware of the areas in which they hunt and should be prepared for all eventualities. Traveling alone in remote and rural areas increases the chance of disorientation occurring. Every hunter, hiker, and camper that ventures into the rural regions of Cameron County should have a plan in place for every activity in the woods. Maps and other resources would enhance the capabilities of visitors to successfully navigate rural areas. A risk factor of 2.4 has been assigned to this hazard.

4.3.17.5 Vulnerability Assessment

Disorientation events are typically a local event, but sometimes may span across municipality and county borders as state game lands and forests lie within multiple municipalities. A search and rescue operation can take place in a variety of settings, which can include municipalities, parks, forested lands, lakes, or ponds. Due to the rural nature of Cameron County and seasonal dwellings within the county, many people are not familiar with area and the terrain. Many people entering the forests and waterways to enjoy recreational activities can become confused about their surroundings and how to return to a safe location.

Figure 54 - Cameron County Wild Areas



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 profile 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. Section 4.3.22.1 *Figure 57 – Environmental Hazard Transportation Vulnerability* shows major transportation routes through Cameron County, including Pennsylvania routes 120, 155, and 46.

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 two SARA Title III facilities in Cameron 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 56 – Hazardous Waste Locations* identifies SARA Title III facilities as well as several other locations that consume, store, or release potentially hazardous materials and wastes.

Fixed facilities are also monitored by the Environmental Protection Agency (EPA). The EPA has identified hazardous materials sites, not regulated by SARA Title III, and are known as Toxic Releases Inventory (TRI) sites. Facilities which employ ten or more full time employees, and which manufacture or process more than 25,000 pounds (or use more than 10,000 pounds) of any SARA Section 313-listed toxic chemical in the course of a calendar year are required to report TRI information to the EPA. The EPA is the federal enforcement agency responsible for SARA Title III and PEMA classifications. As of 2021, there are four TRI facilities in Cameron County, all located in and around Emporium Borough.

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 55 – 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. In April of 1994, a backhoe operated by an Emporium Borough street crew ruptured a natural gas line at the intersection of Allegheny Avenue and East 3rd Street in Emporium, Pennsylvania. Fifty people were evacuated in a one block areas and offered shelter in St. Mark's Center for three hours while the situation was analyzed. More recent events are recorded in the Corvena Knowledge Center™ and are summarized in *Table 62 – Hazardous Material Incidents*. Transportation accidents that involved hazardous materials were included in the table below.

Another significant incident occurred on June 28, 2006, when a train operated by Norfolk Southern derailed near the Gardeau area in Norwich Township in McKean County, right across the border from Cameron County. According to the Cameron County Conservation District, approximately 40,000 gallons of pH 14 Sodium Hydroxide solution was spilled and resulted in the deaths of fish in the stream for approximately 30 miles. The spill resulted in Norfolk Southern, the operator of the train, paying $7.35 million in environmental fines and for cleanup efforts. This incident could have resulted in loss of human life as well if the chlorine tanks onboard the train had ruptured. Those tanks remained intact during the derailment and did not result in further loss of life.

Table 62 - Hazardous Material Incidents

Hazardous Material Incidents		
Municipality	**Date**	**Event**
Gardeu (Norwich Township)	06/28/2006	Train Derailment
Shippen Township	08/31/2009	Oil Spill
Gibson Township	05/31/2011	Fuel Spill
Emporium Borough	06/05/2011	Fuel Spill
Shippen Township	12/09/2011	Diesel Fuel Leak/Spill
Lumber Township	03/19/2017	Fuel Spill Inland Water
Lumber Township	03/19/2017	Flammable Liquid and Solids Event
Cameron County	02/04/2019	Possible Fuel Oil Spill
Gibson Township	04/24/2020	Natural Gas Leak / Low Grade Road
Cameron County	06/23/2020	Oil Sheen
Source: Corvena Knowledge Center, 2021		

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 Cameron County in the past but few of those events have been related to fixed facilities in the county. One event did occur in May of 1992, when a drainage pipe at Pennsylvania Pressed Metal, Inc. leaked into the Sinnemahoning Creek in Shippen Township. More recent events are recorded in Knowledge Center™ and are summarized in *Table 62 – Hazardous Material Incidents* (Knowledge Center™).

The EPA tracks the management of hazardous materials in facilities that handle significant amounts of hazardous materials. The four TRI facilities in Cameron County as of 2020 are summarized in *Table 63 – TRI Facilities* (EPA, 2020). 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 63 - TRI Facilities

Toxic Release Inventory Facilities				
Name	**Address**	**Industry Sector**	**Chemical**	**Production-related Waste Managed (lbs)**
WABTEC U.S. Rail Inc.	55 Pine Street, Emporium, PA	Electrical Equipment	Copper	446
Embassy Powdered Metals, Inc.	513 E 2nd Street, Emporium, PA	Fabricated Metals	Copper	5,488
GKN Sinter Metals – Airport Road	1 Airport Road, Emporium, PA	Fabricated Metals	Copper	0
GKN Sinter Metals – Airport Road	1 Airport Road, Emporium, PA	Fabricated Metals	Nickel	1,974.4
Source: EPA, 2020				

As of 2021, Cameron County was home to 153 active natural gas wells.

4.3.18.4 Future Occurrence

Transportation

While many incidents involving hazardous material releases have occurred in Cameron County in the past, they are generally considered 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 Cameron 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 Cameron County is vulnerable to a hazardous materials incident caused along a transportation route. These incidents can occur along highways, railways, and pipelines. *Figure 57 – Environmental Hazard Transportation Vulnerability Map* identified the 2,000-foot hazard corridor for all major highways in Cameron County. *Figure 58 – Annual Truck Traffic Percentages* identifies the annual truck traffic percentages for all of the roadways in Cameron 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. Shippen Township contains the most oil and gas wells along with the most drinking water wells, meaning that Shippen township is most vulnerable to water contamination from oil and gas wells. *Table 64 – Oil and Gas Wells & Drinking Water Wells* illustrates the type of well and the local domestic drinking water wells for each municipality.

Table 64 - Oil and Gas Wells & Drinking Water Wells

Oil & Gas Wells in Cameron County (2020)					
Municipality	Type of Well				Domestic Drinking Water Wells
	Active	Abandoned	Inactive	Proposed	
Driftwood Borough	0	6	0	0	11
Emporium Borough	0	0	0	0	4
Gibson Township	28	48	17	0	45
Grove Township	1	4	5	0	86
Lumber Township	0	1	4	1	47

Oil & Gas Wells in Cameron County (2020)					
Municipality	**Type of Well**				**Domestic Drinking Water Wells**
	Active	**Abandoned**	**Inactive**	**Proposed**	
Portage Township	3	0	9	1	17
Shippen Township	17	4	43	2	141
Total:	**49**	**63**	**78**	**4**	**351**
Source: PA DEP, 2020					

Figure 55 - Oil and Gas Well Locations

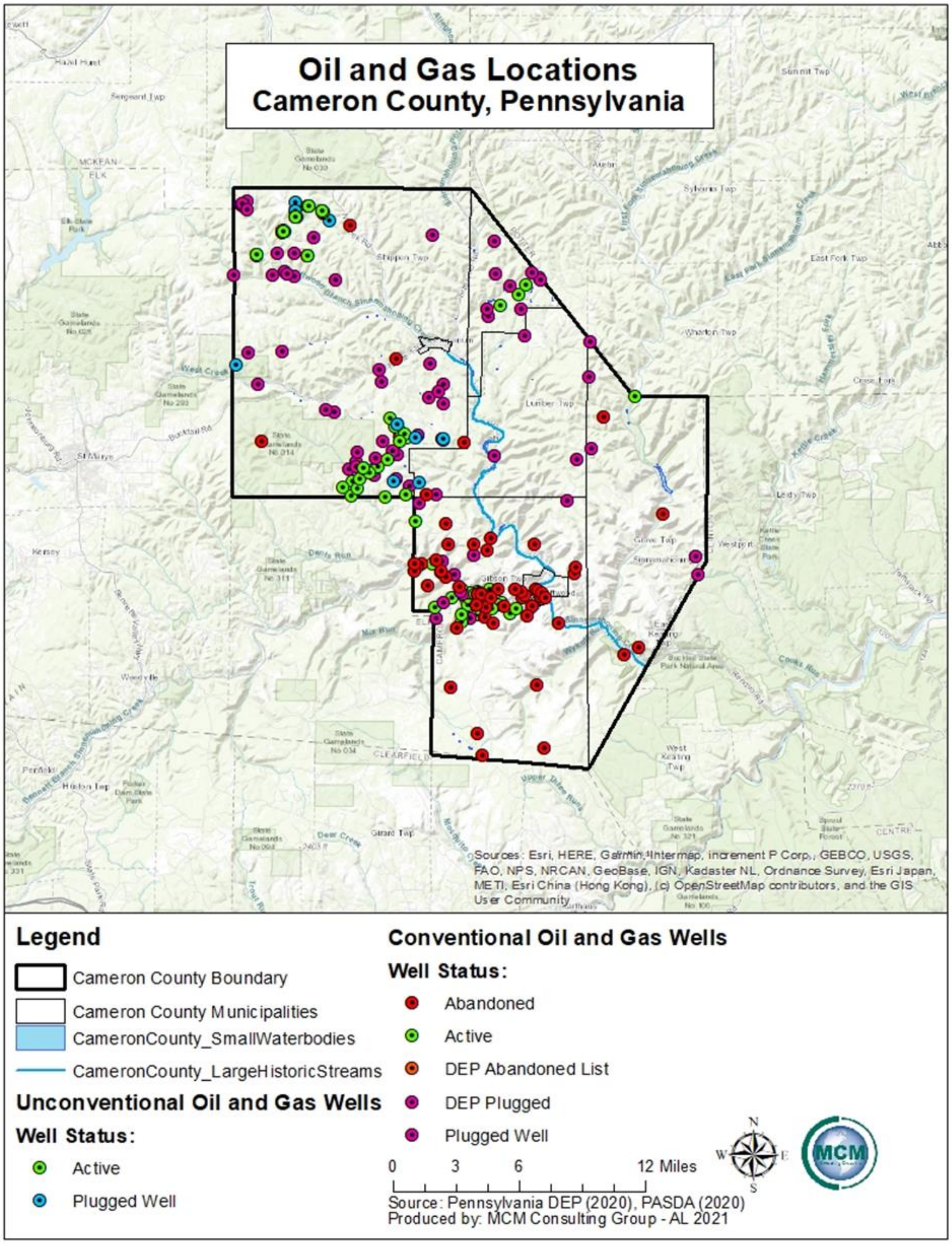


Figure 56 - Hazardous Waste Locations

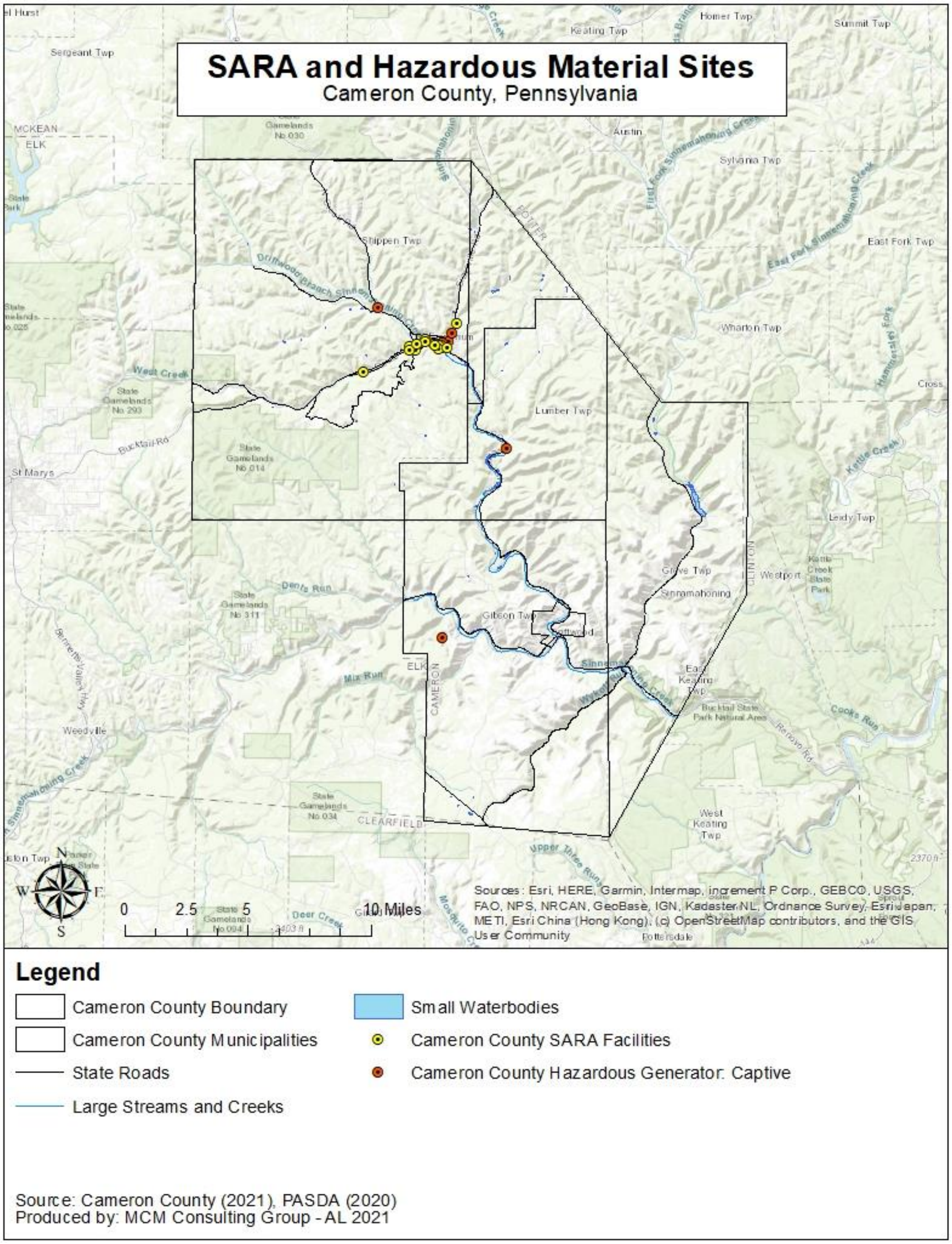


Figure 57 - Environmental Hazard Transportation Vulnerability

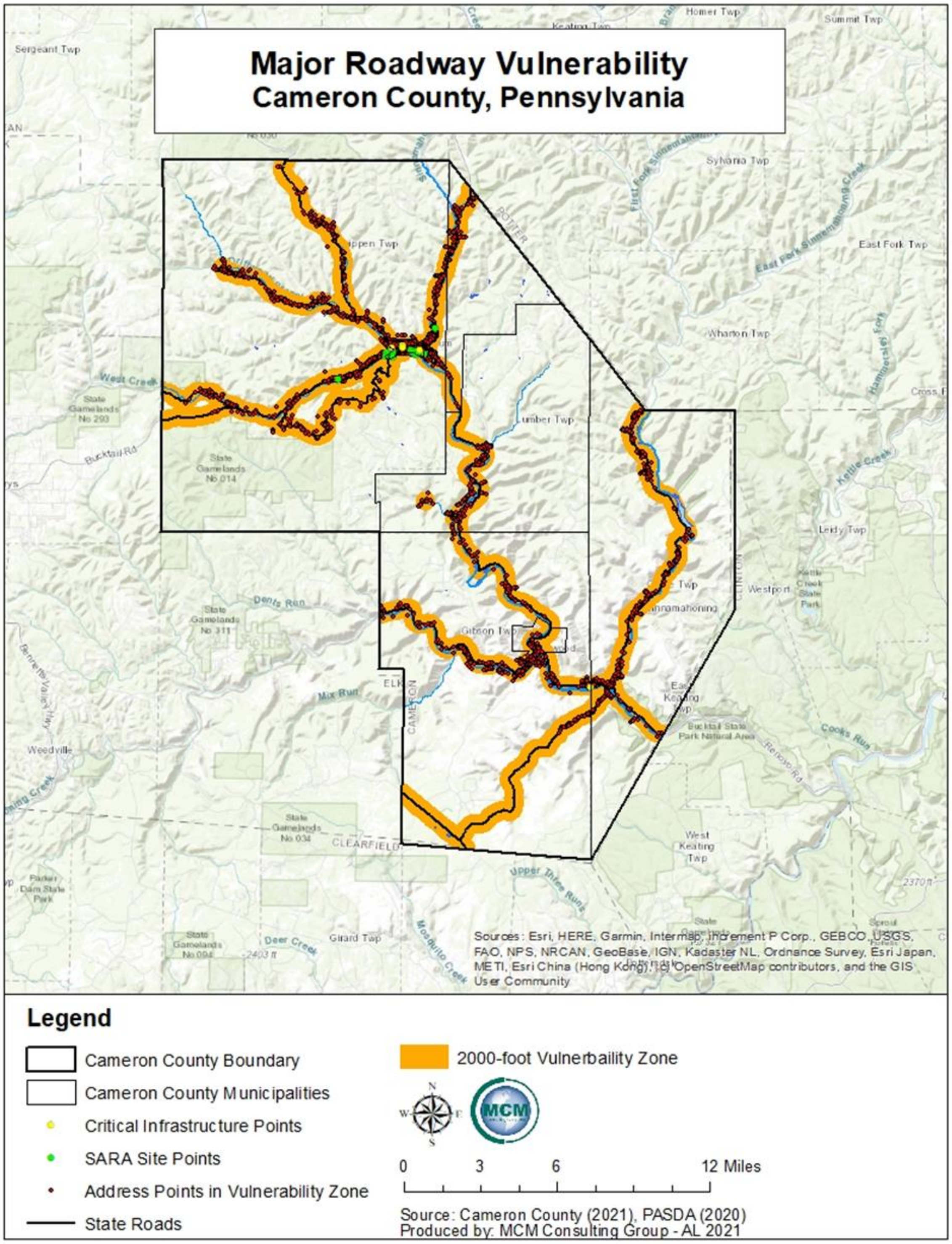
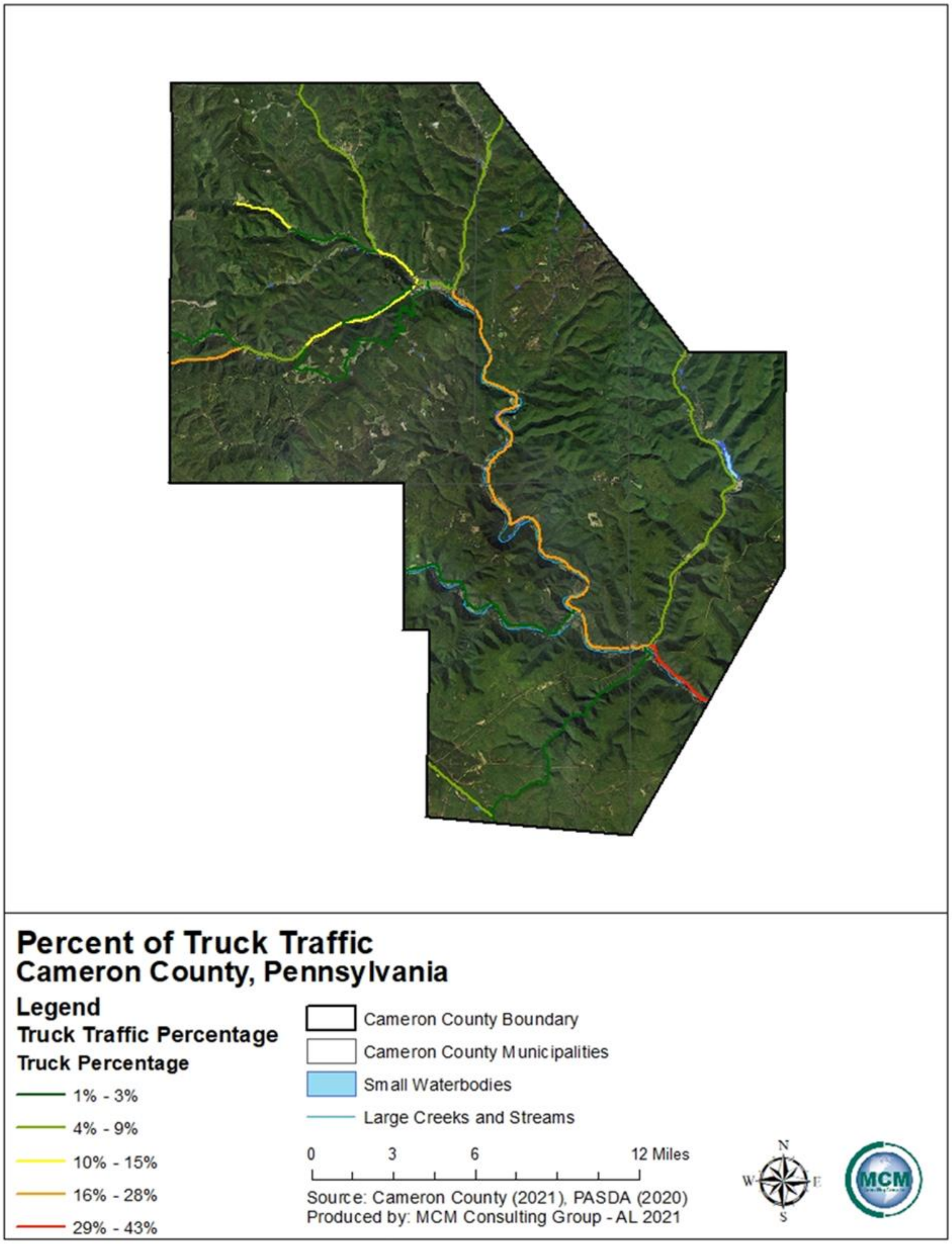


Figure 58 - Annual Truck Traffic Percentages



4.3.19. Opioid Epidemic

4.3.19.1 Location and Extent

Pennsylvania and the United States have been experiencing an epidemic of opioid drug abuse. Opioid addiction occurs when an individual becomes physically dependent on opioids. Opioids are a class of drug that interact with receptors on nerve cells in the body and brain. Opioid is a broad term and includes opiates, which are drugs that are 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 for both prescribed (e.g., fentanyl) and illicit (e.g., heroin) opioids. Overdose deaths from opioids occur when a large dose slows breathing, which can be likely when opioids are combined with alcohol or anti-anxiety medication. While generally prescribed with good intentions, opioids can be over-prescribed, often resulting in addiction and abuse.

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 fifty to one hundred 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. Heroin has become more widely used in the United States in the past two decades.

While other addictive substances such as methamphetamine and alcohol can be problematic for the health of individuals in Cameron County, this profile focuses on opioid drugs and the opioid epidemic. The opioid crisis was declared to be a public health emergency on October 26, 2017. While the declaration provides validation for the scope and severity of the problem, it was not accompanied by any release of funding for mitigating actions. On January 10, 2018, Governor Tom Wolf declared the opioid epidemic to be a statewide public health disaster emergency for Pennsylvania. The declaration is intended to enhance response and increase access to treatment.

4.3.19.2 Range of Magnitude

Opioid addiction can lead to overdose, which can be fatal if appropriate medical attention is not available. This type of addiction can affect not only the user, but also loved ones and family members. The most dangerous side effect of an opioid overdose is the suppression of the respiratory system. The lack of oxygen to the brain causes permanent brain damage, leading to organ failure, and eventually death. Opioid addiction can also be passed from mother to child in the womb if a mother is addicted while pregnant. This condition, known as neonatal abstinence syndrome, has increased five-fold, according to the National Institute on Drug Abuse (NIDA). This results in an estimated 22,000 babies in the United States born with this condition. First responders such as paramedics, police officers, and firefighters are also affected by the opioid addiction crisis. First responders face exposure risk due to an increase in the crisis, creating increased emergency medical incidents which lead to increased exposure, especially to synthetic fentanyl. Two to three milligrams of fentanyl cause induced respiratory depression, respiratory arrest, and possibly death.

According to the Center for Disease Control and Prevention (CDC), more than 192 Americans die every day from an opioid overdose. In 2014, 2,732 overdose deaths were reported across Pennsylvania. This number increased to 3,264 reported overdose deaths in 2015, an increase of 19.5%. Reported overdose deaths increased again in 2016 to 4,627, an increase of 41.7% from 2015, then again to a total of 5,388 deaths in 2017. From 2015 to 2017 the increase in reported drug related overdose deaths in Pennsylvania increased 65%. This increased the need for the gubernatorial disaster declaration in Pennsylvania on January 10, 2018. Heroin and fentanyl are the two drugs most often found in overdose deaths, and they are considered to be highly available and nearly ubiquitous in Pennsylvania.

4.3.19.3 Past Occurrence

In 2020, there was an estimated total of 81,000 drug-related overdose deaths in the United States. Pennsylvania has seen an increase in opioid related deaths since 2014. Cameron County has recorded no opioid overdose deaths since 2014. *Figure 60 – Opioid Overdose Deaths in Pennsylvania 2020* and *Figure 59 – Opioid Overdose Deaths in Pennsylvania 2019* can be used to compare past opioid overdose deaths in the Commonwealth from 2019 to 2020. In both of the figures, Cameron County has had zero recorded opioid overdose deaths.

4.3.19.4 Future Occurrence

Both Cameron County, and Pennsylvania as a whole, have seen a steady rise in opioid-related deaths over the last several years, with drug-related death rates increasing. Future occurrences of opioid addiction and overdose 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.

In the event of an opioid overdose, death can sometimes be prevented with the use of the drug naloxone. Naloxone is a medication used to block the effects of opioids and is sold under the brand name Narcan. Emergency medical responders have access to the treatment, and as of 2015, naloxone is available without a prescription in Pennsylvania. With the January 10, 2018 disaster declaration, emergency medical technicians (EMTs) are now allowed to leave naloxone behind at a scene, further increasing 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 the 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.

Rather than reduce pain, in some cases high doses of opioid painkillers can increase pain due to a phenomenon known as opioid-induced hyperalgesia (OIH). It is difficult to know how much of an influence OIH has on the opioid epidemic. Some researchers think that OIH could be increasing patients' pain and in turn, increase their dosages and dependence on opioid drugs. This suggests that patients should work with lower dosages of opioids. However, other researchers are unsure of the importance of OIH for opioid users.

Opioid drugs have been a problematic and addictive solution 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 Cameron 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. CBD however can provide relief from pain, inflammation, anxiety, and psychosis. CBD is legal without 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 a member of their community. Opioid addiction is a direct detriment to the personal well-being of addicts, a burden to their families and communities, and a strain to the emergency response system that cares for overdose victims.

While the opioid addiction is often viewed as a criminal problem, a more productive way to view the epidemic can be to view opioid addiction 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 in order to avoid beginning a dependence on highly addictive prescribed opioids.

Fentanyl and related substances are hazardous materials and should be treated as such, which causes the environment and the people around the substance to be vulnerable. Contact with fentanyl can impact first responders and others that are related to the opioid user. Depending on the potency of the drug, it can take as little as the equivalent of few grams of table salt to cause health complications. There have been several reports nationally of first responders accidentally overdosing on fentanyl or carfentanyl through brief skin contact or the drug becoming airborne.

It is best for first responders to err on the side of caution 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 within them. The trace amounts of opioids come from human urine, human feces, or medications that have been discarded in the bathroom. 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. State facilities are not at risk to the opioid crisis, but there are some occupation-specific risks that may make some employees more vulnerable. State employees working in direct patient care are vulnerable to fentanyl exposure. However, the physical plant and facilities of the Commonwealth and Cameron County are not likely to experience losses from the opioid addiction crisis. Absenteeism associated with an opioid addiction in state facilities located in high-risk areas could lead to economic loss through lost productivity and increased medical costs.

Figure 59 - Opioid Overdose Deaths in Pennsylvania 2019

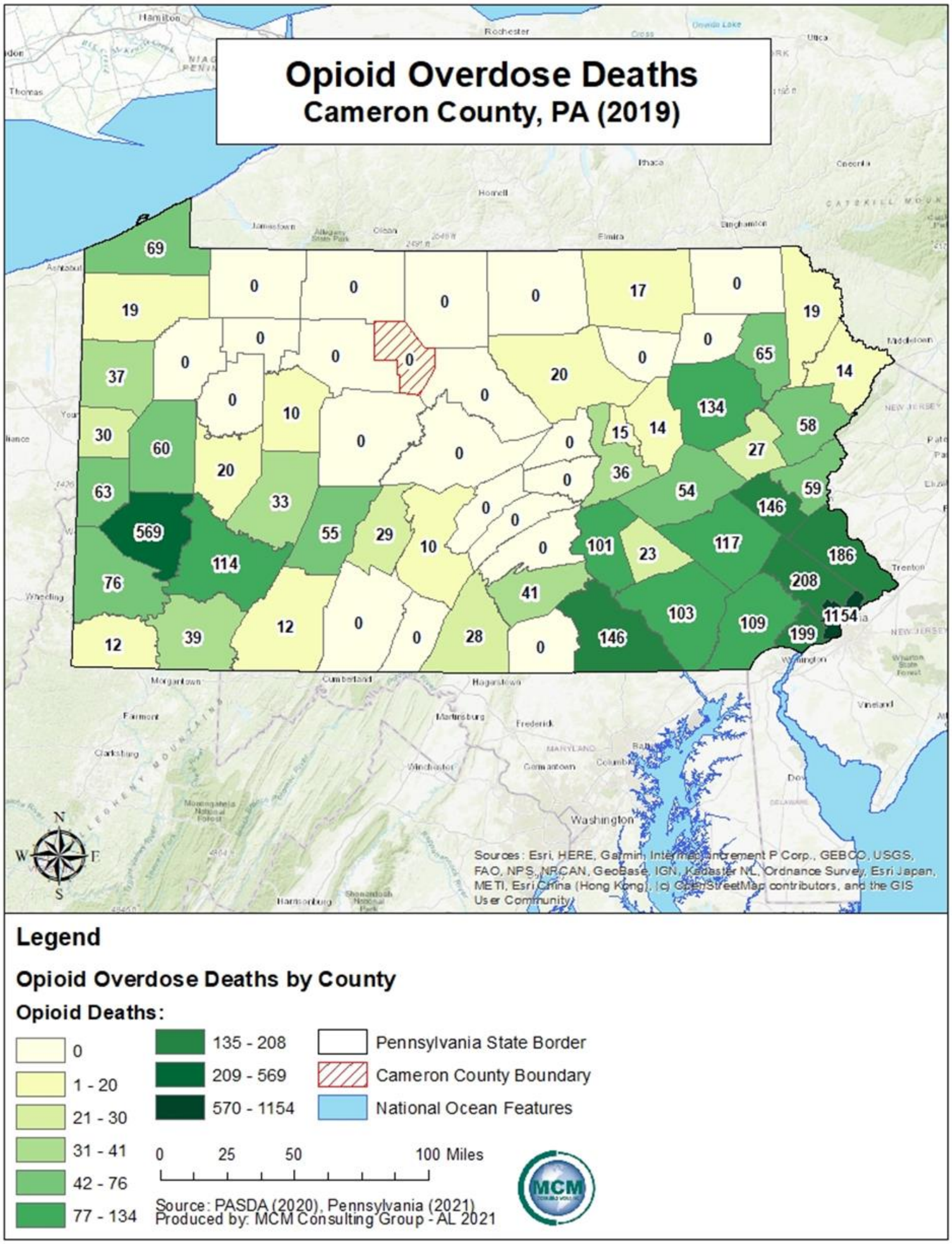
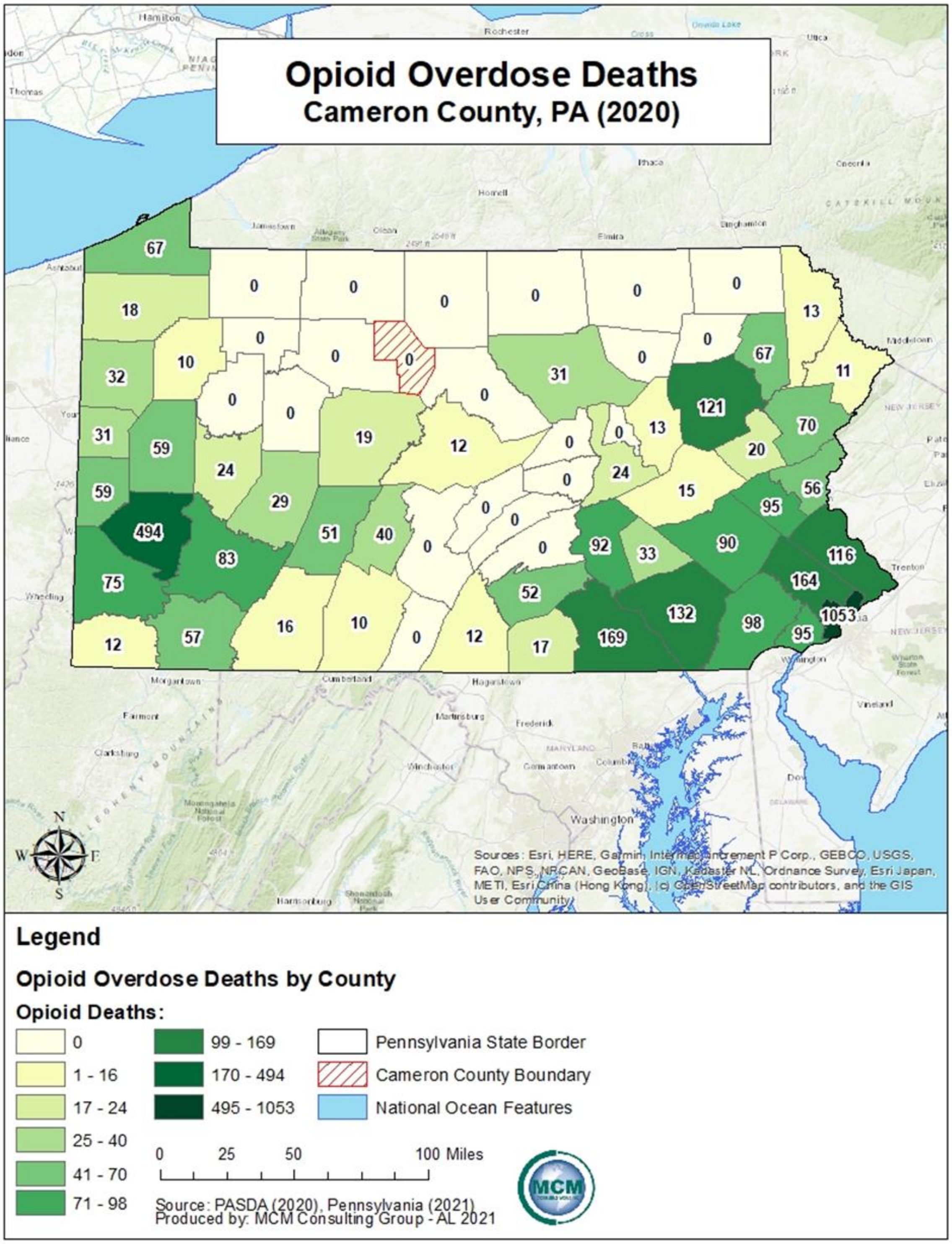


Figure 60 - Opioid Overdose Deaths in Pennsylvania 2020



4.3.20. Structure Fire

4.3.20.1 Location and Extent

Significant structure fires are limited to more densely populated areas that contain large and/or multiple buildings. Such fires may start in a single structure but spread to nearby buildings or throughout a large building if adequate fore control measures are not in place.

Shippen Township and Emporium Borough are the most densely populated areas within Cameron County respectfully. Emporium borough is also the county seat with structures built closely together.

According to the 2019 United States Census estimates, Cameron County has 4,421 structures designated for housing. There is a large portion of seasonal housing units in Cameron County, which are primarily recreational hunting camps and summer residences.

Although fires can start from numerous causes, major fires can often be a secondary result from other hazards such as storms, droughts, transportation accidents, hazardous material spills, and criminal activity such as arson or terrorism. Small structural fires occur on a regular basis and do not have a large impact on an area. However, the increased insurance rates from these fires will impact an area.

4.3.20.2 Range of Magnitude

Severe Structure fires result in extensive damage to residential, commercial, and/or public property. Fire can spread faster in areas with a higher concentration of housing. Severe injuries could occur, lives may be lost, and people are often displaced for several months to years depending on the magnitude of the event.

There are large economic consequences related to structure fires. These types of events may result in lost wages due to temporarily or permanently closed businesses, destruction and damage involving business and personal assets, loss of tax base, recovery costs, and the loss of investments on destroyed property. A secondary effect of structure fire and explosion events relate to the ability of public, private, government, and non-profit entities to provide post-incident relief.

Limited data was available for the worst-case history of structure fires in Cameron County. A possible worst-case scenario would be a fire occurring in a densely populated area. Such as Emporium Borough, where a fire could spread to multiple structures.

4.3.20.3 Past Occurrence

Cameron County experiences a small number of structure fires every year, most of which are minor and affect one to a few structures. A fire-related death has not occurred since 1980.

Table 65 – Cameron County Structure Fires lists all structure fires in Cameron County from December 1, 2007 to March 11, 2017 as provided by Knowledge Center™.

Table 65 - Cameron County Structure Fires

Cameron County Structure Fires		
Location	**Date**	**Event**
Emporium Borough	12/06/2007	Commercial/Apartment Structure Fire
Portage Township	01/31/2009	Structure Fire
Shippen Township	09/25/2010	Structure Fire
Emporium Borough	03/01/2011	Electrical Fire
Emporium Borough	12/28/2011	Industrial HazMat Fire
Shippen Township	06/16/2013	Graftech Fire
Emporium Borough	12/30/2014	Structure Fire
Shippen Township	03/11/2017	Third Alarm Fire / Industrial
Shippen Township	03/11/2017	Structure Fire
Emporium Borough	10/05/2017	Structure Fire
Emporium Borough	12/01/2017	Structure Fire
Emporium Borough	12/14/2017	Structure Fire
Shippen Township	0107/2018	Structure Fire/Appliance
Emporium Borough	04/08/2018	Structure Fire/Residential
Emporium Borough	04/08/2018	Structure Fire
Emporium Borough	05/08/2018	Structure Fire
Emporium Borough	07/26/2018	Structure Fire
Emporium Borough	03/21/2018	Structure Fire
Emporium Borough	03/21/2018	Structure Fire
Shippen Township	11/04/2019	Structure Fire/Residential
Shippen Township	01/26/2020	Structure Fire/Residential
Shippen Township	02/14/2020	Structure Fire/Garage
Shippen Township	02/28/2020	Structure Fire/Fuel Tank Fire
Emporium Borough	04/29/2020	Structure Fire/Residential
Emporium Borough	06/21/2020	Structure Fire
Emporium Borough	05/02/2021	Garage Structure Fire
Emporium Borough	08/02/2021	Commercial/Industrial Building Fire
Source: Corvena Knowledge Center™, 2021, Cameron County WebEOC, 2021		

4.3.20.4 Future Occurrence

Based on historical events, Cameron County is expected to experience three to four significant structure fire events per decade. Note that this estimate is based on the occurrence of past events over a short period of time and is not the result of a detailed statistical sampling.

Due to the low population density in Cameron County, the county has a low risk factor of having a devastating structure fire event that would destroy multiple residential structures. This hazard was given a risk factor assessment score of 2.0, making it a moderate risk for Cameron County.

4.3.20.5 Vulnerability Assessment

All seven municipalities in Cameron County are vulnerable to fires. Areas where large buildings are located, or development is dense should be considered more vulnerable to structure fire events. Therefore, critical infrastructure located in Emporium Borough are the most vulnerable to this hazard. In order to adequately assess vulnerability to structure fires, detailed information on the design specifications, specifically fire codes, used for construction of individual buildings is required. The uniform construction code assures buildings are designed to address structural fire hazards. However, these regulations will only affect new construction, as well as additions and renovations to existing structures. Older buildings that do not meet the criteria established in modern fire codes continue to remain vulnerable.

Manufacturing in Cameron County mainly consists of machine shops and powder metal manufacturing. There are also logging, lumber, and furniture manufacturing firms within the county. A fire in any one of these businesses could have significant impact, including loss of life, including the general public and local firefighters, and financial ramifications.

As noted in *Table 65 – Cameron County Structure Fires* there have only been nine structure fires in the past thirteen years. Fewer annual fires is a positive factor. It is important to note that local firefighters still need to train to keep their skills up to date.

4.3.21. Terrorism/Cyber Terrorism

4.3.21.1 Location and Extent

Following several serious international and domestic terrorist incidents during the 1990's and early 2000's, 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)

The Federal Bureau of Investigation (FBI) further characterizes terrorism as either domestic or international, depending on the origin, base, and objectives of the terrorist organization. While Cameron County has many notable local historical landmarks, there are no sites considered significant national or international landmarks in Cameron County, meaning the county is not likely to be a primary target for international terrorism. Nonetheless, terrorism can take many forms and the origin of the terrorist or person causing the hazard is far less relevant to mitigation planning than the hazard itself and its consequence.

A critical facility is defined as a facility in either the public or private sector that provides essential products and/or services to the general public, is otherwise necessary to preserve the welfare and quality of life in the county, or fulfills important public safety, emergency response, and/or disaster recovery functions. Critical facilities identified in the county are shelters, gas, electric and communication utilities, health care facilities, water and wastewater treatment plants, hazardous waste sites, police stations, and schools.

Cyber-terrorism is the unlawful use of force and violence over technological methods to cause harm to financial security, identify personal information, or attack 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.

4.3.21.2 Range of Magnitude

Terrorism refers to the use of weapons of mass destruction (WMD), including biological, chemical, nuclear, and radiological weapons, arson, incendiary, explosive, and armed attacks, industrial sabotage, intentional hazardous materials releases, and cyber-terrorism. Within these general categories there are many variations. Particularly in the area of biological and chemical weapons, there are a wide variety of agents and ways for them to be disseminated.

Potential terrorist methods include but are not limited to the following:

- Active Shooter
- Agri-terrorism
- Arson/Incendiary Attack
- Armed Attack
- Biological Agent
- Chemical Agent
- Cyber-Terrorism
- Conventional Bomb or Bomb Threat
- Hazardous material release
- Nuclear Bomb
- Radiological Agent

Four types of terrorism are particularly relevant to Cameron County: Agri-terrorism, intentional hazardous material releases, bomb threats, and active shooters. Agri-terrorism is the direct and intentional, often covert, contamination of food supplies or introduction of pests and/or disease agents to crops and livestock. Cameron County is primarily rural with most of its land area devoted to forest and agriculture. There are also two SARA Title III facilities in the county making intentional hazardous material releases a potential threat to citizens and the environment. This hazard is addressed in Section 4.3.18.

Cyberterrorism is becoming increasingly prevalent. Cyberterrorism 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 and cyber-terrorists often utilize location masking programs to remain hidden. 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 threat to institutions from cyber terrorism 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 data before encrypting it. The cybercriminal will then threaten to publicly release the stolen files if the victims do not provide the requested financial transactions.

4.3.21.3 Past Occurrence

For the most part, Cameron County has not experienced the impacts of major terrorist incidents, however there were two bomb threats in October of 2009 in Emporium Borough and a school lockdown in January of 2012. These events were reported to the Knowledge Center^{TM} and are summarized in *Table 66 – Terrorist Incidents*.

Table 66 - Terrorist Incidents

Terrorist Incidents			
Title	**Type**	**Date**	**Municipality**
Bomb Threat	Terrorist Activity	10/01/2009	Emporium Borough
Bomb Threat	Terrorist Activity	10/08/2009	Emporium Borough
School Incident	Civil Disorder	01/60/2012	Emporium Borough
Source: Corvena Knowledge Center, 2021			

4.3.21.4 Future Occurrence

The likelihood of Cameron County being a main target for major international terrorist acts is small, however activity like bomb threats or incidents at schools are more likely. The county could provide ample refuge for populace evacuating other areas of the Commonwealth if under terrorist attack. Cyber-terrorism attacks are expected to increase in the following years due to the transition of employees from office work to work from home during the Covid-19 Pandemic. Infiltration and exfiltration attacks will also become more common for government workers as hackers increasingly target county and municipal governments.

4.3.21.5 Vulnerability Assessment

The probability of terrorism occurring cannot be quantified in the same way as other hazards because of the nature of the hazard, and it is not possible to assess vulnerability in terms of likelihood of occurrence. Instead, vulnerability is assessed in terms of specific assets. By identifying potentially at-risk terrorist targets in a community, planning efforts can be put in place to reduce the risk of an attack. A comprehensive list of critical assets should be developed and prioritized so that efforts can be directed to protect the most important assets first, and then beginning with the highest-priority assets, the vulnerability can be assessed on a sliding scale.

All communities in Cameron County are vulnerable on some level, whether directly or indirectly, to a terrorist attack. However, communities where critical facilities are located should be considered more vulnerable. Site-specific assessments should be based on the relative importance of a particular site to the surrounding community or population, threats that are known to exist and existing vulnerabilities.

These vulnerability aspects include:

Inherent Vulnerability:

- Visibility: How aware is the public of the existence of the facility?
- Utility: How valuable might the place be in meeting the objectives of a potential terrorist?
- Accessibility: How accessible is the place to the public?
- Asset Mobility: Is the asset's location fixed or mobile?
- Presence of hazardous materials: Are flammable, explosive, biological, chemical, and/or radiological materials present on site? If so, are they secured?
- Potential of hazardous materials: What are the potential consequences for the surrounding area if the asset is attacked or damaged?
- Occupancy: What is the potential for mass casualties based on the maximum number of individuals on site at a given time?

Tactical Vulnerability:

Site Perimeter:

- Site planning and landscape design: Is the facility designed with security in mind? Both site-specific and with regard to adjacent land uses?
- Parking security: Are vehicle access and parking managed in a way that separates vehicles and structures?

Building Envelope:

- Structural Engineering: Is the building's envelope designed to be blast-resistant? Does it provide collective protection against chemical, biological, and radiological contaminants?

Facility Interior:

- Architectural and Interior Space Planning: Does security screening cover all public and private areas?
- Mechanical Engineering: Are utilities and HVAC systems protected and/or backed up with redundant systems?
- Electrical Engineering: Are emergency power and telecommunications available? Are alarm systems operational? Is lightning sufficient?
- Fire Protection Engineering: Are the building's water supply and fire suppression systems adequate, code-compliant, and protected? Are on-site personnel trained appropriately? Are local first responders aware of the nature of the operations at the facility?

- Electronic and Organized Security: Are systems and personnel in place to monitor and protect the facility?

According to a study carried out on data sourced from the Federal Bureau of Investigations, Pennsylvania is ranked second worst among states when it comes to handling cyber-attacks. The study made by the Information Network Associates – an international security consulting company – says there was an increase of 25% 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 Acronis Cyberthreats Report 2020 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, 2021 will continue to see aggressive cybercrime activities as criminals pivot their attacks from data encryption to data exfiltration.

The major points illustrated in the report follow:

- 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.

4.3.22. Transportation Accidents

4.3.22.1 Location and Extent

Transportation accidents, for the purpose of this plan, are defined as incidents involving highway, air, and rail travel. Within Cameron County, there are over 113 miles of roads, eighty-four bridges (state and locally owned), and approximately forty-five miles of railways with nine railroad crossings, and two private airports. See *Figure 61 – Cameron County Major Roadways and Railways*. Significant routes within Cameron County are Pennsylvania Routes 120, 46, 155, 555, and 872.

Western PA & New York runs between Port Allegheny in McKean County and Renovo in Clinton County, passing through Cameron County. The Pittsburgh and Shawmut Division of the Genesee & Wyoming Railroad runs between DuBois in Clearfield County and Driftwood in Cameron County.

The two airports in Cameron County are privately owned and are Murray's Mountain in Shippen Township and Grove Hill in Grove Township.

4.3.22.2 Range of Magnitude

Transportation accidents can result in death or serious injury, or extensive property damage or loss. Road and railway accidents can also result in hazardous materials release. Accidents involving hazardous materials pose potential environmental contamination to the air, water, and soil.

Aviation accidents most often occur near landing or take-off sites, as such a five-mile radius around the two private airports in Cameron County can be considered high risk areas.

Heavier traveled roads can experience a higher percentage of automobile accidents, which are typically due to high speeds and inclement weather.

4.3.22.3 Past Occurrence

The most common transportation accidents in Cameron County involve incidents on highways; with the highest number of accidents occurring along PA Routes 120, 155, and 46.

Table 67 – Past Transportation Accidents or Incidents shows the accidents that were reported to the Elk County 9-1-1 (which is the contracted public-safety answering point (PSAP) for Cameron County) as entered in the Cameron County Corvena database between November 29, 2007, and August 18, 2021.

Table 67 - Past Transportation Accidents or Incidents

Past Transportation Accidents or Incidents for Cameron County		
Date	**Event**	**Municipality**
11/29/2007	Accident with ejection, 4 injuries	Shippen Township
06/14/2008	ATV accident with fatality	Lumber Township
08/05/2008	Accident with power outage	Shippen Township
09/06/2008	Accident with road closure	Shippen Township
01/11/2009	Vehicle crash with power outage	Shippen Township
12/13/2009	EMS unit accident	Emporium Borough
04/01/2010	Aircraft emergency landing	Gibson Township
12/06/2010	Low flying aircraft	Emporium Borough
08/11/2011	Accident with road closure	Gibson Township
11/27/2011	Accident with SAR deployment	Driftwood Borough
04/25/2013	Accident with power and phone outage	Shippen Township
11/22/2014	Route 46 closed due to icy roadways and an accident	Norwich to Emporium
02/19/2015	School bus vs passenger vehicle	Cameron County
03/20/2015	Multiple accidents on Route 46 due to icy roadways	Shippen Township
05/03/2018	Wires down across roadway.	Shippen Township
02/06/2019	Train derailment	Emporium Borough
Source: Corvena Knowledge Center, 2021		

The train derailment in 2019 was with the Western New York Railroad, consisting of a complete derailment of two sand cars and a partial derailment of three sand cars at the crossing of PA Route 120 in Emporium Borough.

The Center for Highway Safety of the Pennsylvania Department of Transportation (PennDOT) issues an annual report of reportable motor vehicle traffic accidents within the Commonwealth of Pennsylvania. Some of the data within these annual reports includes the total number of accidents, fatal accidents, accidents with injuries, and train versus vehicle accidents. *Table 68 – Traffic Accident Statistics for Cameron County* details Cameron County data for the past five years. It should be noted that not all reportable accidents are captured on the Corvena database.

Table 68 - Traffic Accident Statistics for Cameron County

Traffic Accident Statistics for Cameron County (PennDOT)						
Year	Auto Accidents			Deaths from Pedestrian/auto accidents	Train/vehicle	
	With fatalities	With injuries	Total		Crashes	Deaths
2016	0	18	40	0	0	0
2017	0	27	65	0	0	0
2018	0	21	53	0	0	0
2019	3	16	42	1	0	0
2020	1	11	32	0	0	0
Source: PennDOT, 2020						

4.3.22.4 Future Occurrence

There is always a potential for transportation accidents to occur within Cameron County. Automobile accidents occur more frequently than rail or aviation accidents as identified from past occurrences. From the crash facts and statistics supplied from PennDOT, Cameron County has the potential of having approximately forty-six accidents per year. The probability of transportation accidents is due to the steep slopes that make up the terrain in Cameron County and weather conditions that can quickly change along roadways. Heavy rain, snow, and ice pose hazards to vehicle travel on all roadways and bridges. Landslides and subsidence could result in future transportation accidents.

4.3.22.5 Vulnerability Assessment

The terrain and possibility of severe weather in the county, rather than high traffic volumes, increases the chance of traffic accidents occurring in Cameron County. Vulnerability for highway accidents fall within a ¼ mile of the highway. Like highway incidents, rail incidents can impact populations living near rail lines; with a vulnerability within a ¼ mile of the rail line.

Emporium Borough and Grove Township are susceptible to airplane accidents due to the privately owned airports in those areas. Vulnerability of airplane accidents fall within jurisdictions within two miles of the airport; shown in *Figure 62 - Cameron County Airport Vulnerability*.

Table 69 – Cameron County Addressable Structure and Critical Facilities vulnerable to Transportation Accidents identifies the addressable structures and critical facilities vulnerable to highway, railroad, and airport accidents.

Table 69 - Cameron County Addressable Structure and Critical Facilities vulnerable to Transportation Accidents

Cameron County Addressable Structure and Critical Facilities vulnerable to Transportation Accidents				
Municipality	**Within ¼ mile of Highways and Railways**		**Within a two-mile radius of an Airport**	
	Addressable structures	**Critical facilities**	**Addressable structures**	**Critical facilities**
Driftwood Borough	112	0	0	0
Emporium Borough	1,102	1,102	1,102	17
Gibson Township	390	34	034	0
Grove Township	673	1	1	0
Lumber Township	167	5	5	0
Portage Township	130	0	0	0
Shippen Township	1,221	612	612	0
Total	3,795	1,754	1,754	17
Source: Cameron County, 2021				

Figure 61 - Cameron County Major Roadways and Railways

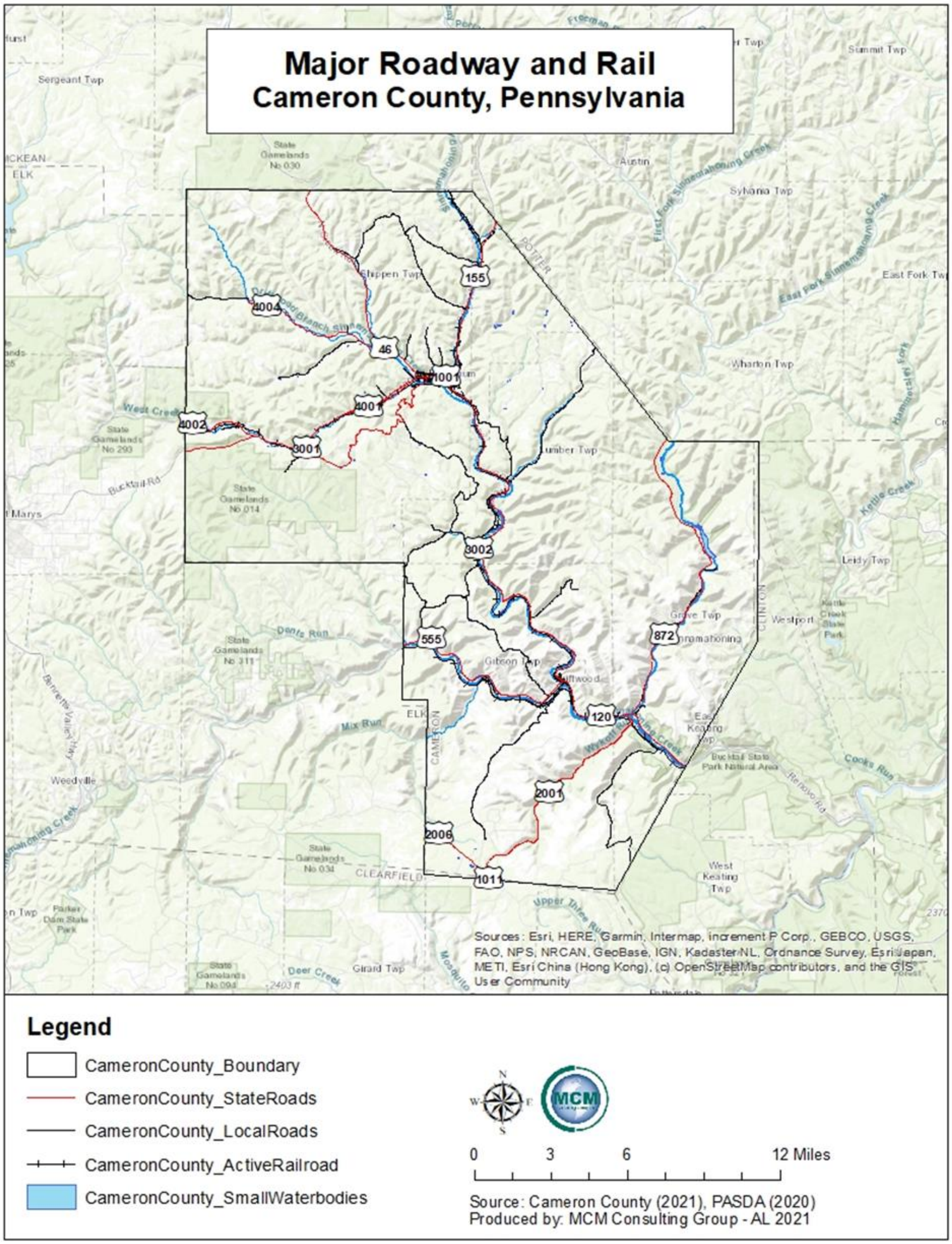
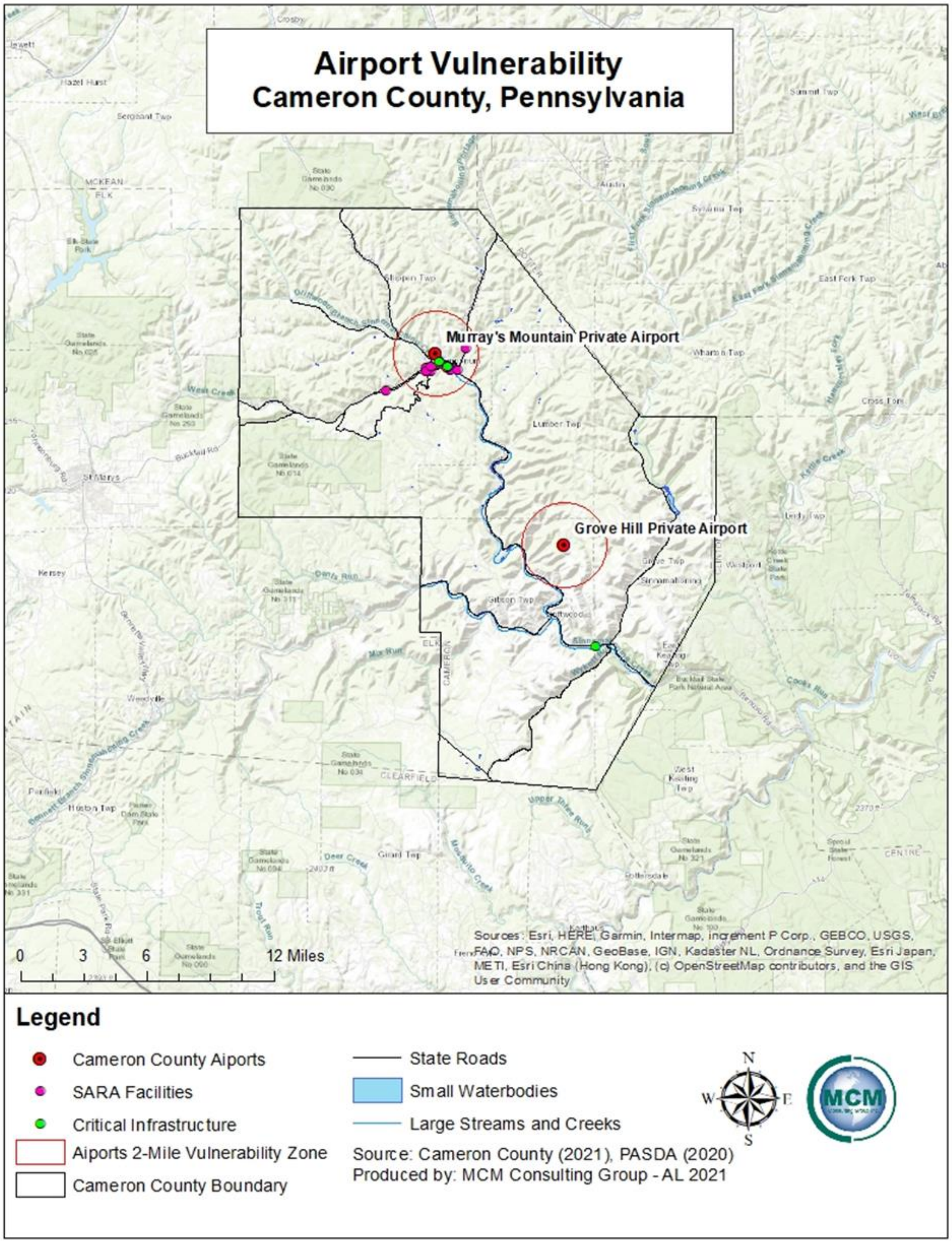


Figure 62 - Cameron County Airport Vulnerability



4.3.23. Utility Interruptions

4.3.23.1 Location and Extent

Utility interruptions can occur from an internal system failure or as a secondary impact of another hazard. Utility interruptions in Cameron County are mainly power failures, which are often a secondary impact of another event, commonly a thunderstorm or weather event. For example, severe thunderstorms or winter storms could bring down power lines and cause widespread interruptions in electrical service to a localized area or a region at large. Strong heat waves may result in rolling blackouts where power may not be available for an extended period of time. Space weather, specifically solar flares, can also pose a threat to utility service across not just a region but the entire globe. Although uncommon, the northeastern seaboard and the north central regions of the United States are particularly vulnerable to solar flares. Local outages may be caused by traffic accidents or wind damage.

The age of the utility infrastructure also plays a role in potential interruptions of service. Utility interruptions can also include communications failures and water supply issues. Other causes for minor power outages include but are not limited to falling tree limbs, vehicle accidents, and wire destruction due to animals or wildlife. Worker strikes at power generation facilities have also been known to cause minor and temporary power outages and failures. Communication failures can also be a secondary impact of another event. Utility interruptions can take place throughout the county.

The list of utility providers in Cameron county is shown in *Table 70 – Cameron County Utility Providers*.

Table 70 - Cameron County Utility Providers

Cameron County Utility Providers	
Utility Type	**Name of Utility Provider**
Electricity	Allegheny West Penn Power Company
Telephone/9-1-1/Wireless	AT&T T-Mobile Verizon
Natural Gas	National Fuel Gas Distribution Company UGI Energy Services LLC
Water	Emporium Water Company
Source: Cameron County Chamber of Commerce, 2021	

4.3.23.2 Range of Magnitude

Most severe power failures or outages are regional events. A loss of electricity can have numerous impacts including, but not limited to, food spoilage, loss of heat or air conditioning (HVAC), basement flooding (including sump pump failure), lack of indoor lighting, loss of water supply (including well pump failure) and lack of phone or internet service. These issues are often more of nuisance to a community than a hazard but can cause damage or harm depending on the population affected and the severity of the outage.

Communication failures occur locally or throughout the county. The worst-case scenario for a communication failure is the loss of 911 telephone and communication equipment. When 911 phone lines are lost, those in need of emergency assistance are unable to get emergency response and assistance.

A possible worst-case scenario would be a power outage lasting several days requiring distribution of provisions in the most populated parts of the county, such as Emporium Borough and Shippen Township.

4.3.23.3 Past Occurrence

Minor outages of electric and phone service occur annually. A significant outage occurred on December 16, 2007. Approximately 75,000 Pennsylvania Power and Lighting (PP&L) customers were without power across south-central Pennsylvania due to heavy icing. Some customers were without power for up to three days.

In Cameron County, power outages are most often associated with winter storms and windstorms. *Table 71 – Utility Interruptions in Cameron County* below depicts the events that have been recorded for utility interruptions or outages. This list is compiled from data gathered in Knowledge Center™.

Table 71 - Utility Interruptions in Cameron County

Utility Interruptions in Cameron County		
Location	**Date**	**Event**
Cameron County (entire county)	11/06/2007	Microwave Outage
Cameron County (entire county)	01/30/2008	Power Outage
Shippen Township	02/11/2008	Power Outage
Shippen Township	08/05/2008	Power Outage due to MVA
Cameron County (entire county)	12/12/2008	General and 911 Phone Outage
Shippen Township	01/11/2009	Power Outage due to MVA
Driftwood Borough	03/11/2009	Power Outage
Cameron County (entire county)	04/23/2009	Communications Outage
Grove Township	05/16/2009	Total 911 Outage

Utility Interruptions in Cameron County		
Location	**Date**	**Event**
Grove Township	08/10/2009	Power Outage
Shippen Township	10/13/2009	Power and Phone Outage
Cameron County (entire county)	10/16/2009	Power Outage
Shippen Township	10/20/2009	Trees on Lines
Cameron County (entire county)	10/28/2009	Cell Phone Outage
Emporium Borough	12/14/2009	Power Outage
Emporium Borough	04/01/2010	Phase Two Failure
Emporium Borough	04/16/2010	Power Outage
Gibson Township	08/16/2010	Power and Phone Outage
Grove Township	09/22/2010	Power Outage
Cameron County (entire county)	02/28/2011	Radio Outage
Shippen Township	02/28/2011	Power Outage
Cameron County (entire county)	09/05/2011	Phone Outage
Driftwood Borough	01/03/2012	Phone and 911 Outage
Shippen Township	07/11/2012	Power Outage
Grove Township	03/30/2013	911 Outage
Cameron County (entire county)	04/14/2013	911 Outage
Emporium Borough	05/20/2013	Power Outage
Cameron County (entire county)	05/24/2013	Long Distance Phone Outage
Cameron County (entire county)	12/11/2013	Phone Outage
Driftwood Borough	01/14/2014	Drinking Water Issues
Driftwood Borough	03/09/2014	Boil Water Notice
Grove Township	07/20/2014	Phone Outage
Shippen Township	04/08/2015	Unable to Connect to 911 PSAP
Cameron County (entire county)	05/08/2015	911 Outage
Cameron County (entire county)	07/27/2015	Windstream Phone Outage
Driftwood Borough	07/15/2016	Voluntary Water Restrictions
Cameron County (entire county)	02/02/2018	Phone Outage
Cameron County (entire county)	08/06/2018	Phone Outage
Cameron County (entire county)	02/14/2019	Radio Outage
Cameron County (entire county)	05/14/2019	Utility Outage
Cameron County (entire county)	11/13/2019	Planned Power Outage
Gibson Township	04/24/2020	Natural Gas Leak
Cameron County (entire county)	08/27/2020	Power Outage
Cameron County (entire county)	10/30/2020	Power Outage
Grove Township	07/14/2021	Utility Outage
Source: Corvena Knowledge Center™, 2021		

The Pennsylvania Public Utility Commission tracks the reliability of electric distribution companies (EDC) and outages. *Table 72 – 2018 Winter Storm Riley and Quinn Power Outages by EDC* compares the customers affected by power outage in Pennsylvania during these storm events and compares the 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 72 - 2018 Winter Storm 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			

4.3.23.4 Future Occurrence

The probability of a utility interruption event is high. Minor power failures and interruption events may occur several times a year for any given area in the county, while major (i.e., widespread, long-term outage) events take place once every few years. Power failures are a likely occurrence during severe weather and therefore, should be expected during those events. A risk factor of 3.4 has been assigned to this hazard.

As utility infrastructure ages, interruption events could become more frequent and could last for longer periods of the maintenance of the infrastructure is not maintained. Utility providers can reduce Cameron County's vulnerability to power outages by implementing improvement plans for utility infrastructure. Total replacement of utility infrastructure 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. Also, a phased replacement schedule can be established, to replace certain parts of aging infrastructure gradually.

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 an area's population. Power outages can cause even greater detriment to at-risk and vulnerable populations, such as elderly 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 a utility interruption to ensure a seamless transition from the everyday, grid power to the emergency generator. When officials consider maintenance and supplies for a facility, long term use of backup power 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, lighting, 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 grid system.

The causes of a regional scale power outage or failure could be from infrastructure failure, sabotage, human error, or worker strikes. Critical infrastructure is 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 Cameron County.

Water:

Water distribution can be affected in three ways:

1. The amount of water available (depends on natural events).
2. The quality of the water (depends on human responsibility).
3. 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.

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).
- Costal or winter storms.
- Extreme heat of 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 Cameron county if 911 calls cannot be received, or if emergency units could not be dispatched properly and/or timely.

No data regarding economic impacts from utility interruptions in Cameron County are available. However, utility interruptions can cause economic impacts stemming from lost income, spoiled food and other goods, costs to the owners and operators of the utility facilities, and costs to government and community service groups.

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 profile 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 Hazard Mitigation Plan update. Those categories include:

- Probability
- Impact
- Spatial Extent
- Warning Time
- 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 73 – 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:

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

Table 73 – 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 73 - Risk Factor Approach Summary

<table>
<tr><th colspan="6">Summary of Risk Factor Approach Used to Rank Hazard Risk</th></tr>
<tr><th rowspan="2">RISK ASSESSMENT CATEGORY</th><th colspan="4">DEGREE OF RISK</th><th rowspan="2">WEIGHT VALUE</th></tr>
<tr><th>LEVEL</th><th colspan="2">CRITERIA</th><th>INDEX</th></tr>
<tr><td rowspan="4">PROBABILITY
What is the likelihood of a hazard event occurring in a given year?</td><td>Unlikely</td><td colspan="2">Less than 1% Annual Probability</td><td>1</td><td rowspan="4">30%</td></tr>
<tr><td>Possible</td><td colspan="2">Between 1 & 10% Annual Probability</td><td>2</td></tr>
<tr><td>Likely</td><td colspan="2">Between 10 & 100% Annual Probability</td><td>3</td></tr>
<tr><td>Highly Likely</td><td colspan="2">100% Annual Probability</td><td>4</td></tr>
<tr><td rowspan="4">IMPACT
In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?</td><td>Minor</td><td colspan="2">Very few injuries, if any, only minor property damage & minimal disruption on quality of life. Temporary shutdown of critical facilities.</td><td>1</td><td rowspan="4">30%</td></tr>
<tr><td>Limited</td><td colspan="2">Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.</td><td>2</td></tr>
<tr><td>Critical</td><td colspan="2">Multiple deaths/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.</td><td>3</td></tr>
<tr><td>Catastrophic</td><td colspan="2">High number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.</td><td>4</td></tr>
<tr><td rowspan="4">SPATIAL EXTENT
How large of an area could be impacted by a hazard event? Any localized or regional?</td><td>Negligible</td><td colspan="2">Less Than 1% of Area Affected</td><td>1</td><td rowspan="4">20%</td></tr>
<tr><td>Small</td><td colspan="2">Between 1 & 10% of Area Affected</td><td>2</td></tr>
<tr><td>Moderate</td><td colspan="2">Between 10 & 50% of Area Affected</td><td>3</td></tr>
<tr><td>Large</td><td colspan="2">Between 50 & 100% of Area Affected</td><td>4</td></tr>
<tr><td rowspan="4">WARNING TIME
Is there usually some lead time associated with the hazard event? Have waning measures been implemented?</td><td>More than 24 HRS</td><td>Self-Defined</td><td rowspan="4">(Note: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)</td><td>1</td><td rowspan="4">10%</td></tr>
<tr><td>12 to 24 HRS</td><td>Self-Defined</td><td>2</td></tr>
<tr><td>6 to 12 HRS</td><td>Self-Defined</td><td>3</td></tr>
<tr><td>Less Than 6 HRS</td><td>Self-Defined</td><td>4</td></tr>
<tr><td>DURATION</td><td>Less Than 6 HRS</td><td>Self-Defined</td><td>(Note: Levels of warning time and</td><td>1</td><td>10%</td></tr>
</table>

Summary of Risk Factor Approach Used to Rank Hazard Risk					
RISK ASSESSMENT CATEGORY	DEGREE OF RISK				WEIGHT VALUE
	LEVEL	CRITERIA		INDEX	
How long does the hazard event usually last?	**Less Than 24 HRS**	Self-Defined	*criteria that define them may be adjusted based on hazard addressed.)*	**2**	
	Less Than 1 Week	Self-Defined		**3**	
	More Than I Week	Self-Defined		**4**	

4.4.2. Ranking Results

Using the methodology described in Section 4.4.1, *Table 74 – Risk Factor Assessment* lists the risk factor calculated for each of the twenty potential hazards identified in the 2022 Hazard Mitigation Plan. It should be noted that the flooding, flash flooding, ice jam flooding, tornado and windstorm hazards were ranked individually instead of together. 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 74 - Risk Factor Assessment

Cameron County Hazard Ranking Based on Risk Factor Methodology							
Hazard Risk	Hazard Natural or Manmade	Risk Assessment Category					Risk Factor (RF)
		Probability	Economic Impact	Spatial Extent	Warning Time	Duration	
HIGH	Pandemic and Infectious Disease	4	4	4	1	4	3.7
	Dam Failure	2	4	4	4	4	3.4
	Utility Failure	4	3	3	4	3	3.4
	Flooding	3	3	4	3	4	3.3
	Windstorm	4	3	3	2	3	3.2
	Radon Exposure	4	2	4	1	4	3.1
	Winter Storm	4	2	4	1	3	3.0
	Flash Flood	4	2	3	4	2	3.0

Cameron County Hazard Ranking Based on Risk Factor Methodology							
Hazard Risk	**Hazard Natural or Manmade**	**Risk Assessment Category**					**Risk Factor (RF)**
		Probability	**Economic Impact**	**Spatial Extent**	**Warning Time**	**Duration**	
	Cyber-Terrorism	3	3	2	4	4	3.0
	Levee Failure	2	4	3	2	3	2.9
	Drought	3	2	4	1	4	2.8
	Invasive Species	4	1	4	1	4	2.8
	Hurricane, Tropical Storm	3	2	4	1	3	2.7
	Wildfire	3	2	2	4	3	2.6
	Environmental Hazards – Trans.	3	2	2	4	3	2.6
	Landslide	3	2	2	4	3	2.6
MODERATE	Disorientation	4	1	1	4	3	2.4
	Transportation Accidents	4	1	1	4	2	2.3
	Environmental Hazards – Fixed Facility	2	2	2	4	3	2.3
	Ice Jam Flooding	2	2	2	4	3	2.3
	Tornado	2	2	2	2	3	2.1
	Structure Fire	2	2	1	4	2	2.0
	Terrorism	2	2	1	4	2	2.0
LOW	Earthquake	1	1	4	4	1	1.9
	Subsidence & Sinkholes	1	1	1	4	1	1.3
	Civil Disturbance	1	1	1	3	2	1.3

Based on these results, there are sixteen high-risk hazards, seven moderate-risk hazards, and three low-risk hazards in Cameron 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 all 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 75 – Countywide Risk Factor by Hazard* shows the different municipalities in Cameron 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 75 - Countywide Risk Factor by Hazard

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk														
IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR														
JURISDICTION	Pandemic and Infectious Disease	Dam Failure	Utility Failure	Flooding	Windstorm	Radon Exposure	Winter Storm	Flash Flood	Cyber-terrorism	Levee Failure	Drought	Invasive Species	Hurricane and Tropical Storm	Wildfire
	3.7	**3.4**	**3.4**	**3.3**	**3.2**	**3.1**	**3**	**3**	**3**	**2.9**	**2.8**	**2.8**	**2.7**	**2.6**
Driftwood Borough	>	=	=	>	=	=	=	=	>	<	>	=	=	=
Emporium Borough	>	=	=	>	=	=	=	=	>	>	=	=	=	=
Gibson Township	>	=	=	=	=	=	=	=	>	<	>	=	=	=
Grove Township	>	=	=	=	=	=	=	=	>	<	=	=	=	=
Lumber Township	>	=	=	=	=	=	=	=	>	<	=	=	=	=
Portage Township	>	=	=	=	=	=	=	=	>	<	=	=	=	=
Shippen Township	>	=	=	>	=	=	=	=	>	>	=	=	=	=

Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk														
IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR														
JURISDICTION	Environmental Hazards - Transportation	Landslide	Disorientation	Transportation Accidents	Environmental Hazards – Fixed Facility	Ice Jam Flooding	Tornado	Structure Fire	Terrorism	Earthquake	Sinkholes and Subsidence	Civil Disturbance		
	2.6	**2.6**	**2.4**	**2.3**	**2.3**	**2.3**	**2.1**	**2**	**2**	**1.9**	**1.3**	**1.3**		
Driftwood Borough	>	=	=	=	>	=	=	=	=	=	=	>		
Emporium Borough	>	=	=	=	>	=	=	=	=	=	=	>		
Gibson Township	<	>	=	=	<	=	=	=	=	=	=	<		
Grove Township	<	=	=	=	<	=	=	=	=	=	=	<		
Lumber Township	<	=	=	=	<	=	=	=	=	=	=	<		
Portage Township	<	=	=	=	<	=	=	=	=	=	=	<		
Shippen Township	<	=	=	=	<	=	=	=	=	=	=	<		

4.4.3. Potential Loss Estimates

Based on various kinds of available data, potential loss estimates were established for flood, flash flood, and ice jam flooding. Estimates provided in this section are based on HAZUS-MH, version 3.2, 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 Cameron 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 of the Cameron County municipalities is outlined in Section 4.3.X of the flooding hazard profile.

MCM Consulting Group conducted a county wide flood study using the Hazard 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 Cameron County are estimated to equal nearly $64,650,000.00. Residential occupancies make up 56.81% of the total estimated building-related losses. Total economic loss, including replacement value, content loss, functional loss, and displacement cost, from a county-wide 1%-annual-chance flood are estimated to equal $101,570,000.00.

Severe Windstorm and Tornado Loss Estimation:

Table 76 – Wind & Tornado Loss Estimates outlines the potential losses for each municipality due to a high wind related event. Losses shown here can only be viewed as estimates and a potential, based on the random occurrence of wind conditions and the limitations of data. Assessed value data include those based on a point within two-dimensional (latitude and longitude) plane. Further, this analysis assumes a total loss of a property that is designated as a mobile home property. As a result of these limitations, the estimates are likely overstated, but to what degree the potential losses are overstated cannot be determined.

Table 76 - Wind & Tornado Loss Estimates

Wind and Tornado Estimation of Loss		
Municipality	**Number of Mobile Homes**	**Total Value**
Driftwood Borough	11	$61,495.00
Emporium Borough	6	$88,820.00
Gibson Township	134	$1,841,935.00
Grove Township	98	$522,650.00
Lumber Township	58	$453,892.00
Portage Township	24	$247,045.00
Shippen Township	219	$3,111,763.00
Total:	**550**	
Source: Cameron County, GIS, 2021		

4.4.4. Future Development and Vulnerability

The total population in Cameron County increased one percent between 1990 and 2000 from 5,889 to 5,974. However, all seven municipalities within the county have seen population decreases in the period between 2000 and 2010 with an overall county population loss of 14.9%, as seen in *Table 77 – 2000 – 2020 Population Change*. At the same time, the Borough of Driftwood and the Borough of Emporium have, and will continue to have, the highest population densities in the county. This means that the hazard vulnerability and loss estimates will be relatively higher in those two municipalities. The only municipality that had an increase in population from 2000 to 2010 was Grove Township. Although there was a population increase in for Grove Township, no new development areas have been identified by the Cameron County Planning Commission. Between 2010 and 2020, each of the seven municipalities in Cameron County saw negative population growth. The total population of the county also decreased by -11.89% over the ten-year window. Overall, Cameron County's hazard vulnerability and loss estimates should remain constant or decrease over the next five years.

Table 77 - 2010-2020 Population Change

Population Change in Cameron County from 2000 – 2020					
Municipality	**2000 Population**	**2010 Population**	**Percent Change (2000 – 2010)**	**2020 Population***	**Percent Change (2010 – 2020)**
Driftwood Borough	103	67	-34.95	32	-52.24
Emporium Borough	2,526	2,073	-17.93	2,056	-0.82
Gibson Township	222	164	-26.13	137	-16.46
Grove Township	129	183	29.51	141	-22.95
Lumber Township	241	195	-19.09	131	-32.82
Portage Township	258	171	-33.72	149	-12.87
Shippen Township	2,495	2,232	-10.54	1,965	-11.96
Total:	**5,974**	**5,085**	**-14.9**	**4,480**	**-11.90**
*2020 Population estimates are from the Census Bureau but are not official figures.					

5. Capability Assessment

5.1. Update Process Summary

The capability assessment is an evaluation of Cameron County's governmental structure, political framework, legal jurisdiction, fiscal status, policies and programs, regulations and ordinances and resource availability. Each category is evaluated for its strengths and weaknesses in responding to, preparing for, and mitigating the effects of the 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 of Cameron County officials. These meetings were designed to seek input from 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 seven municipalities. Pennsylvania municipalities have their own governing bodies, pass their own ordinances and regulations, purchase equipment and managed their own resources including critical infrastructure. These capability assessments, therefore, consider the various characteristics and capabilities of municipalities under study.

The evaluation of the following categories – political framework, legal jurisdiction, 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 Cameron County, and its municipalities have the capacity to do and provides an understanding of what must be changed to mitigate loss.

Cameron County has a number of 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, states, 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

All participating municipalities completed and submitted a capability assessment survey. The results of the survey were collected, aggregated, and analyzed.

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 in compliance with all criteria established in the Pennsylvania Municipalities Planning Code (MPC) and their respective municipal codes. Municipalities can develop their own policies and serve their local 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 and 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. Adoption of the Pennsylvania Floodplain Management Act (Act 166 of 1978) established higher 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 Cameron County and municipal legal capabilities to mitigate profiled hazards. It identified the county's and the municipalities' 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 existing in that area. Consequently, structures that are built according to applicable codes are inherently resistant to many hazards, such as strong 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 has many advantages. It 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 Cameron County adhere to the standards of the Pennsylvania Uniform Construction Code (Act 45). All municipalities have opted in on building 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; 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. There is no zoning in any municipality in Cameron County.

Subdivision Ordinance

Subdivision and land development ordinances include regulations to control the layout of streets, the planning of lots, the provision of utilities, and other site improvements. The objectives of a subdivision and land development ordinance are to:

- Coordinate street patterns
- Assure adequate utilities and other improvements are provided in a manner that will not pollute streams, wells, or soils

- Reduce traffic congestion
- Provide sound design standards as a guide to developers, the elected officials, planning commission, 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. All municipalities in Cameron County have adopted the Cameron County Subdivision and Land Development Ordinance as the municipal ordinance.

Stormwater Management Plan/Stormwater Ordinance

The proper management of stormwater 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 stormwater 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 to any county for the preparation and adoption of plans. Counties must prepare the watershed plan 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 so they are current. 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 stormwater management plan by amending or adopting laws and regulations for land use and development. The implementation of stormwater management criteria and standards at the local level are necessary since municipalities are responsible for local land use decisions and planning. The degree of detail in the ordinances depends on the extent of existing and projected development. The watershed stormwater 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 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.

There are seven watersheds in Cameron County. Cameron County and other local municipalities have general (non-Act 167 compliant) stormwater management regulations as part of either the county or local subdivision and land development plan. No specific storm water management plans have been adopted by any municipality in Cameron County.

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 Planning Code (MPC Act 247 of 1968, as reauthorized and amended) requires counties to prepare and maintain a county comprehensive plan. In addition, the MPE requires counties to update the comprehensive plan every ten years.

With regard to 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 give consideration to floodplains and other areas of special hazards and other similar uses. The MPC also requires comprehensive plans to include a plan for community facilities and services and recommends giving consideration to storm drainage and floodplain management.

Cameron County has a comprehensive plan that was adopted in 2019.

Article III of the Municipality Planning Code (MPC) enables municipalities to prepare a comprehensive plan; however, development of a comprehensive plan is voluntary. All municipalities in Cameron County have adopted the Cameron County Comprehensive Plan as the municipal plan. No municipalities have independent 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 identified the highest priority projects recommended for funding in the next annual budget. The improvements plan is dynamic and can be tailored to specific circumstances. Cameron County does not have a capital improvements plan in place.

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

The Pennsylvania Department of Community and Economic Development (PA DCED) provides communities, based on their CFR, Title 44, Section 60.3 level or 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 limited to:

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 structures.
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 542 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 measure that protect natural and beneficial floodplain functions.

There 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 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

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. The Pennsylvania Department of Community and Economic Development (DCED) 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 establishes 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.

All seven of the municipalities that are located in Cameron County 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.

In an effort 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, three municipalities submitted an NFIP survey. These surveys can be found in Appendix C of this plan.

5.2.2. Administrative and Technical Capability

There are two boroughs and five townships within Cameron County. Each of these municipalities conducts its 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. Others choose to operate on their own. Municipalities vary in staff size, resource availability, fiscal status, service provision, constituent population, overall size, and vulnerability to the profiled hazards.

County Planning Commission

In Pennsylvania, planning responsibilities traditionally 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 as to what form an agency will possess. A governing body can create a planning commission, a planning department, or both. The Cameron County Assessment Office assists all municipalities in the county as needed. The county employs a chief assessor and a tax claim assistant on an annual basis.

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.

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 third-party vendor for use in the Cameron County mapping initiatives. There are no members of Cameron County that have completed HAZUS training or Basic HAZUS-MH.

Emergency Management Coordinator

Emergency management is a comprehensive, integrated program of mitigation, preparedness, response, and recovery for emergencies or 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 of its own.

A municipal emergency management coordinator is responsible for emergency management – preparedness, response, recovery, and mitigation within his or her respective authority having jurisdiction (AHJ). The responsibilities of the emergency management coordinator are outlined in PA Title 35 §7503:

- Prepare and maintain a current disaster emergency management plan.
- Establish, equip, and staff an emergency operations center.
- Provide individuals 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 of Pennsylvania, local officials, or agencies and the general public.
- Participate in all tests, drills, and exercises, including remedial drills and exercises, scheduled by the agency or by the federal government.

Title 35 requires Cameron county and its municipalities to have an emergency management coordinator.

The Cameron County Office 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 hazard events have on their community.

The Emergency Management Code (PA Title 35) requires that all municipalities in the Commonwealth of Pennsylvania have a local emergency operations plan (EOP) which is updated every two years. All seven municipalities have adopted the county EOP. The notification and resource section of the plan was developed individually by each municipality.

Political Capability

One of the most difficult capabilities to evaluate involves the political will of a jurisdiction to enact meaningful policies and projects designed to mitigate hazard events. The adoption of hazard mitigation measures may be seen as an impediment to growth and economic development. In many cases, mitigation may not generate interest among local officials when compared with competing priorities. Therefore, the local political climate must be considered when designing mitigation strategies, as it could be the most difficult hurdle to overcome in accomplishing the adoption or implementation of specific actions.

The capability assessment survey was used to capture information on each jurisdiction's political capability. Survey respondents were asked to identify examples of political capability such as guiding development away from hazard areas or enforcing local development standards that go beyond the minimum state of federal requirements (i.e., building codes, floodplain management ordinances). These examples were used to guide respondents in scoring their community on a scale of "unwilling" (0) to "very willing" (5) to adopt policies and programs that reduce hazard vulnerabilities. *Table 78 – Cameron County Community Political Capability* summarizes the results of political capability.

Table 78 - Cameron County Community Political Capability

Cameron County Community Political Capability						
Municipality Name	**Capability Ranking**					
	0	**1**	**2**	**3**	**4**	**5**
Driftwood Borough	Not Completed by Municipality					
Emporium Borough						X
Gibson Township	X					
Grove Township	Not Completed by Municipality					
Portage Township						X
Lumber Township				X		
Shippen Township						X
Cameron County Chamber of Commerce				X		
Cameron County					X	

Self-Assessment

In addition to the inventory and analysis of specific local capabilities, the capability assessment survey required each local jurisdiction to conduct its own self-assessment of its capability effectively implement hazard mitigation activities. As part of this process, county and municipal officials were encouraged to consider the barriers to implementing proposed mitigation strategies in addition to the mechanisms that could enhance of further such strategies. In response to the survey questionnaire, local officials classified each of the capabilities as either "L = Limited", "M = Moderate", or "H = High". *Table 79 – Capability Self-Assessment Matrix* summarizes the results of the self-assessment survey. All seven municipalities, the Cameron County Office of

Community and Economic Development, and the Cameron County Chamber of Commerce all returned this section of the assessment completed.

Table 79 - Capability Self-Assessment Matrix

Cameron County Capability Self-Assessment Matrix				
Municipality Name	**Capability Category**			
	Planning and Regulatory Capability	**Administrative and Technical Capability**	**Fiscal Capability**	**Community Political Capability**
Driftwood Borough	L	L	L	L
Emporium Borough	M	M	M	M
Gibson Township	L	L	L	L
Grove Township	L	L	L	L
Portage Township	M	M	M	H
Lumber Township	L	L	L	L
Shippen Township	L	L	L	L
Other Stakeholders				
Agency Name	**Capability Category**			
	Planning and Regulatory Capability	**Administrative and Technical Capability**	**Fiscal Capability**	**Community Political Capability**
Cameron County Chamber of Commerce	L	L	L	L
Cameron County	M	M	H	M

In addition to the institutional capability of the municipal government structure described above, the county itself is capable of engaging in mitigation activities. The county has its own staff, resources, budget, and objectives, which may or may not be similar to those of its constituent municipalities. Therefore, the county has its own capabilities to mitigate the profiled hazards through planning and coordination of local mitigation efforts. The Cameron County GIS Department is also able to provide needed skills in the analysis of geographic data. Other local organizations that could act as partners include the Cameron County Conservation District, Cameron County Fire Chiefs, the Cameron County Area Agency on Aging, business development organizations such as the Cameron County Chamber of Commerce, and historical or cultural agencies such as the Cameron County Historical Society.

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 for the municipalities. The county and the municipalities' 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, the majority of municipalities within the county perceive fiscal capability to be moderate to limited. The following information pertains to various financial assistance programs relevant to hazard mitigation.

State and Federal Grants

During the 1960's and 1970's, state and federal grants-in-aid were available to finance a large number of municipal programs, including streets, water and sewer facilities, airports, parks, and playgrounds. During the early 1980's, 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 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, PEMA's Pre-Disaster Mitigation (PDM) Grant, Flood Mitigation Assistance Grant Programs, and Hazard Mitigation Grant Program. Cameron County does not employee a full-time grant writer, but members of the staff in various departments (Office of Emergency Services and Office of Community and Economic Development) have experience writing grants for funding.

Below are some of the state programs which may provide financial support for mitigation activities which include, but are not limited to:

- CFA/DCED Flood Mitigation Program
- CFA/DCED H2O PA Flood Control Projects

- CFA/DCED H2O PA High Hazard Unsafe Dam Projects
- CFA/DCED H2O PA Water Supply, Sanitary Sewer, and Storm Water Projects
- CFA/DCED PA Small Water and Sewer
- DCNR Community Conservation Partnerships Program
- DCNR Pennsylvania Heritage Areas Program
- DCNR Pennsylvania Recreational Trails Program
- DCNR Land & Water Conservation Fund

Below are some of the federal programs which may provide financial support for mitigation activities which include, but are not limited to:

- 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

Most capital investments involve the outlay of substantial funds from local governments and those local governments can seldom pay for these facilities through annual appropriations in the annual operating budget. Therefore, numerous techniques have evolved to enable to local government to pay for capital improvements over a time period exceeding one year. Public 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 is always a priority.

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 retire debt. General obligation bonds can be sold to finance permanent types of improvements, such as schools, municipal buildings, parks, and recreation facilities. Voter approval 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 official of the member municipalities.

Sewer Authorities

Sewer 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 among the principal activities of the local government facilities' financing authorities. An operating water authority issues bonds to purchase existing facilities or to construct, extend, or improve a system. The primary source of revenue is user fees based on metered usage. The cost of 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 be 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 effective.

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 among the principal activities of the local government facilities' financing authorities. An operating water authority issues bonds to purchase existing facilities or to construct, extend, or improve a system. The primary source of revenue is user fees based on metered usage. The cost of 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.

Circuit Riding Program

The Circuit Riding Program is an example of intergovernmental cooperation. This program offers municipalities the ability to join together to accomplish a common goal. The circuit rider is a municipal engineer who serves several small municipalities simultaneously. These are municipalities that may be too small to hire a professional engineer for their own operations yet need the skills and expertise the engineer offers. Municipalities can jointly obtain what no one municipality could obtain on its own.

5.2.4. Education and Outreach

Cameron County conducts an education and outreach program to members of the general public. The Cameron County Office of Emergency Services 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. Many of these projects are related to or directly impact hazard mitigation projects.

Education activities that directly impact hazard mitigation in Cameron County predominantly revolve around the first responders. Providing fire, medical, and search and rescue training and education enhances the response and recovery capabilities of response agencies in the county. Additional training is always a goal with Cameron County.

Education and outreach on the NFIP are necessary. With new regulations in flood-plain management, update digital flood insurance rate maps and new rates for insurance policies, education, and outreach on the NFIP would assist the program. The Cameron 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, and an overall reduction of risk by ensuring that the goals and actions established in the Hazard Mitigation Plan are included in comprehensive planning efforts so they can affect future land use and development. Some of the most important areas of planning and regulatory capabilities to integrate hazard mitigation goals and actions into include comprehensive plans, the hazard mitigation plans from all surrounding or encompassing areas, emergency operations plans, building codes, floodplain ordinances, subdivision and land development ordinances, stormwater management plans and ordinances, and zoning ordinances. All of these tools provide mechanisms for the implementation of adopted mitigation strategies.

Cameron County and all of its participating municipalities have attempted integration of hazard mitigation principals and concepts from the 2017 Cameron County Hazard Mitigation Plan. Due to the impact of the Covid-19 Pandemic and staffing shortages, integration of hazard mitigation principals was very limited. Attempts to collaborate and integrate the 2022 Cameron County Hazard Mitigation Plan into other planning mechanisms will continue during the next five-year planning period.

Cameron County Comprehensive Plan (Northern Pennsylvania Tri-County Comprehensive Plan)

Overview

Comprehensive plans establish the overall vision, goals, and objectives for a community's growth. Cameron County's Comprehensive Plan, which was last updated in 2019 and adopted in 2020, 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. Cameron County's Comprehensive Plan is a part of a tri-county comprehensive plan conducted and written by Michael Baker International. At the time of this writing, the next update to the Comprehensive Plan is slated for 2030, outside of this planning period.

As part of this update process, the Steering Committee in the 2020 Comprehensive Plan, identified those that are currently supportive of hazard mitigation goals and principles, and identified opportunities to integrate goals and objectives from the 2017 Hazard Mitigation Plan and the 2022 Hazard Mitigation Plan Update into the next update of the comprehensive plan.

There are many goals in the Northern Pennsylvania Tri-County Comprehensive Plan that are supportive of hazard mitigation. Key goals that relate to hazard mitigation are found in all sections of the comprehensive plan, but particularly in the Infrastructure / Environment, Health Services, and Economic Base sections of the plan. The objectives that most relate to hazard mitigation is to "Improve local roads, bridges, and 4-digit state routes". As discussed previously, there are many ways hazard mitigation planning can be tied to comprehensive planning, including the improvement of local roads and transportation routes.

Recommendations for Continued and Future Integration

As discussed above, many of the goals and objectives outlined in the Northern Pennsylvania Tri-County Comprehensive Plan that are related to the hazard mitigation risks and goals established in the Hazard Mitigation Plan. Several could be revised to include updated information from this HMP. Additionally, the comprehensive plan can identify 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.

Another key opportunity for further integration of hazard mitigation into planning and regulatory tools is to incorporate hazard mitigation goals and objectives into the ongoing Northern Pennsylvania Tri-County Comprehensive Plan update.

Finally, it is expected there will be some emphasis on Continuity of Operations Plans (COOP) based on lessons learned during and through the COVID-19 pandemic. There may be some opportunities for integration of COOP goals and objectives into the county comprehensive plan update and county and municipal EOP, e.g.: loss of use of business and government workplaces; employee notification systems, and or public information campaigns.

Cameron County High Hazard Dam Emergency Action Plans

There are two high hazard dams located within Cameron County that have Emergency Action Plans (EAPs) that can be tied into the other regional plans impacting Cameron County. The Emergency Action Plans can be related to the Infrastructure and Environment section of the Northern Pennsylvania Tri-County Comprehensive Plan. One of the primary goals for the Infrastructure and Environment section of Northern Pennsylvania Tri-County Comprehensive Plan is the upgrading of “water and sewer infrastructure”. Emergency Action Plans can be used to develop upgrade paths and development for the dams located in Cameron County. By considering both the Northern Pennsylvania Tri-County Comprehensive Plan and the Cameron County High Hazard Dam Emergency Action Plans, Cameron County can more efficiently plan for potential emergency events regarding dams, and allow for future development and maintenance of the dams.

6. Mitigation Strategy

6.1. Update Process Summary

Mitigation goals are general guidelines that explain what the county wants to achieve. Goals are usually expressed as broad policy statements representing desired long-term results. Mitigation objectives describe strategies or implementation steps to attain the identified goals. Objectives are more specific statements than goals; the described steps are usually measurable and can have a defined completion date. There were five goals and eighteen objectives identified in the 2017 hazard mitigation plan. The 2022 Cameron County Hazard Mitigation Plan Update has six goals and twenty-one objectives. Objectives have been added and arranged in order to associate them with the most appropriate goal. The past goals and objectives from the 2017 Cameron County Hazard Mitigation Plan Update can be seen in *Table 80 – 2017 Mitigation Goals and Objectives*. Also included in this table is a review summary based on comments received from stakeholders who participated in the HMP update process. These reviews are on the five-year hazard mitigation plan review worksheet, which includes a survey on existing goals and objectives, completed by the local planning team. Municipal officials then provided feedback on the changes to the goals and objectives via a mitigation strategy update meeting. Copies of these meetings and all documentation associated with the meetings are located in Appendix C.

Actions provide more detailed descriptions of specific work tasks to help the county and its municipalities achieve prescribed goals and objectives. There were twenty-one actions identified actions identified in the 2017 mitigation strategy section. A review of the 2017 mitigation actions was completed by the local planning team. The result of this review is identified in *Table 81 – 2017 Mitigation Actions Review*. A list of these actions as well as a review and summary of their progress based on comments from the Cameron County Local Planning Team is included.

Table 80 - 2017 Mitigation Goals and Objectives Review

Cameron County 2017 Mitigation Goals and Objectives Review Worksheet		
Goal / Objective	**Description**	**Review**
Goal 1	**Reduce potential injury, death, and damage to existing community assets due to natural hazards, especially flooding.**	**The Local Planning Team reviewed and approved this goal.**
Objective 1.1	Utilize comprehensive planning as a means to reduce flood losses.	The Local Planning Team reviewed and approved this goal.

Cameron County 2017 Mitigation Goals and Objectives Review Worksheet		
Goal / Objective	**Description**	**Review**
Objective 1.2	Continue participation in the national flood insurance program to ensure flood insurance policies remain available through government programs.	The Local Planning Team reviewed and approved the new verbiage: “Continue participation in the national flood insurance program to ensure flood insurance policies remain available through government funded programs.”
Objective 1.3	Ensure adequate and consistent enforcement of ordinances and codes within and between jurisdictions.	The Local Planning Team reviewed and approved the new verbiage: “Continue to ensure adequate and consistent enforcement of ordinances and codes within and between jurisdictions.”
Objective 1.4	Reduce the number of repetitive loss and severe repetitive loss properties in the county.	The Local Planning Team reviewed and approved the new verbiage: “Continue to reduce the number of repetitive loss and severe repetitive loss properties in the county.”
Objective 1.5	Assess and implement historical preservation data to enhance hazard mitigation planning.	The Local Planning Team reviewed and approved the new verbiage: “Continue to assess and implement historical preservation data to enhance hazard mitigation planning.”
Goal 2	**Reduce the potential injury, death, and damage to existing community assets due to human caused disasters on public and private properties.**	**The Local Planning Team reviewed and approved this goal.**
Objective 2.1	Review, update, and exercise all plans associated with human caused hazards.	The Local Planning Team suggested adding “Continue to” to the verbiage of this goal.

Cameron County 2017 Mitigation Goals and Objectives Review Worksheet		
Goal / Objective	**Description**	**Review**
Objective 2.2	Develop strategy for mitigating high risk and moderate risk human caused hazards.	The Local Planning Team reviewed and approved the new verbiage: "Develop a strategy for mitigating high-risk and moderate-risk human-caused hazards."
Objective 2.3	Conduct planning and develop strategy to decrease hazardous material releases.	The Local Planning Team reviewed and approved the new verbiage: "Continue to conduct necessary planning and develop strategies to decrease hazardous material releases."
Goal 3	**Increase public education awareness regarding natural and human caused risk, vulnerability, preparedness, and mitigation.**	**The Local Planning Team reviewed and approved the new verbiage: "Increase public awareness regarding natural and human-caused hazards; specifically, risks, vulnerabilities, preparedness, and mitigation strategies."**
Objective 3.1	Provide public outreach/education regarding strategies (e.g., floodproofing) for property owners in the 100-year floodplain.	The Local Planning Team reviewed, edited, and approved the new verbiage: "Provide outreach and education regarding strategies (e.g., floodproofing) for property owners in the special flood hazard area (previously called the 100-year floodplain)."

Cameron County 2017 Mitigation Goals and Objectives Review Worksheet		
Goal / Objective	**Description**	**Review**
Objective 3.2	Support public education programs for business, household, and individual mitigation, safety measures, and preparedness for all hazards.	The Local Planning Team reviewed and approved the new verbiage: "Support public education programs, individual mitigation actions, safety measures, and preparedness strategies for businesses and households for all hazards impacting Cameron County."
Goal 4	**Improve emergency preparedness, planning, procedures, and capabilities.**	**The Local Planning Team reviewed and approved this goal.**
Objective 4.1	Enhance response capability of emergency services.	The Local Planning Team reviewed, edited, and approved the new verbiage: "Support and enhance response capabilities of emergency services."
Objective 4.2	Develop and maintain GIS data that supports hazard mitigation planning.	The Local Planning Team reviewed, edited, and approved the new verbiage: "Continually develop and maintain GIS vulnerability data that supports hazard mitigation planning."
Objective 4.3	Encourage and facilitate the development of continuity planning to reduce impact of all hazards.	The Local Planning Team reviewed and approved the new verbiage: "Encourage and facilitate the development of continuity planning to reduce the impacts of all natural and human-caused hazards."

Cameron County 2017 Mitigation Goals and Objectives Review Worksheet		
Goal / Objective	**Description**	**Review**
Goal 5	**Recue or redirect the impact of natural and human caused disaster away from at risk environmental and population areas.**	**The Local Planning Team reviewed and approved the new verbiage: “Reduce or redirect the impact of natural and human-caused hazards away from populated areas and vulnerable environmental areas.”**
Objective 5.1	Complete acquisition, elevation, and relocation of properties in the floodplain to reduce the impact of flooding.	The Local Planning Team reviewed and approved the new verbiage: “Complete actions and projects to decrease the impact of flooding and to acquire, elevate, demolish or demolish/reconstruct properties, repetitive loss properties, and severe repetitive loss properties.”
Objective 5.2	Research possible structural mitigation projects to redirect or reduce the impact of disasters.	The Local Planning Team reviewed, edited, and approved the new verbiage: “Continue to research possible structural mitigation projects to refocus or reduce the direct or indirect impact of disasters.”
Objective 5.3	Encourage and facilitate the development of comprehensive planning, zoning, land use, and most importantly, floodplain management ordinances to appropriately direct development away from high-hazard areas.	The Local Planning Team reviewed, edited, and approved the new verbiage: “Continue to Encourage and facilitate the development of comprehensive planning, zoning, land use, and most importantly, floodplain management ordinances to appropriately direct development away from high-hazard areas.”

Cameron County 2017 Mitigation Goals and Objectives Review Worksheet		
Goal / Objective	**Description**	**Review**
Objective 5.4	Assess the adequacy of contingency power sources and methods of prevention.	The Local Planning Team reviewed, edited, and approved the new verbiage: "Continue to assess the adequacy of contingency power sources and methods of prevention."
Objective 5.5	Identify by municipality the most vulnerable and critical existing structures.	The Local Planning Team reviewed and approved the new verbiage: "Identify, by municipality, the most vulnerable, critical infrastructure facilities in Cameron County."

Table 81 – 2017 Mitigation Actions Review illustrates the evaluations of the existing mitigation actions by the local planning team. This was done with the intent to determine if any actions would be carried over from the previous planning process. Actions were also evaluated based on being in progress, started or completed.

Table 81 - 2017 Mitigation Actions Review

2017 Cameron County Mitigation Actions Review						
Existing Mitigation Actions	**Status**					**Review Comments**
	No Progress / Unknow	**In Progress / Not Yet Complete**	**Continues**	**Completed**	**Discontinued**	
1.1.1 Feasibility Study to analyze options for reducing flooding at Plank Hollow Road		X				The Local Planning Team suggested that "Conduct…"be added to the verbiage for the 2022 plan.

2017 Cameron County Mitigation Actions Review						
Existing Mitigation Actions	**Status**					**Review Comments**
	No Progress / Unknow	**In Progress / Not Yet Complete**	**Continues**	**Completed**	**Discontinued**	
1.1.2 Sinnemahoning Creek Floodplain Management study to analyze effects of existing dike on Driftwood Branch and to determine alternatives to downstream flood protection.	X					The Local Planning Team suggested that "Conduct Sinnemahoning Creek Floodplain Management Study to analyze…." Be added to the verbiage for the 2022 plan.
1.1.3 Sinnemahoning Creek & West Creek Hydraulic Study. Hydraulic study of streams to develop sound scientific and environmental approaches to flood protection.	X					The Local Planning Team suggested that the following change be made to the verbiage of the action and integrated into the 2022 plan: "Conduct Sinnemahoning Creek and West Creek Hydraulic Study of streams to develop sound scientific and environmental approaches to flood protection." LPT Suggested looking at integrating Act 167 plan information.
1.1.4 Comprehensive plan and hazard mitigation plan integration upon next update.		X				The Local Planning Team suggested the following change be made to the verbiage of the action and integrated into the 2022 plan: "Integrate all county and municipality plans with the hazard mitigation plan update."

2017 Cameron County Mitigation Actions Review						
Existing Mitigation Actions	Status					Review Comments
	No Progress / Unknow	In Progress / Not Yet Complete	Continues	Completed	Discontinued	
1.2.1 Participate in FEMA's Community Rating System (CRS) Program. Each municipality will review opportunities within FEMA's Community Rating System (CRS) Program to determine the program's applicability and potential effectiveness within their jurisdiction.			X			The Local Planning Team suggested the following change be made to the verbiage of the action and integrated into the 2022 plan: "Research the feasibility of participation in FEMA's Community Rating System (CRS) Program. Each municipality will review opportunities within FEMA's Community Rating System (CRS) Program to determine the program's applicability and potential effectiveness within their jurisdiction."
1.3.1 Review existing building codes to ensure anchoring requirements for manufactured homes are adequate. If determined inadequate for existing vulnerability, consider revising.		X				LPT decided and approved that this will be moved to the new plan.
1.4.1 Conduct buyout of repetitive loss and severe repetitive loss properties as funding is available.	X					Split into two objectives: 1.4.1 "Research and identify repetitive loss and severe repetitive loss properties and open dialogue with property owners to

2017 Cameron County Mitigation Actions Review						
Existing Mitigation Actions	Status					Review Comments
	No Progress / Unknow	In Progress / Not Yet Complete	Continues	Completed	Discontinued	
						determine interest in buyout program." 1.4.2 "Conduct buyout of repetitive loss and severe repetitive loss properties as funding is available."
2.1.1 Complete annual updates to SARA facility plans.			X			
2.2.1 Conduct feasibility study for Salt Run Reservoir Dam warning system.	X					
2.3.1 Complete commodity flow study to identify hazardous materials transported through the county.			X			An updated commodity flow study will be needed during the term of this hazard mitigation plan update.
3.1.1 Disseminate information on the NFIP to residents of Cameron County.			X			

2017 Cameron County Mitigation Actions Review						
Existing Mitigation Actions	Status					Review Comments
	No Progress / Unknow	In Progress / Not Yet Complete	Continues	Completed	Discontinued	
3.2.1 Community Rating System Education to municipalities.					X	Refer to action 1.2.1 with the understanding that an action needs to be developed for this. Split into new Actions for 3.2: 3.2.1 New Action "Continue to coordinate and work with healthcare coalitions, the Pennsylvania Department of Health, and Center for Disease Control to educate the public on Covid-19 and infectious diseases within Cameron County." NEW 3.2.2 New Action "Provide public education for continuity of operations and business resiliency for businesses in Cameron County for all hazards." NEW 3.2.3 "Continue work with Pennsylvania Department of Agriculture and Penn State University to educate the public and license businesses within Cameron County and the

2017 Cameron County Mitigation Actions Review						
Existing Mitigation Actions	Status					Review Comments
	No Progress / Unknow	In Progress / Not Yet Complete	Continues	Completed	Discontinued	
						quarantine area for Spotted Lantern-fly mitigation." New Action 3.2.4 "Conservation District will work with Sinnemahoning Invasive Plant Management Area to educate landowners of tree populations and noxious weeds."
4.1.1 4-Wheel Drive Fire Truck Replacement Program. 4-Wheel Drive vehicles for each volunteer fire department with replacement schedule.					X	The Local Planning Team suggested the following change be made to the verbiage of the action and integrated into the 2022 plan: "Upgrade the emergency communications system, including upgrades to the microwave links to provide redundancy between tower sites and the back-up 911 center."
4.2.1 Collect location data for manufactured homes. Work with Tax Assessors office to determine the number and locations of manufacturing homes within the county in order to prepare a more comprehensive vulnerability analysis.		X				LPT reviewed and approved new verbiage for this mitigation action: "Collect location data for manufactured homes and recreational vehicles (RV's) to determine the number of manufactured structures within the county in order to prepare a more comprehensive vulnerability analysis."

2017 Cameron County Mitigation Actions Review						
Existing Mitigation Actions	**Status**					**Review Comments**
	No Progress / Unknow	**In Progress / Not Yet Complete**	**Continues**	**Completed**	**Discontinued**	
4.3.1 Complete overview with the commissioners on the current Cameron County Continuity of Government draft plan and seek adoption.				X		The Local Planning Team suggested the following change be made to the verbiage of the action and integrated into the 2022 plan: "Review and update with the Commissioners, the current Cameron County Continuity of Government Plan." LPT suggested the addition of two new actions: New Action 4.3.2: "Review and update with individual municipalities the current, existing municipality continuity of government plans. " New Action 4.3.3: "Develop continuity of government plans with municipalities that do not have existing plans."
5.1.1 Develop flood mitigation project proposals which are eligible for state and federal mitigation grant funding programs for acquisition, elevation and relocation of properties in the floodplain and other flood mitigation projects.			X			

2017 Cameron County Mitigation Actions Review						
	Status					
Existing Mitigation Actions	**No Progress / Unknow**	**In Progress / Not Yet Complete**	**Continues**	**Completed**	**Discontinued**	**Review Comments**
5.2.1 Emporium Flood Protection Project. Flooding mitigation including earth debris, impounding basins, culverts, concrete stilling basins, etc. Completed in 1962; Operations & Maintenance continue.			X			The Local Planning Team suggested the following change be made to the verbiage of the action and integrated into the 2022 plan: "Continue operations and maintenance for earth debris, impounding basins, culverts, concrete stilling basins, and levees for the Emporium Flood Protection Project."
5.2.2 Portage Creek Dike feasibility study for stream bank stabilization and upgrades to the dike.	X					Cameron County Conservation District reviewed the status of this project. The status is unknown as of this planning period. Verbiage was changed to cover more of the county. It will now read "Research the need for future feasibility studies along creeks, streams, and tributaries in the county to determine potential upgrades to dike and levee systems."
5.3.1 Review existing floodplain Management Ordinances, Zoning Ordinances, and Comprehensive Plan and integrate hazard mitigation principals.			X			Change the verbiage to "Review existing floodplain management ordinances, zoning ordinances, municipality plans, and the Cameron County Comprehensive Plan. Integrate hazard

2017 Cameron County Mitigation Actions Review						
Existing Mitigation Actions	Status					Review Comments
	No Progress / Unknow	In Progress / Not Yet Complete	Continues	Completed	Discontinued	
						mitigation principals" for the 2022 plan.
5.4.1 Install and maintain emergency generators at critical facilities.			X			Driftwood Water Company and the radio station do not have emergency generators installed.
5.5.1 Maintain critical infrastructure and critical facility list that will be utilized for all emergency planning and response agents.			X			

6.2. Mitigation Goals and Objectives

Based on results of the goals and objectives evaluations and input from the local planning team, a list of one goal and three corresponding objectives were developed. *Table 82 – 2022 Goals and Objectives* details the mitigation goals and objectives established for the 2022 Cameron County Hazard Mitigation Plan.

Table 82 - 2022 Goals and Objectives

Cameron County 2022 Goals and Objectives	
Goal 1	**Reduce potential injury, death, and damage to existing community assets due to natural hazards, especially flooding.**
Objective 1.1	Utilize comprehensive planning as a means to reduce flood losses.

Cameron County 2022 Goals and Objectives	
Objective 1.2	Continue participation in the national flood insurance program to ensure flood insurance policies remain available through government funded programs.
Objective 1.3	Continue to ensure adequate and consistent enforcement of ordinances and codes within and between jurisdictions
Objective 1.4	Continue to reduce the number of repetitive loss and severe repetitive loss properties in the county.
Objective 1.5	Continue to assess and implement historical preservation data to enhance hazard mitigation planning."
Goal 2	**Reduce potential injury, death, and damage to existing community assets due to human caused disasters on public and private property.**
Objective 2.1	Continue to review, update, and exercise all plans associated with human-caused hazards.
Objective 2.2	Develop a strategy for mitigating high-risk and moderate-risk human-caused hazards.
Objective 2.3	Continue to conduct necessary planning and develop strategies to decrease hazardous material releases.
Goal 3	**Increase public awareness regarding natural and human-caused hazards; specifically, risks, vulnerabilities, preparedness, and mitigation strategies.**
Objective 3.1	Provide outreach and education regarding strategies (e.g., floodproofing) for property owners in the special flood hazard area (previously called the 100-year floodplain).
Objective 3.2	Support public education programs, individual mitigation actions, safety measures, and preparedness strategies for businesses and households for all hazards impacting Cameron County.
Goal 4	**Improve emergency preparedness, planning, procedures, and capabilities.**
Objective 4.1	Support and enhance response capabilities of emergency services

Cameron County 2022 Goals and Objectives	
Objective 4.2	Continually develop and maintain GIS vulnerability data that supports hazard mitigation planning.
Objective 4.3	Encourage and facilitate the development of continuity planning to reduce the impacts of all natural and human-caused hazards.
Goal 5	**Reduce or redirect the impact of natural and human-caused hazards away from populated areas and vulnerable environmental areas.”**
Objective 5.1	Complete actions and projects to decrease the impact of flooding and to acquire, elevate, demolish or demolish/reconstruct properties, repetitive loss properties and severe repetitive loss properties.
Objective 5.2	Continue to research possible structural mitigation projects to redirect or reduce the impact of disasters.
Objective 5.3	Continue to encourage and facilitate the development of comprehensive planning, zoning, land use, and most importantly, floodplain management ordinances to appropriately direct development away from high-hazard areas.
Objective 5.4	Continue to assess the adequacy of contingency power sources and methods of prevention.
Objective 5.5	Identify, by municipality, the most vulnerable, critical infrastructure facilities in Cameron County.
Goal 6	Participate in FEMA’s High-Hazard Potential Dam Program (HHPD).
Objective 6.1	Educate Cameron County municipalities, property owners, and businesses about FEMA HHPD program.
Objective 6.2	Reduce long-term vulnerabilities from existing, eligible High-Hazard Potential Dams that pose an unacceptable risk to the public.
Objective 6.3	Identify, by area, locations in Cameron County that could potentially be impacted by FEMA’s HHPD program.

6.3. Identification and Analysis of Mitigation Techniques

This section includes an overview of alternative mitigation actions based on the goals and objectives identified in Section 6.2. There are four general mitigation action strategy techniques to reducing hazard risks:

1. Local plans and regulations
2. Structure and infrastructure
3. Natural resource protection
4. Education and awareness

Local Plans and Regulations: These actions include government authorities, policies or codes that influence the way land and buildings are developed and built. The following are some examples:

- Comprehensive plans
- Land use ordinances
- Subdivision regulations
- Development review
- Building codes and enforcement
- National Flood Insurance Program and Community Rating System
- Capital improvements programs
- Open space preservation
- Stormwater management regulations and master plans

The local plans and regulations will protect and reduce the impact of specific hazards on new and existing buildings by improving building code standards and regulating new and renovation construction. The improved building codes will decrease the impacts of both natural and human-caused hazards. Subdivision and land development enhancements will also augment this process. Ensuring that municipalities participate in the National Flood Insurance Program and encourage participation in the Community Rating System will decrease the impact as well.

Structure and Infrastructure Implementation: These actions involve modifying existing structures and infrastructure or constructing new structures to reduce hazard vulnerability. The following are examples:

- Acquisitions and elevations of structures in flood prone areas
- Utility undergrounding
- Structural retrofits
- Floodwalls and retaining walls
- Detention and retention structures
- Culverts
- Safe rooms

Structure and infrastructure implementation is a technique that removes or diverts the hazard from structures or protects the structure from a specific hazard. The new or renovated structures are therefore protected or have a reduced impact of hazards.

Natural Resource Protection: These are actions that minimize damage and losses and also preserve or restore the functions of natural systems. They include the following:

- Erosion and sediment control
- Stream corridor restoration
- Forest management
- Conservation easements
- Wetland restoration and preservation

Natural resource protection techniques allow for the natural resources to be used to protect or lessen the impact on new or renovated structures through the management of these resources. Utilization and implementation of the examples above will protect new and existing buildings and infrastructure.

Education and Awareness: These actions to inform and educate citizens, elected officials, and property owners about natural hazards and potential ways to mitigate them and may also include participation in national programs. Examples of these techniques include the following:

- Radio and television spots
- Websites with maps and information
- Real estate disclosure
- Provide information and training

- NFIP outreach
- StormReady
- FireWise Communities

The education and awareness technique will protect and reduce the impact of specific hazards on new and existing buildings through education of citizens and property owners on the impacts that specific hazards could have on new or renovated structures. This information will allow the owner to make appropriate changes or enhancements that will lessen or eliminate the impact of hazards.

Table 83 – Mitigation Strategy Technique Matrix provides a matrix identifying the mitigation techniques used for all low, moderate, and high-risk hazards in the county. The specific actions associated with these techniques are included in *Table 84 – 2022 Mitigation Action Plan*.

Table 83 - Mitigation Strategy Technique Matrix

Mitigation Strategy Technique Matrix				
Hazard	**Mitigation Technique**			
	Local Plans and Regulations	**Structural and Infrastructure**	**Natural Systems Protection**	**Education and Awareness**
Pandemic and Infectious Disease	X			X
Dam Failure	X	X	X	X
Utility Interruption	X	X		X
Flooding	X	X	X	X
Windstorm	X			X
Radon Exposure	X	X		X
Winter Storm	X			X
Flash Flood	X	X	X	X
Cyber-Terrorism	X			X
Levee Failure	X	X	X	X
Drought	X	X	X	X
Invasive Species	X		X	X
Hurricane and Tropical Storm	X			X
Wildfire	X			X
Environmental Hazards – Transportation	X	X		X
Landslide	X			X
Disorientation	X			X

Mitigation Strategy Technique Matrix				
Hazard	Mitigation Technique			
	Local Plans and Regulations	Structural and Infrastructure	Natural Systems Protection	Education and Awareness
Transportation Accidents	X			X
Environmental Hazards – Fixed Facility	X	X		X
Ice Jam Flooding	X	X	X	X
Tornado	X			X
Terrorism	X			X
Earthquake	X			X
Subsidence and Sinkholes	X	X	X	X
Civil Disturbance	X			X
All Hazards	X			X

6.4. Mitigation Action Plan

The Cameron County Hazard Mitigation Plan Local Planning Team (LPT) immediately began work on the mitigation strategy section of the 2022 Hazard Mitigation Plan (HMP) Update after the risk assessment section was completed. The LPT started this section by reviewing the 2017 HMP mitigation strategy section. A review of the previous goals, objectives, actions, and project opportunities documented when the 2017 HMP was conducted. The next step the LPT completed was the brainstorming of possible new actions based on new identified risks. The LPT compiled all this information for presentations to the municipalities.

The LPT identified the following accomplishments since the development of the 2017 Cameron County Hazard Mitigation Plan:

MCM Consulting Group, Inc. completed municipality meetings at various time periods at the Cameron County Office of Emergency Services. During all these meetings, an overview of mitigation strategy were presented, and the municipalities were informed that they needed to have at least one hazard-related mitigation action for their municipality. All municipalities were invited to attend these meetings.

The municipalities were notified of draft mitigation actions and encouraged to provide new mitigation actions that could be incorporated into the plan. Municipalities were provided copies of their previously submitted mitigation opportunity forms and asked to determine if the projects were still valid. Municipalities were solicited for new project opportunities as well. All agendas, sign in sheets, and other support information from these meetings is included in Appendix C.

Mitigation measures for the 2022 Cameron County HMP are listed in the mitigation action plan. *Table 84 – 2022 Mitigation Action Plan* is the 2022 Cameron County Mitigation Action Plan. This plan outlines mitigation actions and projects that comprise a strategy for Cameron County. The action plan includes actions, a benefit and cost prioritization, a schedule for implementation, any funding sources to complete the action, a responsible agency or department and an estimated cost. All benefit and cost analysis was completed using the Pennsylvania Emergency Management Agency recommended analysis tool. The completed analysis tool is located in Appendix H. *Table 85 – Municipal Hazard Mitigation Actions Checklist* is a matrix that identifies the county and/or municipalities responsible for mitigation actions in the new mitigation action plan. *Table 86 – Mitigation Actions by Hazard Mitigated* illustrates which mitigation action from the mitigation action plan applies to the hazards it is meant to mitigate.

Table 84 - 2022 Mitigation Action Plan

Cameron County 2022 Mitigation Action Plan									
	Mitigation Actions			Prioritization			Implementation		
Action Number	Category	Description/Action Items	Hazard Vulnerability	High	Medium	Low	Schedule	Funding	Responsibility
1.1.1	Local Plans and Regulations	Conduct feasibility study to analyze options for reducing flooding at Plank Hollow Road.	Flooding Flash Flooding		X		2022 – 2026	Local, FMA, BRIC	Shippen Township Supervisors
1.1.2	Local Plans and Regulations	Conduct Sinnemahoning Creek Floodplain Management Study to analyze effects of existing dike on Driftwood Branch and to determine alternatives to downstream flood protection.	Flooding Flash Flooding Levee Failure			X	2022 – 2026	Local, FMA, BRIC	Elected Officials

Cameron County 2022 Mitigation Action Plan									
Action Number	Mitigation Actions		Hazard Vulnerability	Prioritization			Implementation		
	Category	Description/Action Items		High	Medium	Low	Schedule	Funding	Responsibility
1.1.3	Local Plans and Regulations Natural Resource Protection	Conduct Sinnemahoning Creek and West Creek Hydraulic Study of streams to develop sound scientific and environmental approaches to flood protection.	Flooding Flash Flooding Levee Failure		X		2022 – 2026	Local, FMA, BRIC	Elected Officials
1.1.4	Local Plans and Regulations	Integrate all county and municipality plans with the hazard mitigation plan update.	All Hazards			X	2022 – 2026	Local	Cameron County Planning Commission
1.2.1	Local Plans and Regulations Education and Awareness	Research the feasibility of participation in FEMA's Community Rating System (CRS) Program. Each municipality will review opportunities within FEMA's Community Rating System Program to determine the program's applicability and potential effectiveness within their jurisdiction.	Flooding	X			2022 – 2026	Local, FMA	Cameron County Municipality Supervisors or Managers
1.3.1	Local Plans and Regulations	Review existing building codes to ensure anchoring requirements for manufactured homes are adequate. If determined inadequate for existing vulnerability, consider revising.	Flooding	X			2022 – 2026	Local, FMA	Cameron County EMA

Cameron County 2022 Mitigation Action Plan									
	Mitigation Actions			Prioritization			Implementation		
Action Number	Category	Description/Action Items	Hazard Vulnerability	High	Medium	Low	Schedule	Funding	Responsibility
1.4.1	Local Plans and Regulations	Research and identify repetitive loss and severe repetitive loss properties and open dialogue with property owners to determine interest in buyout program	Flooding	X			2022 – 2026	Local, FMA	Cameron County EMA
1.4.2	Local Plans and Regulations	Conduct buyout of repetitive loss and severe repetitive loss properties as funding is available.	Flooding			X		Local, FMA	Cameron County EMA
2.1.1	Local Plans and Regulations	Complete annual updates to SARA facility plans.	Environmental Hazards	X			2022 – 2026	Act 165 Funds	Cameron County LEPC
2.2.1	Local Plans and Regulations	Conduct feasibility study for Salt Run Reservoir Dam warning system.	Dam Failure	X			2022 – 2026	Local	Portage Township Supervisors, Shippen Township Supervisors, Dam Owner
2.3.1	Local Plans and Regulations	Complete commodity flow study to identify hazardous materials transported through the county. An updated commodity flow study will be needed during the term of this hazard mitigation plan update.	Transportation Accidents Environmental Hazards		X		2022 – 2026	Act 165, HMEP, HMRF	Cameron County LEPC

Cameron County 2022 Mitigation Action Plan									
Action Number	Mitigation Actions		Hazard Vulnerability	Prioritization			Implementation		
	Category	Description/Action Items		High	Medium	Low	Schedule	Funding	Responsibility
3.1.1	Education and Awareness	Disseminate information on the National Flood Insurance Program (NFIP) to residents of Cameron County.	Flooding Flash Flooding Ice Jam Flooding		X		2022 – 2026	Local, FMA	Cameron County EMA Cameron County Municipality Supervisors or Managers
3.2.1	Education and Awareness	Continue to coordinate and work with healthcare coalitions, the Pennsylvania Department of Health, and Center for Disease Control to educate the public on Covid-19 and infectious diseases within Cameron County.	Pandemic and Infectious Diseases	X			2022 – 2026	Local	Cameron County EMA Cameron County Commissioners
3.2.2	Local Plans and Regulations	Provide public education for continuity of operations and business resiliency for businesses in Cameron County for all hazards.”	All Hazards			X	2022 - 2026	Local	Cameron County EMA
3.2.3	Natural Resource Protection	Continue work with Pennsylvania Department of Agriculture and Penn State University to educate the public and license businesses within Cameron County and the quarantine area for Spotted Lantern-fly mitigation.	Invasive Species	X			2022 - 2026	Local	Cameron County Conservation District

Cameron County 2022 Mitigation Action Plan									
	Mitigation Actions			Prioritization			Implementation		
Action Number	Category	Description/Action Items	Hazard Vulnerability	High	Medium	Low	Schedule	Funding	Responsibility
3.2.4	Natural Resource Protection	Conservation District will work with Sinnemahoning Invasive Plant Management Area to educate landowners of tree populations and noxious weeds.	Invasive Species	X			2022 - 2026	Local	Cameron County Conservation District
4.1.1	Structural and Infrastructure	Upgrade of countywide emergency communications system, including upgrades to console, microwave links and repeaters to provide a more reliable system with redundancy between tower sites and the back-up 911 center.	All Hazards			X	2022 – 2026	Local	Cameron County EMA
4.2.1	Structural and Infrastructure	Collect location data for manufactured homes and to determine number of manufactured homes within the county in order to prepare a more comprehensive vulnerability analysis.	All Hazards		X		2022 – 2026	Local	Cameron County Tax Assessment Office Cameron County Municipality Supervisors or Managers
4.2.2	Local Plans and Regulations	Review and update list of blighted properties in Cameron County to determine the extent of blighted properties and work with municipalities to remediate them.	Blighted Properties	X			2022 - 2026	Local	Cameron County Office of Community and Economic Development

Cameron County 2022 Mitigation Action Plan									
	Mitigation Actions			Prioritization			Implementation		
Action Number	Category	Description/Action Items	Hazard Vulnerability	High	Medium	Low	Schedule	Funding	Responsibility
4.3.1	Local Plans and Regulations Education and Awareness	Review and update with the Commissioners, the current Cameron County Continuity of Government Plan.	All Hazards			X	2022 – 2026	Local, EMPG	Cameron County Commissioners and Cameron County EMA
5.1.1	Structural and Infrastructure Natural Resource Protection	Develop flood mitigation project proposals which are eligible for state and federal mitigation grant funding programs for acquisition, elevation, relocation, and demolish/reconstruction of properties in the floodplain and other flood mitigation projects.	Flooding Flash Flooding Ice Jam Flooding		X		2022 – 2026	Local	Cameron County Municipality Supervisors or Managers
5.2.1	Structural and Infrastructure	Continue operations and maintenance for earth debris, impounding basins, culverts, concrete stilling basins, and levees for the Emporium Flood Protection Project.	Levee Failure			X	2022 – 2026	Local, FMA	Shippen Township
5.2.2	Structural and Infrastructure Natural Resource Protection	Research the need for future feasibility studies along creeks, streams, and tributaries in the county to determine potential upgrades to dike and levee systems.	Flooding Flash Flooding Levee Failure		X		2022 – 2026	Local	Cameron County Municipality Supervisors or Managers

Cameron County 2022 Mitigation Action Plan									
Action Number	Mitigation Actions		Hazard Vulnerability	Prioritization			Implementation		
	Category	Description/Action Items		High	Medium	Low	Schedule	Funding	Responsibility
5.3.1	Local Plans and Regulations	Review existing floodplain management ordinances, zoning ordinances, municipality plans, and the Cameron County Comprehensive plan. Integrate hazard mitigation principals.	Flooding Flash Flooding Ice Jam Flooding		X		2022 – 2024	Local	Cameron County Planning Commission
5.4.1	Structural and Infrastructure	Install and maintain emergency generators at critical facilities.	All Hazards			X	2022 – 2026	Local, HMGP	All county and municipality agencies
5.5.1	Local Plans and Regulations	Maintain critical infrastructure and critical facility list that will be utilized for all emergency planning and response aspects.	All Hazards			X	2022 – 2026	Local, EMPG	Cameron County EMA
6.1.1	Education and Awareness Natural Resource Protection	Hold educational workshops to educate Cameron County residents about FEMA's HHPD program.	Dam Failure	X			2022 - 2026	Local	Cameron County EMA
6.1.2	Education and Awareness	Utilize county social media pages to educate Cameron County residents about FEMA's HHPD program.	Dam Failure		X		2022 - 2026	Local	Cameron County EMA

Cameron County 2022 Mitigation Action Plan									
	Mitigation Actions			Prioritization			Implementation		
Action Number	Category	Description/Action Items	Hazard Vulnerability	High	Medium	Low	Schedule	Funding	Responsibility
6.2.1	Local Plans and Regulations Natural Resource Protection	Review, update, and exercise high-hazard dam plans.	Dam Failure		X		2022 - 2026	Local	Dam Owner
6.3.1	Natural Resource Protection	Determine areas of Cameron County downstream from dams classified as HHPD to understand which populations are affected.	Dam Failure	X			2022 - 2026	Local	Cameron County EMA
6.3.2	Natural Resource Protection	Digitize HHPD Flood-Inundation Zones for future use in GIS applications to determine vulnerability of residents.	Dam Failure		X		2022 - 2026	Local	Cameron County EMA Cameron County Contracted GIS Vendor

Funding Acronym Definitions:

- FMA: Flood Management Assistance Grant Programs, administered by the Federal Emergency Management Agency
- HMGP: Hazard Mitigation Grant Program, administered by the Federal Emergency Management Agency
- BRIC: Building Resilient Infrastructure and Communities Program, administered by the Federal Emergency Management Agency
- EMPG: Emergency Management Performance Grant, administered by the Federal Emergency Management Agency
- HSGP: Homeland Security Grant Program, administer by the Federal Emergency Management Agency
- HMEP: Hazardous Material Emergency Planning Grant, administered by the Pennsylvania Emergency Management Agency

- HMRF: Hazardous Material Response Fund, administered by the Pennsylvania Emergency Management Agency

Table 85 - Municipal Hazard Mitigation Actions Checklist

Municipality	1.1.1	1.1.2	1.1.3	1.1.4	1.2.1	1.3.1	1.4.1	1.4.2	2.1.1
Driftwood Borough		X	X	X	X	X	X	X	X
Emporium Borough	X		X	X	X	X	X	X	X
Gibson Township			X	X	X	X	X	X	X
Grove Township			X	X	X	X	X	X	X
Lumber Township			X	X	X	X	X	X	X
Portage Township			X	X	X	X	X	X	X
Shippen Township	X		X	X	X	X	X	X	X
Cameron County	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**

Municipality	2.2.1	2.3.1	3.1.1	3.2.1	3.2.2	3.2.3	3.2.4	4.1.1	4.2.1
Driftwood Borough	X	X	X	X	X	X	X	X	X
Emporium Borough	X	X	X	X	X	X	X	X	X
Gibson Township	X	X	X	X	X	X	X	X	X
Grove Township	X	X	X	X	X	X	X	X	X
Lumber Township	X	X	X	X	X	X	X	X	X
Portage Township	X	X	X	X	X	X	X	X	X
Shippen Township		X	X	X	X	X	X	X	X
Cameron County	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**

Municipality	4.2.2	4.3.1	5.1.1	5.2.1	5.2.2	5.3.1	5.4.1	5.5.1	6.1.1
Driftwood Borough	X	X	X		X	X	X		X
Emporium Borough	X	X	X	X	X	X	X		X
Gibson Township	X	X	X		X	X	X		X
Grove Township	X	X	X		X	X	X		X
Lumber Township	X	X	X		X	X	X		X
Portage Township	X	X	X		X	X	X		X
Shippen Township	X	X	X		X	X	X		X
Cameron County	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**

Municipality	6.1.2	6.2.1	6.3.1	6.3.2
Driftwood Borough		X	X	
Emporium Borough		X	X	
Gibson Township		X	X	

Municipality	6.1.2	6.2.1	6.3.1	6.3.2
Grove Township		X	X	
Lumber Township		X	X	
Portage Township		X	X	
Shippen Township			X	
Cameron County	**X**	**X**	**X**	**X**

Table 86 - Mitigation Actions by Hazard Mitigated

Mitigation Actions by Hazard Mitigated	
Hazard	**Mitigation Action**
Natural Hazards	
Drought	1.1.4, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.4.1, 5.5.1
Earthquake	1.1.4, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.4.1, 5.5.1
Extreme Temperature	1.1.4, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.4.1, 5.5.1
Flooding	1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.2.1, 1.3.1, 1.4.1, 1.4.2, 3.1.1, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.1.1, 5.2.2, 5.3.1, 5.4.1, 5.5.1
Flash Flooding	1.1.1, 1.1.2, 1.1.3, 1.1.4, 3.1.1, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.1.1, 5.2.2, 5.3.1, 5.4.1, 5.5.1
Ice Jam Flooding	1.1.4, 3.1.1, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.1.1, 5.3.1, 5.4.1, 5.5.1
Hurricane, Tropical Storm, Nor'easter	1.1.4, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.4.1, 5.5.1
Invasive Species	1.1.4, 3.2.2, 3.2.3, 3.2.4, 4.1.1, 4.2.1, 4.3.1, 5.4.1, 5.5.1
Landslide	1.1.4, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.4.1, 5.5.1
Pandemic and Infectious Disease	1.1.4, 3.2.1, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.4.1, 5.5.1
Radon Exposure	1.1.4, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.4.1, 5.5.1
Subsidence and Sinkhole	1.1.4, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.4.1, 5.5.1
Tornado and Windstorm	1.1.4, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.4.1, 5.5.1
Wildfire	1.1.4, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.4.1, 5.5.1
Winter Storm	1.1.4, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.4.1, 5.5.1
Human-Caused Hazards	
Blighted Properties	1.1.4, 3.2.2, 4.1.1, 4.2.1, 4.2.2, 4.3.1, 5.4.1, 5.5.1
Civil Disturbance	1.1.4, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.4.1, 5.5.1
Dam Failure	1.1.4, 2.2.1, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.4.1, 5.5.1, 6.1.1, 6.1.2, 6.2.1, 6.3.1, 6.3.2
Disorientation	1.1.4, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.4.1, 5.5.1
Environmental Hazards	1.1.4, 2.1.1, 2.3.1, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.4.1, 5.5.1
Levee Failure	1.1.2, 1.1.4, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.2.1, 5.2.2, 5.4.1, 5.5.1
Opioid Epidemic	1.1.4, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.4.1, 5.5.1
Structure Fire	1.1.4, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.4.1, 5.5.1
Transportation Accidents	1.1.4, 2.3.1, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.4.1, 5.5.1
Utility Interruption	1.1.4, 3.2.2, 4.1.1, 4.2.1, 4.3.1, 5.4.1, 5.5.1

National Flood Insurance Program (NFIP) Related Mitigation Actions

The Federal Emergency Management Agency (FEMA) requires that every participating jurisdiction that either participates in the NFIP or has identified Special Flood Hazard Areas (SFHAs) have at least one specific action in its mitigation action plan that relates to continued compliance with the NFIP. Action numbers\ 3.1.1 comply for Cameron County and all its municipalities.

Evaluate and Prioritize Mitigation Actions

Mitigation Action Evaluation:

Evaluating mitigation actions involves judging each action against certain criteria to determine whether or not it can be executed. The feasibility of each mitigation action is evaluated using the ten evaluation criteria set forth in the Mitigation Action Evaluation methodology as outlined in the Commonwealth of Pennsylvania's All-Hazard Mitigation Planning, Standard Operating Guide. The methodology solicits input on whether each action is highly effective or feasible and ineffective or not feasible for the criteria. These criteria are listed below and aid in determining the feasibility of implementing one action over another.

- Life Safety: Will the action be effective in promoting public safety?
- Property Protection: Will the action be effective in protecting public or private property?
- Technical: How effective will the action be in avoiding or reducing future losses?
- Political: Does the action have public and political support?
- Legal: Does the community have the authority to implement the proposed measure?
- Environmental: Will the action provide environmental benefits, and will it comply with local, state, and federal environmental regulations?
- Social: Will the action be acceptable by the community, or will it cause any one segment of the population to be treated unfairly?
- Administrative: Is there adequate staffing and funding available to implement the action in a timely manner?
- Local Champion: Is there local support for the action to help ensure its completion?
- Other Community Objectives: Does the action address any current or future community objectives either through municipal planning or community goals?

To evaluate the mitigation actions, each action is identified as highly effective or feasible, ineffective, or not favorable and no cost or benefit. For each criterion, the prioritization methodology assigns a "+" if the action is highly effective or feasible, a "-" if the action was ineffective or not feasible, and a "N" if no cost of benefit could be associated with the suggested action or the action was no applicable to the criteria.

Mitigation Action Prioritization:

Actions should be compared with one another to determine a ranking or priority by applying the multi-objective mitigation action prioritization criteria. Scores are assigned to each criterion using the following weighted, multi-objective mitigation action prioritization criteria:

- Effectiveness (weight: 20% of score): The extent to which an action reduces the vulnerability of people and property.
- Efficiency (weight: 30% of score): The extent to which time, effort, and cost is well used as a means of reducing vulnerability.
- Multi-Hazard Mitigation (weight: 20% of score): The action reduces vulnerability for more than one hazard.
- Address High Risk Hazard (weight: 15% of score): The action reduces vulnerability for people and property from a hazard identified as high risk.
- Address Critical Communications/Critical Infrastructure (weight: 15% of score): The action pertains to the maintenance of critical functions and structures such as transportation, supply chain management, and data circuits, etc.

Scores of 1, 2, or 3 are assigned for each multi-objective mitigation action prioritization criterion where 1 is a low score and 3 is a high score. Actions are prioritized using the cumulative score assigned to each. Each mitigation action is given a priority ranking (Low, Medium, and High) based on the following:

- Low Priority: 1.0 – 1.89
- Medium Priority: 1.9 – 2.49
- High Priority: 2.5 – 3.0

The cumulative results of the prioritization of mitigation actions is identified in the mitigation action evaluation and prioritization tool. The results for the mitigation action evaluation and prioritization are located in Appendix H of this plan.

7. Plan Maintenance

7.1. Update Process Summary

Monitoring, evaluating, and updating this plan is critical to maintaining its value and success in Cameron County's hazard mitigation efforts. Ensuring effective implementation of mitigation activities paves the way for continued momentum in the planning process and gives direction for the future. This section explains who will be responsible for maintenance activities and what those responsibilities entail. It also provides a methodology and schedule of maintenance activities including a description of how the public will be involved on a continued basis. The Cameron County Hazard Mitigation Plan update establishes a review of the plan within thirty days of a disaster event in addition to continuing with an annual plan evaluation. This HMP update also defines the municipalities' role in updating and evaluating the plan. Finally, the 2022 HMP update encourages continued public involvement and how this plan may be integrated into other planning mechanisms in the county.

7.2. Monitoring, Evaluating and Updating the Plan

Hazard mitigation planning in Cameron County is a responsibility of all levels of government (i.e., county and local), as well as the citizens of the county. The Cameron County Local Planning Team will be responsible for maintaining this multi-jurisdictional HMP. The local planning team will meet annually and following each emergency declaration to review the plan. Every municipality that has adopted this plan will also be afforded the opportunity to provide updated information or information specific to hazards encountered during an emergency or disaster. Each review process will ensure that the hazard vulnerability data and risk analysis reflect current conditions of the county, that the capabilities assessment accurately reflects local circumstances and that the hazard mitigation strategies are updated based on the county's damage assessment reports and local mitigation project priorities. The HMP must be updated on a five-year cycle. An updated HMP must be completed and approved by the end of the five-year period. The monitoring, evaluating, and updating of the plan every five years will rely heavily on the outcomes of the annual HMP planning team meetings.

The Cameron County Local Planning Team will complete a hazard mitigation progress report to evaluate the status and accuracy of the multi-jurisdictional HMP and record the local planning team's review process. The annual plan review will be distributed to appropriate representatives at both PEMA and FEMA. The following items will be completed during the annual review and reporting process:

- Review the risk assessment section and identify occurrences of hazards within the last year. Identify date, time, damage, fatalities, and other specific information events. Also identify any new hazards that have occurred or increased risk within the county.

- Complete a review and update of capability assessment section. Identify any capability weaknesses.
- Complete a review of the mitigation strategy section. Review the goals and objectives identified in the 2021 HMP and determine if any updates are needed. Provide all mitigation actions and opportunities to the county and municipalities that are applicable. Have all entities complete an action review matrix and document all results in the report. Also, add any new actions that are identified. Complete a review of each mitigation opportunity and identify the status of each opportunity on the opportunity review spreadsheet. All information will be included in the annual review report.

The Cameron County Office of Emergency Services will maintain a copy of these records and place them in Appendix I of this plan. Cameron County will continue to work with all municipalities regarding hazard mitigation projects, especially those municipalities that did not submit projects for inclusion in this plan.

7.3. Continued Public Involvement

The Cameron County Office of Emergency Services will ensure that the 2022 Cameron County Hazard Mitigation Plan is posted and maintained on the Cameron County website and will continue to encourage public review and comment on the plan. The Cameron County website that the plan will be located at is as follows:

https://www.cameroncountypa.com/resident/emergency_management/cameron_county_hazard_mitigation_plan.php

The public will have access to the 2022 HMP through their local municipal office, the Cameron County Planning Commission, or the Cameron County Office of Emergency Services. Information on upcoming events related to the HMP or solicitation for comments will be announced via newsletters, newspapers, mailings, and the county website.

The citizens of Cameron County are encouraged to submit their comments to elected officials and/or members of the Cameron County Local Planning Team. To promote public participation, the Cameron County Local Planning Team will post a public comment form as well as Hazard Mitigation Project Opportunity form on the county's website. These forms will offer the public various opportunities to supply their comments and observations. All comments received will be maintained and considered by the Cameron County Hazard Mitigation Team.

8. Plan Adoption

8.1. Resolutions

In accordance with federal and state requirements, the governing bodies of each participating jurisdiction must review and adopt by resolution, the 2022 Cameron County Hazard Mitigation Plan. Copies of the adopting resolutions are included in this plan in Appendix J. FEMA Region III in Philadelphia is the final approval authority for the Hazard Mitigation Plan. PEMA also reviews the plan before submission to FEMA.

9. Appendices

APPENDIX A:	**References**
APPENDIX B:	**FEMA Local Mitigation Review Tool**
APPENDIX C:	**Meetings and Support Documents**
APPENDIX D:	**Municipal Flood Maps**
APPENDIX E:	**Critical and Special Needs Facilities**
APPENDIX F:	**2021 HAZUS Reports**
APPENDIX G:	**2021 Mitigation Project Opportunities**
APPENDIX H:	**2021 Mitigation Action Evaluation & Prioritization**
APPENDIX I:	**Annual Review Documentation**
APPENDIX J:	**Cameron County & Municipal Adoption Resolutions**