



BUTLER COUNTY 2021

HAZARD MITIGATION PLAN UPDATE



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Certification of Annual Review Meetings

The Butler County Hazard Mitigation Planning Team (HMPT) takes a comprehensive approach to planning, encouraging discussion and incorporating feedback by meeting planning partners where they are. The below list of meetings includes hazard mitigation focused and adjacent conversations where an aspect of hazard mitigation planning was discussed. The Director of the HMPT hereby certifies the review.

YEAR	DATE OF MEETING	AUDIENCE	SIGNATURE

Record of Changes

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

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

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Table of Acronyms

ACRONYM	FULL NAME	ACRONYM	FULL NAME
BRIC	Building Resilient Infrastructure and Communities Program	NFPA	National Fire Protection Association
CFR	Code of Federal Regulations	NHC	National Hurricane Center
CRS	Community Ratings System	NIDIS	National Integrated Drought Information System
DCED	Department of Community and Economic Development	NOAA	National Oceanic and Atmospheric Association
DCNR	Department of Conservation and Natural Resources	NWS	National Weather Service
DCNR-BOF	Department of Conservation and Natural Resources-Bureau of Forestry	PEIRS	Pennsylvania Emergency Incident Reporting System
DMA	Disaster Mitigation Act	PA DEP	Pennsylvania Department of Environmental Protection
EOP	Emergency Operations Plan	PaGWIS	Pennsylvania Groundwater Information System
EOC	Emergency Operations Center	PASDA	Pennsylvania Spatial Data Access
EMC	Emergency Management Coordinator	PDM	Pre-Disaster Mitigation Assistance Program
EPA	Environmental Protection Agency	PDSI	Palmer Drought Severity Index
FEMA	Federal Emergency Management Agency	PEMA	Pennsylvania Emergency Management Agency
FIRM	Flood Insurance Rate Map	PennDOT	Pennsylvania Department of Transportation
FMA	Flood Mitigation Assistance Program	RF	Risk Factor
HMGP	Hazard Mitigation Grant Program	SFHA	Special Flood Hazard Area
HMPT	Hazard Mitigation Planning Team	SOG	Standard Operating Guide
HMPU	Hazard Mitigation Plan Update	TRI	Toxic Release Inventory
HVA	Hazards Vulnerability Analysis	UCC	Uniform Construction Code
ICC	International Code Council	US DOT	United States Department of Transportation
IBC	International Building Code	USACE	United States Army Corps of Engineers
NCEI	National Centers for Environmental Information	USDA	United States Department of Agriculture
NDIS	National Drought Information System	USGS	United States Geological Survey
NDMC	National Drought Mitigation Center	WYO	Write Your Own
NFIP	National Flood Insurance Program		

1. Introduction

1.1. Background

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

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

The Butler County Hazard Mitigation Steering Committee comprised of County Emergency Management and Planning along with the Hazard Mitigation Planning Team (HMPT) composed of government leaders from Butler County and in cooperation with the elected officials of the County and its



**The Butler County
Department of
Emergency Services
and Butler County
Planning has taken an
all-hazards approach
to the 2021 Hazard
Mitigation Plan
Update.**

municipalities, and other stakeholders has prepared this Hazard Mitigation Plan Update (HMPU). The Plan is the result of work by citizens of the County to develop a pre-disaster multi-hazard mitigation plan that will not only guide the County towards greater disaster resistance but will also respect the character and needs of the community.

Previous Plan Updates

The initial Hazard Mitigation Plan (HMP) for Butler County was adopted in 2004 as a comprehensive All-Hazard Countywide plan for their 57 municipalities.

The plan was updated for the first time in 2010. This updated consisted of a review of the 2004 Plan, which was used as a base document. The 2010 plan followed an outline developed by PEMA in 2009, which provides a standard format for all hazard mitigation plans in the commonwealth of Pennsylvania, which contrasted significantly from the 2004 HMP.

The plan was last updated in 2015, and followed the same PEMA provided format as the 2010 plan. There were some minor updates to the hazards included in the 2015 plan. The Terrorism, Criminal Activity, or Civil Disturbance profile was separated into three separate profiles. The new Civil Disturbance profile, Terrorism profile and War and Criminal Activity profile allowed the plan to focus on vulnerabilities specific to each hazard. Urban Fire and Explosion, which was previously included in the Wildfire profile was made its own profile. Also, the 2010 Hazardous Materials profile was updated to be the Environmental Hazards profile to include information hazardous material sites as well as conventional and unconventional oil wells.

2021 Plan Update

The 2021 Plan Update is intended to enable the County and its municipalities to effectively reduce the potential risks of identified hazards to the health, safety, and property of the residents. The Plan Update will also allow Butler County municipalities to be eligible for a range of financial assistance following hazard events.

The 2021 Plan Update consists of a thorough review and evaluation of the 2015 Plan. Each chapter in the 2021 HMP has been updated where new data are available. The Plan Update involves the review of data on potential hazards and reprioritization of these hazards in terms of frequency and severity. The Plan Update includes a review of mitigation actions, which were revised, deleted, or modified to address the high priority hazards as well as a Plan Maintenance section that describes how the Plan will be updated and maintained in the next 5-year cycle.

1.2. Purpose

This plan was developed for the purpose of:

- Providing a blueprint for reducing property damage and saving lives from the effects of future natural and human-made hazards in Butler County;

- Complying with state and federal legislative requirements for County mitigation in order for the County to be eligible for federal and technical assistance from State and Federal hazard mitigation programs;
- Identifying, introducing, and implementing cost-effective hazard mitigation measures in order to accomplish County goals and objectives and to raise awareness and acceptance of hazard mitigation; and
- Improving community resiliency following a disaster event.

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

1.3. Scope

The Butler County 2021 Hazard Mitigation Plan Update has been prepared to meet requirements set forth by FEMA and PEMA in order for the County to be eligible for funding and technical assistance from state and federal hazard mitigation programs. It will be updated and maintained to continually address hazards determined to be of significant risk to the County and/or its local municipalities. Review will take place annually and following significant disasters, and a full Plan Update will occur, as required, every five years.

In March of 2021, Butler County contracted with Michael Baker International, Inc. to support HMP Update development in compliance with the requirements of the Disaster Mitigation Act of 2000. The HMP Update was funded by Hazard Mitigation Assistance (HMA) funds from FEMA and administered by the Pennsylvania Emergency Management Agency (PEMA). The Plan Update is a multi-jurisdictional plan that covers Butler County and its 57 municipalities.

It should be noted that future funding for certain mitigation projects will be contingent upon having each jurisdiction in Butler County adopt the plan after the County adopts the Update. Any jurisdiction that does not adopt the 2021 Plan Update will either have to draft their own plan or may become ineligible for FEMA pre- and post-disaster mitigation funds.

Organization of the Plan

The 2021 Hazard Mitigation Plan Update consists of seven chapters, each focusing on a different aspect of the planning process. Chapter 1 includes the prerequisites of the Plan including letters of adoption by the County Commission and the individual municipalities. Chapter 2 introduces the plan update process and includes an overview of the socio-economic and demographic characteristics. Chapter 3 discusses the planning process. Chapter 4 comprises the hazard identification and risk assessment and examines vulnerability and the potential losses from the top priority hazards. Chapter 4 also includes a historic profile of hazard types and associated losses, and a vulnerability assessment, which analyzes the potential for future damages due to the hazards identified. Chapter 5 contains a capability

assessment including a review of existing plans and ordinances from the counties and municipalities. Chapter 6 discusses the mitigation strategy including updated mitigation goals and objectives, mitigation actions, and the method for prioritization and implementation of mitigation actions. Chapter 7 outlines how Butler County and its municipalities will implement the Plan once it is adopted and ways to monitor progress and ensure continued public involvement.

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;
- CFR, Title 44, Parts 201 and 206;
- Disaster Mitigation Act of 2000, Public Law 106-390, as amended; and
- National Flood Insurance Act of 1968, as amended, 42 U.S.C. 4001 *et seq.*

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

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

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

- FEMA 386-1: *Getting Started*. September 2002.
- FEMA 386-2: *Understanding Your Risks: Identifying Hazards and Estimating Losses*. August 2001.
- FEMA 386-3: *Developing the Mitigation Plan*. April 2003.
- FEMA 386-4: *Bringing the Plan to Life*. August 2003.
- FEMA 386-5: *Using Benefit-Cost Review in Mitigation Planning*. May 2007.
- FEMA 386-6: *Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning*. May 2005.
- FEMA 386-7: *Integrating Manmade Hazards into Mitigation Planning*. September 2003.
- FEMA 386-8: *Multijurisdictional Mitigation Planning*. August 2006.
- FEMA 386-9: *Using the Hazard Mitigation Plan to Prepare Successful Mitigation Projects*. August 2008.
- FEMA: *Local Mitigation Planning Handbook*. March 2013.
- FEMA: *Local Mitigation Plan Review Guide*. October 2011.
- FEMA: *National Fire Incident Reporting System 5.0: Complete Reference Guide*. January 2008.
- FEMA: *Hazard Mitigation Assistance Unified Guidance*. February 2015.
- FEMA: *Integrating Hazard Mitigation into Local Planning: Case Studies and Tools for Community Officials*. March 2013

- FEMA: *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards*. January 2013.
- FEMA: *National Flood Insurance Program Fact Sheet*. May 2016.
- FEMA P-758: *Substantial Improvement / Substantial Damage Desk Reference*. May 2010.

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

- PEMA: *Hazard Mitigation Planning Made Easy!*
- PEMA *Mitigation Ideas: Potential Mitigation Measures by Hazard Type; A Mitigation Planning Tool for Communities*. March 2009.
- PEMA: *Pennsylvania's Hazard Mitigation Planning Standard Operating Guide*. August 2020.
- PEMA: *Pennsylvania State Hazard Mitigation Plan, 2019 Update*.

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

- NFPA 1600: *Standard on Disaster/Emergency Management and Business Continuity Programs*. 2007. Community Profile

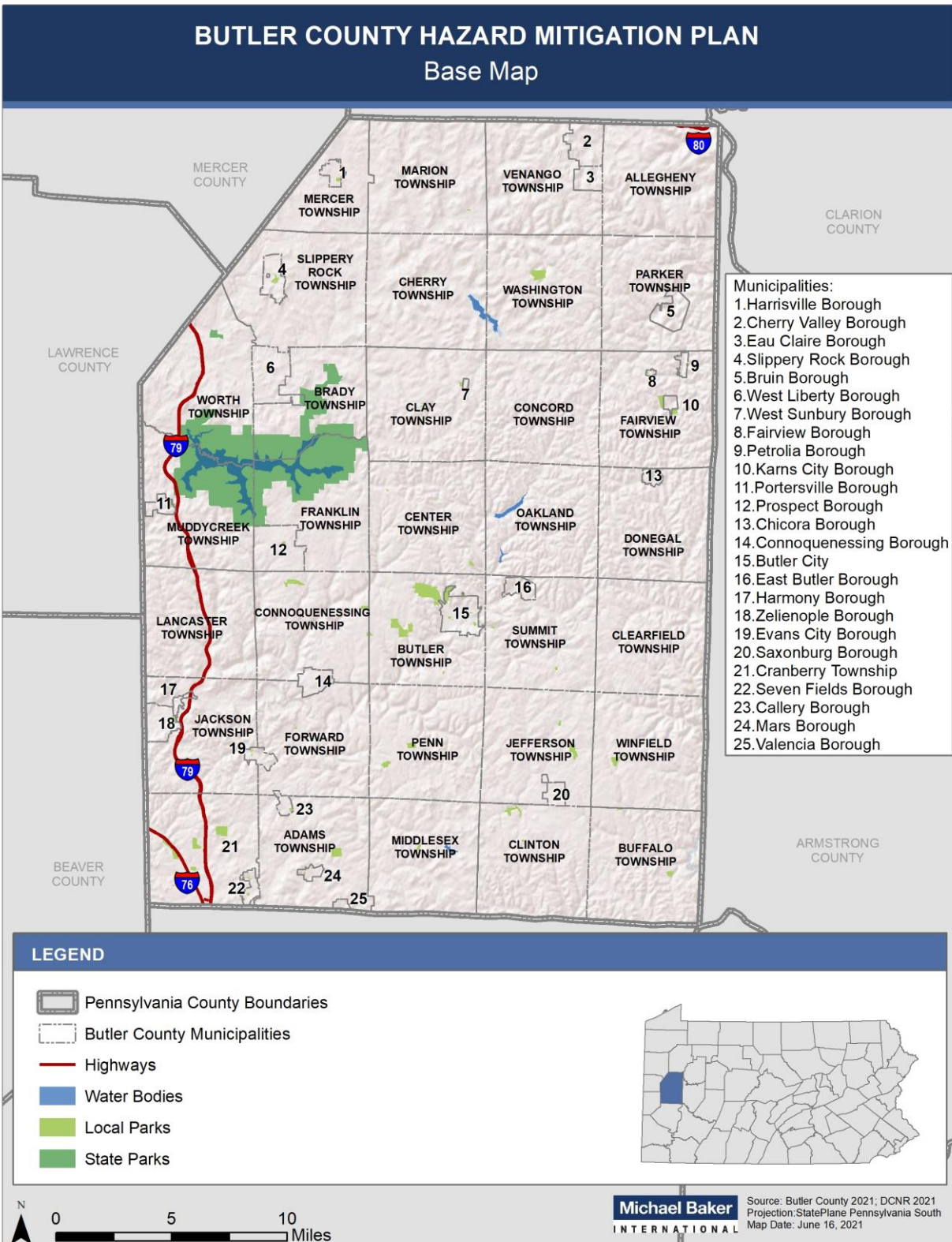
2. Community Profile

This section includes a profile of Butler County and its municipalities. Information on the County's geography, climate, demographics, employment and industry are included below. While some information such as the study area boundaries and geography have remained unchanged, and are derived from the 2015 Plan, other information including demographics, employment and industry has been developed using the latest U.S. Census, updated Comprehensive Plans, Long Range Transportation Plans and other recent Economic Development Strategy and Planning documents.

2.1. Geography and Environment

With a land area of 789 square miles, Butler County is approximately 23 miles wide by 34 miles long. The County is located in Southwestern Pennsylvania on the Allegheny Plateau. Butler County occupies the high divide between the Allegheny and Beaver Rivers. As part of the Allegheny Plateau, the County is characterized by irregular terrain, having both sharp hills and valleys along with pockets of moderately sloped terrain. Only the extreme northwest corner of the County has been glaciated. Elevations range from 1,500 feet at the summits in the northern part of the County to 750 feet at the riverbeds in southern part of the County. Figure 2.1-1 provides an outline of Butler County.

Figure 2.1-1 Butler County Base Map



Butler County is traversed by Slippery Rock Creek, Connoquenessing Creek, Muddy Creek, Bear Creek, Breakneck Creek, and Buffalo Creek. The County lies entirely within the Ohio River watershed, which has a total drainage area of 23,487 square miles within the State of Pennsylvania. The Allegheny River watershed lies within the Ohio River watershed, and all waterbodies within it are considered part of both watersheds. Using a HUC-8 classification, Butler County has 4 major watersheds: Connoquenessing Watershed, Middle Allegheny Tionesta Watershed, Middle Allegheny Redbank Watershed, and Lower Allegheny Watershed. An extremely small portion of the Upper Ohio Watershed is in the southwest corner of the County. Butler County has over 200 ponds, lakes, and reservoirs. The largest of these, Lake Arthur in Moraine State Park, is 3,225 acres (Butler County, 2008).

The Connoquenessing Watershed is the largest and most populous watershed within the County, with more municipalities within its borders than any of the other watersheds in Butler County. The Connoquenessing Watershed is primarily made up of Conoquenessing Creek and its tributaries. Conoquenessing Creek flows 54.1 square miles through Allegheny, Beaver, Butler, Lawrence, Mercer, and Venango counties. The creek and its tributaries provide adjacent residents with drinking water and outdoor recreational opportunities and serve as an important environmental asset providing habitat to a wide range of biodiversity, including 101 species of concern and 42 state listed threatened or endangered species (Connoquenessing Watershed Alliance, 2008).

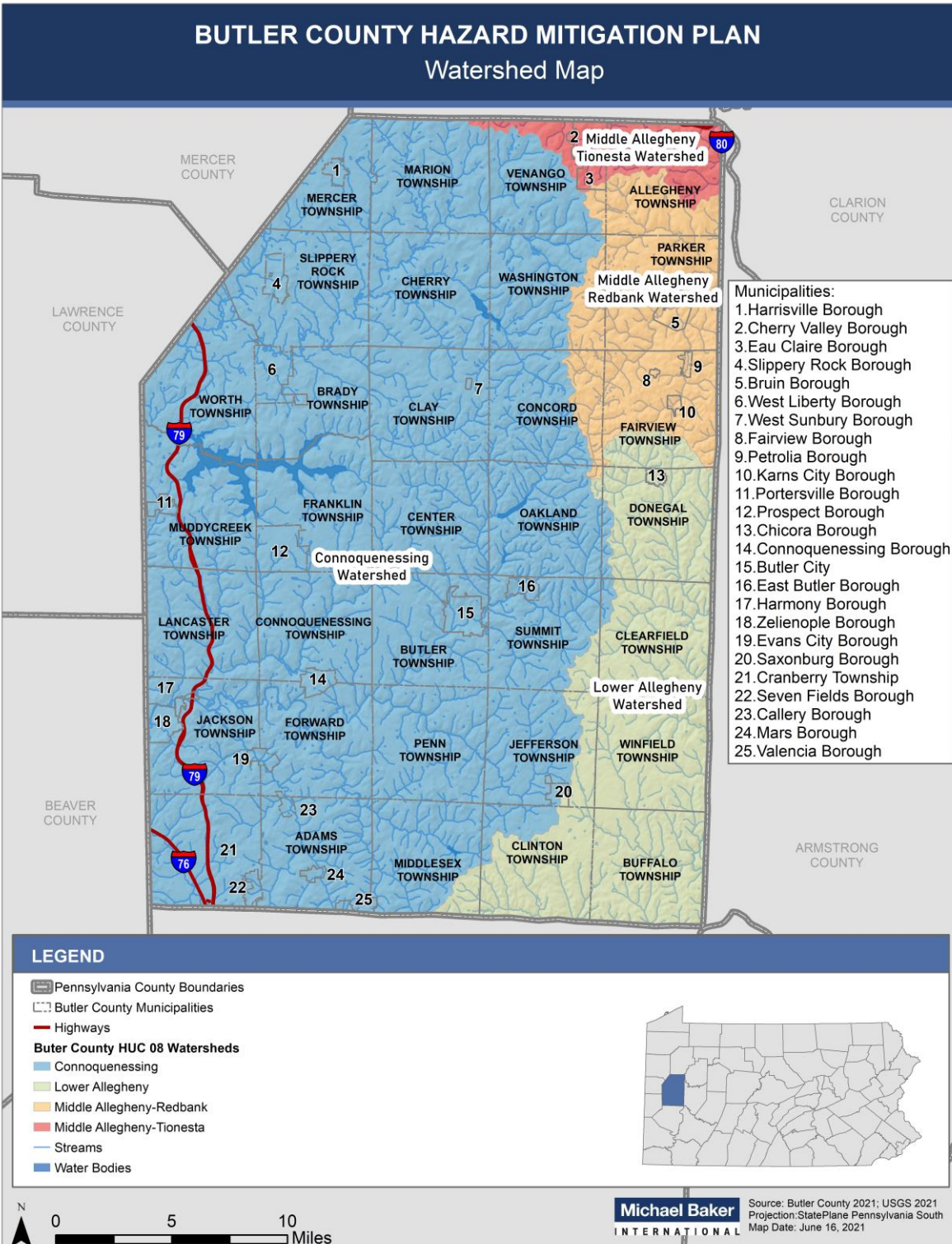
Butler County has one state park complex run by the Department of Conservation and Natural Resources – Moraine State Park (DCNR, 2021a). The County also has 9,962.5 acres in State game lands and 3,000 acres of fishing in Moraine State Park (BCTCB, 2021a). There are multiple protected areas for birds and waterfowl including the Wolf Creek Narrows Natural Area, Succop Nature Park, and Todd Nature Reserve preserved by both State Agencies and non-profit organizations (BCTCB, 2021b).

Table 2.1-1 lists the Watersheds corresponding HUC 8 codes and Figure 2.1-2 shows the County’s HUC 8 watersheds.

Table 2.1-1 Watersheds and Corresponding HUC 08 Codes

NAME	HUC 08
Upper Ohio	05030101
Connoquenessing	05030105
Middle Allegheny-Redbank	05010006
Lower Allegheny	05010009
Middle Allegheny-Tionesta	05010003

Figure 2.1-2 Butler County Watershed Map



2.2. Community Facts

Butler County was formed from parts of Allegheny County on March 12, 1800. The County was named in honor of General Richard Butler, a hero of the American Revolution. Today, Butler County has a diverse landscape with both rural and urban settings. This is reflected by high-density residential and commercial areas, such as the City of Butler and Cranberry Township, coupled with large tracts of open space and agricultural lands. The County is comprised of 57 municipalities; including 33 townships, 23 boroughs, and the City of Butler, the metropolitan center and County seat.

TRANSPORTATION

The County is served by a number of major transportation routes. They include:

- US Routes 422 and 19;
- PA State Routes 8, 68, 38, 58, 528, 356, 28, and
- Interstate 80, 79, and 76.

In addition to the Greater Pittsburgh International Airport, Butler County is served by four public airports: Butler County Airport (Penn Township), Butler Farm Show Airport (City of Butler), Zelienople Municipal Airport (Zelienople Borough), and Lakehill Airport (Mars Borough). Rail transportation is also a vital means of transportation in Butler County. The longest active line is operated by the Chessie System Railway and the Seaboard Coast Line Railroad (CSX), which travels the P&W Subdivision from Allegheny County to Lawrence County. The second longest rail line is the Main Line of Bessemer, which travels from Mercer County to Allegheny County. There are two other lines traversing Butler County - the Northern Subdivision Line and the Western Allegheny Line (Butler County, 2021a). While public transit is limited within Butler County, there are two notable public transit services. Butler Area Rural Transit is operated by the County and provides low-cost ride share services for adults who can no longer drive; Butler Transit Authority operates five public bus routes in Butler City, as well as a commuter bus line between Butler City and Pittsburgh (BTA, 2020).

EDUCATION

Butler County is the home of two institutions of higher learning. Butler County Community College has a primary location in Butler Township and satellite location in Cranberry Township. Slippery Rock University is located in Slippery Rock Township. Also located within the County are a number of business, technical and trade schools. There are seven public school districts, 24 private schools, and a network of parochial schools (Butler County, 2021b). Butler County has a county federated library system with nine branches offering over 930,000 cataloged items (BCFLS, 2020).

2.3. Population and Demographics

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

Table 2.3-1 Demographic Summary of Butler County (US Census ACS, 2019)

DEMOGRAPHIC CATEGORY	BUTLER COUNTY	PENNSYLVANIA
Population, 2019 estimate	186,899	12,791,530
Population, percent change, 2014 to 2019	1.01%	0.26%
Median Age 2019	43.3	40.8
Persons under 5 years old, percent, 2019	5.10%	5.5%
Persons 5-19 years old, percent, 2019	18%	18.10%
Person 20-64 years old, percent 2019	58.60%	58.70%
Persons 65 years old and over, percent, 2019	18.20%	17.80%
Female persons, percent, 2019	50.49%	51.02%
Male persons, percent 2019	49.51%	48.98%
RACIAL DEMOGRAPHICS	BUTLER COUNTY	PENNSYLVANIA
White persons, percent, 2019	95.80%	80.50%
Black persons, percent, 2019	1%	11.20%
American Indian and Alaska Native persons, percent, 2019	0%	0.20%
Asian persons, percent, 2019	1.20%	3.40%
Native Hawaiian and Other Pacific Islander, percent, 2019	0%	0%
Persons reporting two or more races, percent, 2019	1.70%	2.50%
Persons of Hispanic or Latino origin, percent, 2019	1.50%	7.30%
White persons not Hispanic, percent, 2019	94.70%	76.40%

Butler County ranks 19th in population among counties in Pennsylvania. The population has grown from 174,083 in 2000, to 183,862 in 2010, and an estimated population of 186,899 in 2019. This growth represents a 7.36% increase in twenty-nine years. (US Census, 2000) (US Census, 2010) (US Census, 2019).

Butler County is the fourth most populated county in the Pittsburgh–Laurel Highlands region, which consists of Lawrence, Butler, Armstrong, Indiana, Beaver, Allegheny, Westmoreland, Washington, Greene, Fayette, and Somerset Counties.

Table 2.3-2 provides the estimated total population for each jurisdiction in Butler County for years 2010 and 2019. As seen in the table, much of Butler County's population can be attributed to Butler City. Butler City had an estimated total population of approximately 13,092 in 2019.

In 2019, approximately 18 percent of Butler County's population was 65 or older. This is an increase from 2010 where approximately 14 percent of the County was 65 or older. These residents may have special needs. For example, many may be unable to drive; therefore, special evacuation plans may need to be created for them. They may also be hard of hearing or low vision which could make receiving emergency instructions difficult. Both older and younger populations have higher risks for contracting certain diseases. Butler County's combined under 5-years-of-age and over-65 populations represent approximately 23 percent of its population (US Census, 2010) (US Census, 2019).

Population estimates show that Butler County is projected to continue to grow in population. Census-based projections estimate that the County's population will be 217,076 in 2040. These same estimates projected a population of 196,325 in 2020. The 2019 population of 186,899 indicates that the population might be growing at a slower rate than estimated (PA DEP, 2014).

Table 2.3-2 Municipal Population in Butler County (US Census ACS, 2010) (US Census ACS, 2019)

MUNICIPALITY	2010	2019	MUNICIPALITY	2010	2019
Adams Township	10,793	13,643	Jackson Township	3,674	3,979
Allegheny Township	499	656	Jefferson Township	5,535	5,307
Brady Township	1,195	1,171	Karns City Borough	344	186
Bruin Borough	523	483	Lancaster Township	2,529	2,610
Buffalo Township	7,239	7,308	Marion Township	1,348	1,184
Butler City	14,035	13,092	Mars Borough	1,798	1,336
Butler Township	17,348	16,610	Mercer Township	1,269	1,424
Callery Borough	355	392	Middlesex Township	5,437	5,637
Center Township	7,917	7,674	Muddy Creek Township	2,158	2,232
Cherry Township	1,176	1,014	Oakland Township	3,008	2,882
Cherry Valley Borough	55	68	Parker Township	423	588
Chicora Borough	1,114	982	Penn Township	5,107	4,916
Clay Township	2,697	2,594	Petrolia Borough	170	152
Clearfield Township	2,661	2,574	Portersville Borough	255	284
Clinton Township	2,857	2,802	Prospect Borough	1,150	1,089
Concord Township	1,639	1,338	Saxonburg Borough	1,852	1,609
Connoquenessing Borough	595	554	Seven Fields Borough	2,736	2,766
Connoquenessing Township	4,094	3,948	Slippery Rock Borough	3,678	3,552

Table 2.3-2 Municipal Population in Butler County (US Census ACS, 2010) (US Census ACS, 2019)

MUNICIPALITY	2010	2019	MUNICIPALITY	2010	2019
Cranberry Township	27,364	30,875	Slippery Rock Township	5,396	6,356
Donegal Township	1,649	1,755	Summit Township	4,890	4,711
East Butler Borough	705	757	Valencia Borough	461	524
Eau Claire Borough	236	297	Venango Township	878	917
Evans City Borough	1,948	2,009	Washington Township	1,394	1,346
Fairview Borough	237	192	West Liberty Borough	392	347
Fairview Township	1,845	1,993	West Sunbury Borough	188	186
Forward Township	2,565	2,709	Winfield Township	3,551	3,438
Franklin Township	2,572	2,729	Worth Township	1,325	1,439
Harmony Borough	899	1,100	Zelienople Borough	3,875	3,651
Harrisville Borough	921	932	Butler County	182,554	186,899

Table 2.3-3 displays the housing characteristics for Butler County. In 2019, Butler County was estimated to have 83,257 residential units. These properties may be vulnerable to various natural hazards, in particular flooding and windstorms. Damage to residential properties is not only expensive to repair or rebuild, but also can be devastating to the displaced family. Meanwhile, approximately eight percent of the County’s residential properties are vacant. Vacant buildings are particularly vulnerable to arson and criminal activity. Since many vacant properties may not have been maintained, they may be structurally deficient and at risk of collapsing during a hazard event (USFA, 2021).

Table 2.3-3 Butler County Housing Characteristics (US Census ACS, 2010) (US Census ACS, 2019)

HOUSING CHARACTERISTIC	2010	2019
Total Housing Units	77,377	83,257
Occupied Housing Units	71,911	76,502
Vacant Housing Units	5,466	6,755
Owner-Occupied Housing Units	55,391	58,061
Renter-Occupied Housing Units	16,520	18,441
Median Home Value	\$159,000	\$205,600

Approximately 22 percent of the County’s population rent. Renters are often more transient than homeowners; therefore, communicating with renters may be more difficult than with homeowners. Similarly, tourists would be a harder population to communicate with during an emergency event. Communication strategies should be developed to ensure that these populations can be given proper notification. About 0.6% of Butler County’s population is limited English speaking households (US Census, 2019). Although a small portion of the population, hazard mitigation strategies will need to address language barriers to ensure that all residents can receive emergency instructions.

As displayed in Table 2.3-4, the 2019 estimated median household income in the County is \$70,668, which is higher than the Commonwealth of Pennsylvania’s median household income of \$61,744. The County’s estimated per capita income of \$37,811 is also higher than the Commonwealth’s per capita income of \$34,352 (US Census, 2019).

Table 2.3-4 Income Levels & Wage Statistics (US Census ACS, 2010) (US Census ACS, 2019) (US BLS, 2020)

INCOME	BUTLER COUNTY		PENNSYLVANIA	
	2010	2019	2010	2019
Median Household Income	\$56,878	\$70,668	\$50,398	\$61,744
Median Family Income	\$69,464	\$90,478	\$63,364	\$78,521
Per Capita Income	\$28,446	\$37,811	\$27,049	\$34,352
WAGES (4TH QUARTER 2020)	BUTLER COUNTY		PENNSYLVANIA	
Average Weekly Wage	\$1,164		\$1,287	
Average Annual Wage (2019)	\$49,760		\$53,950	

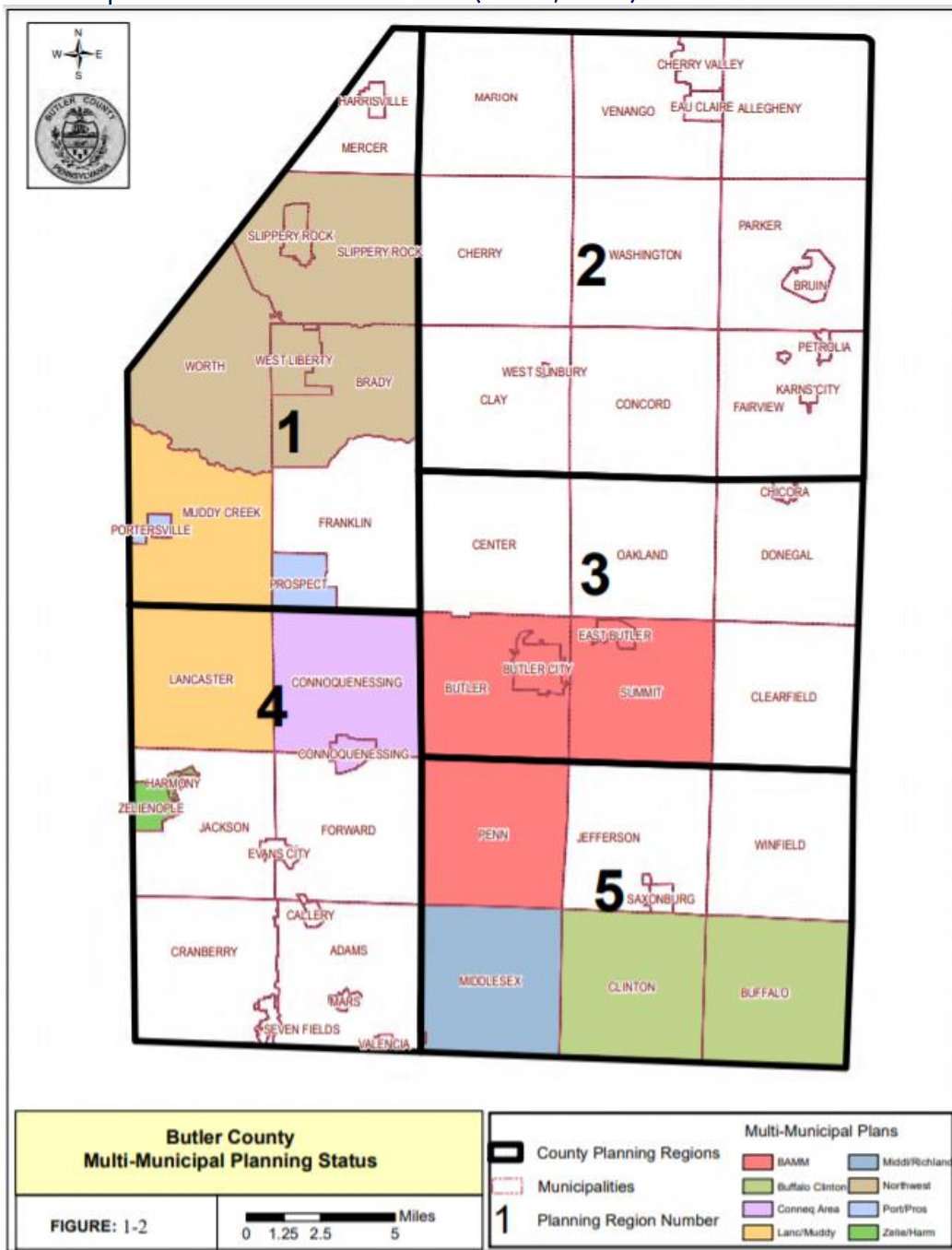
2.4. Land Use and Development

Butler County is mostly rural with the majority of its population located in the central and south-western area of the County, primarily in and around Butler City, and Adams and Cranberry Townships. Figure 2.4-2 shows the current land cover in the County and Table 2.4-1 presents the distribution of land use by acreage. The County’s vision for future development, as documented in the 2017 Comprehensive Plan, is to promote growth while sustaining community characteristics, with an emphasis on centering local planning efforts, downtown economic development, and a commitment to the protection and expansion of open space. Figure 2.4-3, which presents the County’s generalized land use plan, reflects this goal by targeting areas in around Butler City as well as multiple towns for revitalizations efforts, while also identifying areas for new suburban development surrounding these targeted revitalization areas. The County’s Comprehensive Plan calls upon townships and boroughs to adopt their own comprehensive planning, zoning and land use ordinances to produce a more detailed iteration of these goals. According to the Capability Assessment Surveys completed by 35 municipalities, 24 respondents identified having their own local Land Use or Comprehensive Plan, which influences local development. The County does not have any countywide zoning ordinance nor ownership of water or sewer lines. Pennsylvania is a home rule state but allows for an exception for zoning. Because of this it leaves land use decisions to individual municipalities (BCPC, 2017).

The Comprehensive Plan also identifies five distinct planning regions. Region 1 is the northwest portion of the County, containing Moraine State Park; Region 2 is the northeast section of the County, with the least dense population, and largest amount of forest and Gamelands; Region 3 is the central region of the County, containing Butler City, the County

Seat, and much of the County's industry; Region 4 is the southwest portion of the County, containing Cranberry Township, Butler's largest municipality; and Region 5 is the southeast portion of the County, a traditionally agricultural region that has experienced some recent suburban development. The Comprehensive Plan outlines recommendations for growth and preservation for each of these five regions. Figure 2.4-1.

Figure 2.4-1 Planning Regions in Butler County with Multi-Municipal Comprehensive Plan Identification (BCPC, 2017)



The County has prioritized the protection of its natural, historic, and environmentally sensitive areas. These regulations are largely through voluntary programs such as conservation easements and County financed projects.

Table 2.4-1 Distribution of Land Use (Butler County, 2021c)

LAND USE CATEGORY	ACREAGE	PERCENT OF TOTAL COUNTY AREA
Agriculture	6,995,194	35.17%
Commercial	513,755	2.58%
Commercial Mixed Use	17,047	0.09%
Industrial	190,676	0.96%
Institutional	221,009	1.11%
Other	20,498	0.10%
Recreation	1,191,654	5.99%
Residential	4,538,157	22.81%
Transportation	12,238	0.06%
Utility	22,442	0.11%
Vacant	6,046,759	30.40%

Figure 2.4-2 Butler County Land Use

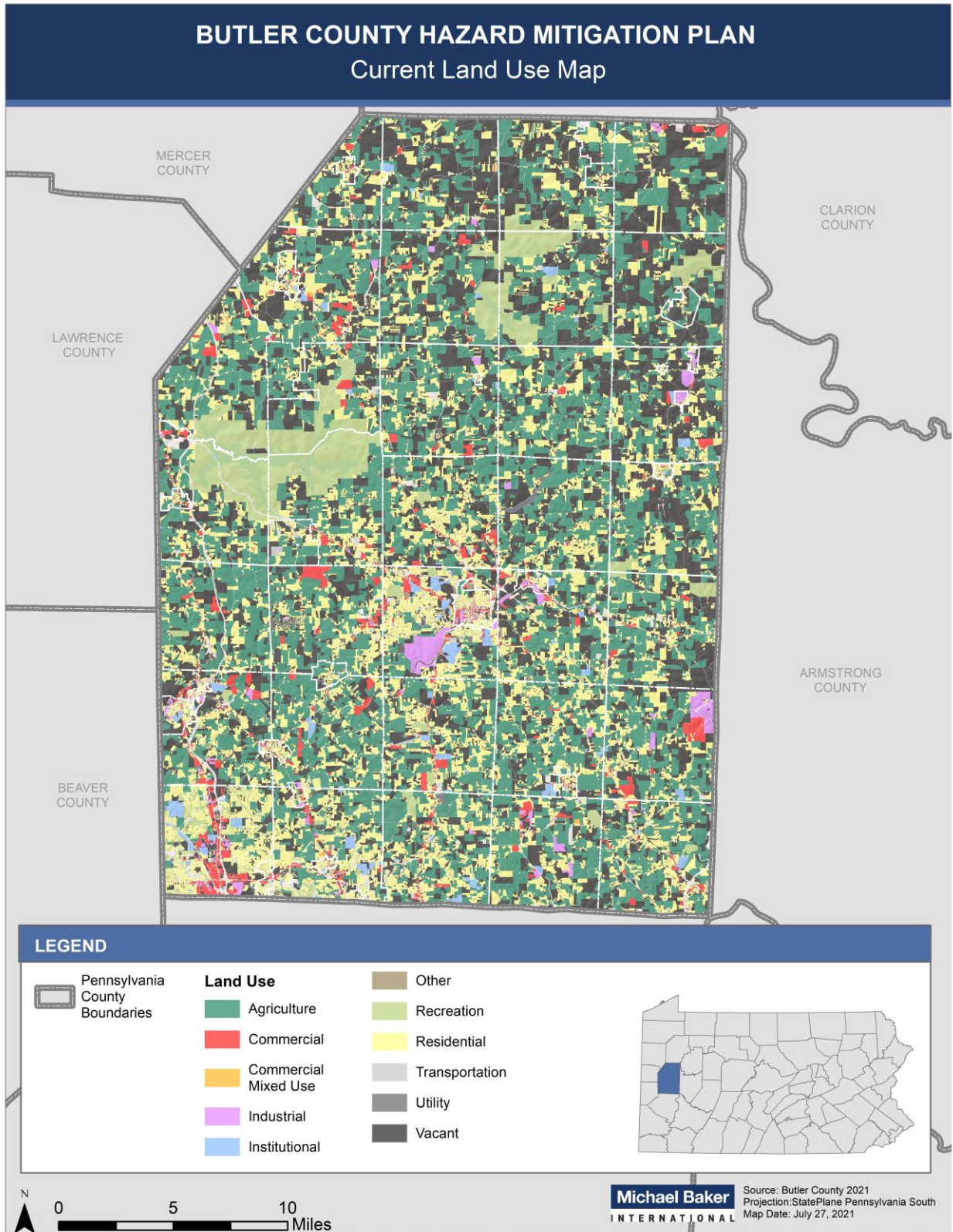
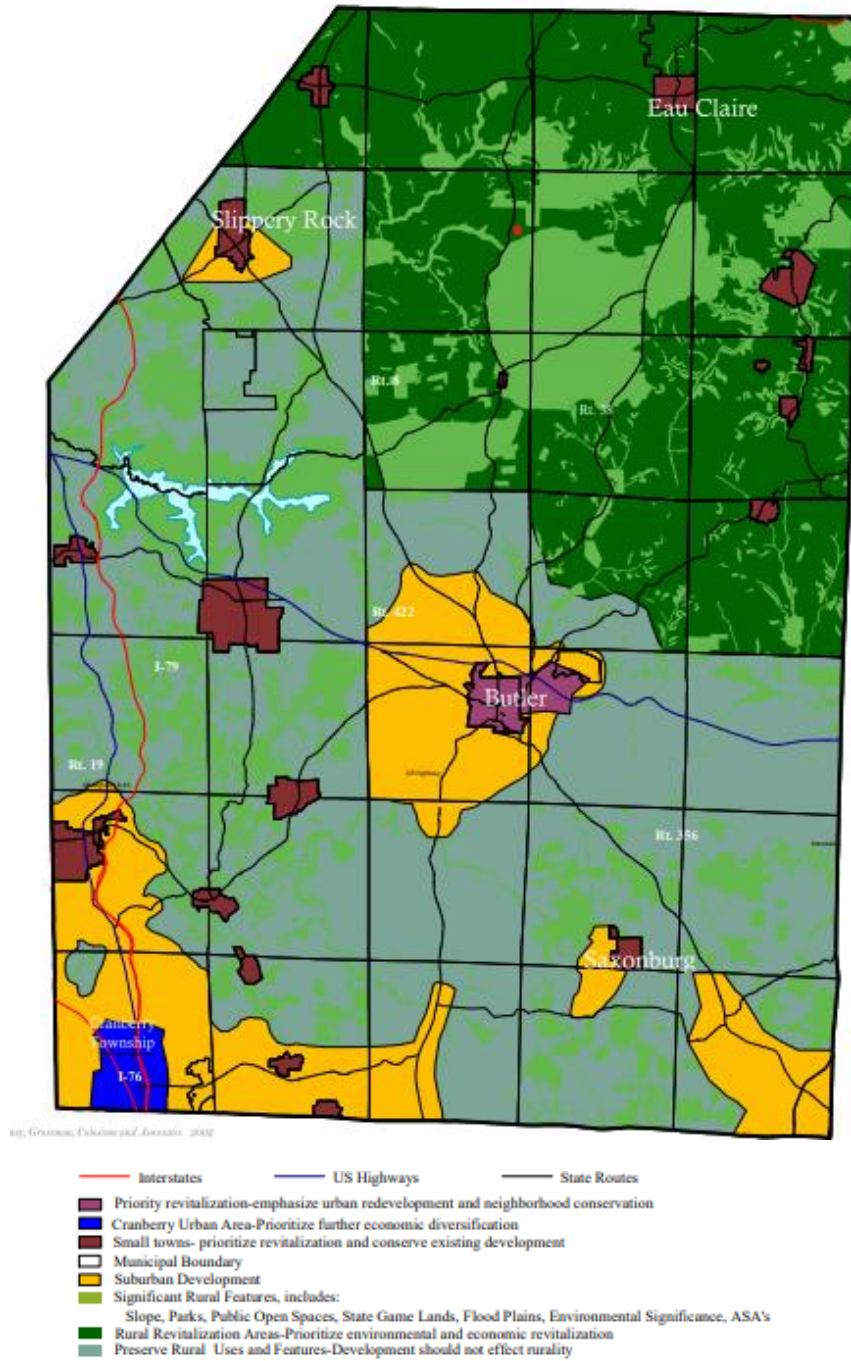


Figure 2.4-1 Butler County Land Use Policy Plan (BCPC, 2017)



2.5. Data Sources and Limitations

The Butler County tax assessment parcel database and the County’s address points were used as an inventory of properties throughout the County. The address points did not include certain attributes necessary for analysis, including the value of the structure, detailed land use, etc. In order to effectively evaluate the type of structures vulnerable to individual hazards, the consultant team used a spatial join to assign a land use and assessment value to each structure using the parcel database. Land use categories were then reviewed and consolidated as needed. For example, single family residential, rural residential, and multifamily residential parcel land uses were consolidated to “residential.” In addition, since a spatial join was used to derive land use, if a parcel had more than one structure on it, both would be given the same underlying land use. As a result, the structure types used throughout this HMP should be considered estimates. The actual structure and land use may differ from the information contained in the database.

The countywide Digital Flood Insurance Rate Map (DFRIM), published on August 2, 2018, was downloaded from the FEMA Map Service Center (FEMA, 2018a). This data provides flood frequency and elevation information used in the flood hazard risk assessment. Other GIS datasets including waterbodies, parks, road centerlines, municipal boundaries, fire departments, police stations, schools, hospitals, helipads, airports, and other government buildings, were provided by the Butler County Mapping Department. Any data not available from the County was retrieved from the Open Data portals of the Pennsylvania Department of Transportation, the Pennsylvania Department of Environmental Protection and the Pennsylvania Department of Conservation and Natural Resources.

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

Butler County considers nine types of facilities critical, or essential to the health and welfare of the community:

- * Airports and Heliports
- * Cell Towers
- * EMS Facilities
- * EOCs
- * Fire Stations
- * Government Buildings
- * Hospitals
- * Police Stations
- * Schools *(includes all campus buildings associated with each school/college)*

Technologies Office and the Penn State Institutes of Energy and the Environment of the Pennsylvania State University.

In order to assess the vulnerability of different jurisdictions to the hazards, data on past occurrences of damaging hazard events was gathered. For a number of historic natural-hazard events, the National Centers for Environmental Information (NCEI) database was utilized. NCEI is a division of the US Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). Information on hazard events is compiled by NCEI from data gathered by the National Weather Service (NWS), another division of NOAA. NCEI then presents it on their website in various formats. The data used for this plan came from the US Storm Events database, which "documents the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, and/or disruption to commerce" (NOAA NCEI, 2021).

When applicable, Pennsylvania Emergency Incident Reporting System (PEIRS) incident data spanning 1/1/2002 through 6/1/2009 was used in the 2011 plan update and kept in the 2015 and 2021 updates. Current PEIRS data is not publicly available.

This HMP evaluates the vulnerability of the County's critical facilities. For the purposes of this plan, critical facilities are those entities that are essential to the health and welfare of the community. This includes airports and heliports, cell towers, EMS facilities, emergency operation centers, fire stations, government buildings, hospitals, police stations and schools. The list of critical facilities was developed based on information available from Butler County. Table 2.5-1 summarizes the critical facilities in Butler County by type and by municipality. A complete listing of critical facilities and their vulnerability to individual hazards is provided in **Appendix E**. Due to the sensitive information in **Appendix E**, this appendix is not available to the public.

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

Table 2.5-1 Critical Facilities by Municipality and Type

MUNICIPALITIES	AIRPORTS AND HELIPOINTS	CELL TOWERS	EMS	EOCs	FIRE STATIONS	GOVERNMENT BUILDINGS	HOSPITALS	POLICE STATIONS	SCHOOLS
Adams Township	0	0	1	0	1	1	0	1	21
Allegheny Township	0	0	0	0	0	1	0	0	0
Brady Township	0	0	0	0	0	1	0	0	0
Bruin Borough	0	0	0	0	1	1	0	0	0
Buffalo Township	0	0	0	0	2	1	0	1	4
Butler Township	0	0	1	0	1	5	0	2	9
Butler, City	1	0	2	1	4	4	2	5	25
Callery Borough	1	0	0	0	1	1	0	1	0
Center Township	0	0	1	0	1	1	1	0	1
Cherry Township	0	0	0	0	0	1	0	0	1
Cherry Valley Borough	0	0	0	0	0	0	0	0	0
Chicora Borough	0	0	1	0	1	2	0	0	1
Clay Township	0	0	0	0	1	1	0	0	1
Clearfield Township	0	0	0	0	0	1	0	0	0
Clinton Township	0	0	0	0	0	1	0	0	0
Concord Township	0	0	0	0	0	1	0	0	0
Connoquenessing Borough	0	0	0	0	1	1	0	0	0
Connoquenessing Township	2	0	0	0	0	1	0	0	1
Cranberry Township	1	0	1	0	2	7	1	1	8
Donegal Township	1	0	0	0	0	1	0	0	0
East Butler Borough	0	0	1	0	1	1	0	0	0
Eau Claire Borough	0	0	0	0	1	1	0	0	0
Evans City Borough	0	0	0	0	1	2	0	1	2
Fairview Borough	0	0	0	0	0	1	0	0	0
Fairview Township	0	0	0	0	0	1	0	0	1
Forward Township	2	0	0	0	0	1	0	0	0
Franklin Township	0	0	0	0	0	1	0	0	0
Harmony Borough	0	0	0	0	1	1	0	0	1
Harrisville Borough	0	0	0	0	1	2	0	1	0
Jackson Township	0	0	1	0	0	1	0	1	4
Jefferson Township	0	0	0	0	0	1	0	0	4
Karns City Borough	0	0	0	0	0	1	0	0	0
Lancaster Township	1	0	0	0	0	1	0	1	0
Marion Township	0	0	0	0	1	1	0	0	0
Mars Borough	0	0	0	0	0	1	0	1	0

Table 2.5-1 Critical Facilities by Municipality and Type

MUNICIPALITIES	AIRPORTS AND HELIPTS	CELL TOWERS	EMS	EOCs	FIRE STATIONS	GOVERNMENT BUILDINGS	HOSPITALS	POLICE STATIONS	SCHOOLS
Mercer Township	0	1	0	0	0	1	0	0	0
Middlesex Township	1	1	0	0	1	1	0	1	1
Muddy Creek Township	0	0	0	0	0	1	0	2	1
Oakland Township	0	0	0	0	1	1	0	0	1
Parker Township	0	0	0	0	0	1	0	0	0
Penn Township	2	1	0	0	1	2	0	1	1
Petrolia Borough	0	0	1	0	1	0	0	0	0
Portersville Borough	0	0	1	0	1	0	0	0	0
Prospect Borough	0	0	0	0	1	0	0	1	1
Saxonburg Borough	0	0	1	0	1	2	0	1	0
Seven Fields Borough	0	0	0	0	0	0	0	1	0
Slippery Rock Borough	0	0	1	0	1	2	0	2	9
Slippery Rock Township	0	0	0	0	0	0	0	0	5
Summit Township	0	0	0	0	2	1	0	0	2
Valencia Borough	0	0	0	0	0	0	0	0	0
Venango Township	0	0	0	0	0	1	0	0	0
Washington Township	0	0	0	0	1	1	0	0	0
West Liberty Borough	0	0	0	0	0	0	0	0	0
West Sunbury Borough	0	0	0	0	0	0	0	0	0
Winfield Township	0	0	0	0	0	1	0	0	0
Worth Township	1	0	0	0	0	1	0	0	0
Zelienople Borough	0	0	0	0	0	0	0	1	2
TOTAL	13	3	13	1	33	66	4	26	106

Note: Schools include all campus buildings associated with each school/college

3. Planning Process

3.1. Update Process and Participation Summary

A successful planning process builds partnerships and brings together members representing government agencies, the public, and other stakeholders to reach consensus on how the community will prepare for and respond to hazards that are most likely to occur. Applying a comprehensive and transparent process adds validity to the Plan. Those involved gain a better understanding of the problem or issue and how solutions and actions were devised. The result is an updated set of common community values and widespread support for directing financial, technical, and human resources to an agreed-upon action. The planning process has been an integral part of updating the Butler County Multi-Jurisdictional Hazard Mitigation Plan (HMP), which was originally adopted on September 8, 2004. This section describes Butler County’s update process and how the HMP evolved since it was first approved by the Federal Emergency Management Agency (FEMA).

The 2021 HMP Update was again led by Butler County Emergency Services, contracting with Michael Baker International, to assist in updating the Butler County HMP. In accordance with the Disaster Mitigation Act of 2000 (DMA 2000 § 203) requirements, this plan documents the following topics:

1. Planning process
2. Hazard identification
3. Risk assessment
4. Mitigation strategy: goals, actions, and projects
5. Formal adoption by the participating jurisdictions
6. PEMA and FEMA approval

During the 2004 update process, planners began by identifying the hazards that could significantly impact the County and its municipalities, and they determined these hazards’ economic, social, and environmental impacts. The Hazard Mitigation Local Planning Team (LPT) was also first formed by stakeholders to provide input on the plan. From planner analysis and stakeholder input, the County created an action strategy identifying technically feasible and cost-effective mitigation actions to reduce hazard impacts.

The County’s 2010 Hazard Mitigation Plan Update was initiated in August 2009. Through the 2010 update process the HMP underwent a restructure so that it met the requirements set forth by PEMA using the

The 2021 Butler County Hazard Mitigation Planning Team included:

- **Municipal Officials**
- **Butler County Departments, Commissions, and Boards**
- **State and Federal Agencies**
- **Neighboring Counties**
- **Sewer Authority**
- **School Districts**
- **Water Companies**

Pennsylvania Hazard Mitigation Standard Operating Guidance. The same format was used during the 2015 HMP update and was carried through to the 2021 HMP update as well.

During the 2021 update, stakeholder feedback was solicited through virtual meetings that had an in-person component, a project website, and written and electronic communication. The virtual component of the meeting was held via WebEx and a guidance sheet was included with all email invites to help attendees use the platform. The in person component of the meeting was held at the County Government Center, which is a central location in Butler County. All hazards were carried over from the previous HMP update. To comply with the 2020 Pennsylvania Hazard Mitigation Plan Standard Operating Guide, the War and Criminality profile was combined into the Terrorism and Civil Disturbance profiles, and the Environmental Hazards profile was broken out into Hazardous Materials, Conventional Oil and Gas Wells, Unconventional Oil and Gas Wells and Coal Mining. Also, Pandemic and Infectious Disease was added as a hazard to the HMP during the 2021 update, in order to address the current and future concerns related to pandemic health risks in the County. Stakeholders were asked to provide information on identified hazards and to assist with the Risk Factor ranking.

The mitigation strategy was reviewed by the Steering Committee and stakeholders provided information about what had been accomplished over the last five years along with actions and projects to be implemented moving forward.

The report format is structured in accordance with the most current planning guidance from FEMA, Local Mitigation Planning Handbook (2013), and PEMA, Standard Operating Guide (SOG) (2020). The 2020 HMP follows the Pennsylvania Model Plan Outline developed by PEMA in 2020 which provides a standardized format for all multi-jurisdictional HMPs in the Commonwealth of Pennsylvania. The Plan Update was led by the Hazard Mitigation Plan Steering Committee (HMPSC) and informed by the Hazard Mitigation Planning Team (HMPT). Community leaders and other agency and organizational stakeholders were invited by Butler County to participate in the Plan Update process.

It is important to note that this plan update took place during the COVID-19 pandemic with varying stay-at-home orders in place at the local and state level throughout. In an effort to ensure participation and minimize any barrier to entry, the HMSC took additional initiatives:

1. Offering (when possible) in person and virtual meeting options. An in-person option was offered when possible with safety precautions in place.
2. Providing meetings at two different times of the day (standard) and providing recordings of the meetings (new). The recordings, presentations, and applicable forms were all posted on the project website for later reference by the HMSC, HMPT, and general public.

3.2. The Planning Team

Members of the HMSC are listed below in Table 3.2-1. The HMPSC met multiple times throughout the planning process to discuss the plan update process. Topics discussed included FEMA and PEMA requirements and guidance, a schedule for deliverables and meetings, participation, contacts for the HMPT, and currently available data and documentation to inform the 2021 update.

Table 3.2-1 Butler County Hazard Mitigation Plan Steering Committee

PARTICIPANT	TITLE
Steve Bicehouse	Emergency Management Director, Butler County Emergency Services
Amy Marree	Emergency Management Planner, Butler County Emergency Services
Sheryl Kelly	Environmental Specialist and Recycling & Farmland Coordinator, Butler County Planning Commission
Mark Gordon	Chief of Economic Development and Planning, Butler County Planning Commission
Ashley Leslie	Director of GIS and Mapping, Butler County
Kevin Gray	Butler County Bridge Department

The HMPT was organized by the County, with assistance from the Mitigation Planning consultant, to plan meetings, collect information, and conduct outreach. Outreach was done in an effort to include stakeholders that are involved in hazard mitigation activities and stakeholders that have other interests that would provide a unique perspective to the planning process. From that outreach many stakeholders were involved in the update process, and the HMPT included municipal officials, Butler County government representatives, adjacent counties, non-profit organizations, state agencies, and other stakeholders such as regional watershed outreach groups and regional government and planning entities. Documentation pertaining to stakeholder participation, including invitations and sign in sheets, are provided in **Appendix C - Meeting and Other Participation Documentation**. Due to sensitive information in **Appendix C**, this appendix is not available to the public.

Stakeholders participated by attending meetings and submitting valuable input and feedback to inform the planning process in form of completed paper and online surveys, questionnaires, or verbal comment. The HMSC communicated with the HMPT with letters through post and email, telephone, webinar, in person meeting, and the project website. Post letters were sent to a range of municipal stakeholders including the community identified CEO and the Emergency Management Coordinator. Email invites were distributed to a wider range of stakeholders including municipal contacts, adjacent county representatives, school district and university representatives, sewer authorities, state agencies and other stakeholders that could provide insight into the planning process. A brief description of each meeting that was

held is provided in **Section 3.3**. In addition, detailed meeting minutes describing events of each meeting are available in **Appendix C**.

The stakeholders listed in Table 3.2-2 served on the 2021 countywide HMPT and actively participated in the planning process.

Table 3.2-2 Stakeholders Who Participated in the Planning Process

MUNICIPALITY/ORGANIZATION	PARTICIPANTS
Municipal Participants	
Adams Township	Scott Foreman, Emergency Management Coordinator
Allegheny Township	James Sullivan; Charles Stowe, Supervisor
Brady Township	Kristina McCullough
Bruin Borough	
Buffalo Township	Matt Sweeny, Supervisor; Michael George
Butler Township	Jesse Hines, Butler Township Zoning;
Butler, City	Jim Reeder, Butler City Fire Dept;
Callery Borough	Lorena Adams, Emergency Management Coordinator
Center Township	Randy Brown
Cherry Township	David Mishler
Cherry Valley Borough	
Chicora Borough	
Clay Township	
Clearfield Township	Ralph Snyder
Clinton Township	Adam Hartwig, Emergency Management Coordinator
Concord Township	Frank McCall
Connoquenessing Borough	Dan Cox; Vickie Forbes, Secretary/Treasurer
Connoquenessing Township	Dan Cox
Cranberry Township	Scott Garing, Chief Fire and Emergency Services
Donegal Township	Leslie Stewart, Secretary/Treasurer
East Butler Borough	Jim Angert, EMC
Eau Claire Borough	Jennifer Rottman, Administrator;
Evans City Borough	Dan Cox; Beth Crowley, Secretary Treasurer Evans City Borough; Cheri Deener-Kohan, President of Evans City Borough Council
Fairview Borough	
Fairview Township	
Forward Township	Lindsey Everett, Treasurer; Scott Marree; Steve Bicerhouse Municipal Emergency Management Coordinator; Amy Marree Municipal Emergency Management Coordinator
Franklin Township	Jeff McGarvey
Harmony Borough	John Kovacic, Deputy EMA

Table 3.2-2 Stakeholders Who Participated in the Planning Process

MUNICIPALITY/ORGANIZATION	PARTICIPANTS
Harrisville Borough	
Jackson Township	John Kovacic, Deputy EMA
Jefferson Township	Adam Hartwig, Emergency Management Coordinator; Leo Rosenbauer III
Karns City Borough	Eric Ritzert, Karns City Area School District
Lancaster Township	Christina Senft; John Kovacic, Deputy EMA
Marion Township	Doug Dick, EMC
Mars Borough	Chris Clutter, Emergency Management Coordinator
Mercer Township	Jason Yasment
Middlesex Township	Adam Hartwig, Emergency Management Coordinator
Muddy Creek Township	Vaughn Badger
Oakland Township	Gary Wulff
Parker Township	James R. Allen, Chair Board of Supervisors
Penn Township	Linda Zerfoss
Petrolia Borough	Vaughn Badger
Portersville Borough	James Bish
Prospect Borough	Brian Taylor, Council Member
Saxonburg Borough	David Felsing; Mary Papik
Seven Fields Borough	Robert Womer
Slippery Rock Borough	Shawn Pugh, Borough Manager
Slippery Rock Township	John Hines
Summit Township	David Barry, Emergency Management Coordinator
Valencia Borough	Brian Himmelstein, Council President; Krystal Schultz
Venango Township	
Washington Township	
West Liberty Borough	
West Sunbury Borough	
Winfield Township	Matt Klabnik, Board of Supervisors Chairman
Worth Township	Joshua McCracken, EMC
Zelienople Borough	John Kovacic, Deputy EMA
Other Stakeholder Participants	
Allegheny County	Charles Stowe
AM Water	Kevin Mortimer; Brent Robinson
Armstrong County	Michael Molluck, EMA; Becky Waugaman, Coordinator
Beaver County	Kelly Staschak, Emergency Services
Butler Area School District	Brian J White, Jr, Superintendent
Butler Area Sewer Authority	Dennis Mike, Superintendent of Treatment Plant Operations

Table 3.2-2 Stakeholders Who Participated in the Planning Process

MUNICIPALITY/ORGANIZATION	PARTICIPANTS
Butler City Firefighters	Jim Kaufman, President
Butler County Board of Commissioners	Leslie Osche, Chair; Kim Geyer, Commissioner
Butler County Community College	Brian Ortiz, Executive Director of Operations
Butler County Conservation District	Leo Rosenbauer, District Technician
Butler County Federated Library System	Cheryl Ferraro, System Administrator
Clarion County	Brett Whitling, Planner
Community Development Corporation of Butler County	Joe Saeler, Executive Director
Karns City Area School District	Eric Ritzert, Superintendent
Mars Area School District	Mark Gross, Superintendent
Moraine State Park	Park Manager
PA American Water Co	Kevin Mortimer
PA DEP Northwest Region	Kimberly Yeakle, Local Government Liaison; Erin Wells, Regional Director NW Regional Office
PEMA - Western Area Office	Michael Hajjar
PEMA Bureau of Recovery and Mitigation	Ernest Szabo, State Hazard Mitigation Planner
UPMC Sherwood Oaks	Mike Mills

3.3. Meetings and Documentation

The following meetings were held during the plan update process. Invitations, agendas, sign-in sheets, and minutes for these meetings are included in **Appendix C**.

March 23, 2021 - Planning Team Kick-Off Meeting was held virtually to discuss project scope, schedule, goals, the planning process, participation and engagement, and next steps. Hazards from the 2015 plan were reviewed with the HMPT at the kick-off. During this meeting, County staff, municipal representatives, and interested stakeholders provided vital information on changes in hazard risk and local capabilities to mitigate those risks since the last HMP update. Many municipalities indicated that they would like to include pandemic in the plan and indicated that utility interruption has become more prominent of a hazard. Municipal attendees were asked to complete a "Hazard-Risk Evaluation Form" to identify their jurisdictional risk to each hazard as well as a Capability Assessment Survey and an NFIP Survey.

Figure 3.3-1 Slide from Presentation at Kickoff Meeting on March 23, 2021.



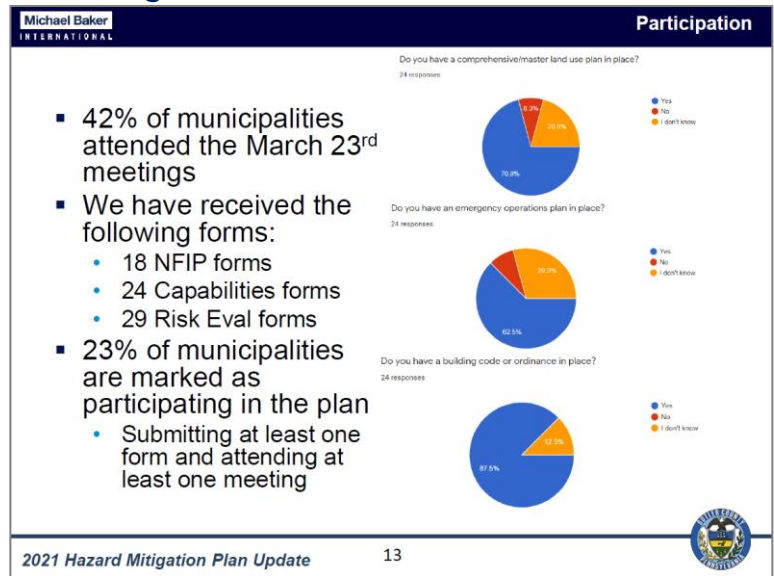
Links to complete each of these forms were provided in the meeting notes sent out in a follow-up email and posted to the project website. Each form was provided as both a google form and a PDF so that respondents could fill out the version that was easiest for them. Representatives from 23 communities and seven other stakeholder organizations were present at the Kick-Off Meetings.

May 11, 2021 - Steering Committee Meeting was held virtually and attended by County representatives and the consultant to go over the planning process and major milestones including the schedule for HMPT meetings and anticipated HMP submission dates. The group also discussed planning requirements, relevant stakeholders, the availability of geospatial data and other plans and documentation for integration.

June 22, 2021 - Steering Committee Logistics Call was held virtually and attended by County representatives, PEMA and the consultant to discuss Risk Assessment and Mitigation Solutions Meeting logistics including new hazards being profiled and municipal participation to date and to coordinate the timeline for submitting the plan to PEMA for review.

June 24, 2021 – Risk Assessment and Mitigation Solutions held virtually and in person to discuss Butler County’s hazard vulnerability and new hazards to be profiled in the 2021 HMP. Participants discussed progress of mitigation actions from the 2015 Plan Update and identified additional mitigation actions that would help reduce or eliminate potential losses. Municipal attendees were asked to complete a Risk Ranking Review Form and a 2015 Mitigation Action Review Form. They were also encouraged to complete a New Mitigation Action Form for any new actions they would like to include in the plan update. Links to complete each of these forms were provided in the meeting notes sent out in a follow-up email and posted to the project website. Each form was provided as both a google form and a PDF so that respondents could fill out the version that was easiest for them. Attendees asked questions about participation in the planning process, filling out the forms and how to best incorporate mitigation efforts into their responses. At these meetings there were 41 people in attendance. Significant outreach efforts between March and June helped increase participation from the first meeting.

Figure 3.3-2 Slide from Presentation at Mitigation Solutions Meeting on June 24, 2021.



July 9, 2021 – Steering Committee Guidance Meeting was held virtually and attended by County representatives, PEMA, FEMA and the consultant to discuss the project review logistics timeline as well as recommendations to encourage and enhance plan participation. Guidance was provided by PEMA and FEMA on the project timeline and plan components.

August 10, 2021 – Draft Plan Review Meeting held virtually and in person to discuss the plan review process with the public. The purpose of this final HMPT meeting was to provide information about the update process, evaluation, and general findings in the Butler County HMP. The HMSC also explained to participants how to review and submit comments on the Draft HMP, as well as a final timeline for the review and submission of the HMP to PEMA and FEMA. A form to provide comments on the plan was posted to the project website and presented on during the meeting. Draft Plan Review Meeting attendees were provided a link to the comment form in follow-up meeting notes and stakeholders were encouraged to also share the plan and form with the public. There were 34 people in attendance at these meetings.

3.4. Public & Stakeholder Participation

Each municipality was given multiple opportunities to participate in the plan update process through invitation to above outlined meetings, review of risk assessment results and mitigation actions, and an opportunity to comment on a final draft of the 2021 Hazard Mitigation Plan Update. The tools listed below were distributed at meetings, in meeting follow-up emails and on the plan update website to solicit information, data, and comments from both local municipalities and other key stakeholders in Butler County. Responses to these worksheets and surveys are included in **Appendix C**.

Figure 3.4-1 Butler County 2021 HMP Update Website

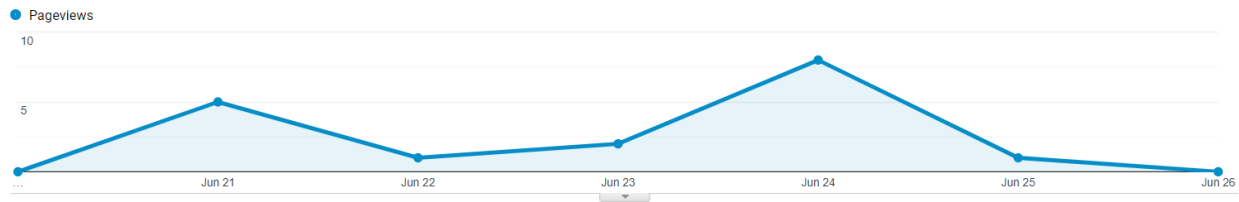


- **Capability Assessment Survey:** Collects information on local planning, regulatory, administrative, technical, fiscal, political, and resiliency capabilities that can be included in the plan’s Capability Assessment section.
- **Hazard Risk Evaluation Form:** Collects information from the HMPT regarding whether there have been changes to the frequency of occurrence, magnitude of impact, or geographic extent of hazards identified in the 2015 plan. In addition, the form asks members of the HMPT to select any additional hazards they believe should be considered for inclusion in the 2021 plan.
- **National Flood Insurance Policy (NFIP) Survey:** Collects information on each municipality’s floodplain management and ordinance enforcement related to NFIP standards and requirements.
- **Mitigation Progress Report:** This form was specific to each jurisdiction and included all actions for that jurisdiction in the 2015 HMP with space to provide the current status of each action and document any progress made.
- **New Mitigation Action Form:** This form was provided to communities that wanted to include a new action in the HMP. The purpose was to collect details about the action, including priority, responsible parties, potential partners, potential funding sources, implementation timeframe, and more.

Community participation and comment was encouraged throughout the planning process, particularly through the project website, <https://www.pennsylvaniiahmp.com/butler-hmp>. This site acted as a repository for the entire planning process, including presentations (PPT and meeting recordings), agendas, minutes, and worksheets from each meeting. The site was made publicly available. Since the site was published in March 2021, the County has

monitored the number of site visits. Some of the highest views occurred on and leading up to the RAMS meeting (June 24th), as shown in Figure 3.4-2 below.

Figure 3.4-2 Sample Website Analytics



Butler County posted the 2021 Draft Hazard Mitigation Plan Update on the plan update website (<https://www.pennsylvaniiahmp.com/butler-hmp>) for review and comment on August 9, 2021. In addition, an invitation to the public to review and comment on the draft plan was posted in the local newspaper and on the plan website. The public notice was included in the local newspaper for three days, in an effort to garner additional awareness and feedback. Comments were to be submitted in via the online comment form or in writing to Devon DelVecchio (Consultant) by mail or email. Two comment forms were received and the input provided was incorporated into the plan. These comment forms are included in **Appendix C**.

Figure 3.4-3 Public Notice Posted in the Butler Eagle

PUBLIC NOTICE
 Butler County is updating their Hazard Mitigation Plan (HMP). The HMP includes an overview to local hazards and possible actions communities can take to reduce risk. The Draft Plan will be available for public review and comment for 30 days starting August 9, 2021. The Draft Plan meeting will be on August 11, 2021. For more information visit <https://www.pennsylvaniiahmp.com/butler-hmp>. If you would like to join or have questions about the plan and process, please contact Planning Contractor Devon Delvecchio at Devon.Delvecchio@mbakerintl.com (215-861-9311).

3.5. Multi-Jurisdictional Planning

This HMP was developed using a multi-jurisdictional approach. Although County-level departments have resources such as technical expertise and data that local jurisdictions may lack, involvement from local municipalities is critical to the collection of local knowledge related to hazard events. Local municipalities also have the legal authority to enforce compliance with land use planning and development. The HMSC and HMPT committed to garnering municipal participation.

Table 3.5-1 documents jurisdictional presence at the meetings described in **Section 3.3** and other involvement from each jurisdiction throughout the planning process. Each municipality was emailed and mailed invitations to all meetings if email addresses were available, as well as reminders emails prior to each meeting. Surveys and forms were emailed to jurisdictions after each meeting and also posted to the project website. About 72 percent of the municipalities, 41 of 57 total municipalities, attended at least one meeting and completed one form.

Figure 3.5-1 Summary of Participation from Local Municipalities During the 2021 Hazard Mitigation Planning Process

Jurisdiction	2021 Participation	Previous Plan Participation				Documentation Provided						
		Kick-Off Meeting	RAMS Meeting	Draft Plan Review Meeting	Other Meeting	Risk Evaluation	Jurisdictional Risk Ranking	NFIP Guide	Capability Assessment	2015 Mitigation Action Review	New Action	Provided Other Input
Adams Township	○	○	○	○	○	○		○	○	○		
Allegheny Township	○	○	○	○		○				○	○	
Brady Township	○		○		○	○				○		
Bruin Borough												
Buffalo Township	○	○								○		
Butler Township	○	○		○	○	○	○	○	○			
Butler, City	○	○			○	○				○		
Callery Borough	○	○	○	○		○	○	○	○	○	○	
Center Township	○		○			○	○	○	○	○	○	
Cherry Township	○	○		○	○	○	○			○		
Cherry Valley Borough												
Chicora Borough						○		○	○			
Clay Township												
Clearfield Township	○	○		○		○	○	○	○	○	○	
Clinton Township	○			○		○						
Concord Township	○	○	○	○	○	○		○	○			
Connoquenessing Borough	○	○	○	○		○		○	○			
Connoquenessing Township	○	○	○	○	○	○		○	○			
Cranberry Township	○	○	○	○	○	○		○	○			
Donegal Township	○		○			○		○	○			
East Butler Borough	○		○	○		○		○	○			
Eau Claire Borough		○			○	○						
Evans City Borough	○	○	○	○	○	○		○	○			
Fairview Borough												
Fairview Township												

Figure 3.5-1 Summary of Participation from Local Municipalities During the 2021 Hazard Mitigation Planning Process

Jurisdiction	2021 Participation	Previous Plan Participation				Documentation Provided						
		Kick-Off Meeting	RAMS Meeting	Draft Plan Review Meeting	Other Meeting	Risk Evaluation	Jurisdictional Risk Ranking	NFIP Guide	Capability Assessment	2015 Mitigation Action Review	New Action	Provided Other Input
Forward Township	○	○	○	○	○	○			○			
Franklin Township	○	○	○	○		○						
Harmony Borough	○		○	○	○	○	○		○	○	○	
Harrisville Borough												
Jackson Township	○		○		○							○
Jefferson Township	○		○			○						
Karns City Borough			○									
Lancaster Township	○	○	○			○			○			
Marion Township												
Mars Borough	○	○	○			○		○	○			
Mercer Township	○			○		○	○	○	○	○	○	
Middlesex Township	○		○			○						
Muddy Creek Township	○	○							○			
Oakland Township		○										
Parker Township				○								
Penn Township	○		○	○	○	○	○	○	○	○		
Petrolia Borough		○				○						
Portersville Borough	○	○		○								
Prospect Borough	○				○	○		○	○			
Saxonburg Borough	○	○	○	○	○	○		○	○			
Seven Fields Borough	○	○		○		○		○	○			
Slippery Rock Borough	○		○	○	○	○			○	○	○	
Slippery Rock Township	○		○	○		○			○			
Summit Township	○	○	○	○		○		○	○			
Valencia Borough	○		○		○	○		○	○	○		
Venango Township												

Figure 3.5-1 Summary of Participation from Local Municipalities During the 2021 Hazard Mitigation Planning Process

Jurisdiction	2021 Participation	Previous Plan Participation				Documentation Provided						
		Kick-Off Meeting	RAMS Meeting	Draft Plan Review Meeting	Other Meeting	Risk Evaluation	Jurisdictional Risk Ranking	NFIP Guide	Capability Assessment	2015 Mitigation Action Review	New Action	Provided Other Input
Washington Township	○				○	○						
West Liberty Borough												
West Sunbury Borough												
Winfield Township	○				○	○						
Worth Township	○	○	○			○		○	○			
Zelienople Borough			○									

4. Risk Assessment

4.1. Update Process Summary

Hazard profiles in the 2021 HMP include the following Natural and Human-Made Hazards:

- Drought
- Earthquake
- Flood, Flash Flood, Ice Jam
- Landslide
- Pandemic and Infectious Disease
- Radon Exposure
- Subsidence, Sinkhole
- Tornado and Windstorm
- Wildfire
- Winter Storm
- Civil Disturbance
- Dam Failure
- Environmental Hazards
 - Coal Mining Incidents
 - Conventional Oil and Gas Well Incidents
 - Hazardous Materials Release
 - Unconventional Oil and Gas Well Incidents
- Nuclear Incident
- Terrorism
- Transportation Incidents
- Urban Fire and Explosion
- Utility Interruption

The risk assessment is required to include a description of the type of all hazards that can affect the jurisdiction. To reduce the potential for damage due to hazards, it is necessary to identify hazards that may affect the County. This risk assessment provides a factual basis for activities proposed by the County in their mitigation strategy. Hazards that may affect Butler County are identified and defined in terms of location and geographic extent, magnitude of impact, previous events, and likelihood of future occurrence (Emergency Management and Assistance, 2021). All information from the previous plan has been incorporated and/or updated in the 2021 Butler County HMP Update. In addition, new data sources and analysis have been incorporated throughout the Risk Assessment. Anecdotal information provided by the HMPT was incorporated in appropriate hazard profiles.

The 2010 Butler County HMP identified six natural hazards and eight human-made hazards impacting the County. In the 2015 HMP, the HMSC split two profiles and added one natural hazard to include a total of 18 hazards. Fire Hazard (Urban and Wild) was separated into the Wildfire and Urban Fire and Explosion profiles. Terrorism, Criminal Activity, or Civil Disturbance was separated into three profiles: Civil Disturbance, Terrorism, and War and Criminal Activity. Radon Exposure was added for inclusion in the 2015 HMP process. In addition, both the 2010 and 2015 Plans re-arranged the hazard profiles to be compliant with the Commonwealth of Pennsylvania’s Standard Operating Guide.

For the 2021 Plan Update, the HMSC reviewed the previously identified hazards and ensured that they remained currently relevant hazards. The HMSC also reviewed the updated Pennsylvania Standard List of Hazards for consideration in the updated Risk Assessment. The HMSC identified one additional hazard for inclusion in the Plan Update: Pandemic and Infectious Disease. Along with the Pandemic Profile, **Appendix H – COVID-19** Pandemic was

also created to provide information and mitigation ideas for the ongoing pandemic. The decision was based on the ongoing COVID-19 pandemic that has had global impacts. The hazards selected by the HMSC were then reviewed at the July 24, 2021 Risk Assessment and Mitigation Solutions Workshop. The municipalities completed an Evaluation of Hazards and Risk Form to indicate their jurisdictional risk to each hazard that would be profiled in the 2021 plan. The HMSC reviewed comments and feedback to inform the Risk Assessment and Risk Assessment Prioritization Matrix.

In the 2021 HMP Update, Butler County decided to focus on the impacts and changes of high-risk hazards since 2015. Mapping and vulnerability analyses for these hazards were reviewed and updated during the 2021 planning process. Medium and low-risk hazard profiles were shortened to focus on the most pertinent information between the 2015 HMP and present day. Mapping and vulnerability analyses for these hazards can be referenced in **Appendix I – Medium and Low Risk Natural Hazards**. It is understood that there is the possibility for any hazard profiled in this plan to occur in Butler County, regardless of its risk ranking. The County anticipates updating hazard profiles for medium and low risk hazards more extensively on an as-needed basis to respond to and prepare for changing risks.

Additionally, several changes were made to the organization of the hazard profiles per PEMA's updated 2020 SOG. The Environmental Hazards profiled in the 2015 Plan were separated into four distinct profiles. The Mining Subsidence profile was renamed to Subsidence, Sinkhole and moved to the natural hazards section of the Risk Assessment. Coal mining related hazards are covered in this profile and the Coal Mining Environmental Hazards profile. Finally, the War and Criminal Activity hazard profile was combined with the Terrorism hazard profile. Table 4.1.1-1 details the hazards included in the 2021 HMP, the year they were first identified for inclusion, a description of how they've evolved, and their 2015 risk ranking.

Table 4.1.1-1 Natural and Human-Made Hazards by Year Identified for Inclusion in Butler County HMP

HAZARD	YEAR	DESCRIPTION	2021 RISK RANKING
Drought	2010	-	Low
Earthquake	2010	-	Low
Flood, Flash Flood, Ice Jam	2010	-	High
Landslides	2010	-	Low
Pandemic and Infectious Disease	2021	Identified for inclusion in the 2021 HMP Update.	High
Radon Exposure	2015	Identified for inclusion in the 2015 HMP Update.	Medium
Sinkhole, Subsidence	2010	Originally identified as Mining Subsidence. Title updated to Sinkhole, Subsidence in 2021 to adhere to PEMA SOG guidelines. Coal mining related hazards are covered in this profile and the Coal Mining Environmental Hazards profile.	Medium
Tornado, Wind Storm	2010	-	High
Wildfire	2010	Originally combined with "Urban Fire and Explosion" in the 2010 HMP. Separated in 2015 to focus on vulnerabilities of different fire hazards.	Low
Winter Storms	2010	-	High
Civil Disturbance	2010	Originally combined with "Terrorism" and "War and Criminal Activity" in the 2010 HMP. Separated in 2015 to focus on vulnerabilities of different types of hazards.	Low
Dam Failure	2010	-	Medium
Environmental Hazards: Coal Mining Incidents	2021	Identified for inclusion in the 2010 HMP as "Hazardous Materials." The profile was expanded in 2015 to include risk and vulnerabilities related to hazardous material sites, coal mining hazards, and conventional and unconventional oil wells. These have been separated into four distinct profiles in the 2021 HMP to adhere to PEMA SOG guidelines.	High
Environmental Hazards: Conventional Oil and Gas Well Incidents	2021	Identified for inclusion in the 2010 HMP as "Hazardous Materials." The profile was expanded in 2015 to include risk and vulnerabilities related to hazardous material sites, coal mining hazards, and conventional and unconventional oil wells. These have been separated into four distinct profiles in the 2021 HMP to adhere to PEMA SOG guidelines.	High

Table 4.1.1-1 Natural and Human-Made Hazards by Year Identified for Inclusion in Butler County HMP

HAZARD	YEAR	DESCRIPTION	2021 RISK RANKING
Environmental Hazards: Hazardous Material Release Incidents	2021	Identified for inclusion in the 2010 HMP as "Hazardous Materials." The profile was expanded in 2015 to include risk and vulnerabilities related to hazardous material sites, coal mining hazards, and conventional and unconventional oil wells. These have been separated into four distinct profiles in the 2021 HMP to adhere to PEMA SOG guidelines.	High
Environmental Hazards: Unconventional Oil and Gas Well Incidents	2021	Identified for inclusion in the 2010 HMP as "Hazardous Materials." The profile was expanded in 2015 to include risk and vulnerabilities related to hazardous material sites, coal mining hazards, and conventional and unconventional oil wells. These have been separated into four distinct profiles in the 2021 HMP to adhere to PEMA SOG guidelines.	High
Nuclear Incidents	2010	-	High
Terrorism	2010	Originally combined with "Civil Disturbance" and "War and Criminal Activity" in the 2010 HMP. Separated in 2015 to focus on vulnerabilities of different types of hazards. Combined with the "War and Criminal Activity" profile in the 2021 HMP to adhere to PEMA SOG guidelines.	Low
Transportation Accidents	2010	-	High
Urban Fire and Explosion	2010	Originally combined with "Wildfire" in the 2010 HMP. Separated in 2015 to focus on vulnerabilities of different fire hazards.	Medium
Utility Interruption	2010	-	Medium

Following hazard identification and profiling, a vulnerability assessment was performed to identify the impact of natural hazard events on people, buildings, infrastructure, and the community. Each natural hazard is discussed in terms of its potential impact on individual communities in Butler County, including the types of parcels and critical facilities that may be at risk. The assessment allows the County and its municipalities to focus mitigation efforts on areas most likely to be damaged or most likely to require early response to a hazard event. A vulnerability analysis was performed which identifies structures, critical facilities, or people that may be impacted by hazard events and describes what those events can do to physical, social, and economic assets. Depending upon data availability, assessment results consist of an inventory of vulnerable structures or populations.

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

4.2. Hazard Identification

4.2.1. Table of Presidential Disaster Declarations

Under the Stafford Act, there are two forms of presidential action that authorize federal disaster assistance dollars. Presidential Emergency Declarations are intended to spur activities that will protect property and strengthen public safety to lessen impacts or avoid a catastrophic event. Presidential Disaster Declarations are made as a result of a disaster event and provide supplemental coordination and financial assistance beyond the ability of state and local governments (McCarthy, 2011). Because of this difference in these declarations, a single event may qualify for both kinds of declarations.

There is no financial threshold for an Emergency Declaration, but there are two thresholds for Presidential Disaster Declarations established under the Stafford Act: a state and a county threshold. These thresholds are based on a formula that uses the population of a jurisdiction (as recorded in the decennial census) times a set per capita indicator. For federal fiscal year 2021, these thresholds are \$3.89 per capita for counties and \$1.55 per capita for the state. With a population of over 180,000 the Butler County threshold is over seven hundred thousand dollars. State and County thresholds must be simultaneously attained for a Presidential Disaster Declaration to be issued.

Table 4.2.1-1 identifies Presidential Disaster and Emergency Declarations issued between 1955 through 2021 that have affected Butler County. Additional declarations beyond 2021 can be found on the FEMA website at: <https://www.fema.gov/disasters/disaster-declarations>. A list of past presidential disaster declarations through June 2021 in Butler County is provided in Table 4.2.1-1.

Table 4.2.1-1 Presidential Disaster and Emergency Declarations in Butler County (FEMA, 2021a)

DECLARATION NUMBER	DECLARATION DATE	EVENT
DR 40	August 20, 1955	Floods and Rains
DR 51	March 15, 1956	Flood
DR 58	May 21, 1956	Severe Storm
DR 61	August 9, 1956	Storm
DR 89	January 23, 1959	Floods
DR 340	June 23, 1972	Tropical Storm Agnes

Table 4.2.1-1 Presidential Disaster and Emergency Declarations in Butler County (FEMA, 2021a)

DECLARATION NUMBER	DECLARATION DATE	EVENT
DR 629	August 19, 1980	Severe Storms, Flooding
DR 737	June 3, 1985	Severe Storms, High Winds, Tornadoes
EM 3105	March 16, 1993	Severe Snowfall and Winter Storm
DR 1093	January 13, 1996	Flooding
DR 1085	January 21, 1996	Blizzard
DR 1485	August 23, 2003	Severe Storms, Tornadoes, and Flooding
DR 1555	September 19, 2004	Severe Storms and Flooding associated with Tropical Depression Francis
DR 1557	September 19, 2004	Tropical Depression Ivan
EM 3235	September 10, 2005	Hurricane Katrina
DR 1898	April 16, 2010	Severe Winter Storms and Snowstorms
DR 4003	July 13, 2011	Severe Storms and Flooding
DR 4025	September 3, 2011	Hurricane Irene
DR 4030	September 12, 2011	Tropical Storm Lee
EM 3356	October 29, 2012	Hurricane Sandy
DR 4099	January 10, 2013	Hurricane Sandy
DR 4149	October 1, 2013	Severe Storms, Tornadoes, and Flooding
EM 3441	March 13, 2020	COVID-19
DR 4506	March 30, 2020	Pandemic (COVID-19)

Since 1955, declarations have been issued for various hazard events including hurricanes or tropical storms, severe summer and winter storms, and flooding. A unique Presidential Emergency Declaration was issued in September 2005. Through Emergency Declaration 3235, Presidents George W. Bush declared that a state of emergency existed in the Commonwealth of Pennsylvania and ordered federal aid to supplement Commonwealth and local response efforts to help people evacuated from their homes due to Hurricane Katrina. All counties within the Commonwealth, including Butler County, were indirectly affected by Hurricane Katrina as a result of evacuee assistance. Most recently, in March 2020, a major disaster declaration was declared nationwide in response to the COVID-19 pandemic. In Pennsylvania, the declaration awarded public assistance for emergency work related to emergency protective measures to the Commonwealth and eligible local governments. The disaster is still open for public assistance claims over one year later in July 2021 (FEMA, 2021b).

4.2.2. Summary of Hazards

Following a review of the hazards evaluated in the 2010 and 2015 HMPs and the Standard List of Hazards, the HMSC along with input from the HMPT decided that the 2021 plan should

identify, profile, and analyze 21 hazards. These 21 hazards include all hazards profiles in the 2015 Plan with the addition of Pandemic and Infectious Disease, and splitting Environmental Hazards (Coal Mining Incidents, Hazardous Materials Release, Conventional Oil and Gas Wells, and Unconventional Oil and Gas Wells) into four separate hazards and combining the Terrorism and War and Criminal Activity profiles.

Table 4.2.2-1 contains a complete list of the 21 potential hazards in Butler County identified through previous Risk Assessments, the County Hazards Vulnerability Analysis, and input from those that participated in the 2021 HMP Update. Hazard profiles are included in **Section 4.3** for each of these hazards. Full profiles for all high risk hazards are included, and shortened profiles for all medium and low risk hazards are included in the main plan. Additional details for medium and low risk hazards can be found in **Appendix I - Medium and Low Risk Natural Hazards**.

Table 4.2.2-1 List and Description of Natural and Manmade Hazards Profiled in the 2021 Hazard Mitigation Plan Update (PEMA, 2020)

HAZARD	HAZARD DESCRIPTION
NATURAL HAZARDS	
 <p data-bbox="266 562 399 604">Drought</p>	<p data-bbox="477 373 1471 617">Drought is defined as a deficiency of precipitation experienced over an extended period of time, usually a season or more. Droughts increase the risk of other hazards, like wildfires, flash floods, and landslides or debris flows. This hazard is of particular concern in Pennsylvania due to the prevalence of farms and other water-dependent industries, water-dependent recreation uses, and residents who depend on wells for drinking water.</p>
 <p data-bbox="250 842 415 884">Earthquake</p>	<p data-bbox="477 653 1471 932">An earthquake is the motion or trembling of the ground produced by sudden displacement of rock usually within the upper 10-20 miles of the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of underground caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in loss of life and injury to hundreds of thousands of persons, and disrupt the social and economic functioning of the affected area.</p>
 <p data-bbox="266 1199 399 1241">Floods</p>	<p data-bbox="477 953 1471 1339">Flooding is the temporary condition of partial or complete inundation of normally dry land, and it is the most frequent and costly of all-natural hazards in Pennsylvania. Flash flooding is usually a result of heavy localized precipitation falling in a short time period over a given location, often along mountain streams and in urban areas where much of the ground is covered by impervious surfaces. Winter flooding can include ice jams which occur when warm temperatures and heavy rain cause snow to melt rapidly. Snow melt combined with heavy rains can cause frozen rivers to swell, which breaks the ice layer on top of a river. The ice layer often breaks into large chunks, which float downstream, piling up in narrow passages and near other obstructions such as bridges and dams.</p>
 <p data-bbox="250 1535 415 1577">Landslide</p>	<p data-bbox="477 1358 1471 1598">In a landslide, masses of rock, earth or debris move down a slope. Landslides can be caused by a variety of factors, including earthquakes, storms, fire, and human modification of land. Areas that are prone to landslide hazards include previous landslide areas, areas on or at the base of slopes, areas in or at the base of drainage hollows, developed hillsides with leach field septic systems, and areas recently burned by forest or brush fires.</p>

Table 4.2.2-1 List and Description of Natural and Manmade Hazards Profiled in the 2021 Hazard Mitigation Plan Update (PEMA, 2020)

HAZARD	HAZARD DESCRIPTION
	<p>A pandemic is a global outbreak of disease that occurs when a new virus emerges in the human population, spreading easily in a sustained manner, and causing serious illness. An epidemic describes a smaller-scale infectious outbreak, within a region or population, that emerges at a disproportional rate. Infectious disease outbreaks may be widely dispersed geographically, impact large numbers of the population, and could arrive in waves lasting several months at a time.</p>
	<p>Radon is a radioactive gas produced by the breakdown of uranium in soil and rock that can lead to lung cancer in people exposed over a long period of time. Most exposure comes from breathing in radon gas that enters homes and buildings through foundation cracks and other openings. According to the DEP, approximately 40% of Pennsylvania homes have elevated radon levels.</p>
	<p>Land subsidence is a gradual settling or sudden sinking of the ground surface due to the movement of subsurface materials. A sinkhole is a subsidence feature resulting from the sinking of surficial material into a pre-existing subsurface void. Subsidence and sinkholes are geologic hazards that can impact roadways and buildings and disrupt utility services. Subsidence and sinkholes are most common in areas underlain by limestone and can be exacerbated by human activities such as water, natural gas, and oil extraction.</p>
	<p>A tornado is a narrow, violently rotating column of air that extends from the base of a thunderstorm to the ground. About 1,250 tornadoes hit the U.S. each year, with about 16 hitting Pennsylvania. Damaging winds exceeding 50-60 miles per hour can occur during tornadoes, severe thunderstorms, winter storms, or coastal storms. These winds can have severe impacts on buildings, pulling off the roof covering, roof deck, or wall siding and pushing or pulling off the windows.</p>
	<p>A wildfire is an unplanned fire that burns in a natural area. Wildfires can cause injuries or death and can ruin homes in their path. Wildfires can be caused by humans or lightning, and can happen anytime, though the risk increases in period of little rain. In Pennsylvania, 98% of wildfires are caused by people.</p>

Table 4.2.2-1 List and Description of Natural and Manmade Hazards Profiled in the 2021 Hazard Mitigation Plan Update (PEMA, 2020)

HAZARD	HAZARD DESCRIPTION
	<p>A winter storm is a storm in which the main types of precipitation are snow, sleet, or freezing rain. A winter storm can range from a moderate snowfall or ice event over a period of a few hours to blizzard conditions with wind-driven snow that lasts for several days. Most deaths from winter storms are not directly related to the storm itself, but result from traffic incidents on icy roads, medical emergencies while shoveling snow, or hypothermia from prolonged exposure to cold.</p>
<p>HUMAN MADE HAZARDS</p>	
	<p>A civil disturbance is defined by FEMA as a civil unrest activity (such as a demonstration, riot, or strike) that disrupts a community and requires intervention to maintain public safety.</p>
	<p>Dam failure is the uncontrolled release of water (and any associated wastes) from a dam. This hazard often results from a combination of natural and human causes, and can follow other hazards such as hurricanes, earthquakes, and landslides. The consequences of dam failures can include property and environmental damage and loss of life.</p>
	<p>Major impacts from mining include surface-elevation changes and subsidence, modification of vegetation, the chemical degradation and flow redistribution of surface water and groundwater, the creation of mine voids and entry openings, adverse aesthetic impacts, and changes in land use.</p> <p>In addition, active and abandoned mines can result in injury and loss of human life. This can occur in active mines where workers are injured or killed by mine collapse, entrapment, poisonous gases, inundation, explosions, fires, equipment malfunction, and improper ventilation. Injuries and death, such as All-Terrain Vehicle (ATV) accidents, falling, and drowning, can also occur in abandoned mines.</p>
	<p>As is the case with all-natural resource extraction, a variety of potential hazards exist with oil and gas extraction. Abandoned oil and gas wells that are not properly plugged can contaminate groundwater and consequently domestic drinking water wells. Surface waters and soil are sometimes polluted by brine, a salty wastewater product of oil and gas well drilling, and from oil spills occurring at the drilling site or from a pipeline breach. This can degrade public drinking water supplies and be particularly detrimental to vegetation and aquatic animals.</p>

Table 4.2.2-1 List and Description of Natural and Manmade Hazards Profiled in the 2021 Hazard Mitigation Plan Update (PEMA, 2020)








HAZARD	HAZARD DESCRIPTION
 <p>Hazardous Materials</p>	<p>Hazardous material releases can contaminate air, water, and soils and have the potential to cause injury or death. Dispersion can take place rapidly when transported by water and wind. While often accidental, releases can occur as a result of human carelessness, intentional acts, or natural hazards. When caused by natural hazards, these incidents are known as secondary events.</p>
 <p>Unconvent'l Wells</p>	<p>In addition to the traditional hazards associated with oil and gas well drilling, potential impacts from Marcellus Shale gas well drilling include: surface water depletion from high consumptive use with low return rates affecting drinking water supplies, and aquatic ecosystems and organisms; contaminated surface and groundwater resulting from hydraulic fracturing and the recovery of contaminated hydraulic fracturing fluid; and mishandling of solid toxic waste.</p>
 <p>Nuclear Incidents</p>	<p>Nuclear explosions can cause significant damage and casualties from blast, heat, and radiation. The primary concern following a nuclear accident or nuclear attack is the extent of radiation, inhalation, and ingestion of radioactive isotopes which can cause acute health effects (e.g. death, burns, severe impairment), chronic health effects (e.g. cancer), and psychological effects.</p>
 <p>Terrorism</p>	<p>Terrorism is use of force or violence against persons or property with the intent to intimidate or coerce. Acts of terrorism include threats of terrorism; assassinations; kidnappings; hijackings; bomb scares and bombings; cyber-attacks (computer-based); and the use of chemical, biological, nuclear, and radiological weapons. Cyber-attacks have become an increasingly pressing concern.</p>
 <p>Transport. Incidents</p>	<p>Transportation incidents are technological hazards involving the nation's system of land, sea, and air transportation infrastructure. A flaw or breakdown in any component of this system can and often does result in a major disaster involving loss of life, injuries, property and environmental damage, and economic consequences.</p>
 <p>Urban Fire /Explosion</p>	<p>Urban fire and explosion hazards include vehicle and building/structure fires as well as overpressure rupture, overheating, and other explosions that do not ignite. This hazard occurs in denser, more urbanized areas statewide and most often occurs in residential structures. Nationally, fires cause over 3,000 deaths and approximately 16,000 injuries each year.</p>

Table 4.2.2-1 List and Description of Natural and Manmade Hazards Profiled in the 2021 Hazard Mitigation Plan Update (PEMA, 2020)

HAZARD	HAZARD DESCRIPTION
	<p>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:</p> <ul style="list-style-type: none"> • Geomagnetic Storms • Fuel or Resource Shortage • Electromagnetic Pulse • Information Technology Failure • Ancillary Support Equipment • Public Works Failure • Telecommunications System Failure • Transmission Facility or Linear Utility Accident • Major Energy, Power, Utility Failure

4.3. Hazard Profiles

NATURAL HAZARDS



4.3.1. Drought

4.3.1.1. Location and Extent

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 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 areas across the Commonwealth. A prolonged drought could severely affect these sectors of the local economy, as well as residents who depend on wells for drinking water and other personal uses (NDMC, 2021).

The entirety of Butler County can be subject to droughts, but no particular areas are prone to water shortages. The main type of drought that affects Butler County is a hydrological drought. A hydrologic drought results when there is a shift in normal weather patterns over an area causing the amount of precipitation to fall significantly below the long-termed average. Conversely, a water management drought results not from a reduction in supply, but a disparity in supply versus demand. Poor water management practices and/or community planning generally cause this condition.

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

4.3.1.2. Range of Magnitude

Droughts can have varying effects, depending upon what month they occur, severity, duration, and location. Some droughts have their greatest impact on agriculture and even short-term droughts, when coupled with extreme temperatures can be devastating. Others may impact water supply or other water use activities such as recreation. Most droughts cause direct impacts to aquatic resources. Drought events are defined by rainfall amounts, vegetation conditions, soil-moisture conditions, water levels in reservoirs, stream flow, agricultural productivity, or economic impacts. Refer to the **Appendix I – Medium and Low Risk Natural Hazards** for more information on impacts from drought in Butler County

4.3.1.3. Past Occurrence

Based on data collected by NOAA since 1950, Butler County experienced severe drought emergencies in 1985 and 1992. These situations resulted from reduced rainfall and affected public and private water supplies. Drought emergencies were declared, and water restrictions

were put into place. Refer to **Appendix I – Medium and Low Risk Natural Hazards** for a list of droughts the County has experienced.

4.3.1.4. Future Occurrence

Butler County has experienced droughts in the past and the potential exists for the County to experience droughts in the future. Increases in water usages and leakage may result in a deficiency in coming years. Overall, the probability of future drought events can be considered *unlikely* according to the Risk Factor Methodology (see Table 4.4.1-1).

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.



4.3.2. Earthquake

4.3.2.1. Location and Extent

An earthquake is the motion or trembling of the ground produced by sudden displacement of rock usually within the upper 10 - 20 miles of the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of underground caverns. They can also result from human activity like mine blasts and nuclear experiments. The closest fault line that might contribute to an earthquake in Butler County is the Mid-Atlantic Ridge, which is approximately 2,000 miles to the east of Pennsylvania. As regional hazards, an earthquake would affect all of Butler County. Earthquakes can cause damage to buildings and other rigid superstructures, depending on factors like magnitude, distance of local areas to the epicenter, and local geologic conditions. It remains incredibly difficult to predict when and where an earthquake will occur in the northeast U.S. and Pennsylvania (DCNR, 2003).

Earthquake events in Pennsylvania typically do not impact areas greater than 100 km (62 miles) from the epicenter, and earthquake epicenters in Butler County are rare (DCNR, 2003). The area is generally not known for seismicity, and USGS downgraded the probabilistic seismic hazard for much of Pennsylvania in 2014. Butler County lies in the 0.04 zone, indicating that the hazard is unlikely (USGS, 2014). Refer to the Earthquake hazard profile in **Appendix I - Medium and Low Risk Natural Hazards** for a map showing seismic hazard potential throughout the Commonwealth.

4.3.2.2. Range of Magnitude

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 due to ground shaking which is dependent upon amplitude and duration of the earthquake (FEMA, 1997).

The effect an earthquake event has on an area is typically measured in terms of earthquake intensity. Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale based on direct and indirect measurements of seismic effects. A detailed description of the Modified Mercalli Intensity Scale is included in **Appendix I - Medium and Low Risk Natural Hazards**. The earthquakes that occur in Pennsylvania originate deep within the Earth's crust, and not on an active fault. Therefore, little or no damage is expected.

Recent earthquakes in Pennsylvania have been measured from IV to VI on the Modified Mercalli Intensity Scale. Earthquakes originating from outside Pennsylvania, can also impact the Commonwealth, as was the case with a magnitude 5.8 earthquake in Virginia in August 2011. However, since the worst earthquake recorded in Pennsylvania was a magnitude 5.2, a

worst-case scenario for this hazard would be if an earthquake of similar magnitude occurred in or around Butler County near a populated area. Refer to **Appendix I – Medium and Low Risk Natural Hazards** for more information on impacts from earthquakes in Butler County.

4.3.2.3. Past Occurrence

No earthquake epicenters have been measured in Butler County. Low magnitude earthquakes may have occurred undetected in the County, their impacts not felt by county residents. Earthquakes in nearby counties or those well outside the County boundaries can have some impacts. In 2011, a magnitude 5.8 earthquake with an epicenter in rural Louisa County, VA was felt throughout Pennsylvania, triggering evacuations, emergency bridge and tunnel inspections, and minor damage to some buildings. This shallow earthquake occurred along the Spotsylvania Fault; it was felt as far north as Ontario, Canada and as far south as Alabama (USGS, 2011).

Refer to **Appendix I – Medium and Low Risk Natural Hazards** for a map of recorded earthquake events across Pennsylvania between 1724 and 2003. No injury or severe damage from earthquake events has been reported in Butler County. Additionally, no earthquake has been recorded in Butler County since 2003 (USGS, 2021a).

4.3.2.4. Future Occurrence

The probability of an earthquake event being felt in Butler County is very low. Butler County does not sit on any fault lines; therefore, it is reasonable to believe that the County will not experience earthquake damage anytime soon. The future occurrence of earthquakes can be considered *unlikely* as defined by the Risk Factor Methodology probability criteria (see Table 4.4.1-1).

4.3.2.5. Vulnerability Assessment

All structures and infrastructure in Butler County are equally at risk of experiencing an earthquake. However, in a mild earthquake of the magnitude typically experienced in Pennsylvania, no structural damage is anticipated. In other cases, damages are expected to be limited, and examples of anticipated damages are broken dishes and windows and toppled file cabinets. All future structures will also have the potential to experience an earthquake. However, given that new structures must also meet current building codes and given the expected magnitude of earthquakes in the County, no property damages are anticipated.



4.3.3. Flood, Flash Flood, Ice Jam

4.3.3.1. Location and Extent

Flooding is the temporary condition of partial or complete inundation on normally dry land and it is the most frequent and costly of all the natural hazards in Pennsylvania. Flooding occurs when excess water from snowmelt or rainfall fills a stream, causing it to overflow onto the stream banks and adjacent floodplains. Floodplains are lowlands adjacent to rivers, streams, and creeks that are subject to recurring floods.

Flash flood conditions can result from a large amount of rainfall over a short time span. Though, a small amount of rain can also result in floods in locations where the soil is frozen or saturated from a previous wet period or if the rain is concentrated in an area of impervious surfaces such as large parking lots, paved roadways, or other densely developed areas.

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

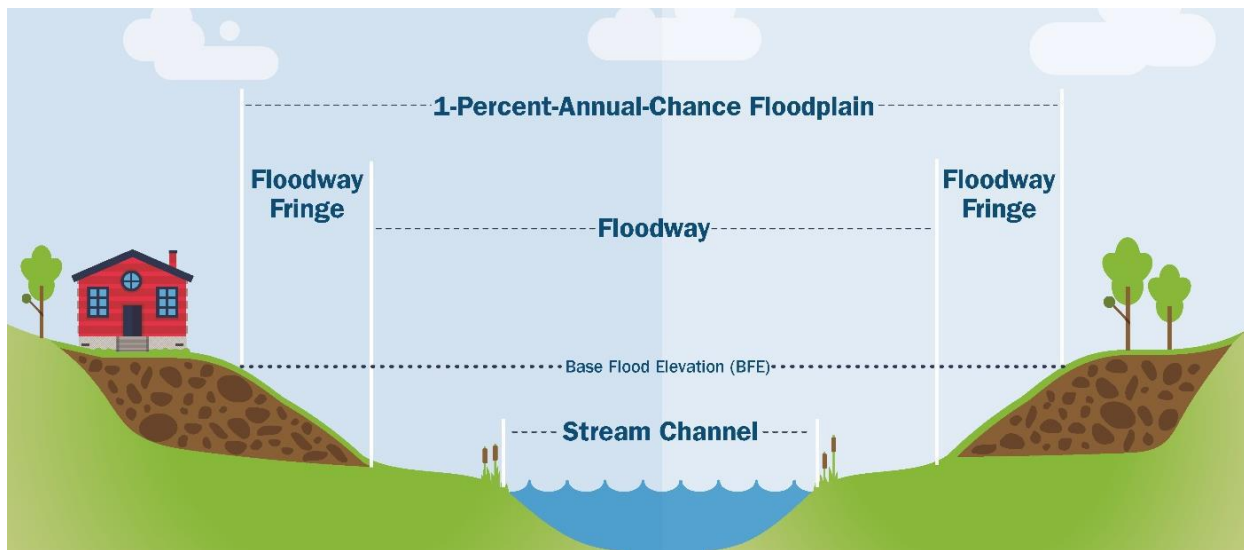
Butler County lies entirely within the Ohio River watershed, which has a drainage area of 23,487 square miles in Pennsylvania. Rivers, streams, and tributaries throughout the County drain into the Allegheny River, which empties into the Ohio River in Pittsburgh. The Allegheny River watershed is within the Ohio River watershed. Therefore, any watercourse that drains into the Allegheny River is not only part of the Allegheny River watershed but is also part of the larger Ohio River watershed. All precipitation which falls in Butler County is channeled into nine designated watersheds. The major watersheds are Allegheny River, Breakneck Creek, Buffalo Creek, Bull Creek, Connoquenessing Creek, Deer Creek, Slippery Rock Creek, Sullivan Run, and Wolf Run. Major watersheds are illustrated in the Watersheds Map in **Section 2**, Figure 2.1-2. Each of these basins drains surface water into the major streams and rivers running through the County (Butler County, 2008).

Butler County contains over 200 ponds, lakes, and reservoirs within its boundaries. These ponds, lakes, and reservoirs vary greatly in size, from the smallest unnamed pond with an area of less than 0.1 acres, to the largest lake, Lake Arthur, in Moraine State Park, with an area of approximately 3,255 acres (Butler County, 2008).

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 4.3.3.4**. However, in assessing the potential spatial extent of flooding it is important to know that a floodplain associated with a 10-percent-annual chance of occurring in a given year is smaller than the floodplain associated with a flood that has a 0.2-percent-annual chance of occurring. The National Flood Insurance Program (NFIP), for which Flood Insurance Rate Maps (FIRM) are published, identifies the risk

associated with the 1-percent-annual chance flood. This 1-percent-annual chance flood event is used to delineate the *Special Flood Hazard Area* (SFHA) and to identify *Base Flood Elevations* (BFE). Figure 4.3.3-1 illustrates these terms. The SFHA serves as the primary regulatory boundary used by FEMA, the Commonwealth of Pennsylvania, and Butler County when determining risk associated with flooding.

Figure 4.3.3-1 Diagram Identifying Special Flood Hazard Area, 1% Annual Chance (100-Year) Floodplain, Floodway, and Flood Fringe.



The current countywide FIRM and Flood Insurance Study (FIS) report were published for Butler County on August 2, 2018 (FEMA, 2018b). This best available flood hazard data, which was used to update this flood hazard profile, included current effective FIRM data and incorporated Letters of Map Revision (LOMRs). The FIRM and FIS for the entire County can be obtained from the FEMA Map Service Center (<http://www.msc.fema.gov>) and can be used to identify the expected spatial extent and elevation of flooding from a 1-percent and 0.2-percent-annual chance event.

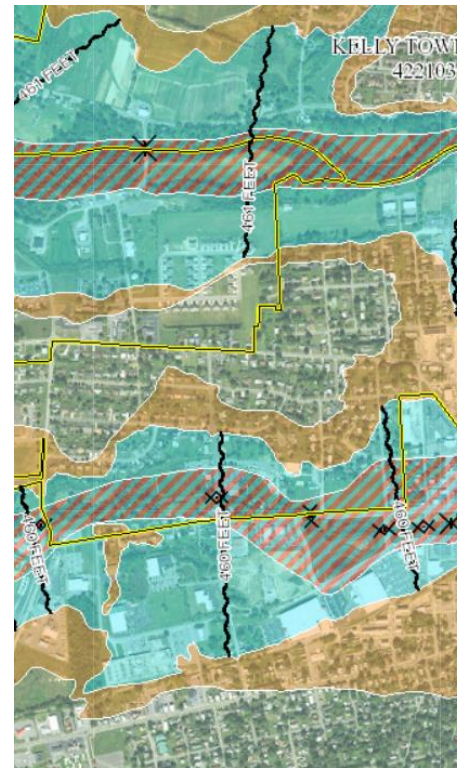
Most of Butler County’s municipalities are flood prone. All but seven municipalities have identified special flood hazard areas. Municipalities without identified SFHAs are Cherry Valley Borough, Eau Claire Borough, Fairview Borough, Portersville Borough, Saxonburg Borough, Slippery Rock Borough, and West Sunbury Borough. The FIS identifies principal flood problems throughout the County. Bonnie Brook and South Branch Bear Creek are more susceptible to flash flooding from high-intensity, short-duration thunderstorms than from typical rain-snowmelt winter storms due to their basin size and shape, and the proximity to

steep slopes. Breakneck Creek, Little Connoquenessing Creek, and Scholars Run have high potential for flash flooding. This is often a result of intense, localized thunderstorms. Additional waterways prone to flooding include Slippery Rock Creek, Muddy Creek, Bear Creek, and Buffalo Creek. The main flood season is usually December through April; however, flooding can occur throughout the year.

Pennsylvania has more stream miles than any other state, and many of its communities are located in floodplains. For waterfront communities, the level of risk constantly changes in response to unpredictable weather patterns and seasonal influences. Major flood-prone areas are communities located in low-lying valleys of major streams and tributaries. Unless protected through various means of flood mitigation, most population concentrations along Connoquenessing Creek have a high possibility of flooding.

It should also be noted that flooding is not only caused by heavy rain events. Additionally, as described in the Dam Failure Hazard Profile in **Appendix G**, Butler County has 21 high-hazard dams located within the County. If any one of these dams were to fail, there could be loss of life and property damage resulting from flooding within the dam inundation areas.

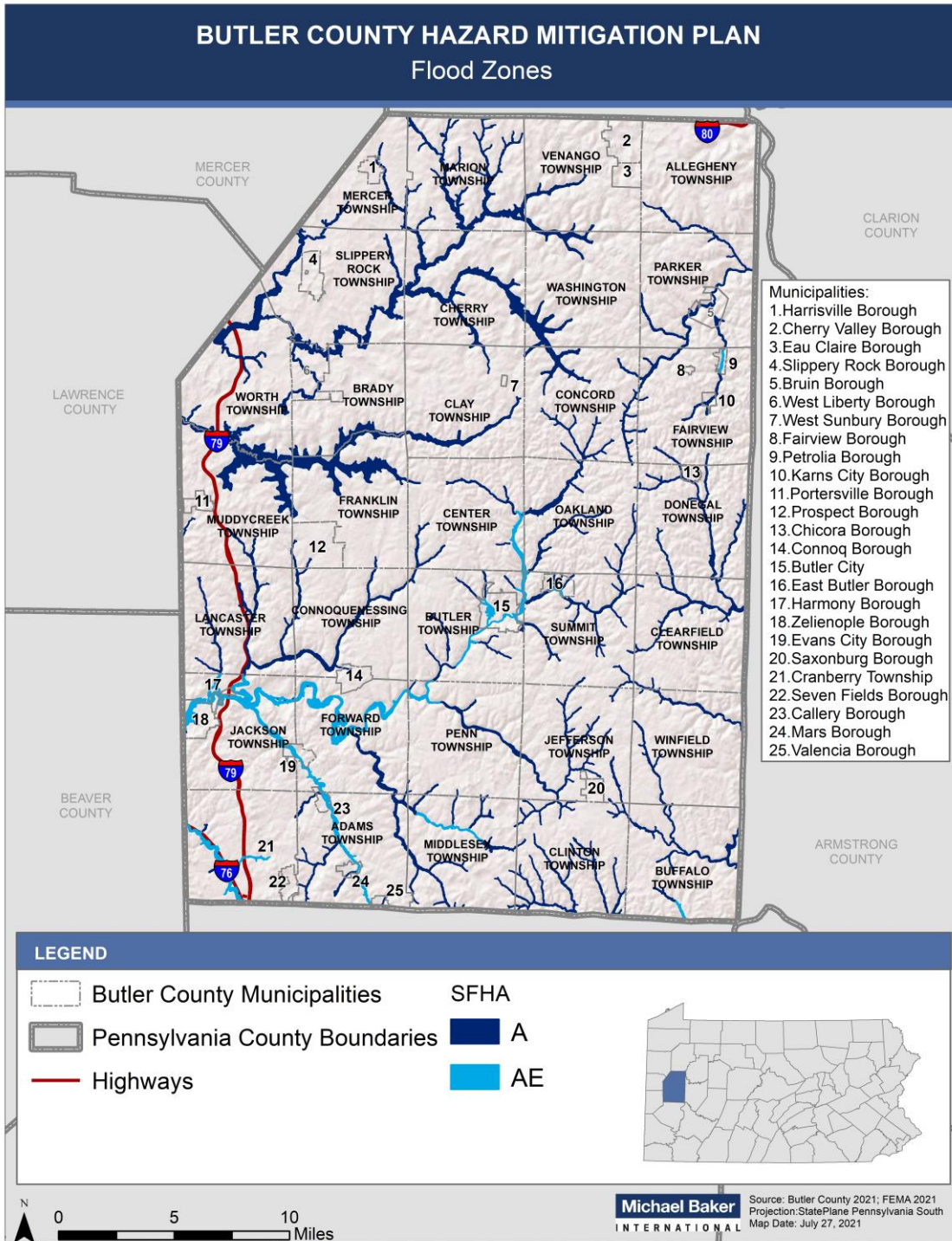
Figure 4.3.3-2 shows the location of watercourses and flood zones in Butler County. The location of approximate and detailed (which include BFEs) SFHAs (1-percent-annual chance zones) are shown.



Butler County's flood zones can be viewed on FEMA's National Flood Hazard Layer:

<https://www.fema.gov/flood-maps/products-tools/national-flood-hazard-layer>

Figure 4.3.3-2 Map Showing the Location of Watercourses and Flood Zones Throughout Butler County



4.3.3.2. *Range of Magnitude*

Floods are considered disasters or a hazard when people and property could be affected. Nationwide, hundreds of floods occur each year, making them one of the most common hazards in all 50 states and U.S. territories. In Pennsylvania, flooding occurs commonly and can happen during any season of the year from a variety of sources. Every two to three years, serious flooding occurs along one or more of Pennsylvania's major rivers or streams, and it is not unusual for this to occur several years in succession. Injuries and deaths can occur when people are swept away by flood currents or bacteria and disease are spread by moving or stagnant floodwaters. Most property damage results from inundation by sediment-filled water. A large amount of rainfall over a short time span can result in flash flood conditions. Small amounts of rain can result in floods in locations where the soil is frozen or saturated from a previous wet period or if the rain is concentrated in an area of impermeable surfaces such as large parking lots, paved roadways, or other impervious developed areas.

Several factors determine the severity of floods, including rainfall intensity and duration, topography, ground cover and rate of snowmelt. Water runoff is greater in areas with steep slopes and little or no vegetative ground cover. Also, urbanization typically results in the replacement of vegetative ground cover with asphalt and concrete, increasing the volume of surface runoff and stormwater, particularly in areas with poorly planned stormwater drainage systems.

In Butler County, there are seasonal differences in the causes for floods. In the winter and early spring (February to April), major flooding has occurred as a result of heavy rainfall on dense snowpack throughout contributing watersheds, although the snowpack is generally moderate during most winters. Winter floods also have resulted from runoff of intense rainfall on frozen ground, and local flooding has been exacerbated by ice jams in rivers, streams, and creeks. Ice jam floods occur on rivers that are totally or partially frozen. A rise in stream stage 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. Summer floods have occurred from intense rainfall on previously saturated soils. Summer thunderstorms deposit large quantities of rainfall over a short period of time that can result in flash flood events.

Flood effects can be volume or force related. Major floods along larger streams having wide floodplains tend to result in large-scale inundations. This causes widespread damage through soaking and silt deposits in homes, businesses, and industrial plants. In hilly regions where runoff paths are steep, flash floods may be prevalent. Flash floods are short in duration and usually occur in a somewhat localized area. In these floods, the velocity rather than the volume of water causes flood damages. Torrents of water can rush down minor hillside gullies at 30-50

miles per hour, carrying trees, debris, and rocks. These floods are often unpredictable and, particularly if they occur at night, can cause major panic and loss of life. Frozen surfaces can more than double normal runoff velocities, particularly in small drainage areas. This causes flash floods which can be compounded by ice and debris jams in channels and culverts. Also, obstructions within the floodplain such as bridges and undersized culverts can also increase flooding.

The worst flooding experienced in Butler County was in September 2004 as a result of Hurricane Ivan. During this event, the slow-moving remainder of the hurricane interacted with a cold front from Canada, merging over central and western Pennsylvania causing on average between four and nine inches of rain. Locally in Butler County, precipitation totals ranged from 3.2 to 7.09 inches of rain in the 24 hours ending September 18, 2004. In response to the floods caused by the storm, the American Red Cross opened three service centers in Butler Township Harmony Borough, and Worth Townships and provided assistance to 13 families which were displaced from their homes due to the flooding past the time of the shelters closing (NOAA NCEI, 2021).

According to the Butler County Department of Emergency Services damage assessment records, The American Red Cross completed a damage assessment of houses of residents who requested assistance, and found 64 single family residences received minor damage in Butler City, 20 single family residences received minor damage in Worth Township, 6 single family residences and one apartment received minor damage in Harmony Borough, and 40 single family residences received minor damage in other municipalities in the County. Additionally, 7 single family residences in Worth Township, 17 single family residences in Harmony Borough, and 6 apartments in Harmony Borough received major damage due to the flooding caused by Hurricane Ivan.

In the wake of Hurricane Ivan Butler County reported almost \$3.8 million in damages to roads and bridges, public buildings and equipment, public utilities, and parks and recreational areas, as well as for costs accrued removing debris and providing emergency protective measures. The highest amount of damages (over \$1.87 million) were assessed on damages to roads and bridges across the County. Buffalo Township had over \$467,000 in damage to this infrastructure, with 13 roads experiencing slides or washing out. Middlesex Township had \$440,000 in assessed damage to its roads and bridge infrastructure (FEMA, 2004).

Across Pennsylvania, FEMA approved over \$86.7 million in the Individual and Households Program as a result of the flooding during Hurricane Ivan. There were over 25,000 Individual Assistance applications approved. Public Assistance grants totaled \$85.3 million (FEMA, 2020). After a comprehensive damage assessment process, Butler County secured a disaster declaration to the following municipalities to ensure the availability of Individual and Public Assistance in these areas: Adams Township, Connoquenessing Township, Cranberry

Township, Evans City Borough, Forward Township, Harmony Borough, Jackson Township, Mars Borough, Middlesex Township, Penn Township, Winfield Township, and Zelienople Borough.

Although floods can cause damage to property and loss of life, floods 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 improving soil fertility. However, the destruction of riparian buffers, changes to land use and land cover throughout a watershed, and the introduction of chemical or biological contaminants which often accompany human presence cause environmental harm when floods occur. Hazardous material facilities are potential sources of contamination during flood events. Other negative environmental impacts of flooding include: water-borne diseases, heavy siltation, damage, or loss of crops, and drowning of both humans and animals.

Dams, levees, and reservoirs act as flood protection measures. There are 79 dams in the County; and 21 of these are high hazard dams. Please refer to the Dam Failure hazard profile in **Appendix G** for more information on dams.

In addition to flood protection measures from dams, protection measures have been built up through various regulations and physical projects across the County. Butler County has a Subdivision and Land Ordinance in place, although only in effect for those municipalities that have not adopted their own ordinance, to steer new development away from the SFHA or from areas that will aggravate flood problems. Development will be approved if adequate measures are taken to eliminate flood hazards in the application area (Butler County, 2012). The City of Butler maintains a Connoquenessing Creek Flood Control Authority. The group regularly meets to discuss flood challenges in the City of Butler and identifies mitigation actions that can be taken to reduce flood risk. The City of Butler also maintains a concrete retaining wall on Sullivan Run, a tributary to Connoquenessing Creek (Butler City, 2021). The city works with the USACE on large scale repair projects. In 2018, USACE assisted with repairs to a scour hole in the retaining wall that resulted from heavy rain and flooding (USACE, 2018).

4.3.3.3. Past Occurrence

Flooding is an annual event expected by residents in various locations throughout Butler County. This has caused much inconvenience and hardship. Property damage has been heavy at times, but no loss of life or injuries due to flooding have been recorded in Butler County. Table 4.3.3-1 lists of flooding occurrences reported to the NCDC within Butler County.

On June 9, 2021, the City of Butler experienced flash flooding in multiple areas. The Butler County Department of Emergency Services shared photographs of the event (see Figure 4.3.3-3).

Figure 4.3.3-3 Flash Flooding in Butler City - June 9, 2021

4:04 PM



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Table 4.3.3-1 contains information on flooding-related events between 1996 and April 2021 that have impacted Butler County. 66 events were reported to the NCDC during this time-period; however, minor flooding occurs throughout the County on a regular basis. Damage reported for these events exceeded \$15.5 million.

These are the oldest floods for which data is available from the NCDC. Reported property damages are estimates reported to the NCDC and displayed in the Storm Events database today. Please note a zero-dollar entry may indicate minimal property damage, or that damage costs were not reported.

In January 1996, flash flooding caused extensive damage along Connoquenessing Creek in Jackson Township, Harmony Borough, and Zelienople Borough. Over 130 homes sustained damage; however, there was little impact throughout the rest of the County (NOAA NCEI, 2021).

A worst-case scenario flooding event in Butler County occurred in May 2019 when flooding caused over \$5 million in damage were reported to the NCDC. Specific damage reports for this event are described in **Section 4.3.3.2**.

In July 2017, thunderstorms and heavy rain produced flash flooding conditions in the Homeacre community of Butler Township. The heaviest rainfall rates were produced in and around the City of Butler, as the storm remained stationary over the area for almost two hours. The storm flooded several homes and basements and trapped some motorists in their cars and floodwaters reached car window level. Multiple water rescues took place in the area, with water still several feet high in places the next day (NOAA NCEI, 2021).

In May 2019, severe storms caused widespread flooding throughout Butler County. Zelienople Borough was hit especially hard, with a total of four to five inches accumulating in just a few hours. Connoquenessing Creek crested at just over 15.3 feet due to the storm; based on historical data going back to the early 1920s this was the 4th highest crest on record for the creek. Little Buffalo Creek also produced flood waters in the County. Flooding was reported along several roadways, and basement flooding was reported in Zelienople and Evans City Boroughs. Over \$10 million in damage were reported for just two days of storms (NOAA NCEI, 2021).

Table 4.3.3-1 Flood and Flash Flood Events Reported to the NCDC through April 2021 (NOAA NCEI, 2021)

DATE	TYPE	LOCATION	COST OF DAMAGES
1/19/1996	Flash Flood	Harmony Borough	\$1,300,000
2/28/1996	Flash Flood	Harmony Borough	\$0
3/20/1996	Flash Flood	Fernway (Cranberry Township)	\$5,000
6/18/1996	Flash Flood	Butler Township	\$0
6/19/1996	Flash Flood	Butler Township	\$0
6/24/1996	Flash Flood	Slippery Rock	\$0
12/12/1996	Flash Flood	Middle Lancaster (Lancaster Township)	\$0
5/25/1997	Flash Flood	Butler Township	\$100,000
1/23/1999	Flash Flood	Northwest portion of Butler County	\$0
4/9/1999	Flash Flood	Leasureville (Winfield Township)	\$0
8/23/2000	Flash Flood	Criders Corners (Cranberry Township)	\$0
3/26/2002	Flood	Butler County	\$5,000
8/12/2002	Flash Flood	Zelienople Borough	\$10,000
6/12/2003	Flash Flood	Sarver (Buffalo Township)	\$0
6/13/2003	Flash Flood	Butler Township	\$0
7/27/2003	Flash Flood	Harrisville Borough	\$0
8/8/2003	Flash Flood	Zelienople Borough	\$0
8/10/2003	Flash Flood	Cherry Valley Borough	\$0
8/26/2003	Flash Flood	West Sunbury Borough	\$0
9/1/2003	Flash Flood	Chicora Borough	\$0
11/19/2003	Flash Flood	Sarver (Buffalo Township)	\$0

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Table 4.3.3-1 Flood and Flash Flood Events Reported to the NCDC through April 2021 (NOAA NCEI, 2021)

DATE	TYPE	LOCATION	COST OF DAMAGES
12/10/2003	Flash Flood	Cooperstown (Middlesex Township)	\$0
1/4/2004	Flood	Butler County	\$0
2/6/2004	Flood	Butler County	\$10,000
5/22/2004	Flood, Flash Flood	Butler County	\$8,000
6/15/2004	Flash Flood	Harmony Borough	\$0
6/17/2004	Flash Flood	Sarver (Buffalo Township)	\$20,000
7/18/2004	Flood	Butler County	\$0
7/26/2004	Flood	Butler County	\$0
8/21/2004	Flood	Butler County	\$15,000
8/28/2004	Flood	Butler County	\$0
9/8/2004	Flood	Butler County	\$50,000
9/17/2004	Flood	Butler County	\$3,100,000
1/6/2005	Flood	Butler County	\$100,000
7/17/2005	Flood	Butler County	\$30,000
6/25/2006	Flash Flood	Cabot (Unincorporated Area)	\$0
6/2/2007	Flash Flood	Butler Township	\$5,000
8/20/2007	Flash Flood	Butler Township, Evans City Borough, Zelenople Borough	\$200,000
3/5/2008	Flood	Evans City Borough	\$25,000
6/2/2010	Flood	Butler Junction	\$25,000
8/14/2010	Flash Flood	St. Joe (Donegal Township), Middle Lancaster (Lancaster Township), Butler-Graham Airport (Butler Township)	\$125,000
12/1/2010	Flood	Zelenople Borough	\$150,000
2/28/2011	Flood	Homeacre (Butler Township)	\$75,000
3/11/2011	Flood	Zelenople Borough	\$5,000
7/10/2013	Flash Flood	Homeacre (Butler Township), Boyers (Marion Township)	\$60,000
8/28/2013	Flood	Chicora Borough, Bruin Borough	\$0
9/11/2013	Flood	Lardintown (Clinton Township)	\$5,000
6/23/2014	Flood	Meridian Census Designated Place	\$3,000
6/24/2014	Flood	East Butler Borough	\$3,000
6/25/2014	Flood	Renfrew (Penn Township)	\$2,000
3/14/2015	Flood	Eidenau (Jackson Township)	\$0
6/15/2015	Flash Flood	Jacksville (Worth Township), Coaltown (Cherry Township)	\$3,000
6/16/2015	Flood	Zelenople Borough	\$5,000

Table 4.3.3-1 Flood and Flash Flood Events Reported to the NCDC through April 2021 (NOAA NCEI, 2021)

DATE	TYPE	LOCATION	COST OF DAMAGES
7/5/2017	Flash Flood	Homeacre (Butler Township)	\$0
7/6/2017	Flood	Zeno (Concord Township)	\$0
7/23/2017	Flash Flood	Bonsu (Allegheny Township)	\$0
7/28/2017	Flash Flood	Butler-Graham Airport (Butler Township), Coyleville (Clearfield Township)	\$0
7/29/2017	Flash Flood	Butler-Graham Airport (Butler Township), Herman (Summit Township)	\$0
2/15/2018	Flood	Whitestown (Prospect Borough)	\$0
2/16/2018	Flood	Butler-Graham Airport (Butler Township), Butler City, Eidenau (Jackson Township), Windward Heights (Butler Township)	\$0
7/2/2018	Flash Flood	Zelienople Borough	\$1,500
9/10/2018	Flood	Eidenau (Jackson Township)	\$10,000
5/28/2019	Flash Flood	Zelienople Borough, Eidenau (Jackson Township), Sarver (Buffalo Township)	\$5,116,000
5/29/2019	Flood	Eidenau (Jackson Township), Butler-Graham Airport (Butler Township), Evans City Borough	\$5,014,000
7/4/2019	Flash Flood	Bruin Borough	\$10,000
6/27/2020	Flash Flood	Jefferson Center (Jefferson Township)	\$0
TOTAL COST			\$15,595,500

Congress established the NFIP in 1968 to help control the growing cost of federal disaster relief. The NFIP is administered by the Federal Emergency Management Agency (FEMA), part of the U.S. Department of Homeland Security. The NFIP offers federally backed flood insurance in communities that adopt and enforce effective floodplain management ordinances to reduce future flood losses.

The NFIP identifies properties that experience frequent flooding. Floods are the most common and costly natural catastrophe. In terms of economic disruption, property damage, and loss of life, floods are “nature’s number-one disaster.” For that reason, flood insurance is almost never available under industry-standard homeowner’s and renter’s policies. The best way for citizens to protect their property against loss to flood is to purchase flood insurance through the NFIP.

Since 1983, the chief means of providing flood insurance coverage has been a cooperative venture of FEMA and the private insurance industry known as the Write Your Own (WYO)

Program. This partnership allows qualified property and casualty insurance companies to “write” (that is, issue) and service the NFIP’s Standard Flood Insurance Policy under their own names.

Today, nearly 60 WYO insurance companies issue and service the NFIP under their own names (FEMA, 2021c). More than 4.9 million federal flood insurance policies are in force. These policies represent \$1.3 trillion in flood insurance coverage for homeowners, renters, and business owners throughout the United States and its territories. As of July 2021, Pennsylvania had a total of 49,966 policies in force across the state, 498 of which were in Butler County (FEMA, 2021d).

The NFIP provides flood insurance to individuals in communities that are members of the program. Membership in the program is contingent on the community adopting and enforcing floodplain management and development regulations. The NFIP is based on the voluntary participation of communities of all sizes. In the context of this program, a “community” is a political entity – whether an incorporated city, town, township, borough, or village, or an unincorporated area of a county or parish – that has legal authority to adopt and enforce floodplain management ordinances for the area under its jurisdiction.

National Flood Insurance is available only in communities that apply for participation in the NFIP and agree to implement prescribed flood mitigation measures. Newly participating communities are admitted to the NFIP’s Emergency Program. Most of these communities quickly earn “promotion” to the Regular Program.

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

The minimum floodplain management requirements include:

- Review and permit all development in the SFHA;
- Elevate new and substantially improved residential structures at or above the base flood elevation;
- Elevate or dry floodproof new and substantially improved non-residential structures;
- Limit development in floodways;
- Locate or construct all public utilities and facilities to minimize or eliminate flood damage; and

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- Anchor foundation or structure to resist floatation, collapse, or lateral movement.

Table 4.3.3-2 below indicates municipal participation in the NFIP. All but five municipalities are actively participating in the NFIP. Those not participating are Cherry Valley Borough, Fairview Borough, Portersville Borough, Seven Fields Borough, and West Sunbury Borough.

Table 4.3.3-2 Butler County National Flood Insurance Program Participation

COMMUNITY	PARTICIPATION STATUS	CID	INITIAL FIRM IDENTIFIED	CURRENT EFFECTIVE MAP DATE
Adams Township	Participating	421415	4/17/1989	8/2/2018
Allegheny Township	Participating	422341	5/1/1985	8/2/2018
Brady Township*	Participating	422241	6/19/1985	8/2/2018
Bruin Borough*	Participating	420211	5/1/1985	8/2/2018
Buffalo Township	Participating	421416	1/18/1984	8/2/2018
Butler, City of	Participating	420212	4/17/1978	8/2/2018
Butler Township	Participating	421138	7/3/1978	8/2/2018
Callery Borough	Participating	420213	4/17/1989	8/2/2018
Center Township	Participating	421417	6/19/1989	8/2/2018
Cherry Township*	Participating	422682	5/1/1985	8/2/2018
Cherry Valley Borough	Not participating	422342	8/2/2018	8/2/2018
Chicora Borough*	Participating	420214	8/10/1979	8/2/2018
Clay Township*	Participating	422343	5/1/1985	8/2/2018
Clearfield Township*	Participating	422344	4/17/1985	8/2/2018
Clinton Township*	Participating	422345	12/11/1981	8/2/2018
Concord Township*	Participating	422346	5/1/1985	8/2/2018
Connoquenessing Borough*	Participating	421413	8/2/2018	8/2/2018
Connoquenessing Township*	Participating	421418	9/1/1986	8/2/2018
Cranberry Township	Participating	421217	4/1/1982	8/2/2018
Donegal Township*	Participating	422347	2/15/1985	8/2/2018
East Butler Borough	Participating	420215	3/18/1991	8/2/2018
Eau Clair Borough	Participating	422348	10/26/1976	N/A
Evans City Borough	Participating	420216	5/4/1989	8/2/2018
Fairview Borough	Not participating	422685	8/2/2018	8/2/2018
Fairview Township*	Participating	422603	9/1/1986	8/2/2018
Forward Township	Participating	421419	6/19/1989	8/2/2018
Franklin Township*	Participating	422350	2/15/1985	8/2/2018
Harmony Borough	Participating	420217	5/4/1989	8/2/2018
Harrisville Borough*	Participating	422351	6/30/1976	8/2/2018
Jackson Township	Participating	421420	9/15/1989	8/2/2018

Table 4.3.3-2 Butler County National Flood Insurance Program Participation

COMMUNITY	PARTICIPATION STATUS	CID	INITIAL FIRM IDENTIFIED	CURRENT EFFECTIVE MAP DATE
Jefferson Township*	Participating	421421	2/15/1985	8/2/2018
Karns City Borough*	Participating	420218	2/15/1985	8/2/2018
Lancaster Township*	Participating	421422	5/1/1986	8/2/2018
Marion Township*	Participating	420219	6/8/1984	8/2/2018
Mars Borough	Participating	420220	5/4/1989	8/2/2018
Mercer Township*	Participating	422352	6/8/1984	8/2/2018
Middlesex Township	Participating	421229	12/1/1983	8/2/2018
Muddy Creek Township*	Participating	422353	4/17/1985	8/2/2018
Oakland Township	Participating	422354	4/17/1985	8/2/2018
Parker Township*	Participating	421219	9/1/1986	8/2/2018
Penn Township	Participating	421241	8/15/1989	8/2/2018
Petrolia Borough	Participating	420221	12/5/1989	8/2/2018
Portersville Borough	Not participating	422355	8/2/2018	8/2/2018
Prospect Borough*	Participating	422356	2/15/1985	8/2/2018
Saxonburg Borough	Participating	422357	4/17/1985	8/2/2018
Seven Fields Borough	Not participating	422683	8/2/2018	8/2/2018
Slippery Rock Borough	Participating	421414	8/2/2018	8/2/2018
Slippery Rock Township*	Participating	420222	9/1/1986	8/2/2018
Summit Township	Participating	422358	2/15/1985	8/2/2018
Valencia Borough	Participating	420223	5/4/1989	8/2/2018
Venango Township*	Participating	422359	5/1/1985	8/2/2018
Washington Township*	Participating	420224	2/15/1985	8/2/2018
West Liberty Borough*	Participating	420225	9/1/1986	8/2/2018
West Sunbury Borough	Not participating	422684	8/2/2018	8/2/2018
Winfield Township*	Participating	421225	5/1/1986	8/2/2018
Worth Township*	Participating	421425	9/1/1986	8/2/2018
Zelienople Borough	Participating	420226	6/17/1986	8/2/2018
*Note: No elevation determined - All Zone A, C, and X				
**Note: Eau Claire does not have flood maps as there is no waterway in the municipality. All Zones are C and X so there is no published FIRM.				

In addition, Regular Program communities are eligible to participate in the NFIP’s Community Rating System (CRS). Under the CRS, policyholders can receive premium discounts of 5 to 45 percent as their cities and towns adopt more comprehensive flood mitigation measures. To date, no municipalities in Butler County participate in the CRS.

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Information on NFIP premiums and coverage, prior claims, and substantial damage claims provide additional information on past flood occurrences. Table 4.3.3-3 shows this information for each community in Butler County.

Table 4.3.3-3 Butler County National Flood Insurance Program Participation

COMMUNITY	POLICIES IN FORCE	TOTAL PREMIUM COVERAGE	PRIOR CLAIMS	TOTAL AMOUNT OF PAID CLAIMS	SUBSTANTIAL DAMAGE CLAIMS
Adams Township	23	\$6,096,333	2	\$ 9,995	0
Allegheny Township	0	\$0	7	\$28,558	0
Brady Township	3	\$422,685	0	\$0	0
Bruin Borough	2	\$350,732	1	\$3,028	0
Buffalo Township	10	\$2,235,669	13	\$106,081	0
Butler, City of	109	\$15,733,950	107	\$762,662	3
Butler Township	13	\$3,678,103	11	\$10,481	0
Callery Borough	2	\$455,719	0	\$0	0
Center Township	5	\$386,986	9	\$54,636	0
Cherry Township	3	\$297,335	1	\$0	0
Cherry Valley Borough	Not participating				
Chicora Borough	0	\$0	5	\$26,540	2
Clay Township	1	\$350,442	0	\$0	0
Clearfield Township	0	\$0	0	\$0	0
Clinton Township	4	\$616,663	12	\$52,349	0
Concord Township	2	\$168,513	2	\$2,947	0
Connoquenessing Borough	1	\$175,349	0	\$0	0
Connoquenessing Township	2	\$267,359	2	\$18,455	0
Cranberry Township	61	\$15,031,812	19	\$93,920	1
Donegal Township	4	\$342,088	2	\$1,372	0
East Butler Borough	1	\$171,751	2	\$139	0
Eau Clair Borough	0	\$0	0	\$0	0
Evans City Borough	45	\$9,048,857	119	\$1,451,050	12
Fairview Borough	Not participating				
Fairview Township	2	\$182,713	1	\$0	0
Forward Township	23	\$3,891,612	142	\$1,844,382	17
Franklin Township	2	\$700,936	0	\$0	0
Harmony Borough	24	\$3,273,577	59	\$1,877,832	11
Harrisville Borough	0	\$0	0	\$0	0
Jackson Township	19	\$3,621,565	158	\$2,075,280	39
Jefferson Township	7	\$1,299,656	6	\$60,385	0

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Table 4.3.3-3 Butler County National Flood Insurance Program Participation

COMMUNITY	POLICIES IN FORCE	TOTAL PREMIUM COVERAGE	PRIOR CLAIMS	TOTAL AMOUNT OF PAID CLAIMS	SUBSTANTIAL DAMAGE CLAIMS
Karns City Borough	0	\$0	0	\$0	0
Lancaster Township	5	\$880,682	10	\$223,797	2
Marion Township	4	\$524,510	9	\$130,361	2
Mars Borough	4	\$1,146,656	9	\$151,708	0
Mercer Township	1	\$28,121	7	\$120,949	3
Middlesex Township	15	\$4,296,302	5	\$14,034	0
Muddy Creek Township	2	\$420,734	0	\$0	0
Oakland Township	1	\$210,406	3	\$11,077	0
Parker Township	0	\$0	0	\$0	0
Penn Township	12	\$2,085,701	38	\$402,636	5
Petrolia Borough	0	\$0	4	\$222,867	2
Portersville Borough	Not participating				
Prospect Borough	0	\$0	2	\$79,656	1
Saxonburg Borough	2	\$700,442	0	\$0	0
Seven Fields Borough	Not participating				
Slippery Rock Borough	1	\$42,189	4	\$19,871	1
Slippery Rock Township	23	\$3,970,397	26	\$183,066	4
Summit Township	6	\$1,898,911	7	\$47,756	0
Valencia Borough	0	\$0	4	\$1,674	0
Venango Township	1	\$175,428	0	\$0	0
Washington Township	0	\$0	1	\$2,906	0
West Liberty Borough	1	\$165,281	3	\$1,583	0
West Sunbury Borough	Not participating				
Winfield Township	3	\$323,474	19	\$260,405	1
Worth Township	16	\$1,581,088	27	\$543,672	7
Zelienople Borough	33	\$13,862,523	60	\$3,569,429	3
TOTAL	498	\$101,113,250	918	\$14,457,544	116

In addition to past flood events, the NFIP identifies properties that experience frequent flooding and can be used to determine areas of higher risk. These properties are identified through the NFIP when they receive more than one payment for flood damages. The NFIP defines a Repetitive Loss (RL) property as “any insurable building for which two or more claims of more than \$1,000 were paid by the NFIP within any rolling ten-year period, since 1978.” The RL data provided in Table 4.3.3-4 and throughout this Plan Update represents the NFIP’s definition of RL.

With respect to obtaining mitigation funding, FEMA’s Hazard Mitigation Assistance (HMA) grant programs define a RL property as a structure that:

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

Under FEMA’s HMA grant programs, a Severe Repetitive Loss property is a structure that:

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

As of July 2021, there were 58 repetitive loss properties in Butler County, with 11 located in Jackson Township. Table 4.3.3-4 shows the number of repetitive loss properties by municipality. Property type was not included with this data.

Table 4.3.3-4 NFIP Repetitive Loss Properties in Butler County by Municipality

MUNICIPALITY	REPETITIVE LOSS PROPERTIES	NUMBER OF LOSSES	TOTAL LOSSES PAID
Buffalo Township	2	6	\$30,873.67
Butler City	3	9	\$31,348.86
Chicora Borough	1	2	\$5,934.45
Evans City Borough	6	19	\$210,442.63
Forward Township	6	18	\$191,923.43
Harmony Borough	7	20	\$499,636.53
Jackson Township	11	34	\$580,984.19
Jefferson Township	1	2	\$14,732.34
Lancaster Township	1	2	\$23,939.69
Middlesex Township	1	2	\$9,222.64
Penn Township	6	13	\$142,848.72

Table 4.3.3-4 NFIP Repetitive Loss Properties in Butler County by Municipality

MUNICIPALITY	REPETITIVE LOSS PROPERTIES	NUMBER OF LOSSES	TOTAL LOSSES PAID
Prospect Borough	1	2	\$79,655.82
Slippery Rock Township	1	2	\$7,017.91
Summit Township	1	2	\$16,484.03
Worth Township	2	4	\$118,724.36
Zelienople Borough	4	13	\$1,261,256.65
TOTAL	54	150	\$3,225,025.92

Table 4.3.3-5 details the number of severe repetitive loss properties by municipality. According to FEMA, all six severe repetitive loss properties in Butler County are identified as 'single-family'.

Table 4.3.3-5 NFIP Severe Repetitive Loss Properties in Butler County by Municipality

MUNICIPALITY	SEVERE REPETITIVE LOSS PROPERTIES	NUMBER OF LOSSES	TOTAL LOSSES PAID
Center Township	1	5	\$44,236.89
Evans City Borough	3	16	\$324,350.54
Forward Township	8	89	\$887,116.54
Jackson Township	4	11	\$330,613.56
Slippery Rock Township	1	3	\$111,667.26
TOTAL	17	124	\$1,697,984.79

4.3.3.4. Future Occurrence

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

Table 4.3.3-6 below shows a range of flood recurrence intervals and associated probabilities of occurrence.

Table 4.3.3-6 Recurrence intervals and associated probabilities of occurrence (USGS, 2021b)

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

In Butler County, flooding occurs commonly and can occur during any season. However, the possibility of flooding is greatly reduced during the winter months. Although most severe floods are attributable to rainfall alone, the spring floods can be compounded by snowmelt

and moving ice. The major floods in the late summer and fall are often associated with tropical storms moving up the Atlantic coastline. Within the flood-susceptible areas in Butler County, it is expected that the character of flooding will remain essentially unchanged from what has been experienced for many years. However, some increase in the severity and frequency of flooding may result due to planned or recent development within the floodplains of the various streams, as well as increased intensity and frequency of rain events. Therefore, the future occurrence of floods in Butler County can be characterized as *likely* as defined by the Risk Factor Methodology probability criteria (see Table 4.4.1-1).

4.3.3.5. Vulnerability Assessment

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

Flood vulnerability is described in terms of what community assets, structures, and infrastructure are situated in locations where flooding is anticipated. For purposes of assessing vulnerability, this plan focuses on those that are located within the SFHA. Please note that while other floods are possible, information about the extent and depths for the flood frequencies likely to be seen in this floodplain are available for all municipalities countywide, thus providing a consistent basis for analysis. Flood vulnerability maps for each applicable local municipality, showing the SFHA, addressable structures, critical facilities, and transportation routes within it, are included in **Appendix D**. These maps were created using FEMA Countywide data from the current effective FIRMS. Due to sensitive information in **Appendix D**, this appendix is not available to the public.

Despite the fact that 52 of Butler County's 57 municipalities participate in the National Flood Insurance Program (NFIP), communities need to strengthen floodplain management by reviewing current codes and ordinances and by strongly enforcing their floodplain codes on new development to avoid aggravating further flooding.

The flood hazard vulnerability assessment for the County focused on the community assets that are located in the 1% chance floodplain. While greater and smaller floods are possible, information about the extent and depth for the 1% chance floodplain is available in a similar format for all 57 Butler County municipalities, providing a consistent basis for analysis. The 2010 population in the SFHA was calculated by selecting the 2010 census block centroids that intersect the hazard areas, resulting in an approximation of populations living near the SFHA. Address points and critical facilities points were used to calculate building and critical facilities vulnerability.

Table 4.3.3-7 shows the structures, critical facilities, and populations located in the SFHA. There are 1,346 structures in the SFHA countywide (2% of all structures).

Evans City Borough, Harmony Borough and Worth Township have the highest proportion of structures in the SFHA. Evans City Borough is the only municipality with critical facilities in the SFHA. The municipalities with the highest proportion of the population in the SFHA are Evans City Borough, Harmony Borough and Butler City.

When looking at structures by property type, shown in Table 4.3.3-8, the majority of vulnerable structures are unsurprisingly residential in nature, followed by commercial uses. A complete listing of critical facilities is in **Appendix E**.

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

Table 4.3.3-7 Community Flood Vulnerability in Butler County

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES IN SFHA	PERCENT STRUCTURES IN SFHA	TOTAL CRITICAL FACILITIES	TOTAL CRITICAL FACILITIES IN SFHA	PERCENT CRITICAL FACILITIES IN SFHA	TOTAL ESTIMATED 2010 POPULATION	POPULATION IN SFHA	PERCENT POPULATION IN SFHA
Adams Township	6,126	14	0%	25	0	0%	12,401	17	0%
Allegheny Township	414	1	0%	1	0	0%	738	0	0%
Brady Township	661	23	3%	1	0	0%	1,310	28	2%
Bruin Borough	245	12	5%	2	0	0%	524	13	2%
Buffalo Township	3,336	9	0%	8	0	0%	7,773	14	0%
Butler, City	5,933	475	8%	18	0	0%	3,757	1,003	7%
Butler Township	7,644	4	0%	44	0	0%	7,248	5	0%
Callery Borough	168	3	2%	4	0	0%	394	6	2%
Center Township	3,788	10	0%	5	0	0%	7,898	14	0%
Cherry Township	570	12	2%	2	0	0%	1,106	17	2%
Cherry Valley Borough	42	0	0%	0	0	0%	66	0	0%
Chicora Borough	473	2	0%	5	0	0%	1,043	0	0%
Clay Township	1,202	0	0%	3	0	0%	2,703	0	0%
Clearfield Township	1,096	3	0%	1	0	0%	2,717	6	0%
Clinton Township	1,351	14	1%	1	0	0%	3,254	26	1%
Concord Township	749	2	0%	1	0	0%	1,505	4	0%
Connoquenessing Borough	352	0	0%	2	0	0%	532	0	0%
Connoquenessing Township	2,146	1	0%	4	0	0%	4,166	2	0%
Cranberry Township	12,665	19	0%	21	0	0%	8,648	34	0%

Table 4.3.3-7 Community Flood Vulnerability in Butler County

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES IN SFHA	PERCENT STRUCTURES IN SFHA	TOTAL CRITICAL FACILITIES	TOTAL CRITICAL FACILITIES IN SFHA	PERCENT CRITICAL FACILITIES IN SFHA	TOTAL ESTIMATED 2010 POPULATION	POPULATION IN SFHA	PERCENT POPULATION IN SFHA
Donegal Township	765	5	1%	2	0	0%	1,930	20	1%
East Butler Borough	331	2	1%	3	0	0%	732	0	0%
Eau Claire Borough	163	0	0%	2	0	0%	316	0	0%
Evans City Borough	776	130	17%	6	3	50%	1,798	265	15%
Fairview Borough	80	0	0%	1	0	0%	198	0	0%
Fairview Township	951	1	0%	2	0	0%	2,208	3	0%
Forward Township	1,325	67	5%	3	0	0%	2,531	95	4%
Franklin Township	1,280	1	0%	1	0	0%	2,620	0	0%
Harmony Borough	459	60	13%	3	0	0%	853	100	12%
Harrisville Borough	380	0	0%	4	0	0%	897	0	0%
Jackson Township	2,422	127	5%	7	0	0%	3,865	99	3%
Jefferson Township	2,103	7	0%	5	0	0%	5,504	17	0%
Karns City Borough	111	0	0%	1	0	0%	209	0	0%
Lancaster Township	1,346	9	1%	3	0	0%	2,708	12	0%
Marion Township	621	7	1%	2	0	0%	1,514	13	1%
Mars Borough	541	0	0%	2	0	0%	1,699	0	0%
Mercer Township	560	0	0%	2	0	0%	1,548	0	0%
Middlesex Township	3,046	13	0%	6	0	0%	5,534	22	0%
Muddy Creek Township	1,144	3	0%	4	0	0%	2,386	3	0%
Oakland Township	1,282	6	0%	3	0	0%	2,987	7	0%
Parker Township	359	3	1%	1	0	0%	928	7	1%

Table 4.3.3-7 Community Flood Vulnerability in Butler County

MUNICIPALITY	TOTAL STRUCTURES	TOTAL STRUCTURES IN SFHA	PERCENT STRUCTURES IN SFHA	TOTAL CRITICAL FACILITIES	TOTAL CRITICAL FACILITIES IN SFHA	PERCENT CRITICAL FACILITIES IN SFHA	TOTAL ESTIMATED 2010 POPULATION	POPULATION IN SFHA	PERCENT POPULATION IN SFHA
Penn Township	2,281	30	1%	8	0	0%	5,071	57	1%
Petrolia Borough	125	4	3%	2	0	0%	152	6	4%
Portersville Borough	146	0	0%	2	0	0%	235	0	0%
Prospect Borough	566	0	0%	3	0	0%	1,169	0	0%
Saxonburg Borough	784	0	0%	5	0	0%	1,525	0	0%
Seven Fields Borough	1,227	0	0%	1	0	0%	2,801	0	0%
Slippery Rock Borough	1,240	0	0%	13	0	0%	3,664	0	0%
Slippery Rock Township	1,904	119	6%	8	0	0%	5,639	129	2%
Summit Township	2,018	12	1%	5	0	0%	4,884	11	0%
Valencia Borough	266	1	0%	0	0	0%	625	1	0%
Venango Township	433	0	0%	1	0	0%	937	0	0%
Washington Township	644	0	0%	2	0	0%	1,300	0	0%
West Liberty Borough	157	8	5%	0	0	0%	340	8	2%
West Sunbury Borough	103	0	0%	0	0	0%	192	0	0%
Winfield Township	1,335	11	1%	1	0	0%	3,533	30	1%
Worth Township	790	79	10%	2	0	0%	1,637	50	3%
Zelienople Borough	1,853	37	2%	3	0	0%	4,000	55	1%
TOTAL	84,878	1,346	2%	265	3	1%	188,452	2,199	1%

Table 4.3.3-8 Structures in the SFHA by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Adams Township	0	5	0	5	0	0	0	3	0	0	0	0	13
Allegheny Township	0	1	0	0	0	0	0	0	0	0	0	0	1
Brady Township	0	0	0	0	0	0	1	20	0	0	0	2	23
Bruin Borough	0	0	0	0	0	0	0	12	0	0	0	0	12
Buffalo Township	2	0	0	0	0	0	0	7	0	0	0	0	9
Butler, City	0	50	10	0	1	0	0	398	0	1	0	15	475
Butler Township	0	1	0	0	0	0	0	2	0	0	0	0	3
Callery Borough	0	0	0	0	0	0	0	2	0	0	0	1	3
Center Township	0	1	0	0	0	0	0	6	0	0	0	3	10
Cherry Township	1	0	0	0	0	0	0	10	0	0	0	1	12
Cherry Valley Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Chicora Borough	0	0	0	0	0	0	0	2	0	0	0	0	2
Clay Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Clearfield Township	0	2	0	0	0	0	0	0	0	0	0	1	3
Clinton Township	7	0	0	0	0	0	0	7	0	0	0	0	14
Concord Township	0	0	0	0	0	0	0	2	0	0	0	0	2
Connoquenessing Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Connoquenessing Township	1	0	0	0	0	0	0	0	0	0	0	0	1
Cranberry Township	0	5	0	0	2	0	0	11	0	0	1	0	19

Table 4.3.3-8 Structures in the SFHA by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Donegal Township	0	2	0	0	0	0	0	2	0	0	0	1	5
East Butler Borough	0	2	0	0	0	0	0	0	0	0	0	0	2
Eau Claire Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Evans City Borough	0	35	4	1	2	0	0	83	0	0	1	4	130
Fairview Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Fairview Township	0	0	0	0	0	0	0	1	0	0	0	0	1
Forward Township	9	11	0	0	1	0	0	37	0	0	0	9	67
Franklin Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Harmony Borough	0	10	0	0	0	0	0	50	0	0	0	0	60
Harrisville Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Jackson Township	22	21	1	2	1	0	3	70	0	0	0	6	126
Jefferson Township	1	0	0	0	0	0	0	6	0	0	0	0	7
Karns City Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Lancaster Township	2	0	0	0	0	0	0	7	0	0	0	0	9
Marion Township	0	1	0	0	1	0	0	4	0	0	0	1	7
Mars Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Mercer Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Middlesex Township	0	5	0	0	0	0	0	8	0	0	0	0	13
Muddy Creek Township	0	0	0	0	0	0	1	2	0	0	0	0	3

Table 4.3.3-8 Structures in the SFHA by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Oakland Township	0	2	0	0	0	0	0	4	0	0	0	0	6
Parker Township	0	0	0	0	0	0	0	3	0	0	0	0	3
Penn Township	1	2	0	0	0	0	0	27	0	0	0	0	30
Petrolia Borough	0	1	0	1	0	0	0	0	0	0	0	1	3
Portersville Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Prospect Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Saxonburg Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Seven Fields Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Slippery Rock Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Slippery Rock Township	2	1	0	0	0	0	0	108	0	0	0	8	119
Summit Township	0	3	0	1	0	0	0	8	0	0	0	0	12
Valencia Borough	0	1	0	0	0	0	0	0	0	0	0	0	1
Venango Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Washington Township	0	0	0	0	0	0	0	0	0	0	0	0	0
West Liberty Borough	0	0	0	0	0	0	0	8	0	0	0	0	8
West Sunbury Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Winfield Township	0	0	0	1	0	0	0	10	0	0	0	0	11
Worth Township	0	17	0	0	0	0	0	55	0	0	0	7	79
Zelienople Borough	1	0	1	7	1	0	0	24	0	0	1	2	37

Table 4.3.3-8 Structures in the SFHA by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
TOTAL	49	179	16	18	9	0	5	999	0	1	3	62	1,341

BUTLER COUNTY 2021 HAZARD MITIGATION PLAN UPDATE

Table 4.3.3-9 lists the number of mobile homes in each municipality and the number and percentage that are located in special flood hazard areas. Mobile homes are significantly vulnerable to the impacts of flooding. The highest number and percentage of mobile homes in flood hazard areas are found in Bruin Borough (8, 28%), Summit Township (7, 3%), and Forward Township (6, 12%). Existing mobile homes and trailer parcels within the SFHA should consider relocation to parcels not in the SFHA.

Mobile homes were identified using the land use codes and parcel data provided by Butler County. These data provide the number of properties identified as having mobile homes, double-wides, or trailers on them. There was no structure data to indicate how many mobile homes or trailers were on each lot. There are likely multiple trailers on each property, but that data does not currently exist.

Table 4.3.3-9 Mobile Home Flood Vulnerability in Butler County

MUNICIPALITY	TOTAL MOBILE HOMES	TOTAL MOBILE HOMES IN SFHA	PERCENT MOBILE HOMES IN SFHA	MUNICIPALITY	TOTAL MOBILE HOMES	TOTAL MOBILE HOMES IN SFHA	PERCENT MOBILE HOMES IN SFHA
Adams Township	134	0	0%	Jackson Township	58	2	3%
Allegheny Township	55	0	0%	Jefferson Township	289	0	0%
Brady Township	243	3	1%	Karns City Borough	6	0	0%
Bruin Borough	29	8	28%	Lancaster Township	51	3	6%
Buffalo Township	344	0	0%	Marion Township	58	2	3%
Butler, City	0	0	-	Mars Borough	1	0	0%
Butler Township	97	0	0%	Mercer Township	53	0	0%
Callery Borough	7	0	0%	Middlesex Township	155	0	0%
Center Township	278	0	0%	Muddy Creek Township	385	0	0%
Cherry Township	70	0	0%	Oakland Township	81	1	1%
Cherry Valley Borough	6	0	0%	Parker Township	52	0	0%
Chicora Borough	26	0	0%	Penn Township	77	1	1%
Clay Township	195	0	0%	Petrolia Borough	3	0	0%
Clearfield Township	189	0	0%	Portersville Borough	3	0	0%
Clinton Township	70	1	1%	Prospect Borough	138	0	0%
Concord Township	163	1	1%	Saxonburg Borough	62	0	0%
Connoquenessing Borough	5	0	0%	Seven Fields Borough	0	0	-
Connoquenessing Township	283	0	0%	Slippery Rock Borough	3	0	0%
Cranberry Township	603	0	0%	Slippery Rock Township	87	1	1%
Donegal Township	43	0	0%	Summit Township	212	7	3%

Table 4.3.3-9 Mobile Home Flood Vulnerability in Butler County

MUNICIPALITY	TOTAL MOBILE HOMES	TOTAL MOBILE HOMES IN SFHA	PERCENT MOBILE HOMES IN SFHA	MUNICIPALITY	TOTAL MOBILE HOMES	TOTAL MOBILE HOMES IN SFHA	PERCENT MOBILE HOMES IN SFHA
East Butler Borough	13	0	0%	Valencia Borough	1	0	0%
Eau Claire Borough	20	0	0%	Venango Township	57	0	0%
Evans City Borough	25	2	8%	Washington Township	87	0	0%
Fairview Borough	3	0	0%	West Liberty Borough	10	0	0%
Fairview Township	73	0	0%	West Sunbury Borough	3	0	0%
Forward Township	50	6	12%	Winfield Township	168	1	1%
Franklin Township	170	0	0%	Worth Township	47	4	9%
Harmony Borough	19	0	0%	Zelienople Borough	10	0	0%
Harrisville Borough	23	0	0%	TOTAL	3,236	21	1%

Hazardous material facilities located in the SFHA have special vulnerability considerations. A total of five hazardous materials facilities are located within the County’s SFHA, listed in Table 4.3.3-10 below. Two are located in Adams Township. Fairview Township, Jackson Township, and Zelienople Borough each have 1 hazardous material facility in the SFHA.

Table 4.3.3-10 EPA TRI Hazmat Facilities in the SFHA

NAME	MUNICIPALITY
Sonneborn LLC	Fairview Township
Robinson Fans	Jackson Township
ATI Precision Finishing LLC	Zelienople Borough
Concast Metal Projects	Adams Township
James Austin Co.	Adams Township

As a discussion within Butler County, current rainfall parameters for high volume precipitation events that are used for engineering design may not reflect actual rainfall patterns. Per (insert source), the maximum expected totals are regularly exceeded. These excess rainfall events overwhelm the engineering parameters for stormwater impoundment and cause excess siltation in local stream and flooding in areas affected by recent housing and commercial developments. This “under engineering” causes both environmental and property damage. Revising the expected maximum precipitation values for engineering design will reduce damages and save money for communities.

There are flood mitigation projects that have recently been completed or are currently underway or planned throughout Butler County. A project of note is the City of Butler's effort to clean out Sullivan Run. The City of Butler is currently working with Bauer Excavating to clean out Sullivan Run for just over \$5,000. Debris in the stream has caused ongoing flooding in the municipality. The contractor will clean out branches and trees to allow for improved water flow and volume. In 2019, a portion of Sullivan Run was cleared at a cost of nearly \$20,000. The city anticipates a more extensive channel improvement project along Sullivan Run to begin in Fall 2021. The upcoming project will cost around \$4 million. Officials say this will greatly reduce the frequency and severity of flooding in the City of Butler (Friel, 2021).

Another project of note is in late 2019 Butler County spearheaded an effort to address stormwater impacts and flooding in the Lower Connoquenessing Creek watershed. This became a regional approach funded by the County, which contributed 20%, with ten municipalities providing fair share reimbursement. The study had two specific focuses, the first to research if release rates for future development could help mitigate some of the historical and future impacts from development. The second focus was identifying specific problem areas that each municipality is experiencing from a watershed view and provide recommendations for three doable projects to address these problems.



4.3.4. Landslide

4.3.4.1. Location and Extent

A landslide is the downward and outward movement of slope-forming soil, rock, and vegetation reacting to the force of gravity. Landslides may be triggered by both natural and human-caused changes in the environment, including heavy rain, rapid snow melt, steepening of slopes due to construction or erosion, earthquakes, and changes in groundwater levels. Mudflows, mudslides, rockfalls, rockslides, and rock topples are all forms of a landslide.

Landslides occur primarily in colluvial (loose) soil and old landslide debris on steep slopes. Steep mountain slopes across the state have experienced debris avalanches associated with extreme rainfall or rain-on-snow events. Glacial and glacial-lake sediments underlie stream bank and lake bluff slumps and other failure areas across the northern part of the state.

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

USGS identifies Butler County as falling into two zones of landslide susceptibility and incidence. The southern half of the County falls in the *High Incidence* zone, meaning the area has a high incidence of occurrence. The northern half of the County falls into the *Low Incidence/High Susceptibility* zone, meaning the area has a high susceptibility to landslides with a low incidence of occurrence. Refer to **Appendix I - Medium and Low Risk Natural Hazards** to see a map of these zones.

4.3.4.2. Range of Magnitude

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

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

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

Landslides cause damage to transportation routes, utilities, and buildings and create travel delays and other side effects. Fortunately, deaths and injuries due to landslides are rare in Pennsylvania. Almost all of the known deaths due to landslides have occurred when rockfalls or other slides along highways have involved vehicles. Storm induced debris flows are the only other type of landslide likely to cause death and injuries. As residential and recreational development increases 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 things rather than people (DCNR, 2021b).

Landslides are not a serious risk in the majority of Butler County but are more likely to occur in the hill and valley areas of Butler County. Limited areas of steep slopes associated with the banks of major watercourses in the County could collapse under heavy rainfall to produce a localized landslide. The potential of damage to lives or property from this type of natural hazard is low. However, the worst-case scenario for Butler County would be a large landslide along I-79 in western Butler County. Not only would this kind of event potentially cause injuries and deaths, but it would also disrupt traffic and necessitate road closures.

4.3.4.3. Past Occurrence

A comprehensive inventory of landslide events in Pennsylvania does not exist. DCNR does not record landslide events or related damages. Past studies have focused on the most vulnerable areas in Pennsylvania, so past occurrence data is not readily available for Butler County. There have been no documented reports of any major landslides in Butler County.

4.3.4.4. Future Occurrence

There is very little chance of a major landslide occurring in Butler County. Mismanaged intense development in steeply sloped areas could increase their frequency of occurrence. However, Butler County has identified steep slopes as an environmentally sensitive area in its Comprehensive Plan, where it establishes the policy that all new growth and development should be steered away from slopes. Utilizing the Risk Factor Methodology, the probability for a landslide event to occur is *possible* (see Table 4.4.1-1).

4.3.4.5. Vulnerability Assessment

The most vulnerable municipalities are those that have identified landslide prone areas or steep slopes in their jurisdiction. Few areas in Butler County are at risk from a major landslide. Continued enforcement of floodplain management and proper road and building construction helps to mitigate this vulnerability.

Structures and critical facilities located in high susceptibility areas are inventoried in the **Appendix I – Medium and Low Risk Natural Hazards**. There are a number municipalities with over 90% of structures or critical facilities in these areas. There are also 18 municipalities with

no structures or critical facilities in landslide susceptible areas. The majority of structures in landslide prone areas throughout Butler County are residential structures.



4.3.5. Pandemic and Infectious Disease

4.3.5.1. Location and Extent

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

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

Prior to the beginning and during the 2021 Hazard Mitigation Plan Update process, a novel coronavirus spread into a worldwide pandemic. Named COVID-19, this type of coronavirus is a new virus that causes respiratory illness and is extremely contagious event prior to exhibiting symptoms or if the infected person is asymptomatic and can be fatal. Butler County is primarily concerned with the possibility of a similar event or pandemic flu outbreak. Influenza, also known as “the flu,” is a contagious disease that is caused by the influenza virus and most commonly attacks the respiratory tract in humans. Influenza is considered to have pandemic potential if it is novel, meaning that people have no immunity to it, virulent, meaning that it causes deaths in normally healthy individuals, and easily transmittable from person-to-person. Different strands of influenza mutate over time and replace older strands of the virus and thus have drastically different effects. To supplement the information in this profile, **Appendix H - COVID-19 Pandemic** can be referenced.

Flu like in nature, symptoms of COVID-19 virus include fever, cough, shortness of breath, and diarrhea. This virus became a great concern due to its high rates of transmission, and high incidence of mortality in addition to so little being known about it. Severe reactions that require immediate medical care include trouble breathing, persistent pain or pressure in the chest, new confusion, inability to wake or stay awake, and discolored skin, lips, or nail beds. In extreme COVID-19 cases that require hospitalization, patients require ventilators to support breathing and may pass away from the virus or related reasons (CDC, 2021a). Governor Tom Wolf issued the first stay-at-home order on March 23, 2020 for seven counties which was then expanded to all 67 counties in the Commonwealth on April 1st. Schools were moved to virtual settings, non-essential businesses were closed, and all essential state services were continued operation (Governor Tom Wolf, 2020). Butler County adopted all state-level restrictions and

guidelines to slow the spread of the virus. People were advised to practice social distancing; only leaving the house for essentials like grocery shopping, and no gathering even in small groups. Even when going on walks, health care professionals recommended that individuals wear masks and remain six feet apart to slow the spread of transmission. On May 31, 2021, the stay-at-home order and any other mitigation order except face mask wearing for the Commonwealth of Pennsylvania was lifted (VisitPA, 2021). At least three new variants of the virus have been detected globally, each reaching the United States by January 2021 (CDC, 2021b).

Starting January 2021, vaccines were being distributed in phases based off of vulnerable populations as well as those who are frequently exposed (PA DOH, 2021a):

- Phase 1A: long-term care facility residents, health care personnel, persons ages 65 and older, persons ages 16-64 with high-risk conditions defined by the CDC, and persons potentially exposed to infectious material that can transmit disease to healthcare personnel and patients, teachers, child-care workers, and frontline groups.
- Phase 1B: Opened on April 5, 2021 – people in congregate settings that are not specified as long-term care facilities, persons receiving home and community-based services, correctional officers and other workers serving people in congregate care settings not included in Phase 1A, education workers not covered in Phase 1A – including those in higher education, U.S. Postal Service workers, manufacturing workers, clergy and other essential support for houses of worship, and public transit workers.
- Phase 1C: Opened on April 12, 2021 – essential workers in transportation and logistics, water and wastewater, food service, housing construction, finance including bank tellers, information technology, communications, energy including nuclear reactors, legal services, federal, state, county, and local government workers including County election workers, elected officials, and members of the judiciary and their staff, media, public safety, and public health workers.
- Phase 2: Opened on April 13, 2021 – all individuals not previously covered who are 12 and older and do not have a contraindication to the vaccine are eligible.

The three vaccines that received emergency approval by the U.S. Food and Drug Administration (FDA) include the Pfizer-BioNTech vaccine, the Johnson & Johnson-Janssen vaccine, and the Moderna vaccine. Each vaccine requires a 15-30-minute on-site observation period after receiving the vaccine. The Pfizer-BioNTech and Moderna vaccine requires two shots for immunity; the Johnson & Johnson-Janssen vaccine is a one-shot vaccine. All three vaccines take two weeks after the final shot to be considered fully vaccinated against COVID-19 (CDC, 2021c). As Butler County, and the rest of the nation, continue to get vaccinated during the pandemic, there have been issues with some of those who chose to receive the two-step vaccines with not returning to receive the second dose for full inoculation. In part to

widespread misinformation, and a temporary pause in the Johnson & Johnson administration, there are individuals who are choosing not to receive the vaccine. There is a growing concern about a potential additional peak of COVID-19 infections and deaths in this unvaccinated population.

4.3.5.2. Range of Magnitude

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

In terms of lives lost, the impact various pandemic influenza outbreaks have had globally over the last century has declined (see Table 4.3.5-1). The severity of illness from the 2009 H1N1 influenza flu virus varied, with the gravest cases occurring mainly among those considered to be high risk. High risk populations are considered to be more vulnerable and include children, the elderly, pregnant women, and chronic disease patients with reduced immune system capacity. These populations are described in more detail in **Section 4.3.5.5** below. Most people infected with swine flu in 2009 recovered without needing medical treatment. Unlike a regular flu season, according to the Centers for Disease Control and Prevention (CDC) the majority of people who died, as many as 77%, were 18-64 years old with up to 11% of the deaths estimated in those 17 years old or younger (CDC, 2009).

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

In 2020, COVID-19, another worst-case pandemic began having worldwide impacts. As of July 2021, we are still facing impacts of the pandemic. Butler County has faced varying impacts of the COVID-19 pandemic. It is believed that the virus originated in an open-air market in the Wuhan province of China in November 2019. Shortly afterwards, the virus began to spread to nearby countries including Japan and South Korea. By March 2020, the virus had reached almost every country worldwide, with the most cases in the United States. At first, concern was focused on people who might be infected due to recent travel. However, community infections soon began to crop up in many cities and towns. This led to a statewide shutdown of schools and businesses and the cancellation of large events for the remainder of 2020. Only life sustaining services were permitted to remain open, including medical facilities,

pharmacies, and grocery stores. People were advised to remain home as much as possible in an attempt to slow the transmission of COVID-19. State health officials note that the virus has infected all age ranges at about the same rate, and that no age group can be considered more or less vulnerable to infection. New variants of the virus reached the United States in January 2021. The CDC notes that these variants spread more easily and quicker than other variants, which may lead to a rapid increase in COVID cases (CDC, 2021b). It is currently unknown how new variants will interact with existing vaccines.

4.3.5.3. Past Occurrence

The United States Department of Health and Human Services estimates that influenza pandemics have occurred for at least 300 years at unpredictable intervals. There have been several pandemic influenza outbreaks over the past 100 years. A list of events and worldwide deaths are shown in Table 4.3.5-1 below.

Table 4.3.5-1 List of Previous Significant Outbreaks of Influenza Over the Past Century (Global Security, 2009) (WHO, 2009)

DATE	PANDEMIC	WORLDWIDE DEATHS (APPROXIMATE)
1918-1920	Spanish Flu / H1N1	50 million
1957-1958	Asian Flu / H2N2	1.5-2 million
1968-1969	Hong Kong Flu / H3N2	1 million
2009 - 2010	Swine Flu / A/H1N1	12,000

Deaths occurred in the United States as a result of the Spanish Flu, Asian Flu, and Hong Kong Flu outbreaks. The Spanish Flu claimed 500,000 lives in the United States. There were 350,000 cases and 8,000 deaths in Pennsylvania. Most deaths resulting from the Asian flu occurred between September 1957 and March 1958; there were about 70,000 deaths in the United States and approximately 15 percent of the population of Pennsylvania was affected. The first cases of the Hong Kong Flu in the United States were detected in September of 1968 with deaths peaking between December 1968 and January 1969 (Global Security, 2009).

In general, confirmed flu cases have been on the rise in Butler County over the past few years. Figure 4.3.5-2 lists the number of confirmed flu cases in the County by flu season. According to the Pennsylvania Department of Health (DOH), there were 1,303 confirmed cases in the most recent influenza season from September 2019 to March 2020 (PA DOH, 2020a).

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

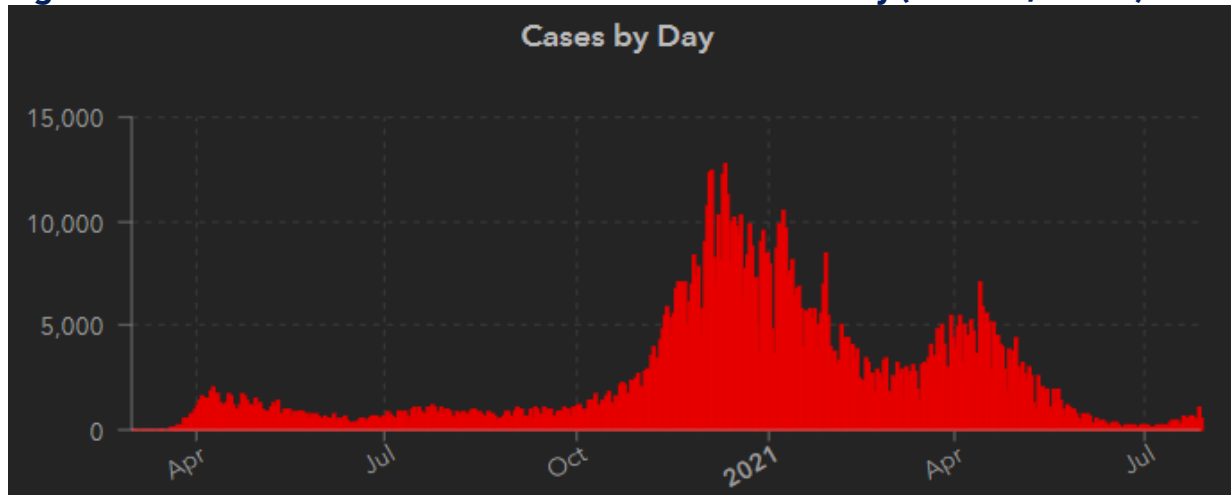
January 2018, approximately halfway through the flu season, 37 pediatric deaths were reported. The CDC estimated that 34 million Americans were affected by the flu (CDC, 2018).

Table 4.3.5-2 Confirmed Flu Cases in Butler County by Flu Season (PA DOH, 2020a)

FLU SEASON	NUMBER OF CONFIRMED CASES
2014/15	1,286
2015/16	563
2016/17	920
2017/18	1,514
2018/19	1,282
2019/20	1,303

The COVID-19 outbreak began in China in November 2019. According to a report published by the CDC on June 5, 2020, the first case of COVID-19 in the United States occurred on January 15, 2020 when a person traveled from Wuhan, China to Seattle and fell ill four days later. Small community spreading of the virus occurred during the second half of January and early February, prior to the more widespread outbreak of the virus in late February of 2020 (Jorden, et al, 2020). The virus became more widespread across the United States in late February 2020, and most counties in Pennsylvania were affected by March 2020. As of July 29, 2021, there were more than 1,023,508 confirmed cases in Pennsylvania, with 11,356 cases and 423 deaths reported in Butler County (PA DOH, 2021b). Case numbers were first expected to peak in May 2020; however, the Commonwealth experienced the largest number of cases in December 2020, with over 12,700 cases. The Commonwealth was experiencing its third peak in cases in April 2021. However, case numbers have drastically decreased since then (see Figure 4.3.5-1). As more people receive the vaccine it is expected that case numbers will decrease. As of July 24, 2021, 93,246 people in Butler County have full COVID-19 vaccine coverage and 6,049 people have partial coverage (PA DOH, 2021a).

Figure 4.3.5-1 COVID-19 Case Numbers in Butler County (PA DOH, 2021c)



4.3.5.4. Future Occurrence

Future occurrences of pandemics and infectious diseases are unclear. The precise timing of pandemic influenza is uncertain, but occurrences are most likely when the Influenza Type A virus makes a dramatic change, or antigenic shift, that results in a new or “novel” virus to which the population has no immunity. This emergence of a novel virus is the first step toward a pandemic. Future pandemics may also emerge from other diseases, especially invasive pathogens that Pennsylvanians do not have natural immunity to. As pandemic is already rated highly, it is unlikely that the hazard ranking will increase in Butler, despite the recent occurrence in Spring 2020 and is ongoing through the HMP update period. It is impossible to predict this type of hazard. The best form of County response is to expect that these events can occur at any time and to constantly evaluate resources and update emergency response plans.

Looking at the number of historical incidences of pandemic-potential diseases, the probability of future pandemic events can be considered *possible* according to the Risk Factor Methodology (see Table 4.4.1-1).

4.3.5.5. Vulnerability Assessment

Certain population groups are at higher risk of pandemic flu infection. This population group includes people 65 years and older, children younger than 5 years old, pregnant women, and people of any age with certain chronic medical conditions. Such conditions include but are not limited to diabetes, heart disease, asthma, and kidney disease (CDC, 2021d). Schools, colleges, convalescent centers, and other institutions serving those younger than 5 years old and older than 65 years old, are locations conducive to faster transmission of pandemic influenza since population identified as being at high risk are concentrated at these facilities or because of a large number of people living in close quarters. In general, jurisdictions that are

more densely populated areas are more vulnerable to disease threats when the disease is directly spread from human to human, but every jurisdiction in the Commonwealth has some vulnerability to pandemic and infectious disease threats. There are some occupation-specific risks that may make some employees more vulnerable. For example, those working in direct patient care situations are more likely to be exposed to a pandemic disease.

There are no true environmental impacts of pandemics and infectious disease threats, but there will be significant economic and social costs beyond the possibility of disease-related deaths. Widespread illness may increase the likelihood of shortages of personnel to perform essential community services. In addition, high rates of illness and worker absenteeism occur within the business community, and these contribute to social and economic disruption. Social and economic disruptions could be temporary but may be amplified in today's closely interrelated and interdependent systems of trade and commerce. Social disruption may be greatest when rates of absenteeism impair essential services, such as power, transportation, and communications.

Jurisdictional losses in a pandemic or infectious disease outbreak stem from lost wages and productivity, not losses to buildings or land. Losses are difficult to estimate because the exact rates of absenteeism and cost of treating a widespread disease will depend on the virus or bacterium in question, the availability of vaccination or treatment, and the severity of symptoms. For historical context, though, the Asian and Hong Kong Flu pandemics killed over 1.5 million people worldwide and caused an estimated \$32 billion losses due to lost productivity and medical expenses (Saunders-Hastings & Krewski, 2016). With Pennsylvania's economy integral to the national economy, economic losses from a pandemic or infectious disease threat could be significant.

It is expected that there will be immense losses due to the COVID-19 pandemic. Thousands of individuals were laid off across the commonwealth as non-essential businesses were forced to close. In just one week, over three million Americans filed for unemployment; the greatest amount ever (Rushe & Holpuch, 2020). The accommodation and food services industry suffered the highest number of jobs lost. Professional services, construction, and manufacturing have all been subsidized at greater rates, allowing for lower amounts of jobs lost. Tourism and hospitality industries have suffered in high density areas; however, remote destinations in Butler County are less susceptible to this trend as they are deemed safe to visit. The majority of COVID-19 aid packages have been distributed to allow some industries to continue operations (Klein & Smith, 2021).

The COVID-19 pandemic has also spurred conversations around creating safe public spaces and work environments in regard to pandemic and infectious disease. The International Code Council (ICC) published an overview of code compliance that helps facilitate response to pandemic instances. For example, properly designed, installed, and maintained ventilation systems can help in mitigating the spread of pathogens (ICC, 2020). Many buildings have

chosen to inspect and upgrade these systems during shelter in place orders. This is essential towards stopping the spread of pathogens in high density residential buildings and ensures workers will return to a safe environment when it is safe to work in offices again. It is currently unknown how COVID-19 will change the economic environment long term.



4.3.6. Radon Exposure

4.3.6.1. Location and Extent

Scientists recognized the radioactive component of airborne radon as a hazard to humans. In the 1980s, as housing prices increased, homeowners began to question the geographic distribution of higher radon levels.

Radon is a gas that cannot be seen or smelled. It is a noble gas that originates by the natural radioactive decay of uranium and thorium. Like other noble gases (e.g., helium, neon, and argon), radon forms essentially no chemical compounds and tends to exist as a gas or as a dissolved atomic constituent in groundwater. Two isotopes of radon are significant in nature, ^{222}Rn and ^{220}Rn , formed in the radioactive decay series of ^{238}U and ^{232}Th , respectively. The isotope thoron (i.e. ^{220}Rn) has a half-life (time for decay of half of a given group of atoms) of 55 seconds, barely long enough for it to migrate from its source to the air inside a house and pose a health risk. However, radon (i.e. ^{222}Rn), which has a half-life of 3.8 days, is a widespread hazard. The distribution of radon is correlated with the distribution of radium (i.e. ^{226}Ra), its immediate radioactive parent, and with uranium, its original ancestor. Due to the short half-life of radon, the distance that radon atoms can travel from their parent before decay is generally limited to distances of feet or tens of feet.

Each County in Pennsylvania is classified as having a low, moderate, or high radon hazard potential. Butler County is classified as having a high hazard, meaning there is a predicted indoor radon level greater than 4 pCi/L (see **Appendix I – Medium and Low Risk Natural Hazards** for maps).

4.3.6.2. Range of Magnitude

Exposure to radon is the second leading cause of lung cancer after smoking. It is the number one cause of lung cancer among non-smokers. In the United States radon is responsible for about 21,000 lung cancer deaths every year; approximately 2,900 of which occur among people who have never smoked. Lung cancer is the only known effect on human health from exposure to radon in air and thus far, there is no evidence that children are at greater risk of lung cancer than are adults (US EPA, 2016a). The main hazard is actually from the radon daughter products (^{218}Po , ^{214}Pb , ^{214}Bi), which may become attached to lung tissue and induce lung cancer by their radioactive decay.

4.3.6.3. Past Occurrence

Current data on abundance and distribution of radon as it affects individual houses in the state of Pennsylvania in general is considered incomplete and potentially biased. Butler County is not an exception. The EPA has estimated that the national average indoor radon concentration is 1.3 pCi/L and the level for action is 4.0 pCi/L; however, they have estimated that the average indoor concentration in Pennsylvania basements is about 7.1 pCi/L and 3.6 pCi/L on the first floor (PA DEP, 2019a). Average basement and first floor radon concentrations are available online by zip code. Residents can view this information through a

database maintained by the PA DEP (<https://www.dep.pa.gov/Business/RadiationProtection/RadonDivision/pages/radon-in-the-home.aspx>).

The Pennsylvania Department of Environmental Protection Bureau of Radiation Protection provides information for homeowners on how to test for radon in their houses. If a test results in radon concentrations over 4 pCi/L, then the Bureau works to help the homeowners make repairs to their houses to mitigate against high radon levels.

4.3.6.4. Future Occurrence

Radon exposure retains a significant probability given present soil, geologic, and geomorphic factors in Butler County. Future occurrence of high radon level hazards can be considered *unlikely* as defined by the Risk Factor Methodology probability criteria (see Table 4.4.1-1).

Development in areas where previous radon levels have been significantly high will continue to be more susceptible to exposure. However, new incidents of concentrated exposure may occur with future development or deterioration of older structures. Exposure can be limited with proper testing for both past and future development and appropriate mitigation measures.

4.3.6.5. Vulnerability Assessment

Houses in Butler County, particularly in high vulnerability areas could be susceptible to moderate levels of radon. Smokers can be up to ten times more vulnerable to lung cancer from high levels of radon depending on the level of radon they are exposed to. Older houses that have crawl spaces or unfinished basements are more vulnerable as well because of the increased exposure to soils which could be releasing higher levels of radon gas. Additionally, houses that rely on wells for their water may face an additional risk, although this type of exposure is low and rare in Pennsylvania.

Proper testing for radon levels should be completed across Butler County, especially in the areas of higher incidence levels and for vulnerable populations that face the contributing risks described above. This testing will determine the level of vulnerability that residents face in their homes, as well as in their businesses and schools. The Pennsylvania Department of Environmental Protection Bureau of Radiation Protection provides short and long term tests to determine radon levels as well as information on how to mitigate high levels of radon in a building. According to the EPA, repairs to protect against radon can cost on average the same as routine house repairs (US EPA, 2016b).



4.3.7. Subsidence, Sinkhole

4.3.7.1. Location and Extent

Subsidence is defined as a sinking movement of the earth’s surface usually described as a sinkhole. There are two common causes of subsidence in Pennsylvania. Dissolution of carbonate rock such as limestone or dolomite, and mining activity. Butler County is most concerned with subsidence events related to mining activities. The County has a long history of mining activity due to its location in the Bituminous Coal Region.

In the first case, water passing through naturally occurring fractures and bedding planes dissolves bedrock leaving voids below the surface (DCNR, 2021c). Eventually, overburden on top of the void collapses, leaving surface depressions resulting in karst topography. Characteristic structures associated with karst topography include sinkholes, linear depressions, and caves. Collapse sometimes occurs only after a large amount of activity, or when a heavy burden is placed on the overlying materials. This type of subsidence is fairly localized in extent.

Subsidence potential in Butler County is primarily associated with previous mining activities. The few mine maps available show that generally the mining that has occurred in the County has been very deep. Of the 57 municipalities, 37 have areas mined under the surface areas mapped. **Appendix H** in the 2015 Butler County HMP includes maps that identify these areas for each municipality. Mining is more prevalent in the north and west areas of the County, though scattered mines are found throughout the County. While there are no past occurrences to map the prevalence of mining shows that this is a hazard that could impact many municipalities in the County.

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

In many cases in Butler County, it is difficult to determine the true extent of susceptibility to mining subsidence because many mined areas were mined out by individual landowners especially in the late 1800s and early 1900s for which there was never any record. This is known to be prevalent around Slippery Rock Township and Cherry Township but may also impact other areas.

4.3.7.2. Range of Magnitude

Underground mining can cause significant damage to property. Mine subsidence most often results in damage to a structure located above the underground mine area, which can range from minor settling to total collapse. These events can also result in contamination,

diminution, or disruption of water supply systems (residential, agricultural, or commercial water supply). Environmental hazards associated with coal mining are detailed in **Section 4.3.13**.

The worst-case scenario for Butler County would be a complete collapse of an underground mine in a heavily populated area, such as Cranberry or the City of Butler. Refer to the 2015 HMP for more information on impacts from subsidence in Butler County.

4.3.7.3. Past Occurrence

A comprehensive list of mine related subsidence does not exist for Butler County. There is a long history of mine subsidence related events throughout the Bituminous Coal region. Anecdotal evidence shows that this hazard has occurred in Butler County.

4.3.7.4. Future Occurrence

Based on widespread undermined areas and continued mining activity throughout Butler County, mining subsidence events may occur in the future. Sinkholes and surface depressions are dependent on a number of variables, including land use and water management. Changes in these variables can affect the likelihood and frequency of future subsidence events. Overall, the probability of future subsidence and sinkhole events can be considered *likely* according to the Risk Factor Methodology (see Table 4.4.1-1).

4.3.7.5. Vulnerability Assessment

The most vulnerable municipalities are those that have identified undermined areas within their jurisdiction. See **Appendix H** in the 2015 Butler County HMP for a listing of these communities.

Since all municipalities in Butler County are vulnerable to the hazard of subsidence, local and County officials should follow some of the following hazard mitigation measures: encourage local awareness of the subsidence hazards; compliance with or enactment of building codes and regulations that consider geologic factors; preparedness to respond to and cope with a geologic hazard occurrence; and encourage local property owners to purchase subsidence insurance. Mine subsidence insurance is available to any homeowner whose property sits on top of an abandoned coal and clay mine; the mine subsidence insurance is intended to supplement standard homeowner’s insurance, which generally exclude mine subsidence damage. The program has been run by the PA DEP since 1961; this non-profit Insurance Fund has paid over \$28 million in claims since then. Monthly premiums are about 55 cents per \$100,000 of coverage. Mine subsidence insurance covers buildings, but not personal items (since they are rarely damaged in a subsidence event). Limited coverage of adjacent structures is available; in addition, the insurance covers incidental costs like temporary relocation and certain kinds of damage occurring from mine water breakouts (PA DEP, 2021a).

Refer to the 2015 HMP for additional information on measures that can reduce vulnerability to subsidence hazards.



4.3.8. Tornado, Wind Storm

4.3.8.1. Location and Extent

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by thunderstorm activity (but sometimes result from hurricanes or tropical storms) 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 30 to more than 300 miles per hour.

Severe wind can occur during severe thunderstorms, winter storms, coastal storms, or tornadoes. Straight-line winds such as a downburst have the potential to cause wind gusts that exceed 100 miles per hour. Based on 40 years of tornado history and over 100 years of hurricane history, FEMA identifies western and central Pennsylvania as being more susceptible to higher winds than eastern Pennsylvania (FEMA, 1997). Summer thunderstorms involve lightning, strong winds and heavy rains can result in wildfires or localized wind damage and flash flooding (NOAA NCEI, 2021).

Tornadoes and windstorms can occur throughout Butler County, though events are usually localized to a small area of land. Windstorms are usually associated with hurricanes, tropical storms, and tornadoes, but may also include thunderstorms and less violent storm systems. 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 to occur during the spring and early summer months of March through June. The destruction from these storms can be tremendous, destroying buildings, uprooting trees and injuring people. Severe thunderstorms most frequently occur in the summer in southwestern Pennsylvania.

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

Straight-line winds and windstorms are experienced on a more region-wide scale. While such winds usually accompany tornadoes, straight-line winds are caused by the movement of air from areas of higher pressure to areas of lower pressure. Stronger winds are the result of greater differences in pressure and usually area a result of a thunderstorm downdraft (NOAA NSSL, 2021a). Windstorms are generally defined with sustained wind speeds of 40 mph or greater lasting for one hour or longer, or winds of 58 mph or greater for any duration (NOAA NHC, 2021).

4.3.8.2. *Range of Magnitude*

Tornadoes are more likely to occur during the spring and early summer months of March through June and are most likely to form in the late afternoon and early evening. Most tornadoes are a few dozen yards wide and touch down briefly, but even small, short-lived tornadoes can inflict tremendous damage. Destruction ranges from minor to catastrophic depending on the intensity, size, location and duration of the storm. The impact of a tornado hits very different if the tornado touches down in a field than at a school. Structures made of light materials such as mobile homes are most susceptible to damage. Waterspouts are weak tornadoes that form over warm water and are relatively uncommon in Pennsylvania.

Each year, tornadoes account for \$400 million in damages and cause over 70 deaths nationally (NGS, 2019). While the extent of tornado damage is usually localized, the vortex of extreme wind associated with a tornado can result in some of the most destructive forces on Earth. Rotational wind speeds can range from 100 mph to more than 250 mph. In addition, the speed of forward motion can range from 0 to 50 mph. Therefore, some estimates place the maximum velocity (combination of ground speed, wind speed, and upper winds) of tornadoes at about 300 mph. The damage caused by a tornado is a result of the high wind velocity and wind-blown debris, also accompanied by lightning or large hail. The most violent tornadoes have rotating winds of 250 miles per hour or more and are capable of causing extreme destruction and turning normally harmless objects into deadly missiles (NOAA NSSL, 2021a).

Damages and deaths can be especially significant when tornadoes move through populated, developed areas. The destruction caused by tornadoes ranges from minor to extreme damage depending on the intensity, size and duration of the storm. Typically, tornadoes cause the greatest damages to structures of light construction such as mobile homes (NOAA NSSL, 2021a).

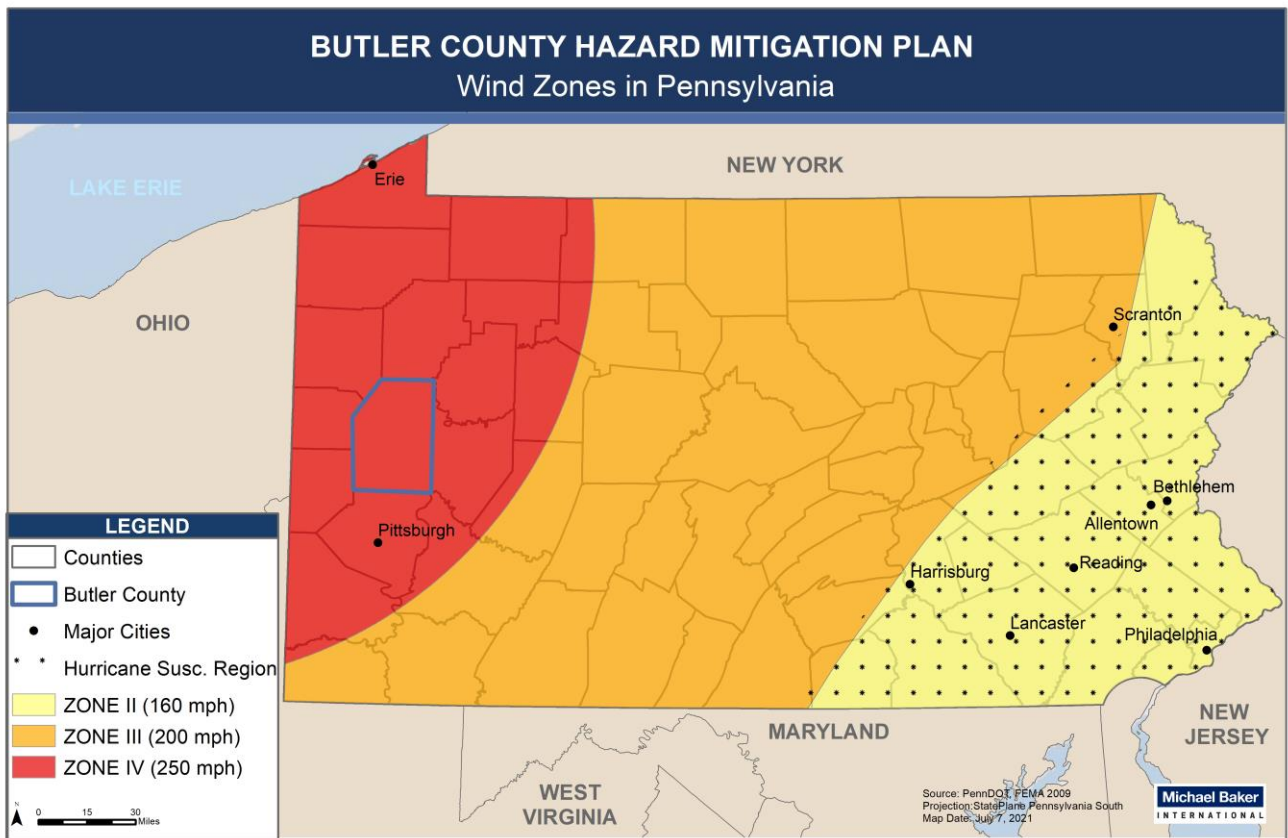
The Enhanced Fujita Scale, also known as the "EF-Scale," measures tornado strength and associated damages. The EF-Scale is an update to the earlier Fujita scale that was published in 1971. It classifies United States tornadoes into six intensity categories, as shown in Table 4.3.8-1, based upon the estimated maximum winds occurring within the wind vortex. The EF-Scale has become the definitive metric for estimating wind speeds within tornadoes based upon the damage done to buildings and structures since it was implemented through the National Weather Service in 2007. Prior to the EF-Scale, the original F-Scale, Fujita Scale, was used. The F-Scale considered fewer variables than the updated EF-Scale when assigning wind speed ratings to tornadoes and was thus phased out. Table 4.3.8-1 also provides a summary of the EF-Scale along with the probability of actually being in the path of a tornado in any given year (NOAA NSSL, 2021a).

Table 4.3.8-1 Tornado Enhanced Fujita Scale, Associated Damage, and Probability of Occurrence (NOAA NWS, 2021a)

TORNADO EF NUMBER	WIND SPEED- 3 SECOND GUSTS (mph)	F-SCALE NUMBER	EXPECTED DAMAGE
EF0	65 - 85	F0-F1	Light damage: Some damage to chimneys; branches break from trees and show-rooted trees pushed over; damage to sign boards.
EF1	86 - 110	F1	Moderate damage: Peel surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off road.
EF2	111 - 135	F1-F2	Considerable damage: Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated.
EF3	136 - 165	F2-F3	Severe damage: Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; cars lifted off ground and thrown.
EF4	166 - 200	F3	Devastating damage: Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
EF5	Over 200	F3-F6	Extreme damage: Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobile-sized missiles fly through the air in excess of 100 yards; trees debarked; incredible phenomena will occur.

Figure 4.3.8-1 shows the wind speed zones developed by the American Society of Civil Engineers based on tornado and hurricane historical events. These wind speed zones are intended to guide the design and evaluation of the structural integrity of shelters and critical facilities. All of Butler County falls within Zone IV. Shelters and critical facilities should be able to withstand a 3-second gust of up to 250 mph, regardless of whether the gust is the result of a tornado, coastal storm, or windstorm event. Therefore, these structures should be able to withstand the wind speeds experienced in an F5 tornado event.

Figure 4.3.8-1 Wind Zones in Pennsylvania



The worst tornado event in Pennsylvania record, an example of the worst-case scenario, occurred on July 15, 2004 in Campbelltown, Lebanon County. This F3 tornado, which had estimated wind speeds of 175-200 miles per hour, leveled 32 houses, severely damaged 37 homes, and an additional 50 homes suffered more minor damage. Two people were hospitalized from the tornado, one critically injured. While only on the ground for 10-15 minutes, it is estimated that the tornado caused \$18 million in property damage (NOAA NCEI, 2021).

The most recent tornado experienced by Butler County was an EF1 and occurred on June 16, 2019. According to local officials the tornado traveled east starting in Bonus, an unincorporated community within Allegheny Township, and crossing into Armstrong County. The majority of the resulting damage was tree damage. Close to 100 hardwood and softwood trees were either uprooted, snapped at the trunk, or broken halfway up. Very minor structural damage was also documented (NOAA NCEI, 2021).

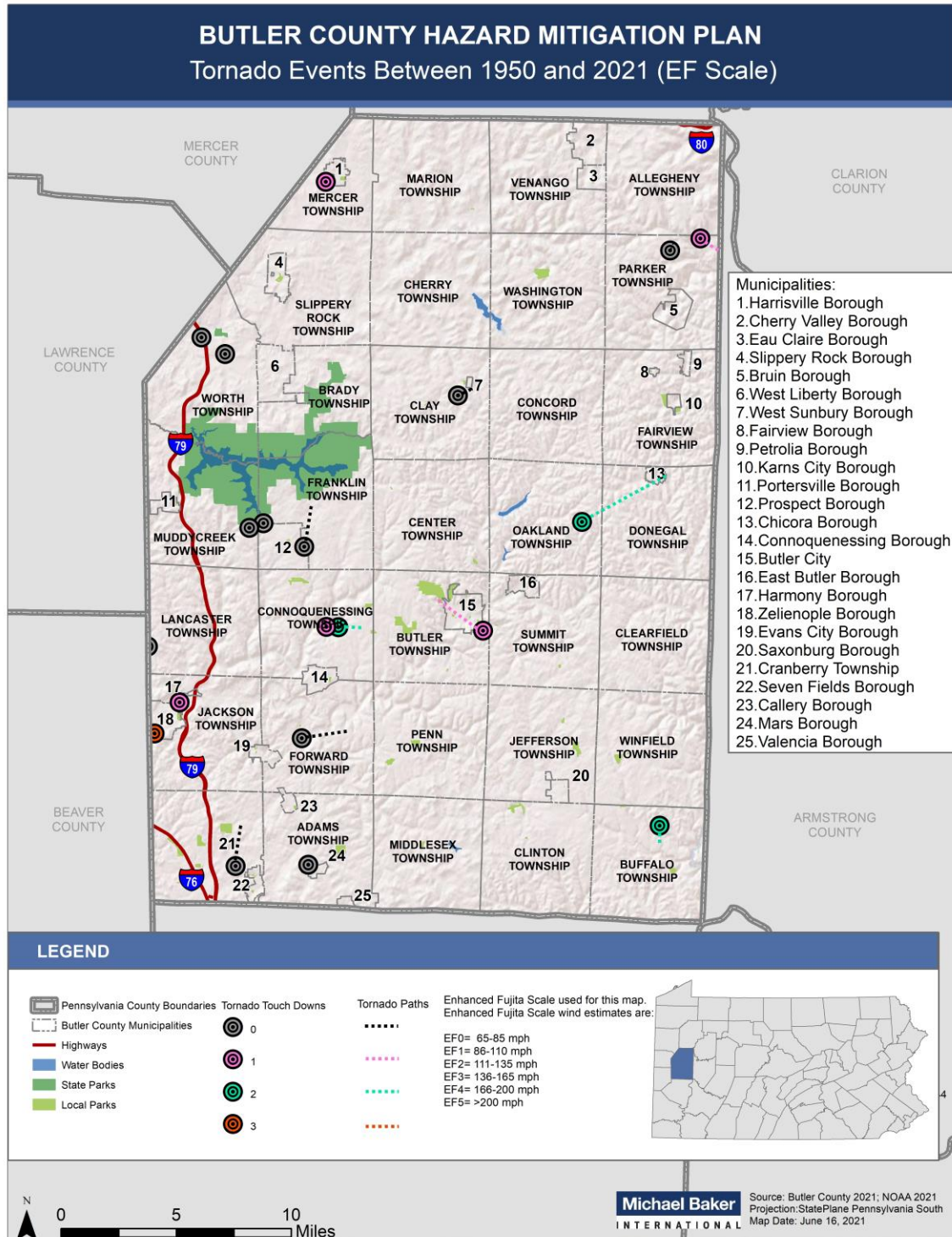
Based on the magnitude of tornadoes experienced in the past in Butler County, the worst-case scenario would be the occurrence of an EF5 tornado, with wind speeds exceeding 200 miles per hour in the area around the City of Butler. While unlikely, this kind of an event would cause extreme damage even to the most well-built homes. Not only would there be damage to structures, but buildings, cars, and other debris would be turned into high-speed missiles capable of traveling far distances and causing significant damage over a wide area.

Table 4.3.8-2 lists previous tornado events that have occurred in Butler County. Figure 4.3.8-3 depicts the locations of tornado touchdowns and paths.

Table 4.3.8-2 Butler County Tornado History (NOAA NCEI, 2021)

LOCATION OR COUNTY	DATE	MAGNITUDE	DEATH	INJURY	PROPERTY DAMAGE
Butler	June 1, 1954	F2	0	0	\$25,000
Butler	August 30, 1970	F1	0	0	\$250,000
Butler	July 23, 1976	N/A	0	0	\$0
Butler	June 16, 1978	F1	0	1	\$250,000
Butler	June 27, 1978	N/A	0	1	\$250,000
Butler	April 28, 1981	F2	0	0	\$25,000
Butler	July 20, 1981	F2	0	0	\$250,000
Butler	May 31, 1985	F3	6	80	\$25,000,000
Butler	July 22, 1990	F0	0	0	\$0
Butler	July 22, 1990	F0	0	0	\$0
Butler	July 22, 1990	F0	0	0	\$0
Butler	September 6, 1990	F1	0	0	\$0
Butler	July 23, 1991	F0	0	0	\$250
Mars	July 29, 1994	F1	0	0	\$500,000
Prospect	April 9, 2001	F0	0	0	\$50,000
Butler	April 28, 2002	F1	0	0	\$200,000
Prospect	July 22, 2008	EF0	0	0	\$0
Butler	June 27, 2015	EF0	0	0	\$5,000
Butler	August 10, 2015	EF0	0	0	\$25,000
Butler	August 25, 2016	EF0	0	0	\$5,000
Prospect	May 1, 2017	EF0	0	0	\$20,000
Bruin	May 1, 2017	EF0	0	0	\$5,000
Butler	July 10, 2017	EF0	0	0	\$15,000
Butler	June 16, 2019	EF1	0	0	\$0
		TOTAL:	6	82	\$26,875,250

Figure 4.3.8-2 Butler County Tornado History (1950-2021)



Butler County has faced 186 significant wind storms during the period of 1960 to 2021. Windstorm events may be the result of thunderstorms, hurricanes, tropical storms, winter storms, or nor'easters. Despite low injuries and deaths, these wind storms have attributed to a total of \$9,899,406.00 in property damages. On July 7, 2021, a thunderstorm with high winds overturned several small planes and other equipment at the Pittsburgh/Butler Regional Airport (see Figure 4.3.8-4). Table 4.3.8-3 summarizes these past occurrences of wind storms within Butler County from 2015 to 2020. Wind storm data prior to 2015 can be found in the 2015 Butler County Hazard Mitigation Plan update.

Table 4.3.8-3 Butler County Wind Storm History 2015-2020 (NOAA NCEI, 2021)

LOCATION	YEAR	NUMBER OF WIND STORMS	HAZARD COMBO	DEATH	INJURY	PROPERTY DAMAGE
Great Belt, Harmony, Timberly Heights, Euclid, Chicora, Jacksville, Homeacre, Cabot, Parkview, Saverville, Sarver, Jefferson Center, Butler Graham Arpt	2015	16	Thunderstorm Wind	1	0	\$80,000
Criders Corners, Zeno, Mt Chestnut, Windward Heights, Bruin, Bovard	2016	6	Thunderstorm Wind	0	0	\$50,000
Goff, Crider Corners, Middle Lancaster, Butler, Jacksville, West Liberty, Branchton, Six Points, Buhls, Whitestown, Evans City, Euclid, Boydstown, Sarver, Portersville, Connoquenessing, Buena Vista, Claytonia	2017	25	Thunderstorm Wind	0	1	\$500
Ogle, Six Points, Park View, Harmony, Keisters, Brownsdale	2018	6	Thunderstorm Wind	0	0	\$2,000

Table 4.3.8-3 Butler County Wind Storm History 2015-2020 (NOAA NCEI, 2021)

LOCATION	YEAR	NUMBER OF WIND STORMS	HAZARD COMBO	DEATH	INJURY	PROPERTY DAMAGE
Coyleville, Evans City, Annisville, Bruin, Bonus, Eidenau, East Butler, Euclid, Zelienople, North Oakland, Goff, Eau Claire, Brownsdale, Butler Graham Arpt, Cooperstown, Six Points, Glenora,	2019	22	High Wind; Thunderstorm Wind	0	0	\$30,000
Slippery Rock, East Butler, Zelienople, Connoquenessing, Renfrew, Homeacre, Euclid, Evans City, Cooperstown, Cabot, Hannahstown, Petrolia, Coaltown, Butler, Herman	2020	22	Thunderstorm Wind	0	0	\$212,000
TOTAL				1	1	\$374,500

Figure 4.3.8-3 Wind Damage at Pittsburgh/Butler Regional Airport - July 7, 2021



4.3.8.3. Future Occurrence

Most of Pennsylvania is susceptible to tornadoes of a magnitude of at most an EF-3. It can reasonably be assumed that future tornadoes will be similar in nature to those that have

affected Butler County in the past. The incidence of smaller tornadoes is increasing. The highest probability of a tornado occurring exists between the months of May, June, and July, although a moderate amount of tornadoes have occurred in the months of March, April, August, and September. It can reasonably be assumed that future tornadoes will be similar in nature to those that have affected the County in the past, and will occur on a yearly basis (NOAA NWS, 2021b).

The probability of the County and its municipalities experiencing severe winds is difficult to quantify but is considered relatively high. Given the significant number of wind storms, often exceeding 10 storms per year, Butler County is likely to be susceptible to additional wind damage. The degree of damage and impact to the County will vary as it has in years past. Furthermore, past occurrences provide evidence of wind storms occurring during all seasons and months within the County.

Changing weather patterns have led to more frequent and extreme storms across the Nation. This includes intense winds associated with severe rain and tropical storms. Further, the annual number of very hot days is growing. Warmer and wetter conditions provide more energy for thunderstorms and tornadoes. While it is difficult to predict, it is expected that these conditions will continue to intensify in Butler County. Overall, the probability of future tornado and windstorms should be considered *possible* according to the Risk Factor Methodology (see Table 4.4.1-1).

4.3.8.4. Vulnerability Assessment

The potential for tornadoes always exists. There has been an increase in the incidence of smaller tornadoes. However, The National Weather Service cannot accurately predict these smaller funnels, so there is difficulty in alerting the populace in a timely manner.

While the chance is small, the damage that results when the tornado arrives is devastating. A tornado with an "F4" designation can carry a wind velocity of 200 mph resulting in a force of more than 100 pounds per square foot of surface area, a "wind load" that exceeds the design limits of most buildings.

While the frequency of windstorms and minor tornadoes is expected to remain relatively constant, vulnerability increases in more densely developed areas. Tornadoes and windstorms may affect the entire County, including all critical infrastructure and all structures. However, there are a number of evaluation criteria to consider when discussing the vulnerability of structures and critical facilities. These criteria include age of the building (and what building codes may have been in effect at the time it was built), type of construction, and condition of the structure (i.e., how well has the structure been maintained). For most assets, this would require site-specific analysis.

The primary structure type vulnerable to a tornado or windstorm is mobile homes due to their lightweight, unanchored design. Table 4.3.8-4 provides the number of structures on mobile

home parcels by municipality. These should be considered an estimate of mobile homes (see Section 2.5 for data limitations).

Table 4.3.8-4 Estimated Mobile Homes Per Municipality (US Census, 2019)

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES ON MOBILE HOME PARCELS	PERCENT MOBILE HOMES
Adams Township	6,126	134	2%
Allegheny Township	414	55	13%
Brady Township	661	243	37%
Bruin Borough	245	29	12%
Buffalo Township	3,336	344	10%
Butler, City	5,933	0	0%
Butler Township	7,644	97	1%
Callery Borough	168	7	4%
Center Township	3,788	278	7%
Cherry Township	570	70	12%
Cherry Valley Borough	42	6	14%
Chicora Borough	473	26	5%
Clay Township	1,202	195	16%
Clearfield Township	1,096	189	17%
Clinton Township	1,351	70	5%
Concord Township	749	163	22%
Connoquenessing Borough	352	5	1%
Connoquenessing Township	2,146	283	13%
Cranberry Township	12,665	603	5%
Donegal Township	765	43	6%
East Butler Borough	331	13	4%
Eau Claire Borough	163	20	12%
Evans City Borough	776	25	3%
Fairview Borough	80	3	4%
Fairview Township	951	73	8%
Forward Township	1,325	50	4%
Franklin Township	1,280	170	13%
Harmony Borough	459	19	4%
Harrisville Borough	380	23	6%
Jackson Township	2,422	58	2%
Jefferson Township	2,103	289	14%
Karns City Borough	111	6	5%
Lancaster Township	1,346	51	4%

Table 4.3.8-4 Estimated Mobile Homes Per Municipality (US Census, 2019)

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES ON MOBILE HOME PARCELS	PERCENT MOBILE HOMES
Marion Township	621	58	9%
Mars Borough	541	1	0%
Mercer Township	560	53	9%
Middlesex Township	3,046	155	5%
Muddy Creek Township	1,144	385	34%
Oakland Township	1,282	81	6%
Parker Township	359	52	14%
Penn Township	2,281	77	3%
Petrolia Borough	125	3	2%
Portersville Borough	146	3	2%
Prospect Borough	566	138	24%
Saxonburg Borough	784	62	8%
Seven Fields Borough	1,227	0	0%
Slippery Rock Borough	1,240	3	0%
Slippery Rock Township	1,904	87	5%
Summit Township	2,018	212	11%
Valencia Borough	266	1	0%
Venango Township	433	57	13%
Washington Township	644	87	14%
West Liberty Borough	157	10	6%
West Sunbury Borough	103	3	3%
Winfield Township	1,335	168	13%
Worth Township	790	47	6%
Zelienople Borough	1,853	10	1%
TOTAL	84,878	5,393	6%



4.3.9. Wildfire

The Wildfire hazard profile has been shortened for the 2021 Hazard Mitigation Plan update. The HMSC decided to focus on high-risk hazards in the update process. As a low-risk hazard, Wildfire has been updated to include the most pertinent information and any changes since the 2015 HMP. Please refer to **Appendix I – Medium and Low Risk Natural Hazards** for additional data on subsidence hazards in Butler County. This includes maps and an assessment of vulnerable structures and critical facilities in each municipality.

4.3.9.1. Location and Extent

A wildfire is an uncontrolled fire that spreads through vegetative fuels, exposing and possibly consuming structures. A wildland fire is a wildfire in an area in which development is essentially nonexistent, except for roads, railroads, power lines, and similar facilities. An urban-wildland interface fire is a wildfire in a geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels.

Wildfires can occur at any time of the year but are most likely to occur in the County during a drought. Wildland fires in Pennsylvania can occur in fields, grass, and brush as well as in the forest itself. Under dry conditions or drought, wildfires have the potential to burn forests as well as croplands. Any small fire in a wooded area, if not quickly detected and suppressed, can get out of control. Much of the County is rural in character which creates vulnerabilities to brush and forest fires. Population density is very low in these rural areas of Butler County, putting less people at risk to wildfire events (BCPC, 2017).

Most wildland fires are caused by human carelessness, negligence, and ignorance. In 2020, debris burning accounted for the largest number of wildfires, while incendiary causes accounted for the largest number of acres burned in Pennsylvania (DCNR, 2020). However, some are precipitated by lightning strikes and in rare instances, spontaneous combustion.

Refer to **Appendix I – Medium and Low Risk Natural Hazards** for a map of locations of wildfires from 2008 to 2013.

4.3.9.2. Range of Magnitude

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

Vegetation loss is often an environmental concern with wildfires but does not always have serious impacts. Many ecosystems benefit from periodic fires as they clear out dead organic

materials. As dead or decaying plants build up on the ground, they may prevent organisms within the soil from accessing nutrients or block animals on the land from accessing the soil. The coating of dead organic matter can also choke outgrowth of smaller or new plants. Additionally, several plants require fire to progress through their life cycles. For example, seeds from many pine tree species are enclosed in pinecones that are covered in pitch, which must be melted by fire for the seeds to be released. Other trees, plants, and flowers, like certain types of lilies, also require fire for seed germination. Prescribed burns, controlled fires intentionally set to create these impacts, are performed if weather conditions permit the safe setting and putting out of wildfires. The most significant negative impact the potential for severe erosion, silting of stream beds and reservoirs, and flooding due to ground-cover loss following a fire event (NGS, 2020).

The County can also be impacted from wildfires occurring in different regions. This includes other counties in Pennsylvania to as far as the west coast. In July 2021, smoke and ash from massive wildfires in California, Oregon, and other states blew across the nation. A smoky haze hung over areas of Pennsylvania, New York, and New Jersey. The nation's largest wildfire, Oregon's Bootleg Fire, grew to 618 square miles, just over half the size of Rhode Island. Air quality alerts for parts of the northeast region were in place for several days. People with heart disease, asthma, and other health issues were advised to avoid the outdoors. Similar impacts have been experienced during other large wildfire events occurring in the northwest (Flaccus & Cline, 2021).

In addition to the risk wildfires pose to the general public and property owners, the safety of firefighters is also a concern. Although loss of life among firefighters does not occur often in Pennsylvania, it is always a risk. More common firefighting injuries include falls, sprains, abrasions, or heat-related injuries such as dehydration. Response to wildfires also exposes emergency responders to the risk of motor vehicle accidents and can place them in remote areas away from the communities that they are chartered to protect.

4.3.9.3. Past Occurrence

Wildfires in Butler County have generally been small, contained events. However, the worst wildfire in Butler County occurred in 2006 in the Sarver area. In this event, 45 acres burned because of a debris fire. The fire occurred near Lardintown Road; conditions at the time of the fire included a temperature of 63 degrees with mild, 5 mph winds from the south. Damages related to this fire are not available.

Between 1999 and 2013, the DCNR Bureau of Forestry reported 2,651 wildfires in Butler County, resulting in 14 fatalities. Refer to **Appendix I - Medium and Low Risk Natural Hazards** for a list of wildfires per year during this time period and a breakdown of acres burned in Butler County municipalities from 2003 to 2013.

DCNR-BOF no longer reports wildfires at the County level, but instead by State Forest District. Butler County falls in State Forest District (8) Clear Creek. Table 4.3.9-1 lists the number of fires and acres burned from 2015-2020. This data represents several counties in Western Pennsylvania, showing a regional view of past wildfire occurrences for Butler County.

Table 4.3.9-1 Wildfire Events Reported in State Forest District 8 from 2015-2020 (DCNR, 2020)

YEAR	# FIRES	ACRES BURNED
2015	67	139.5
2016	59	182.9
2017	39	29.0
2018	85	116.3
2019	81	114.7
2020	96	171.4
TOTAL	427	753.8

4.3.9.4. Future Occurrence

Previous events indicate that annual wildfire occurrences in the County are expected. Weather conditions like drought can increase the likelihood of wildfires occurring. Many wildfires in the County are also the result of human-caused ignitions. Any fire, without the quick response or attention of fire-fighters, forestry personnel, or visitors to the forest, has the potential to become a wildfire. Therefore, the probability of an urban fire or wildfire occurring in Butler County is considered *possible* as defined by the Risk Factor Methodology probability criteria (see Table 4.4.1-1).

4.3.9.5. Vulnerability Assessment

DCNR-BOF conducted an independent wildfire hazard risk assessment for municipalities in Butler County in 2010, which is the most recent assessment of this type available. The analysis identified potential wildfire hazard based on conditions that affect wildfire ignition and/or behavior such as fuel, topography, and local weather. Results of the assessment are mapped in the **Appendix I – Medium and Low Risk Natural Hazards**. Refer to **Appendix I** for a breakdown of structures and critical facilities in high wildfire hazard areas by municipality and land use type.



4.3.10. Winter Storm

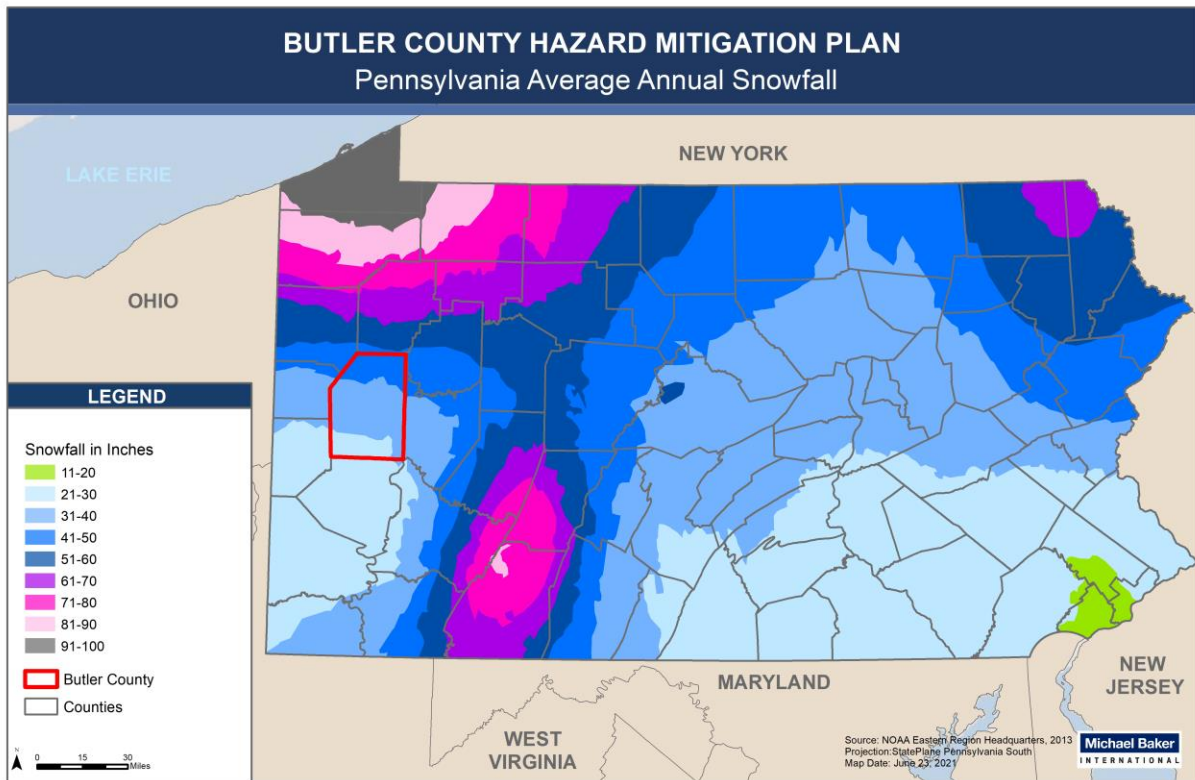
4.3.10.1. Location and Extent

Severe winter weather most frequently occurs during the winter months (November-March) and can be caused by lake-effect conditions, warm air masses associated with the Gulf Stream or other areas.

Heavy snow or ice occurs throughout the Commonwealth of Pennsylvania. Every municipality in Butler County is affected by these storms. Butler County and its 57 municipalities are susceptible to the entire range of severe weather, from heavy snowstorm to severe blizzard. Winter storms typically begin as low-pressure systems that move through Pennsylvania, following the jet stream. Average annual snowfall in Butler County ranges from 21 to 50 inches, with the higher snowfall occurring in the northern portion of the County (NOAA, 2013). See Figure 4.3.10-1 for the average annual snowfall in Pennsylvania from 1981 to 2021. The impact of a winter storms in Butler County are not as devastating as some other hazards can be. Winter storms are a frequent event in Butler County and are mitigated through the plowing, salting, and spraying efforts of PennDOT and local municipalities. During the rare occurrence of a major event, severe winter storms could potentially produce an accumulation of snow and ice on trees and utility lines resulting in loss of electricity and blocked transportation routes. Frequently, especially in rural areas, loss of electric power means loss of heat for residential customers, which poses an immediate threat to human life (NOAA NSSL, 2021b).

Storms tracking up the east coast tap into Atlantic moisture, whereas the Great Lakes supply the moisture and instability for heavy snow squalls in the northwest. Orographic lift enhances snowfall over higher elevations. The snowfall season is November through April, and amounts are generally below one inch during October and May. The greatest monthly snowfalls occur in March as moisture supply begins to increase with rising temperatures.

Figure 4.3.10-1 Pennsylvania Average Annual Snowfall



4.3.10.2. Range of Magnitude

Winter storms consist of cold temperatures, heavy snow or ice and sometimes strong winds. Because these events are regular annual occurrences in Butler County, they are considered hazards only when they result in damage to specific structures and/or overwhelm local capabilities to handle disruptions to traffic, communications, and electric power. The cost of removing snow, repairing damages, especially from ice storms, and the loss to businesses can have a negative economic impact for communities. Winter storms can generate other hazards such as infrastructure disruption (blocked roads and power outages), human-caused hazards (traffic incidents and trapped vehicles), and technological problems (communication system outages and overload). Winter storms can adversely affect roadways, utilities, business activities, and can cause loss of life, frostbite, or freezing. Further, they can result in the closing of secondary roads, loss of utility services and depletion of oil heating supplies. Some rural areas of the County are susceptible to isolation during winter storms due to power and communication loss as well as road closings. Emergency medical, food, and fuel supplies are sometimes required during these storms.

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

- **Heavy Snowstorm:** Accumulations of four inches or more in a six-hour period, or six inches or more in a twelve-hour period.
- **Sleet Storm:** Sleet is formed when snow falling to the earth partially melts as it passes through a layer of warm air. The precipitation then passes through a cold layer of air and refreezes into solid pellets. Sleet causes surfaces to become slippery, posing hazards to pedestrians and motorists.
- **Ice Storm:** An ice storm occurs when rain freezes upon impact with the ground or other objects such as trees and power lines. Heavy accumulations of ice can bring down trees and topple utility poles, disrupting power and communication for days while crews make the necessary repairs. The icy conditions are also dangerous for pedestrians and vehicular traffic.
- **Blizzard:** According to the National Weather Service, a blizzard is a severe snowstorm that occurs when winds reach 35 mph or more. The blowing snow reduces visibility to less than one-quarter of a mile for at least three hours. Storms that meet these criteria are not frequent in Butler County; however, storms that produce blizzard-like conditions are a common occurrence.
- **Severe Blizzard:** Wind velocity of 45 miles per hour, temperatures of 10 degrees Fahrenheit or lower, a high density of blowing snow with visibility frequently measured in feet prevailing over an extended period time.

Environmental impacts of winter storms often include damage shrubbery and trees due to heavy snow loading, ice build-up and/or high winds which can break limbs or even bring down large trees. An indirect effect of winter storms is the treatment of roadway surfaces with salt, chemicals, and other de-icing materials which can impair adjacent surface and ground waters. Another important secondary impact for winter storms is building or structure collapses; if there is a heavy snowfall or a significant accumulation over time, the weight of the snow may cause building damage or even collapse. Winter storms have a positive environmental impact as well; gradual melting of snow and ice provides groundwater recharge. However, abrupt high temperatures following a heavy snowfall can cause rapid surface water runoff and severe flooding.

In Butler County, a worst-case severe winter storm occurred in early February 2010. The storm resulted in 18-24 inches of snowfall across Pennsylvania, with 21.1 inches recorded in Pittsburgh, making it the fourth largest snowfall on record in the area. The wet and heavy nature of the snow resulted in downed trees and powerlines leaving approximately 200,000 people without power after the storm. In some locations, roads were blocked for two to three days and power took up to three days to be restored in some locations (WXPI, 2013).

4.3.10.3. Past Occurrence

The Commonwealth of Pennsylvania has a long history of severe winter weather. In the winter of 1993-1994, the state was hit by a series of protracted winter storms. The severity and nature of these storms, combined with record-breaking frigid temperatures, posed a major threat to the lives, safety, and well-being of Commonwealth residents and caused major disruptions to the activities of schools, businesses, hospitals, and nursing homes.

Butler County has experienced many major winter storms. In January 1978 and February 1992, emergencies were declared statewide because of heavy snow. In February 1978, March 1989, and March 1993, emergencies were declared due to blizzard conditions - high winds with snow. During January and February 1994, Pennsylvania experienced at least 17 regional or statewide winter storms. The consequences of these disasters resulted in the need for intervention by the president in an effort to alleviate the severity of the hardship and to aid the recovery of the hardest-hit counties. The severity and nature of these storms combined with accompanying record-breaking frigid temperatures posed a major threat to the lives, safety and well-being of Commonwealth residents and caused major disruptions to the activities of schools, businesses, hospitals, and nursing homes.

Table 4.3-10-1 describes the full history of severe winter events in Butler County reported to the National Oceanic and Atmospheric Administration Storm Events Database from 2015 to present. These include Blizzard, Heavy Snow, Ice Storm, Lake-Effect Snow, Winter Storm, and Winter Weather. Data prior to 2015 can be found in the 2015 Butler County Hazard Mitigation Plan update.

Table 4.3.10-1 History of Severe Winter Storms in Butler County (NOAA NCEI, 2021)

DATE	TYPE	COSTS	DATE	TYPE	COSTS
1/2/1996	Ice Storm	\$0	1/9/2013	Winter Weather	\$0
1/6/1996	Heavy Snow	\$0	2/4/2014	Winter Storm	\$0
11/13/1997	Ice Storm	\$5,000	2/17/2014	Winter Weather	\$0
1/2/1999	Winter Storm	\$0	11/22/2014	Winter Weather	\$0
1/8/1999	Winter Storm	\$0	11/27/2014	Winter Weather	\$0
1/13/1999	Winter Storm	\$0	12/2/2014	Winter Weather	\$0
12/13/2000	Winter Storm	\$0	1/3/2015	Winter Weather	\$0
3/4/2001	Winter Storm	\$0	3/3/2015	Winter Weather	\$0
12/11/2002	Ice Storm	\$0	12/17/2016	Ice Storm	\$0
2/16/2003	Heavy Snow	\$0	3/3/2017	Winter Weather	\$0
12/5/2003	Heavy Snow	\$0	1/12/2018	Winter Storm	\$0
12/14/2003	Heavy Snow	\$0	2/7/2018	Winter Storm	\$0
2/3/2004	Ice Storm	\$0	3/20/2018	Winter Weather	\$0
2/5/2004	Ice Storm	\$0	4/1/2018	Winter Weather	\$0
3/16/2004	Ice Storm	\$0	11/14/2018	Winter Weather	\$0

Table 4.3.10-1 History of Severe Winter Storms in Butler County (NOAA NCEI, 2021)

DATE	TYPE	COSTS	DATE	TYPE	COSTS
1/22/2005	Heavy Snow	\$0	1/18/2019	Winter Storm	\$0
3/1/2005	Heavy Snow	\$0	2/12/2019	Winter Weather	\$0
4/3/2005	Heavy Snow	\$0	2/20/2019	Winter Weather	\$0
12/15/2005	Ice Storm	\$0	11/12/2019	Winter Weather	\$0
2/13/2007	Heavy Snow	\$0	12/4/2019	Winter Weather	\$0
2/1/2008	Winter Storm	\$10,000	12/17/2019	Winter Weather	\$0
2/12/2008	Winter Storm	\$0	1/18/2020	Winter Weather	\$0
2/29/2008	Heavy Snow	\$0	2/7/2020	Winter Weather	\$0
3/7/2008	Winter Storm	\$0	12/1/2020	Winter Storm	\$0
1/9/2009	Heavy Snow	\$0	12/16/2020	Winter Storm	\$0
1/17/2009	Heavy Snow	\$0	12/24/2020	Winter Weather	\$0
1/27/2009	Ice Storm	\$0	1/16/2021	Winter Weather	\$0
12/13/2009	Winter Weather	\$0	1/25/2021	Winter Weather	\$0
2/5/2010	Heavy Snow	\$0	1/31/2021	Winter Weather	\$0
2/9/2010	Winter Storm	\$0	2/1/2021	Winter Weather	\$0
12/5/2010	Heavy Snow	\$0	2/8/2021	Winter Weather	\$0
1/31/2011	Ice Storm	\$0	2/10/2021	Winter Weather	\$0
2/1/2011	Ice Storm	\$0	2/13/2021	Winter Weather	\$0
2/21/2011	Heavy Snow	\$0	2/15/2021	Winter Weather	\$0
12/26/2012	Heavy Snow	\$0			

4.3.10.4. Future Occurrence

Data from NCEI shows that winter storms are a regular occurrence in Butler County and occur on the average of 35 times a year in Pennsylvania. The County is located in an area with the chance of equaling or exceeding total snow depths of 25 to 50 inches. So, the probability of heavy snow or ice storms occurring in Butler County in any given year is 100%. The future occurrence of winter storms hazard can be considered *likely* as defined by the Risk Factor Methodology probability criteria (see Table 4.4.1-1).

The severity and frequency of major winter storms is expected to remain fairly constant. However, due to increased dependence on various modes of transportation and use of public utilities for light, heat, and power, the disruption from these storms is more significant today than in the past. The future occurrence of climatic events cannot be predicted exactly. As noted in the table above, the County has been affected by one to eight winter storm events each year from 2016 to 2021. Given this record of reported events, it is safe for planning purposes to assume that in an average year the County can expect to experience two winter storm events.

4.3.10.5. Vulnerability Assessment

In Butler County, wintertime snow accumulations are expected and normal. The most common, but potentially serious, effects of very heavy snowstorms with accumulations exceeding six or more inches in a 12-hour period are snow drifts causing road closures, traffic incidents, interruptions in power supply and communications, and the failure of inadequately designed and/or maintained roofing systems. Some rural areas of the County are susceptible to isolation due to the loss of telephone communications and road closings. Power failure and interruption of water supplies are common from ice storms, heavy snow, and blizzard conditions. All critical facilities in Butler County are vulnerable to winter storms.

Vulnerability to the effects of winter storms on buildings is somewhat dependent on the age of a building. As building codes become more stringent, buildings can support heavier loads and as buildings age, various factors may deteriorate their structural integrity. Vulnerability also depends upon the type of construction, materials used, and the degree to which a structure has been maintained. It is assumed that older structures are more vulnerable, but additional information on construction type and building codes enforced at time of construction would allow a more thorough assessment of the vulnerability of structures to winter storm impacts such as severe wind and heavy snow loading.

Butler County has a significant number of older structures. Older structures may have weaker structural integrity than newer ones and are often more susceptible to damage from snow or ice. The weight of heavy snow or ice may lead to structural collapse or to minor damage. All structures and infrastructure in Butler County are exposed to heavy snow and ice.

The Commonwealth of Pennsylvania has adopted statewide building codes that include provisions of the 2015 IBC. Municipalities can choose to opt-out State enforcement and apply their own enforcement and additional building code standards. Some of Butler County's municipalities, including Butler Township, have elected to do this. Because of these building codes, new construction will be able to withstand the weight of heavy snow or ice. Figure 4.3.10-2 shows the distribution of building ages in Butler County; about 15% of all buildings were constructed prior to 1940 in Butler County.

Table 4.3.10-2 Age of Structures for Buildings with Known Ages (US Census, 2015) (US Census, 2019)

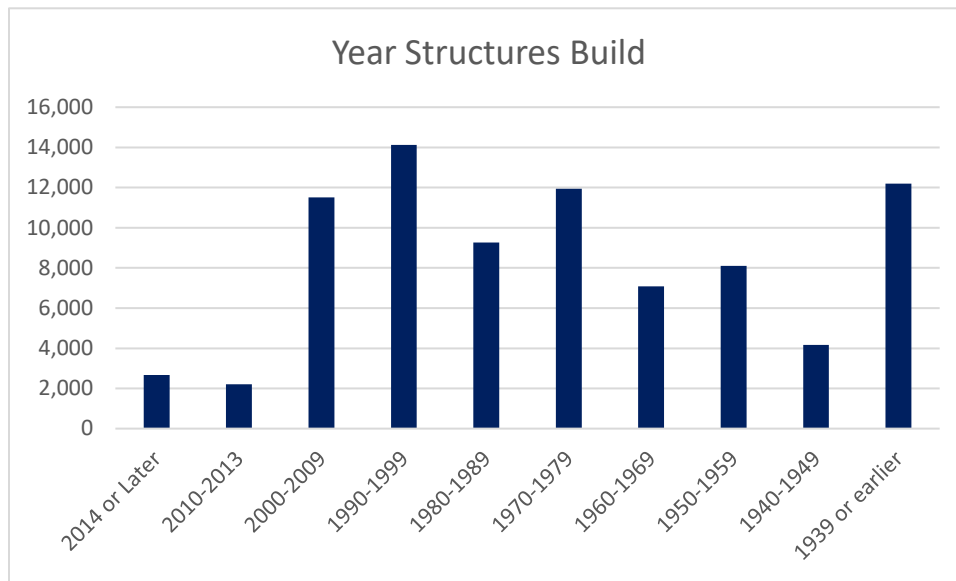


Table 4.3.10-3 below shows the number of housing units in Butler County built prior to 1940 according to the US Census Bureau’s estimates. The following municipalities have the highest proportion of housing units built prior to 1940: Fairview Borough (55.7%), West Sunbury Borough (51.0%), Butler City (50.9%), and Karns City Borough (46.6%). These communities all have higher vulnerabilities to winter storm events from this analysis. While the U.S. Census provide estimates for residential structures, the age of non-residential structures is not available.

Table 4.3.10-3 Age of Housing Units in Butler County (US Census, 2019)

MUNICIPALITY	NUMBER OF HOUSING UNITS BUILT PRIOR TO 1940	PERCENT OF TOTAL HOUSING UNITS	MUNICIPALITY	NUMBER OF HOUSING UNITS BUILT PRIOR TO 1940	PERCENT OF TOTAL HOUSING UNITS
Adams Township	258	4.90%	Jackson Township	211	11.50%
Allegheny Township	49	14.70%	Jefferson Township	216	9.50%
Brady Township	61	10.30%	Karns City Borough	48	46.60%
Bruin Borough	96	39.00%	Lancaster Township	109	10.40%
Buffalo Township	350	11.10%	Marion Township	142	24.90%
Butler City	3612	50.90%	Mars Borough	262	37.30%
Butler Township	930	11.70%	Mercer Township	123	22.00%

Table 4.3.10-3 Age of Housing Units in Butler County (US Census, 2019)

MUNICIPALITY	NUMBER OF HOUSING UNITS BUILT PRIOR TO 1940	PERCENT OF TOTAL HOUSING UNITS	MUNICIPALITY	NUMBER OF HOUSING UNITS BUILT PRIOR TO 1940	PERCENT OF TOTAL HOUSING UNITS
Callery Borough	76	42.50%	Middlesex Township	155	6.20%
Center Township	192	5.10%	Muddy Creek Township	60	6.00%
Cherry Township	45	9.20%	Oakland Township	174	13.50%
Cherry Valley Borough	11	28.90%	Parker Township	51	16.20%
Chicora Borough	178	37.10%	Penn Township	299	13.60%
Clay Township	168	15.50%	Petrolia Borough	40	40.80%
Clearfield Township	109	9.20%	Portersville Borough	51	38.10%
Clinton Township	124	10.40%	Prospect Borough	98	19.10%
Concord Township	78	11.50%	Saxonburg Borough	137	15.60%
Connoquenessing Borough	100	41.70%	Seven Fields Borough	0	0.00%
Connoquenessing Township	229	12.70%	Slippery Rock Borough	216	15.10%
Cranberry Township	146	1.10%	Slippery Rock Township	227	11.40%
Donegal Township	74	10.90%	Summit Township	391	20.10%
East Butler Borough	99	28.90%	Valencia Borough	81	25.70%
Eau Claire Borough	42	30.00%	Venango Township	51	12.20%
Evans City Borough	317	35.90%	Washington Township	94	15.00%
Fairview Borough	39	55.70%	West Liberty Borough	28	18.70%
Fairview Township	134	15.50%	West Sunbury Borough	52	51.00%
Forward Township	127	10.30%	Winfield Township	260	16.30%
Franklin Township	73	5.60%	Worth Township	73	10.00%
Harmony Borough	148	32.70%	Zelienople Borough	561	29.20%
Harrisville Borough	122	35.70%	COUNTY TOTAL	12197	14.60%

HUMAN MADE HAZARDS



4.3.11. Civil Disturbance

4.3.11.1. Location and Extent

Civil disturbance encompasses a set of hazards emanating from a wide range of possible events that cause civil disorder, confusion, strife, and economic hardship. The scale and scope of civil disorders varies widely. However, government facilities, local landmarks, prisons, and universities are common sites where crowds and mobs may gather.

4.3.11.2. Range and Magnitude

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 (Juniata County, PA MJHMP, 2008).

4.3.11.3. Past Occurrence

Butler County and its municipalities have not experienced any periods of civil unrest or disturbance. However, various other areas within the Commonwealth over time have succumbed to riots. For example, the Philadelphia 1964 Race Riot and 1969 York Race Riot occurred. More recently, in 2011 Pennsylvania State University students (State College, Pennsylvania) rioted in protest of the decision to fire head football coach Joe Paterno.

4.3.11.4. Future Occurrence

Minor civil disturbances may occur in Butler County, but it is not possible to accurately predict the probability of future occurrence for civil disorder events over the long-term. However, it may be possible to recognize the potential for an event to occur in the near-term. It is *unlikely* that Butler County will be the target of civil disturbance as defined by the Risk Factor Methodology probability criteria (see Table 4.4.1-1).

4.3.11.5. Vulnerability Assessment

In general, Butler County is not particularly vulnerable to civil disorder events. Most civil disorder events, should they occur, would have minimal impact. However, to reduce vulnerability if there were an event, it is good to determine a plan for responding to these situations. Establishing clear roles for responders is an example of a way to be prepared.



4.3.12. Dam Failure

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



4.3.13. Environmental Hazards: Coal Mining Incidents

4.3.13.1. Location and Extent

Mining, including surface, underground, and open-pit operations, has been an important economic activity in Pennsylvania since before the 1860s and was instrumental in the Commonwealth’s development. Coal mining is the most prominent of Pennsylvania’s mining activities and continues to be a major industry. Pennsylvania produces two types of coal: bituminous and anthracite. Bituminous coal is typically used for electricity generation and metal production. Anthracite coal, which is rarer than bituminous coal and can reach a high heating point that burns blue flame, is typically used for heating and metal production (PA DEP, 2021b).

While resources other than coal are also mined in Pennsylvania - including metal ores, clay and shale, and limestone - most of these deposits are of limited extent. Coal, in contrast, has been mined under large areas of the state. Counties underlain by coal deposits are at highest risk of environmental hazards resulting from coal mining activities. This area includes the majority of southwest Pennsylvania, situated over the Commonwealth’s main bituminous field. Butler County lies entirely in the high-volatile bituminous coal region.

Figure 4.3.13-1 shows the location of active and abandoned coal mining operations in Butler County. Note that the active and abandoned coal mines are primarily located on identified coal fields, however there are mines located outside the field areas. The majority of coal mines identified by PA DEP in Butler County are surface mines (92%). The remaining 8% of mines are underground mines, prep plants, refuse disposal sites, refuse processing sites, and reclaimed sites through government financed construction contracts (GFCC) (PA DEP, 2021c).

Table 4.3.13-1 lists the number of active and abandoned coal mines in each municipality in Butler County. There are 96 active (12%), 438 inactive (55%), 137 abandoned (17%), 10 proposed but never materialized (1%), and 120 (15%) completed reclamation sites throughout the County, for a total of 801 coal mines. The highest concentration of total coal mines are located in Concord Township (82 sites) and Venango Township (76 sites). The highest number of active mines are located in Washington Township (13 mines) and Donegal Township (12 mines). The highest number of abandoned mined are located in Venango Township (35 mines) and Allegheny Township (28 mines). There are 23 municipalities, listed below, that do not have any coal mines identified by the PA DEP; these are not included in Table 4.3.13-1:

- Butler Township
- Butler City
- Callery Borough
- Chicora Borough
- Connoquenessing Borough
- East Butler Borough
- Evans City Borough
- Fairview Borough
- Franklin Township
- Harmony Borough
- Harrisville Borough
- Jefferson Township
- Mars Borough
- Middlesex Township
- Penn Township
- Petrolia Borough
- Portersville Borough
- Prospect Borough
- Saxonburg Borough
- Seven Fields Borough
- Valencia Borough
- West Sunbury Borough
- Zelienople Borough

Table 4.3.13-1 Number of Mines by Type in Butler County Municipalities (PA DEP, 2021c)

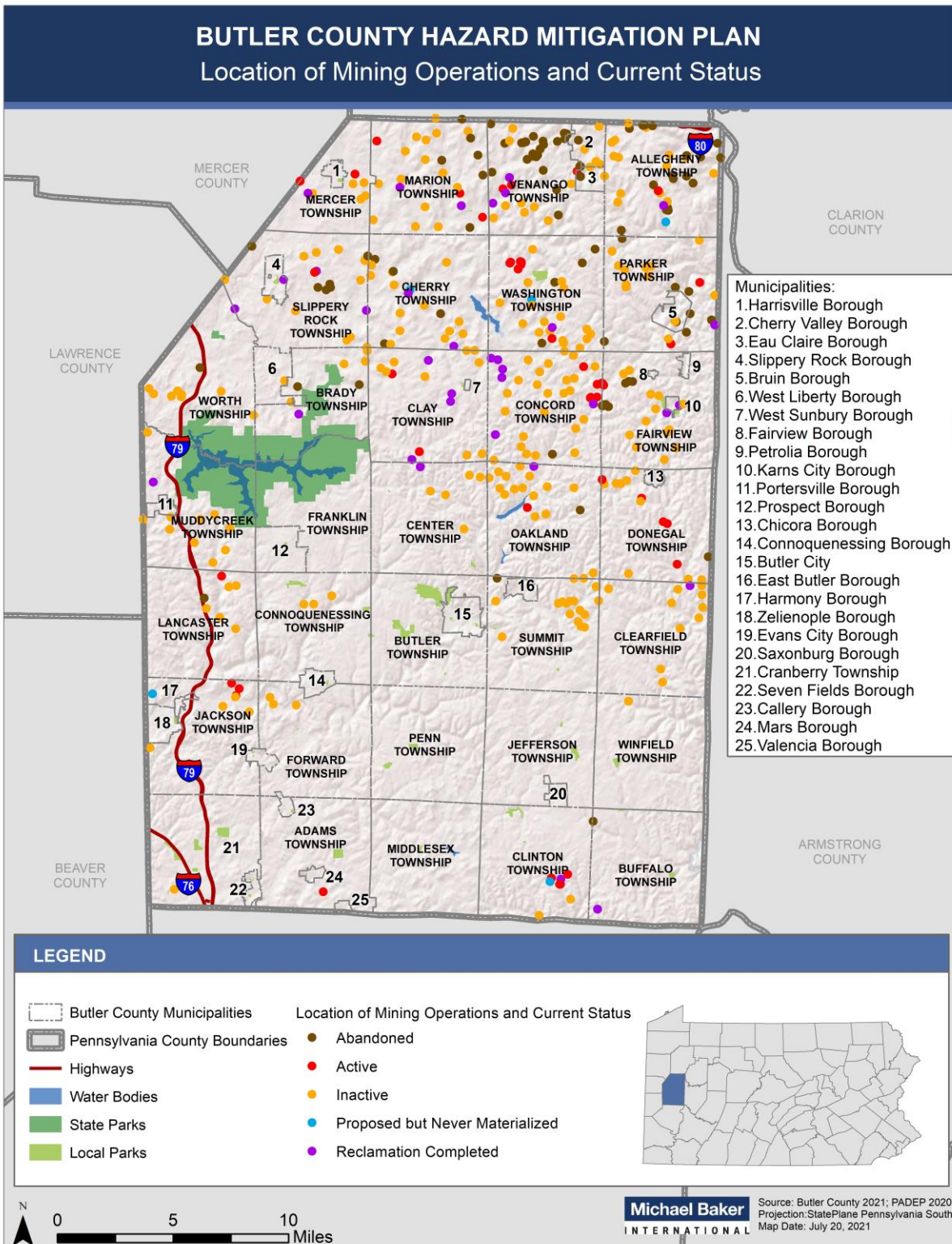
MUNICIPALITY	NUMBER OF MINES					
	ABANDONED	ACTIVE	INACTIVE	PROPOSED BUT NEVER MATERIALIZED	RECLAMATION COMPLETED	TOTAL
Adams Township	0	1	0	0	0	1
Allegheny Township	28	9	23	2	11	73
Brady Township	2	0	8	0	2	12
Bruin Borough	2	0	2	0	0	4
Buffalo Township	1	0	0	0	2	3
Center Township	0	0	8	0	7	15
Cherry Township	6	0	24	2	4	36
Cherry Valley Township	2	0	10	0	0	12
Clay Township	0	6	13	0	6	25
Clearfield Township	0	0	17	0	5	22
Clinton Township	0	9	3	2	2	16
Concord Township	4	10	44	0	24	82
Connoquenessing Township	0	0	7	0	0	7
Cranberry Township	0	0	1	0	0	1
Donegal Township	1	12	13	0	0	26
Eau Claire Borough	1	2	2	0	0	5
Fairview Township	13	1	25	0	5	44
Forward Township	0	0	5	0	0	5
Jackson Township	0	5	6	2	0	13
Karns City Borough	0	0	0	0	9	9
Lancaster Township	1	1	9	0	0	11
Marion Township	10	5	27	0	4	46
Mercer Township	0	7	8	0	2	17
Muddy Creek Township	0	0	17	0	3	20
Oakland Township	1	2	27	0	2	32
Parker Township	13	8	18	0	5	44
Slippery Rock Borough	0	0	0	0	2	2
Slippery Rock Township	7	2	21	0	6	36
Summit Township	2	0	28	0	0	30
Venango Township	35	3	21	0	17	76
Washington Township	6	13	30	2	2	53
West Liberty Borough	0	0	4	0	0	4

Table 4.3.13-1 Number of Mines by Type in Butler County Municipalities (PA DEP, 2021c)

MUNICIPALITY	NUMBER OF MINES					
	ABANDONED	ACTIVE	INACTIVE	PROPOSED BUT NEVER MATERIALIZED	RECLAMATION COMPLETED	TOTAL
Winfield Township	0	0	1	0	0	1
Worth Township	2	0	16	0	0	18
TOTAL	137	96	438	10	120	801

Pennsylvania was one of the first states to initiate, promulgate, and enforce environmental regulations related to mining, including mine reclamation. However, there remains a legacy of abandoned mines, waste piles, and degraded groundwater and surface water in the Commonwealth. The EPA estimates that over 3,000 miles of streams in Pennsylvania have been contaminated by acid mine drainage which occurs when metal sulfides in rock oxidize and generate acidity in nearby waterways (PEMA, 2019).

Figure 4.3.13-1 Mining Activity in Butler County



4.3.13.2. *Range of Magnitude*

Major impacts from mining include surface-elevation changes and subsidence, modification of vegetation, the chemical degradation and flow redistribution of surface water and groundwater, the creation of mine voids and entry openings, adverse aesthetic impacts, and changes in land use.

In addition, active and abandoned mines can also result in injury and loss of human life. This can occur in active mines where workers are injured or killed by mine collapse, entrapment, poisonous gases, inundation, explosions, fires, equipment malfunction, and improper ventilation. Injuries and death, such as All-Terrain Vehicle (ATV) accidents, falling, and drowning, can also occur in abandoned mines.

The mineral-waste disposal from coal mining also is a hazard. Past disposal practices have dotted Pennsylvania's landscape with unsightly refuse piles. Many of the refuse piles contain combustible materials that cause long-term air-quality problems if ignited. Burning refuse piles have also been linked to major underground coal fires, such as those at Centralia and Shamokin in the Anthracite region of Pennsylvania.

Reject wastes from coal mining that contain sulfide minerals can also degrade groundwater and surface water. Coal refuse piles have historically been prolific sources of acid mine drainage which has impaired many streams in Pennsylvania.

The environmental impacts of coal mining are many. Mining activities and acid mine drainage can contaminate surface and groundwater, create acid mine drainage, cause changes in water temperature and damage to streams, lakes, ponds, estuaries, and wetland ecosystems. Mine explosions or burning refuse piles can cause air quality problems. Although mine reclamation is required for much surface mining activity, there is still a loss of quality in landscape, damage to vegetation, and degradation of habitat.

Additionally, jurisdictions where longwall mining has taken place face added risks to domestic water wells. Longwall mines involve the extraction of entire coal seams leaving caverns of up to five feet tall that are left to planned subsidence. However, this earth movement can disrupt aquifers and reduce or eliminate water sources.

Pennsylvania has a long history of mining and there have been numerous mining accidents. The worst-case scenario event in Pennsylvania mining history occurred in 1962 in Centralia, Pennsylvania when an underground fire began in the coal mines underneath the town and continues to burn today. The federal government offered buyouts of homes of residents so they could relocate from the Centralia, resulting in a cost of over \$40 million. In 1992, Pennsylvania claimed eminent domain on all properties in the town and condemned all the buildings. In 1981 the town had over 1,000 residents, but as of 2019, only nine people still reside in the borough (US Census, 2019).

Another example of a worst-case scenario occurred in Somerset County, the Queecreek Mine accident nearly became Pennsylvania's worst-case scenario when 7 million tons of water flooded into the mine. The accident was the result of a breach in the wall between Queecreek Mine and an abandoned, flooded adjacent mine. Nine miners were trapped for 77 hours; however, the accident ended with the safe rescue of all the trapped workers (Kiner, 2019).

4.3.13.3. Past Occurrence

Although state and federal (U.S. Department of Labor, EPA, and the Office of Surface Mining and Reclamation) laws require occupational health, safety, and environmental protection in all mining activities, mining accidents still occur. The U.S. Department of Labor Mine Safety and Health Administration (MSHA) tracks mining accidents and injuries. Since 2008, there have been 21 deaths in Pennsylvania resulting from surface and underground coal mining activities (MSHA, 2021). Although there have been many mining accidents in Pennsylvania's early mining history of the 1800's, there is no comprehensive database that tracks the data. Beyond operator accidents, there can be incidents that are a result of falls, drowning, electrocution, and ATV crashes.

The DEP Bureau of Mine Safety is required by law to investigate all fatal and serious accidents that occur at underground Commonwealth mines. According to the Bureau, there have been four major mine emergencies in Pennsylvania coal mines. They define a mine emergency as a serious situation or occurrence that happens unexpectedly and demands immediate action or a condition of urgent need for action or assistance such as a state of emergency. Two of these were mine fires and two were inundations (PEMA, 2019).

4.3.13.4. Future Occurrence

It is difficult to forecast the severity and frequency of coal mining accidents and environmental damage in Butler County. Although throughout time, the government has strengthened mining and reclamation operation and environmental regulations, permitting, and inspection criteria, this has not prevented mining accidents and environmental damage from occurring.

Surface subsidence resulting from underground mining continues to be a major concern of those impacted by the mining industry (see **Section 4.3.7**). Despite the use of deep mine roof support methods, some subsidence will eventually occur. It is likely that Pennsylvania will continue to modify its laws to reflect additional environmental awareness. Stricter controls on reclamation, perhaps specifically addressing the disposal of mining residuals, are likely. State and federal laws and programs have historically placed an emphasis on environmental preservation and reclamation. As in the past, it seems likely that Pennsylvania will be at the forefront of these programs and future occurrence will decrease. However, until this is in place, coal mining incidents in Butler County are *possible* as defined by the Risk Factor Methodology (see Table 4.1.1-1).

4.3.13.5. Vulnerability Assessment

Table 4.3.13-2 shows the structures and critical facilities that are vulnerable to mining incidents. Structures and critical facilities within a quarter mile of a mine operation are considered vulnerable. There are 2,512 structures in close proximity to coal mining operations countywide (3% of all structures). Municipalities that have the highest proportion of their structures close to mining operations include Karns City Borough, Concord Township and Venango Township. Also, Oakland Township has 33% of their critical facilities in close proximity to coal mining operations, which is significantly higher than any other municipality.

When looking at structures by property type, shown in Table 4.3.13-3, the majority of vulnerable structures are unsurprisingly residential in nature, followed by agricultural uses. A complete listing of critical facilities is in **Appendix E**.

Table 4.3.13-2 Structures and Critical Facilities Vulnerable to Mining Operations

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES VULNERABLE TO COAL MINING OPERATIONS (WITHIN .25 MILES)	PERCENT STRUCTURES VULNERABLE TO COAL MINING OPERATIONS (WITHIN .25 MILES)	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES VULNERABLE TO COAL MINING OPERATIONS (WITHIN .25 MILES)	PERCENT CRITICAL FACILITIES VULNERABLE TO COAL MINING OPERATIONS (WITHIN .25 MILES)
Adams Township	6,126	89	1%	25	0	0%
Allegheny Township	414	33	8%	1	0	0%
Brady Township	661	21	3%	1	0	0%
Bruin Borough	245	40	16%	2	0	0%
Buffalo Township	3,336	10	0%	8	0	0%
Butler, City	5,933	0	0%	18	0	0%
Butler Township	7,644	0	0%	44	0	0%
Callery Borough	168	0	0%	4	0	0%
Center Township	3,788	54	1%	5	0	0%
Cherry Township	570	90	16%	2	0	0%
Cherry Valley Borough	42	7	17%	0	0	0%
Chicora Borough	473	0	0%	5	0	0%
Clay Township	1,202	80	7%	3	0	0%
Clearfield Township	1,096	67	6%	1	0	0%
Clinton Township	1,351	57	4%	1	0	0%
Concord Township	749	170	23%	1	0	0%
Connoquenessing Borough	352	0	0%	2	0	0%
Connoquenessing Township	2,146	10	0%	4	0	0%
Cranberry Township	12,665	440	3%	21	1	5%

Table 4.3.13-2 Structures and Critical Facilities Vulnerable to Mining Operations

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES VULNERABLE TO COAL MINING OPERATIONS (WITHIN .25 MILES)	PERCENT STRUCTURES VULNERABLE TO COAL MINING OPERATIONS (WITHIN .25 MILES)	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES VULNERABLE TO COAL MINING OPERATIONS (WITHIN .25 MILES)	PERCENT CRITICAL FACILITIES VULNERABLE TO COAL MINING OPERATIONS (WITHIN .25 MILES)
Donegal Township	765	45	6%	2	0	0%
East Butler Borough	331	0	0%	3	0	0%
Eau Claire Borough	163	6	4%	2	0	0%
Evans City Borough	776	0	0%	6	0	0%
Fairview Borough	80	0	0%	1	0	0%
Fairview Township	951	142	15%	2	0	0%
Forward Township	1,325	17	1%	3	0	0%
Franklin Township	1,280	0	0%	1	0	0%
Harmony Borough	459	0	0%	3	0	0%
Harrisville Borough	380	0	0%	4	0	0%
Jackson Township	2,422	42	2%	7	0	0%
Jefferson Township	2,103	0	0%	5	0	0%
Karns City Borough	111	54	49%	1	0	0%
Lancaster Township	1,346	32	2%	3	0	0%
Marion Township	621	87	14%	2	0	0%
Mars Borough	541	0	0%	2	0	0%
Mercer Township	560	43	8%	2	0	0%
Middlesex Township	3,046	0	0%	6	0	0%
Muddy Creek Township	1,144	83	7%	4	0	0%
Oakland Township	1,282	100	8%	3	1	33%

Table 4.3.13-2 Structures and Critical Facilities Vulnerable to Mining Operations

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES VULNERABLE TO COAL MINING OPERATIONS (WITHIN .25 MILES)	PERCENT STRUCTURES VULNERABLE TO COAL MINING OPERATIONS (WITHIN .25 MILES)	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES VULNERABLE TO COAL MINING OPERATIONS (WITHIN .25 MILES)	PERCENT CRITICAL FACILITIES VULNERABLE TO COAL MINING OPERATIONS (WITHIN .25 MILES)
Parker Township	359	37	10%	1	0	0%
Penn Township	2,281	0	0%	8	0	0%
Petrolia Borough	125	0	0%	2	0	0%
Portersville Borough	146	2	1%	2	0	0%
Prospect Borough	566	0	0%	3	0	0%
Saxonburg Borough	784	0	0%	5	0	0%
Seven Fields Borough	1,227	0	0%	1	0	0%
Slippery Rock Borough	1,240	159	13%	13	0	0%
Slippery Rock Township	1,904	76	4%	8	0	0%
Summit Township	2,018	160	8%	5	0	0%
Valencia Borough	266	0	0%	0	0	0%
Venango Township	433	98	23%	1	0	0%
Washington Township	644	111	17%	2	0	0%
West Liberty Borough	157	21	13%	0	0	0%
West Sunbury Borough	103	0	0%	0	0	0%
Winfield Township	1,335	0	0%	1	0	0%
Worth Township	790	29	4%	2	0	0%
Zelienople Borough	1,853	0	0%	3	0	0%
TOTAL	84,878	2,512	3%	265	2	1%

Table 4.3.13-3 Structures Vulnerable to Coal Mining Operations by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Adams Township	0	7	0	1	1	0	0	77	0	0	0	3	89
Allegheny Township	10	6	0	4	0	0	0	12	0	0	0	1	33
Brady Township	8	0	0	0	1	0	0	12	0	0	0	0	21
Bruin Borough	2	0	0	0	0	0	0	37	0	0	0	1	40
Buffalo Township	3	0	0	0	0	0	0	7	0	0	0	0	10
Butler, City	0	0	0	0	0	0	0	0	0	0	0	0	0
Butler Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Callery Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Center Township	5	1	0	0	0	0	0	48	0	0	0	0	54
Cherry Township	18	3	0	0	0	0	0	49	0	0	0	20	90
Cherry Valley Borough	5	0	0	0	0	0	0	1	0	0	0	1	7
Chicora Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Clay Township	21	2	0	0	0	0	0	55	0	0	0	2	80
Clearfield Township	11	0	0	0	1	0	0	49	0	0	0	6	67
Clinton Township	20	2	0	1	0	0	0	34	0	0	0	0	57
Concord Township	44	0	0	0	0	0	0	124	0	0	0	2	170
Connoquenessing Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Connoquenessing Township	5	0	0	0	0	0	0	5	0	0	0	0	10
Cranberry Township	0	16	0	0	1	0	0	420	0	3	0	0	440
Donegal Township	7	6	0	0	0	0	0	31	0	0	0	1	45
East Butler Borough	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4.3.13-3 Structures Vulnerable to Coal Mining Operations by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Eau Claire Borough	2	0	0	0	0	0	0	4	0	0	0	0	6
Evans City Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Fairview Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Fairview Township	16	4	0	0	4	0	0	109	0	0	0	9	142
Forward Township	6	0	0	0	0	0	0	7	0	0	0	4	17
Franklin Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Harmony Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Harrisville Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Jackson Township	14	5	0	0	0	0	0	21	0	0	0	2	42
Jefferson Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Karns City Borough	0	1	0	0	1	0	0	51	0	0	0	1	54
Lancaster Township	5	1	0	0	0	0	0	25	0	0	0	1	32
Marion Township	18	2	0	0	1	0	0	60	0	0	0	6	87
Mars Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Mercer Township	6	0	0	0	0	0	0	34	0	0	0	3	43
Middlesex Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Muddy Creek Township	21	6	0	0	0	0	0	55	0	0	0	1	83
Oakland Township	20	1	0	0	1	0	0	76	0	0	0	2	100
Parker Township	10	0	0	0	0	0	0	24	0	0	0	3	37
Penn Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Petrolia Borough	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4.3.13-3 Structures Vulnerable to Coal Mining Operations by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Portersville Borough	0	0	0	0	1	0	0	1	0	0	0	0	2
Prospect Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Saxonburg Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Seven Fields Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Slippery Rock Borough	1	30	3	0	0	0	0	123	0	0	0	2	159
Slippery Rock Township	13	11	1	0	1	0	0	46	0	0	0	4	76
Summit Township	14	11	2	3	0	0	0	120	0	0	0	10	160
Valencia Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Venango Township	19	0	0	0	0	0	0	71	0	0	0	8	98
Washington Township	25	2	0	0	0	0	0	80	0	0	0	4	111
West Liberty Borough	0	0	0	0	0	0	0	21	0	0	0	0	21
West Sunbury Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Winfield Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Worth Township	7	0	0	0	0	0	0	21	0	0	0	1	29
Zelienople Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	356	117	6	9	13	0	0	1,910	0	3	0	98	2,512



4.3.14. Environmental Hazards: Conventional Oil and Gas Well Incidents

4.3.14.1. Location and Extent

Oil and gas development in Pennsylvania is extensive and has been ongoing for over 150 years, with the most recent phase of exploration and production activities targeting the Marcellus and Utica shales. Regulatory standards for the industry have evolved significantly as a function of both advances in technology and a more intense focus on environmental protection. More than 350,000 oil and gas wells have been drilled in Pennsylvania since the first commercial oil well was developed in 1859 (PA DEP-OOGM, 2010). Additionally, oil and gas development has been taking place for nearly a century prior to permitting requirements enacted in 1955, an estimated 100,000 to 560,000 abandoned wells are yet to be accounted for in the state (PA DEP, 2021d). PA DEP differentiates between conventional and unconventional oil and gas wells. Conventional wells are traditional vertical wells, while unconventional wells are typically horizontally drilled wells commonly associated with the Marcellus Shale. Unconventional gas wells are profiled in **Section 4.3.16**.

There are approximately 2,808 conventional oil and gas wells drilled in Butler County (PA DEP, 2021e). Conventional wells are defined as traditional vertical wells. Well types and statuses countywide are as follows:

Well Types

- Oil Wells: 33%
- Gas Wells: 31%
- Combined Oil and Gas Wells: 11.5%
- Other Types of Conventional Wells: 2.5%
- Undetermined: 22%

Well Statuses

- Active: 46%
- Abandoned: 11%
- Orphaned: 14%
- Plugged: 21%
- Other Statuses: 8%

Other statuses include “proposed, but never materialized” meaning that a permit application was submitted but not approved, a well was entered erroneously into the database, or the permit was issued but the well was never drilled, and “operator reported not drilled,” meaning the well permit has expired without being drilled or that the operator will not seek to drill.

There are active and abandoned oil and gas wells in 47 of 57 municipalities in Butler County with activity concentrated in the eastern portion of the County as shown in Figure 4.3.14-1. Data on conventional oil and gas wells obtained from PA DEP, provided in Table 4.3.14-1 below, shows that over 30 percent of existing oil and gas wells are located in only three municipalities: Concord Township, Donegal Township, and Parker Township, with 278, 267, and 314 conventional wells respectively.

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

a fire hazard. Private drinking water is largely unregulated and therefore the existing data is largely incomplete and/or inaccurate. Some information is submitted to the Pennsylvania Topographic and Geologic Survey by water well drillers via the PaGWIS system, but this data is voluntarily reported.

Figure 4.3.14-1 Conventional Oil and Gas Wells in Butler County

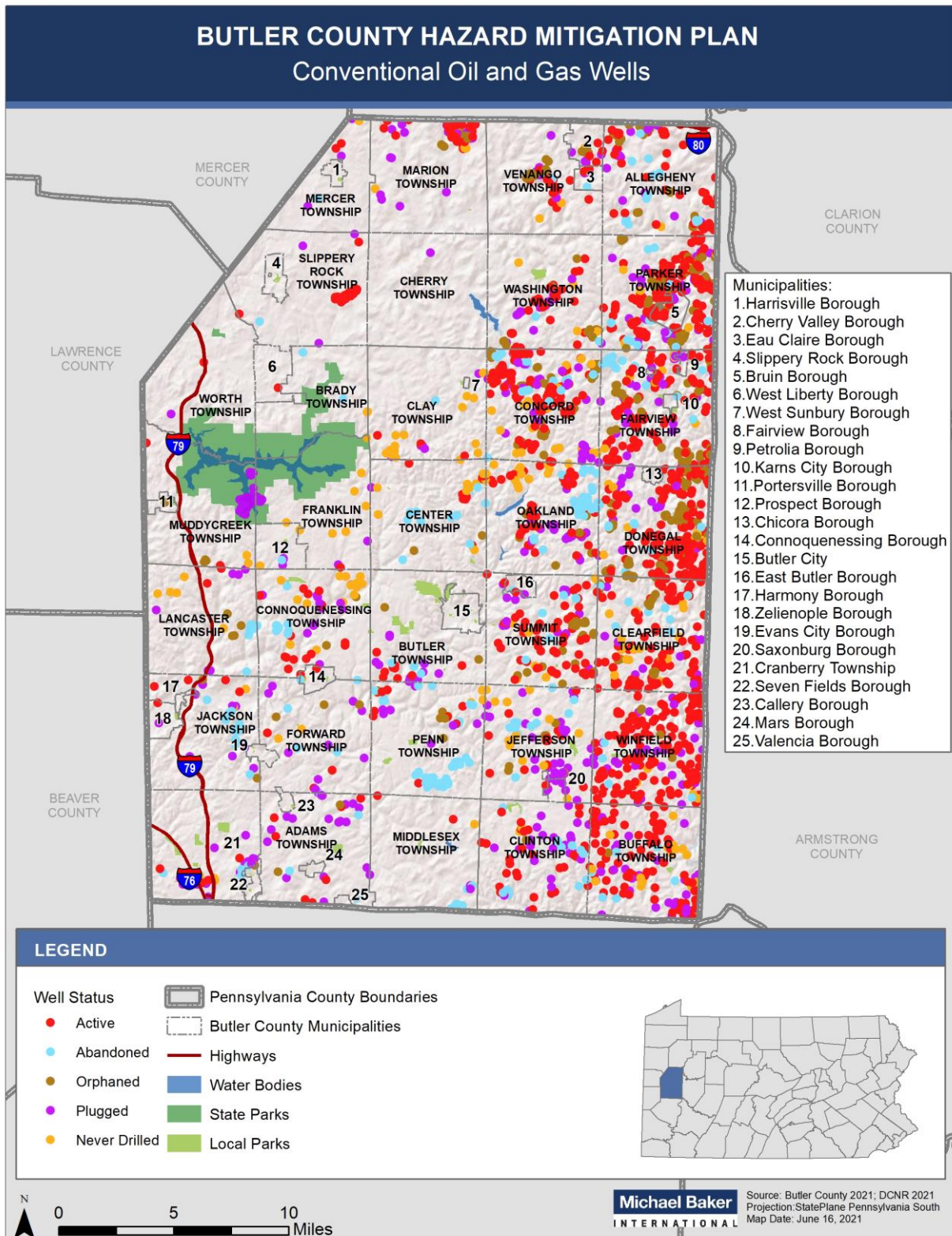


Table 4.3.14-1 Conventional Oil and Gas Wells in Butler County Municipalities (PA DEP, 2021e)

MUNICIPALITY	NUMBER OF WELLS	MUNICIPALITY	NUMBER OF WELLS
Adams Township	32	Jackson Township	30
Allegheny Township	108	Jefferson Township	79
Brady Township	14	Karns City Borough	1
Bruin Borough	31	Lancaster Township	27
Buffalo Township	133	Marion Township	119
Butler Township	4	Mars Borough	0
Butler, City	29	Mercer Township	7
Callery Borough	0	Middlesex Township	18
Center Township	42	Muddy Creek Township	50
Cherry Township	1	Oakland Township	128
Cherry Valley Township	13	Parker Township	314
Chicora Borough	0	Penn Township	68
Clay Township	24	Petrolia Borough	0
Clearfield Township	146	Portersville Borough	1
Clinton Township	75	Prospect Borough	3
Concord Township	278	Saxonburg Borough	5
Connoquenessing Borough	5	Seven Fields Borough	1
Connoquenessing Township	56	Slippery Rock Borough	0
Cranberry Township	34	Slippery Rock Township	35
Donegal Township	267	Summit Township	110
East Butler Borough	3	Valencia Borough	0
Eau Claire Borough	8	Venango Township	54
Evans City Borough	0	Washington Township	57
Fairview Borough	1	West Liberty Borough	0
Fairview Township	177	West Sunbury Borough	0
Forward Township	21	Winfield Township	174
Franklin Township	20	Worth Township	3
Harmony Borough	1	Zelienople Borough	1
Harrisville Borough	0	TOTAL	2,808

4.3.14.2. Range of Magnitude

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

Methane can leak into domestic drinking wells and pose fire and explosion hazards. In addition, natural gas well fires can 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. When methane gas from unplugged gas wells seeps into underground coal mines, miners are at risk of asphyxiation and are subject to impacts of explosion.

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

4.3.14.3. Past Occurrence

Pennsylvania has a long history of oil and gas well drilling. Though relatively infrequent, many accidents and incidents have occurred related to the extraction of these natural resources. Most accidents and incidents in Butler County are related to unconventional oil and gas wells, which are described in **Section 4.3.16.3**. However, it is still possible for incidents related to conventional oil and gas well drilling to occur. There is no comprehensive open database that tracks these incidents, and no anecdotal information was provided for these incidents in Butler County. Stakeholders in the County can draw on reports of conventional oil and gas well drilling incidents in the region or Commonwealth. For example, in January 1988, an oil spill occurred when a four-million-gallon oil storage tank split in Floreffe, Pennsylvania. This occurred Allegheny County, approximately 20 miles from Pittsburgh. The tank, owned by Ashland Oil Company, leaked oil into an adjacent parking lot. Eventually, the contents flowed into the Monongahela River, which led to the Ohio River. The Environment Protection Agency (EPA) reported the spill affected approximately contaminated drinking water for three million people in three states and their river ecosystems, killed wildlife, and damaged property and businesses (US EPA, 1988). While no comprehensive list of oil and gas related incidents exist for the Commonwealth, but conventional oil and gas well incidents are more common northwestern Pennsylvania counties due the presence of these types of wells in the region. The hazards associated with each incident vary widely and encompass damages including serious injury, explosion, fire and water contamination.

4.3.14.4. Future Occurrence

It is difficult to predict when and where environmental hazards will arise as they are often related to equipment failure and human error. Adequate monitoring through the Department of Environment Protection (DEP) will reduce the likelihood of potential impacts to the

community and the environment. Risk associated with conventional oil and gas drilling is expected to remain moderate though.

The number of permits issued for oil and gas wells decreases each year, though production continues to increase. Additionally, the number of orphaned and abandoned wells has increased. In PA DEP’s 2019 Annual Report, they identified a study in partnership with DCNR in Cornplanter State Forest to measure methane leakage from identified orphan wells. This research will help PA DEP better estimate emissions from the thousands of orphaned and abandoned wells in Pennsylvania and determine how to quantify threats from abandoned wells (PA DEP, 2019b).

Based on the short history of past occurrence, the probability of future conventional and oil gas well events is considered *likely* according to the Risk Factor Methodology (see Table 4.4.1-1).

4.3.14.5. Vulnerability Assessment

Table 4.3.14-2 shows the structures and critical facilities that are vulnerable to conventional wells incidents. Structures and critical facilities within 1,000 yards of conventional wells are considered vulnerable. There are 41,953 structures in close proximity to conventional wells countywide (49% of all structures). Five municipalities have 100% of their structures in close proximity to at least one conventional well and twenty-three municipalities are in close proximity to at least one conventional well.

When looking at structures by property type, shown in Table 4.3.14-3, the majority of vulnerable structures are unsurprisingly residential in nature, followed by agricultural uses. A complete listing of critical facilities is in **Appendix E**.

Table 4.3.14-2 Structures and Critical Facilities Vulnerable to Conventional Wells

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES VULNERABLE TO CONVENTIONAL WELLS (WITHIN 1,000 YARDS)	PERCENT STRUCTURES VULNERABLE TO CONVENTIONAL WELLS (WITHIN 1,000 YARDS)	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES VULNERABLE TO CONVENTIONAL WELLS (WITHIN 1,000 YARDS)	PERCENT CRITICAL FACILITIES VULNERABLE TO CONVENTIONAL WELLS (WITHIN 1,000 YARDS)
Adams Township	6,126	3,547	58%	25	3	12%
Allegheny Township	414	386	93%	1	1	100%
Brady Township	661	250	38%	1	0	0%
Bruin Borough	245	245	100%	2	2	100%
Buffalo Township	3,336	3,285	98%	8	8	100%
Butler, City	5,933	0	0%	18	0	0%
Butler Township	7,644	1,986	26%	44	21	48%
Callery Borough	168	57	34%	4	1	25%
Center Township	3,788	1,864	49%	5	3	60%
Cherry Township	570	18	3%	2	0	0%
Cherry Valley Borough	42	32	76%	0	0	0%
Chicora Borough	473	147	31%	5	1	20%
Clay Township	1,202	516	43%	3	1	33%
Clearfield Township	1,096	1,092	100%	1	1	100%
Clinton Township	1,351	1,115	83%	1	1	100%
Concord Township	749	687	92%	1	1	100%
Connoquenessing Borough	352	229	65%	2	1	50%
Connoquenessing Township	2,146	1,359	63%	4	3	75%
Cranberry Township	12,665	5,489	43%	21	21	100%
Donegal Township	765	743	97%	2	2	100%

Table 4.3.14-2 Structures and Critical Facilities Vulnerable to Conventional Wells

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES VULNERABLE TO CONVENTIONAL WELLS (WITHIN 1,000 YARDS)	PERCENT STRUCTURES VULNERABLE TO CONVENTIONAL WELLS (WITHIN 1,000 YARDS)	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES VULNERABLE TO CONVENTIONAL WELLS (WITHIN 1,000 YARDS)	PERCENT CRITICAL FACILITIES VULNERABLE TO CONVENTIONAL WELLS (WITHIN 1,000 YARDS)
East Butler Borough	331	326	98%	3	3	100%
Eau Claire Borough	163	162	99%	2	2	100%
Evans City Borough	776	287	37%	6	2	33%
Fairview Borough	80	80	100%	1	1	100%
Fairview Township	951	943	99%	2	2	100%
Forward Township	1,325	766	58%	3	2	67%
Franklin Township	1,280	604	47%	1	0	0%
Harmony Borough	459	91	20%	3	0	0%
Harrisville Borough	380	28	7%	4	0	0%
Jackson Township	2,422	1,142	47%	7	4	57%
Jefferson Township	2,103	1,927	92%	5	5	100%
Karns City Borough	111	111	100%	1	1	100%
Lancaster Township	1,346	466	35%	3	1	33%
Marion Township	621	187	30%	2	0	0%
Mars Borough	541	222	41%	2	2	100%
Mercer Township	560	153	27%	2	0	0%
Middlesex Township	3,046	612	20%	6	1	17%
Muddy Creek Township	1,144	482	42%	4	0	0%
Oakland Township	1,282	1,055	82%	3	2	67%
Parker Township	359	339	94%	1	1	100%
Penn Township	2,281	1,397	61%	8	3	38%

Table 4.3.14-2 Structures and Critical Facilities Vulnerable to Conventional Wells

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES VULNERABLE TO CONVENTIONAL WELLS (WITHIN 1,000 YARDS)	PERCENT STRUCTURES VULNERABLE TO CONVENTIONAL WELLS (WITHIN 1,000 YARDS)	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES VULNERABLE TO CONVENTIONAL WELLS (WITHIN 1,000 YARDS)	PERCENT CRITICAL FACILITIES VULNERABLE TO CONVENTIONAL WELLS (WITHIN 1,000 YARDS)
Petrolia Borough	125	125	100%	2	2	100%
Portersville Borough	146	139	95%	2	2	100%
Prospect Borough	566	196	35%	3	1	33%
Saxonburg Borough	784	784	100%	5	5	100%
Seven Fields Borough	1,227	449	37%	1	0	0%
Slippery Rock Borough	1,240	0	0%	13	0	0%
Slippery Rock Township	1,904	435	23%	8	0	0%
Summit Township	2,018	1,816	90%	5	5	100%
Valencia Borough	266	125	47%	0	0	0%
Venango Township	433	225	52%	1	1	100%
Washington Township	644	371	58%	2	1	50%
West Liberty Borough	157	53	34%	0	0	0%
West Sunbury Borough	103	38	37%	0	0	0%
Winfield Township	1,335	1,306	98%	1	1	100%
Worth Township	790	81	10%	2	0	0%
Zelienople Borough	1,853	1,383	75%	3	3	100%
TOTAL	84,878	41,953	49%	265	124	48%

Table 4.3.14-3 Structures Vulnerable to Conventional Wells by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Adams Township	70	102	4	11	11	0	5	3,079	1	92	3	165	3,543
Allegheny Township	67	17	0	5	5	0	0	272	0	0	0	19	385
Brady Township	14	5	0	0	1	0	0	225	0	0	0	5	250
Bruin Borough	8	6	1	0	4	0	0	220	0	0	1	5	245
Buffalo Township	191	119	4	3	24	0	1	2,825	1	13	1	101	3,283
Butler, City	0	0	0	0	0	0	0	0	0	0	0	0	0
Butler Township	44	51	14	1	16	2	4	1,841	0	0	1	12	1,986
Callery Borough	1	0	1	1	0	0	0	54	0	0	0	0	57
Center Township	115	144	6	0	5	0	1	1,540	0	2	0	51	1,864
Cherry Township	5	0	0	1	0	0	0	11	0	0	0	1	18
Cherry Valley Borough	10	1	0	0	1	0	0	19	0	0	0	1	32
Chicora Borough	1	11	1	0	1	0	0	130	0	0	0	3	147
Clay Township	71	14	2	0	1	0	0	413	0	0	0	15	516
Clearfield Township	146	35	0	0	2	0	0	877	0	0	0	32	1,092
Clinton Township	149	23	2	15	6	0	1	893	0	2	0	24	1,115
Concord Township	171	8	0	0	2	0	0	483	0	0	0	23	687
Connoquenessing Borough	9	5	0	1	3	0	0	177	0	0	1	33	229
Connoquenessing Township	110	34	0	0	4	0	0	1,140	0	0	0	71	1,359
Cranberry Township	11	563	23	26	26	0	3	4,689	0	59	2	78	5,480

Table 4.3.14-3 Structures Vulnerable to Conventional Wells by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Donegal Township	128	16	0	2	1	0	1	558	1	0	0	36	743
East Butler Borough	0	13	0	11	4	0	0	295	0	0	0	3	326
Eau Claire Borough	4	16	0	0	5	0	0	125	0	0	1	11	162
Evans City Borough	0	31	3	2	1	0	0	245	0	0	1	4	287
Fairview Borough	0	1	0	0	4	0	0	74	0	0	0	1	80
Fairview Township	119	21	0	2	10	2	0	744	1	1	0	43	943
Forward Township	126	17	3	0	4	0	0	540	0	0	0	74	764
Franklin Township	40	22	0	1	0	1	4	505	0	17	0	13	603
Harmony Borough	0	4	0	0	0	0	0	87	0	0	0	0	91
Harrisville Borough	0	0	0	0	1	0	0	27	0	0	0	0	28
Jackson Township	101	74	6	6	8	1	9	886	0	0	0	42	1,133
Jefferson Township	163	52	2	7	12	0	0	1,667	0	4	0	19	1,926
Karns City Borough	0	12	0	0	2	0	0	90	0	0	0	7	111
Lancaster Township	93	10	0	0	1	0	0	310	0	0	0	52	466
Marion Township	43	2	0	0	1	0	0	126	0	0	0	15	187
Mars Borough	0	44	2	0	7	0	0	165	0	0	1	3	222
Mercer Township	26	3	0	0	0	0	0	116	0	0	0	8	153
Middlesex Township	76	2	3	0	3	0	1	517	0	0	0	10	612
Muddy Creek Township	32	12	1	1	0	0	1	431	0	0	0	3	481
Oakland Township	151	17	0	0	3	0	0	859	0	0	0	25	1,055

Table 4.3.14-3 Structures Vulnerable to Conventional Wells by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Parker Township	61	7	0	0	1	0	1	245	0	0	0	24	339
Penn Township	121	65	3	1	3	0	1	1,048	1	119	0	35	1,397
Petrolia Borough	0	6	1	3	3	0	0	101	0	0	1	9	124
Portersville Borough	1	18	1	1	2	0	0	110	0	0	1	5	139
Prospect Borough	9	8	2	0	1	0	0	175	0	0	0	1	196
Saxonburg Borough	1	72	3	1	10	0	0	643	0	37	1	16	784
Seven Fields Borough	0	1	0	0	1	0	0	447	0	0	0	0	449
Slippery Rock Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Slippery Rock Township	26	22	9	2	0	0	0	360	0	0	0	16	435
Summit Township	146	56	5	4	6	1	0	1,554	0	0	1	42	1,815
Valencia Borough	3	0	0	0	2	0	0	86	0	0	0	34	125
Venango Township	44	5	0	0	1	0	0	157	1	0	0	17	225
Washington Township	55	7	0	0	3	0	1	271	0	0	0	34	371
West Liberty Borough	4	0	0	0	0	0	0	49	0	0	0	0	53
West Sunbury Borough	2	4	0	0	1	0	0	31	0	0	0	0	38
Winfield Township	142	31	3	4	4	0	0	1,089	0	0	1	30	1,304
Worth Township	11	2	0	0	0	0	0	67	0	0	0	1	81
Zelienople Borough	2	194	51	13	19	0	0	1,074	0	0	1	27	1,381
TOTAL	2,923	2,005	156	125	236	7	34	34,762	6	346	18	1,299	41,917



4.3.15. Environmental Hazards: Hazardous Materials Release

4.3.15.1. Location and Extent

Hazardous material releases pose threats to the natural environment, the built environment, and public safety through the diffusion of harmful substances, materials, or products. Hazardous materials can include toxic chemicals, infectious substances, biohazardous waste, and any materials that are explosive, corrosive, flammable, or radioactive. Hazardous material releases can occur wherever hazardous materials are manufactured, used, stored, or transported. Such releases can occur along transportation routes or at fixed-site facilities. Hazardous material releases can result in human and wildlife injury, property damage, and contamination of air, water, and soils.

Fixed-site facilities that use, manufacture, or store hazardous materials in Butler County must comply with Title III of the federal Superfund Amendments and Reauthorization Act (SARA), as known as the Emergency Planning and Community Right-to-Know Act (EPCRA), and the Commonwealth's reporting requirements under the Hazardous Materials Emergency Planning and Response Act (1990-165), as amended. These statutes require that all owners or operators of facilities that manufacture, produce, use, import, export, store, supply, or distribute any extremely hazardous substance, as defined by the EPA, at or above the threshold planning quantity, shall report to the County where the facility is located and the Commonwealth. These facilities are subject to the requirement of assisting the Local Emergency Planning Committee (LEPC) in the development of an Off-site Emergency Response Plan (US EPA, 2021a). The right-to-know reporting requirements keep communities abreast of the presence and release of chemicals at individual facilities. The EPA also tracks key information about chemicals handled by industrial facilities through its Toxic Release Inventory (TRI) database. Facilities which employ ten or more full-time employees, and which manufacture or process 25,000 pound or more, or otherwise use 10,000 pounds or more, of any SARA Section 313-listed toxic chemical in the course of a calendar year are required to report TRI information to the EPA and PEMA. In 2019, there were 1,097 tracked facilities on EPA's TRI in Pennsylvania, 66 of which are located in Butler County as shown in Figure 4.3.15-1 (US EPA, 2021a).

Figure 4.3.15-1 US EPA Toxic Release Inventory Facilities in Butler County

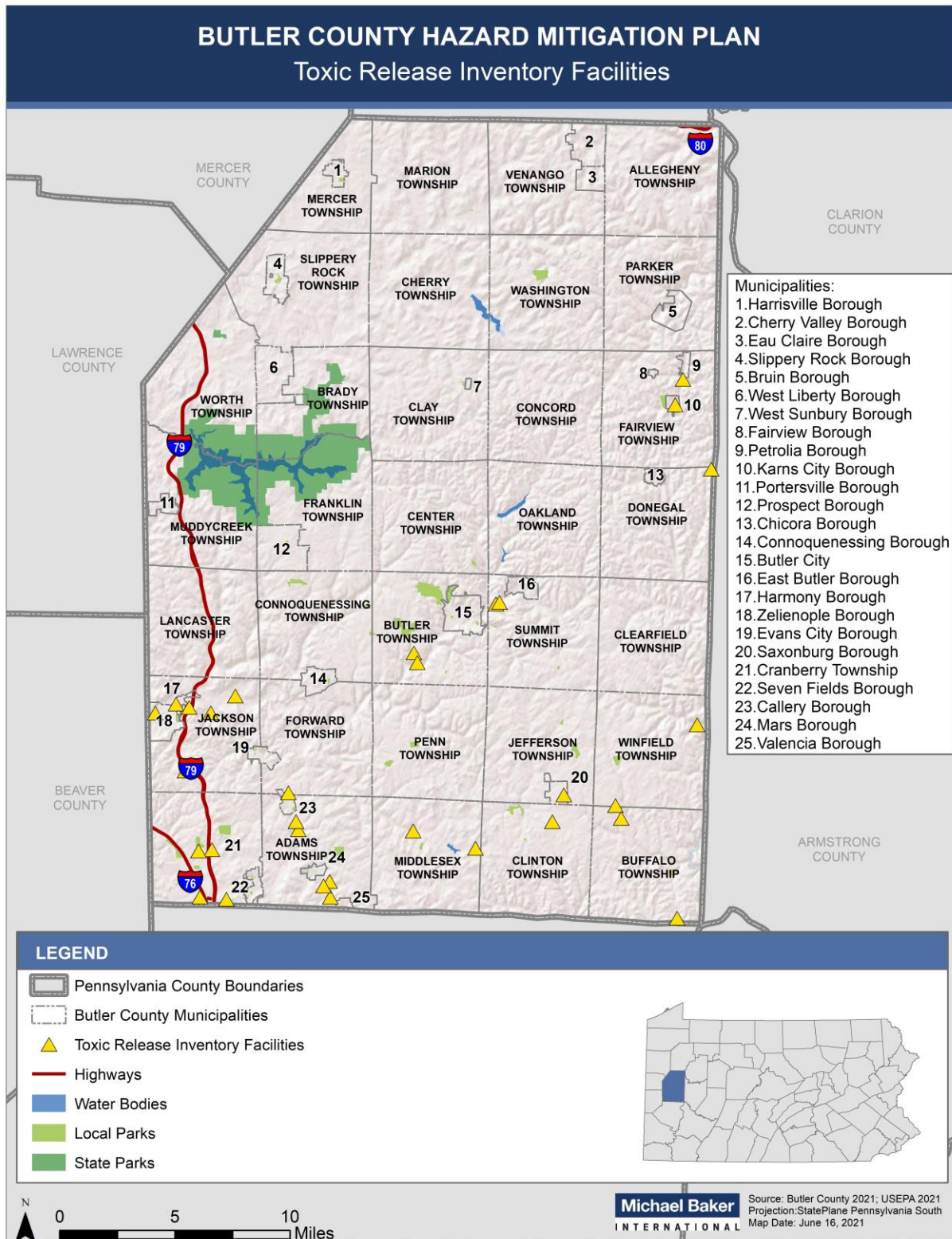


Table 4.3.15-1 lists the number of TRI facilities in Butler County by municipality. Of the 57 municipalities in Butler County, 14 contain a TRI facility. Additionally, there are TRI facilities in the unincorporated area of Cabot in Butler County. The City of Butler and Zelienople Borough are home to the most TRI sites in the County with 10 and 9 TRI sites each.

Table 4.3.15-1 TRI Facilities in Butler County Municipalities (US EPA, 2021a)

MUNICIPALITY	NUMBER OF TRI FACILITIES
Butler, City	10
Buffalo Township	3
Cabot	2
Chicora Borough	1
Cranberry Township	5
East Butler Borough	4
Evanc City Borough	3
Harmony Borough	4
Karns City Borough	1
Mars Borough	8
Petrolia Borough	2
Portersville Borough	1
Saxonburg Borough	6
Slippery Rock Borough	2
Valencia Borough	2
Zelienople Borough	9
TOTAL	63

There are increasingly large numbers of chemicals, oils, radioactive materials and other hazardous substances spilled as the result of highway, rail and waterway accidents, storage tank leakage, pipeline break, and/or other accidents. On occasion, these events become a major disaster and force people to evacuate and/or lose their homes and businesses.

4.3.15.2. Range of Magnitude

Hazardous material releases can contaminate air, water, and soils, possibly resulting in death and/or injuries. Dispersion can take place rapidly when transported by water and wind. While often accidental, releases can occur as a result of human carelessness, intentional acts, or natural hazards. When caused by natural hazards, these incidents are known as secondary events. Hazardous materials can include toxic chemicals, radioactive materials, infectious substances, and hazardous wastes. Such releases can affect nearby populations and contaminate critical or sensitive environmental areas.

With a hazardous material release, whether accidental or intentional, there are several potentially exacerbating or mitigating circumstances that will affect its severity or impact. Mitigating conditions are precautionary measures taken in advance to reduce the impact of a release on the surrounding environment. Primary and secondary containment or shielding by sheltering-in-place protects people and property from the harmful effects of a hazardous material release. Characteristics that can enhance or magnify the effects of a hazardous material release include:

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

The severity of the incident is dependent not only on the circumstances described above, but also with the type of material released and the distance and related response time for emergency response teams. The areas within closest proximity to the releases are generally at greatest risk, yet depending on the agent, a release can travel great distances or remain present in the environment for a long period of time (e.g. centuries to millennia for radioactive materials), resulting in extensive impacts on people and the environment.

The environmental impacts of hazardous material releases include:

- Hydrologic effects - surface and groundwater contamination
- Other effects on water quality such as changes in water temperature
- Damage to streams, lakes, ponds, estuaries, and wetland ecosystems
- Air quality effects - pollutants, smoke, and dust
- Loss of quality in landscape
- Reduced soil quality
- Damage to plant communities- loss of biodiversity; damage to vegetation
- Damage to animal species- animal fatalities; degradation of wildlife and aquatic habitat; pollution of drinking water for wildlife; loss of biodiversity; disease.

A worst-case scenario for environmental hazards in Butler County would be a large-scale chemical release into the Connoquenessing Creek in the City of Butler. Such a chemical release would trigger an evacuation of the immediate area. Additionally, the event could have long-term environmental impacts including long-term water contamination.

4.3.15.3. Past Occurrence

Since the passage of SARA, Title III, facilities which produce, use, or store hazardous chemicals must notify the public through the County emergency dispatch center and PEMA if an

accidental release of a hazardous substance meets or exceeds a designated reportable quantity and affects or has the potential to affect persons and/or the environment outside the plant. SARA, Title III and Pennsylvania Act 165 also require a written follow-up report to PEMA and the County. These written follow-up reports include any known or anticipated health risks associated with the release, and actions to be taken to mitigate potential future incidents. In addition, Section 204(a)(10) of Act 165 requires PEMA to staff and operate a 24-hour State Emergency Operations Center (SEOC) to provide effective emergency response coordination. The Pennsylvania’s Hazardous Material Emergency Planning and Response Act 990-165 - 2018 Annual Report states that there were 2,252 hazardous materials/petroleum incidents in Pennsylvania and nine of these events occurred in Butler County. Incidents included chemical release, chemical spill, and flammable liquid and solid releases (PEMA, 2018). Additional incident information for years prior to 2018 may be obtained from annual reports submitted to PEMA.

Between 2004 and 2009, 33 hazardous materials incidents were reported in Butler County through the Pennsylvania Emergency Incident Reporting System (PEIRS), listed in Table 4.3.15-2. No deaths were reported as a result of these incidents.

Table 4.3.15-2 Hazardous Materials Release Incidents in Butler County Reported to PEIRS from 2004-2009 (PEMA, 2009)

DATE	TYPE	DATE	TYPE
1/22/2004	Chemical Spill	3/23/2007	Chemical Spill
3/5/2004	Chemical Spill	4/18/2007	Chemical Spill
3/5/2004	Chemical Spill	4/28/2007	Dynamite Found
4/22/2004	Chemical Spill	6/26/2007	Chemical Spill
4/26/2004	Military Ordnance	7/14/2007	Explosions
8/5/2004	Military Ordnance	8/2/2007	Military Ordnance
3/11/2005	Chemical Spill	11/14/2007	Chemical Release
3/13/2005	Chemical Spill	1/4/2008	Chemical Spill
4/9/2005	Chemical Release	6/30/2008	Chemical Release
5/20/2005	Military Ordnance	7/20/2008	Chemical Spill
5/22/2005	Chemical Release	10/3/2008	Dynamite Found
10/12/2005	Natural Gas Release	10/11/2008	Chemical Release
3/16/2006	Propane Release	10/16/2008	Military Ordnance
11/7/2006	Odor Investigation	11/27/2008	Chemical Spill
12/19/2006	Military Ordnance	1/9/2009	Natural Gas Release
1/9/2007	Military Ordnance	5/23/2009	Chemical Spill
3/5/2007	Chemical Release		

Since 2010, the Pennsylvania Emergency Incident Reporting System (PEIRS) is no longer in use. Limited information concerning incidents involving hazardous liquids, gas transmission,

gas gathering, and gas distribution at the state level was collected from the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration. Table 4.3.15-3 lists the number of reports each year from 1990 to 2021. 254 events resulting in \$694,870 of damages were reported in Butler County to PHMSA in this period. None of these events occurred at TRI facilities. Table 4.3.15-4 lists reports from 2015 to 2021 with the mode of transportation and incident type. The majority of reported events occurred in Zelienople Borough, were being transported on a highway, and resulted in HAZMAT spillage.

Across the Commonwealth in 2020, there were 810 highway related hazardous material incidents totaling \$1,538,872 in damages, 50 air travel related incidents totaling \$0 in damages, 18 railway related incidents totaling \$300,400 in damages, and one water related incident totaling \$1,750 in damages (PHMSA, 2021). For prior years, incident information for Pennsylvania can be found on the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration website.

Table 4.3.15-3 HAZMAT Release Reports in Butler County from 1990 to 2021 (PHMSA, 2021)

YEAR	NUMBER OF REPORTS	DAMAGES	YEAR	NUMBER OF REPORTS	DAMAGES
1990	6	\$2,949	2007	17	\$62,410
1991	3	\$127,869	2008	9	\$4,500
1992	3	\$750	2009	2	0
1993	1	\$35	2010	1	0
1994	6	\$145,220	2011	4	0
1995	2	\$4,025	2012	3	0
1996	2	0	2013	5	\$8,500
1997	5	\$10,370	2014	3	0
1998	8	\$235,995	2015	5	0
1999	7	\$12,530	2016	8	\$10,000
2000	8	\$11,160	2017	24	0
2001	6	\$632	2018	23	0
2002	13	\$21,370	2019	32	\$21,500
2003	15	\$4,929	2020	3	0
2004	7	\$1,526	2021	1	0
2005	13	0	TOTAL	254	\$694,870
2006	9	\$8,600			

Table 4.3.15-4 HAZMAT Release Incidents in Butler County from 2015 to 2021 (PHMSA, 2021)

DATE	LOCATION	MODE OF TRANSPORTATION	INCIDENT TYPE	DAMAGES	DATE	LOCATION	MODE OF TRANSPORTATION	INCIDENT TYPE	DAMAGES
2/27/2015	Slippery Rock	Highway	Spillage	0	8/13/2018	Zelienople	Highway	Spillage	0
9/6/2015	Butler	Rail	Vapor(Gas) Dispersion	0	8/15/2018	Zelienople	Highway	Spillage	0
9/16/2015	Zelienople	Highway	Spillage	0	8/17/2018	Zelienople	Highway	Spillage	0
9/23/2015	Zelienople	Highway	No Release	0	8/24/2018	Zelienople	Highway	Spillage	0
11/19/2015	Cranberry	Air	Spillage	0	8/28/2018	Zelienople	Highway	Spillage	0
1/22/2016	Butler	Highway	No Release	\$10,000	9/1/2018	Zelienople	Highway	Spillage	0
6/23/2016	Cranberry	Air	Spillage	0	9/12/2018	Zelienople	Highway	Spillage	0
8/8/2016	Cranberry	Air	Spillage	0	9/20/2018	Zelienople	Highway	Spillage	0
9/9/2016	Cranberry	Air	Spillage	0	9/25/2018	Zelienople	Highway	Spillage	0
10/9/2016	Butler	Rail	Vapor(Gas) Dispersion	0	10/23/2018	Zelienople	Highway	Spillage	0
10/14/2016	Zelienople	Highway	Spillage	0	10/29/2018	Zelienople	Highway	Spillage	0
10/24/2016	Butler	Rail	Vapor(Gas) Dispersion	0	12/6/2018	Zelienople	Highway	Spillage	0
11/23/2016	Zelienople	Highway	Spillage	0	1/14/2019	Butler	Highway	Spillage	\$21,500
1/11/2017	Zelienople	Highway	Spillage	0	1/24/2019	Zelienople	Highway	Spillage	0
1/30/2017	Zelienople	Air	No Release	0	1/30/2019	Zelienople	Highway	Spillage	0
2/1/2017	Zelienople	Highway	Spillage	0	3/11/2019	Zelienople	Highway	Spillage	0
4/26/2017	Zelienople	Highway	Spillage	0	4/19/2019	Zelienople	Highway	Spillage	0
5/10/2017	Zelienople	Highway	Spillage	0	4/23/2019	Zelienople	Highway	Spillage	0
5/12/2017	Zelienople	Highway	Spillage	0	5/2/2019	Barkeyville	Highway	Spillage	0
5/20/2017	Zelienople	Highway	Spillage	0	5/29/2019	Zelienople	Highway	Spillage	0
6/6/2017	Cranberry	Air	Spillage	0	6/10/2019	Zelienople	Highway	Spillage	0
6/14/2017	Zelienople	Highway	Spillage	0	7/19/2019	Zelienople	Highway	Spillage	0

Table 4.3.15-4 HAZMAT Release Incidents in Butler County from 2015 to 2021 (PHMSA, 2021)

DATE	LOCATION	MODE OF TRANSPORTATION	INCIDENT TYPE	DAMAGES	DATE	LOCATION	MODE OF TRANSPORTATION	INCIDENT TYPE	DAMAGES
6/23/2017	Zelienople	Highway	Spillage	0	7/30/2019	Zelienople	Highway	Spillage	0
6/28/2017	Zelienople	Highway	Spillage	0	8/6/2019	Zelienople	Highway	Spillage	0
7/13/2017	Zelienople	Highway	Spillage	0	8/12/2019	Zelienople	Highway	Spillage	0
7/20/2017	Zelienople	Highway	Spillage	0	8/20/2019	Zelienople	Highway	Spillage	0
7/24/2017	Cranberry	Air	Spillage	0	8/27/2019	Zelienople	Highway	Spillage	0
7/25/2017	Zelienople	Highway	Spillage	0	8/27/2019	Zelienople	Highway	Spillage	0
8/3/2017	Zelienople	Highway	Spillage	0	8/29/2019	Zelienople	Highway	Spillage	0
8/29/2017	Zelienople	Highway	No Release	0	9/5/2019	Zelienople	Highway	Spillage	0
10/2/2017	Zelienople	Highway	Spillage	0	9/9/2019	Zelienople	Highway	Spillage	0
10/7/2017	Zelienople	Highway	Spillage	0	9/12/2019	Zelienople	Highway	Spillage	0
10/11/2017	Zelienople	Highway	Spillage	0	9/18/2019	Zelienople	Highway	Spillage, Vapor(Gas) Dispersion	0
10/23/2017	Zelienople	Highway	Spillage	0	9/20/2019	Zelienople	Highway	Spillage	0
10/26/2017	Zelienople	Highway	Spillage	0	9/27/2019	Zelienople	Highway	Spillage	0
11/29/2017	Zelienople	Highway	Spillage	0	10/8/2019	Zelienople	Highway	Spillage	0
12/12/2017	Zelienople	Highway	Spillage	0	10/10/2019	Zelienople	Highway	Spillage	0
1/27/2018	Zelienople	Highway	Spillage	0	10/13/2019	Butler	Highway	No Release	0
1/29/2018	Cranberry	Air	Spillage	0	10/28/2019	Zelienople	Highway	Spillage	0
1/31/2018	Zelienople	Highway	Spillage	0	10/31/2019	Zelienople	Highway	Spillage	0
5/2/2018	Zelienople	Highway	Spillage	0	11/18/2019	Zelienople	Highway	Spillage	0
5/5/2018	Zelienople	Highway	Spillage	0	11/26/2019	Butler	Highway	No Release	0
5/29/2018	Zelienople	Highway	Spillage	0	12/10/2019	Zelienople	Highway	Spillage	0

Table 4.3.15-4 HAZMAT Release Incidents in Butler County from 2015 to 2021 (PHMSA, 2021)

DATE	LOCATION	MODE OF TRANSPORTATION	INCIDENT TYPE	DAMAGES	DATE	LOCATION	MODE OF TRANSPORTATION	INCIDENT TYPE	DAMAGES
6/22/2018	Zelienople	Highway	Spillage	0	12/13/2019	Butler	Highway	No Release	0
7/2/2018	Zelienople	Highway	Spillage	0	2/7/2020	Zelienople	Highway	Spillage	0
7/16/2018	Zelienople	Highway	Spillage	0	3/5/2020	Zelienople	Highway	Spillage	0
7/17/2018	Zelienople	Highway	Spillage	0	4/1/2020	Zelienople	Highway	Spillage	0
8/4/2018	Zelienople	Highway	Spillage	0	2/17/2021	Butler	Rail	Vapor(Gas) Dispersion	0

4.3.15.4. Future Occurrence

While many hazardous material release incidents have occurred in Butler County in the past, they are generally considered difficult to predict. An occurrence is largely dependent upon the accidental or intentional actions of a person or group. Intentional acts are addressed under **Section 4.3.18: Terrorism**.

Shifting traffic patterns and the presence of a multitude of hazardous materials in transit through the County, however, still warrants the need for continued development of response capability, which has been an ongoing priority for the Butler County OES, the Butler County Local Emergency Planning Committee, and the County’s fire, hazmat, EMS, and police agencies.

The probability of future hazardous materials release events can be considered *likely* according to the Risk Factor Methodology (see Table 4.4.1-1).

4.3.15.5. Vulnerability Assessment

Table 4.3.15-5 shows the structures and critical facilities that are vulnerable to hazardous material facilities. Structures and critical facilities within a mile and a half of Toxic Release Inventory (TRI) facilities are considered vulnerable. There are 40,350 structures in close proximity to TRI facilities countywide (48% of all structures). Twelve municipalities have 100% of their structures close to TRI facilities and sixteen municipalities have 100% of their critical facilities close to TRI facilities.

When looking at structures by property type, shown in Table 4.3.15-2, the majority of vulnerable structures are residential in nature, followed by commercial uses. A complete listing of critical facilities is in **Appendix E**.

Table 4.3.15-5 Vulnerability to Hazardous Material Sites

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES VULNERABLE TO HAZARDOUS MATERIAL FACILITIES (WITHIN 1.5 MILES)	PERCENT STRUCTURES VULNERABLE TO HAZARDOUS MATERIAL FACILITIES (WITHIN 1.5 MILES)	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES VULNERABLE TO HAZARDOUS MATERIAL FACILITIES (WITHIN 1.5 MILES)	PERCENT CRITICAL FACILITIES VULNERABLE TO HAZARDOUS MATERIAL FACILITIES (WITHIN 1.5 MILES)
Adams Township	6,126	3,465	57%	25	22	88%
Allegheny Township	414	157	38%	1	0	0%
Brady Township	661	0	0%	1	0	0%
Bruin Borough	45	0	0%	2	0	0%
Buffalo Township	3,336	1,884	56%	8	2	25%
Butler, City	5,933	5,933	100%	18	18	100%
Butler Township	7,644	4,198	55%	44	33	75%
Callery Borough	68	168	100%	4	4	100%
Center Township	3,788	5	0%	5	0	0%
Cherry Township	70	112	20%	2	0	0%
Cherry Valley Borough	42	0	0%	0	0	0%
Chicora Borough	73	0	0%	5	0	0%
Clay Township	1,202	0	0%	3	0	0%
Clearfield Township	1,096	0	0%	1	0	0%
Clinton Township	1,351	1,134	84%	1	1	100%
Concord Township	49	0	0%	1	0	0%
Connoquenessing Borough	352	0	0%	2	0	0%
Connoquenessing Township	2,146	3	0%	4	0	0%

Table 4.3.15-5 Vulnerability to Hazardous Material Sites

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES VULNERABLE TO HAZARDOUS MATERIAL FACILITIES (WITHIN 1.5 MILES)	PERCENT STRUCTURES VULNERABLE TO HAZARDOUS MATERIAL FACILITIES (WITHIN 1.5 MILES)	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES VULNERABLE TO HAZARDOUS MATERIAL FACILITIES (WITHIN 1.5 MILES)	PERCENT CRITICAL FACILITIES VULNERABLE TO HAZARDOUS MATERIAL FACILITIES (WITHIN 1.5 MILES)
Cranberry Township	12,665	8,394	66%	21	21	100%
Donegal Township	765	69	9%	2	0	0%
East Butler Borough	31	331	100%	3	3	100%
Eau Claire Borough	163	0	0%	2	0	0%
Evans City Borough	76	776	100%	6	6	100%
Fairview Borough	80	70	88%	1	1	100%
Fairview Township	951	504	53%	2	2	100%
Forward Township	1,325	377	28%	3	1	33%
Franklin Township	1,280	0	0%	1	0	0%
Harmony Borough	459	459	100%	3	3	100%
Harrisville Borough	80	0	0%	4	0	0%
Jackson Township	2,422	2,287	94%	7	7	100%
Jefferson Township	2,103	1,031	49%	5	4	80%
Karns City Borough	111	111	100%	1	1	100%
Lancaster Township	1,346	223	17%	3	0	0%
Marion Township	21	0	0%	2	0	0%
Mars Borough	41	541	100%	2	2	100%
Mercer Township	60	8	1%	2	0	0%
Middlesex Township	3,046	1,168	38%	6	5	83%
Muddy Creek Township	1,144	217	19%	4	0	0%

Table 4.3.15-5 Vulnerability to Hazardous Material Sites

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES VULNERABLE TO HAZARDOUS MATERIAL FACILITIES (WITHIN 1.5 MILES)	PERCENT STRUCTURES VULNERABLE TO HAZARDOUS MATERIAL FACILITIES (WITHIN 1.5 MILES)	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES VULNERABLE TO HAZARDOUS MATERIAL FACILITIES (WITHIN 1.5 MILES)	PERCENT CRITICAL FACILITIES VULNERABLE TO HAZARDOUS MATERIAL FACILITIES (WITHIN 1.5 MILES)
Oakland Township	1,282	182	14%	3	0	0%
Parker Township	59	25	7%	1	0	0%
Penn Township	2,281	121	5%	8	1	13%
Petrolia Borough	125	125	100%	2	2	100%
Portersville Borough	46	146	100%	2	2	100%
Prospect Borough	566	0	0%	3	0	0%
Saxonburg Borough	84	784	100%	5	5	100%
Seven Fields Borough	1,227	778	63%	1	0	0%
Slippery Rock Borough	1,240	795	64%	13	6	55%
Slippery Rock Township	1,904	379	20%	8	0	0%
Summit Township	2,018	595	29%	5	1	20%
Valencia Borough	266	266	100%	0	0	0%
Venango Township	433	0	0%	1	0	0%
Washington Township	644	0	0%	2	0	0%
West Liberty Borough	157	0	0%	0	0	0%
West Sunbury Borough	103	0	0%	0	0	0%
Winfield Township	1,335	676	51%	1	0	0%
Worth Township	790	0	0%	2	0	0%
Zelienople Borough	1,853	1,853	100%	3	3	100%
TOTAL	84,878	40,350	48%	265	156	61%

Table 4.3.15-6 Structures Vulnerable to Hazardous Material Sites Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Adams Township	67	86	7	15	18	0	8	3,007	1	28	3	219	3,459
Allegheny Township	21	7	0	5	2	0	0	114	0	0	0	8	157
Brady Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Bruin Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Buffalo Township	56	40	2	3	11	0	0	1,691	0	1	1	78	1,883
Butler, City	3	456	73	7	42	0	0	5,,171	9	2	0	165	5,928
Butler Township	34	191	41	6	43	2	0	3821	1	5	3	50	4,197
Callery Borough	3	7	1	2	5	0	0	148	0	0	0	2	168
Center Township	0	0	0	0	0	0	0	4	0	0	0	1	5
Cherry Township	18	2	0	0	0	0	0	82	0	0	0	10	112
Cherry Valley Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Chicora Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Clay Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Clearfield Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Clinton Township	143	24	2	16	6	0	1	913	0	2	0	27	1,,134
Concord Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Connoquenessing Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Connoquenessing Township	0	0	0	0	0	0	0	2	0	0	0	1	3

Table 4.3.15-6 Structures Vulnerable to Hazardous Material Sites Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Cranberry Township	22	1,038	33	49	42	2	2	6,994	0	82	5	116	8,385
Donegal Township	9	2	0	2	0	0	0	52	0	0	0	4	69
East Butler Borough	1	13	0	11	4	0	0	299	0	0	0	3	331
Eau Claire Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Evans City Borough	0	61	14	2	8	0	0	674	0	0	1	15	775
Fairview Borough	0	1	0	0	4	0	0	64	0	0	0	1	70
Fairview Township	36	18	0	2	5	0	0	419	1	0	0	23	504
Forward Township	50	21	3	1	1	0	0	279	0	0	0	20	375
Franklin Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Harmony Borough	0	30	3	2	6	0	0	413	0	0	0	5	459
Harrisville Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Jackson Township	149	141	7	10	11	1	10	1,720	0	29	0	200	2,278
Jefferson Township	66	29	1	7	10	0	0	906	0	3	0	9	1031
Karns City Borough	0	12	0	0	2	0	0	90	0	0	0	7	111
Lancaster Township	89	3	0	0	0	0	0	127	0	0	0	4	223
Marion Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Mars Borough	1	51	2	0	8	0	0	472	0	0	2	5	541
Mercer Township	1	0	0	0	0	0	0	7	0	0	0	0	8
Middlesex Township	116	43	5	2	6	0	1	978	0	0	1	16	1,168

Table 4.3.15-6 Structures Vulnerable to Hazardous Material Sites Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Muddy Creek Township	31	20	0	0	0	0	0	162	0	0	0	3	216
Oakland Township	20	3	0	0	0	0	0	157	0	0	0	2	182
Parker Township	8	0	0	0	0	0	0	16	0	0	0	1	25
Penn Township	6	21	2	0	0	0	0	84	0	2	0	6	121
Petrolia Borough	0	6	1	3	3	0	0	101	0	0	1	9	124
Portersville Borough	3	18	1	1	2	0	0	115	0	0	1	5	146
Prospect Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Saxonburg Borough	1	72	3	1	10	0	0	643	0	37	1	16	784
Seven Fields Borough	0	21	0	0	3	0	1	729	0	0	0	24	778
Slippery Rock Borough	4	119	10	1	7	0	0	640	0	1	0	11	793
Slippery Rock Township	48	17	1	2	3	0	0	295	0	0	0	13	379
Summit Township	36	89	2	7	2	1	0	436	0	0	0	21	594
Valencia Borough	3	3	0	0	2	0	0	210	0	0	0	48	266
Venango Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Washington Township	0	0	0	0	0	0	0	0	0	0	0	0	0
West Liberty Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
West Sunbury Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Winfield Township	47	28	3	1	0	0	0	579	0	0	0	16	674
Worth Township	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4.3.15-6 Structures Vulnerable to Hazardous Material Sites Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Zelienople Borough	2	229	56	16	24	2	1	1490	0	0	1	30	1851
TOTAL	1,094	2,922	273	174	290	8	24	34,104	12	192	20	1,194	40,307



4.3.16. Environmental Hazards: Unconventional Oil and Gas Well Incidents

4.3.16.1. Location and Extent

PA DEP defines unconventional wells as wells drilled deep into shale rock formations found thousands of feet underground. These formations, mainly Marcellus Shale and Utica Shale, contain and produce natural gas. These wells use horizontal drilling techniques that use large quantities of high-pressured water, approximately one to eight million gallons, mixed with sand and other additives including hydrochloric and muriatic acid, to hydraulically fracture the rock. This practice is more commonly known as fracking. This type of extraction presents unique challenges for the County. The majority of unconventional wells in Butler County are oil wells (99%). There are only six combined oil and gas wells and one oil well (PA DEP, 2021e)

There are 1,057 unconventional oil and gas wells in Butler County. This includes:

- 609 Active wells (58%)
- 31 Regulatory inactive status (3%)
- 35 Plugged wells (3%)
- 78 Proposed but never materialized (7%)
- 304 Operator reported not drilled (29%)

A status of “proposed, but never materialized” means that a permit application was submitted but not approved, a well was entered erroneously into the database, or the permit was issued but the well was never drilled. A status of “operator reported not drilled” means the well permit has expired without being drilled or that the operator will not seek to drill.

Table 4.3.16-1 lists the number of unconventional oil and gas wells in each municipality. As shown in Figure 4.3.16-1 unconventional wells are scattered throughout 31 municipalities in the County. Unconventional wells are somewhat concentrated in the southern half of Butler County. The highest number of unconventional wells are in Connoquenessing Township (94), Forward Township (87), and Winfield Township (84). Since the 2010 County HMP, the number of oil and gas wells within Butler County has grown exponentially. The Pennsylvania Environment Facility Application Compliance Tracking System shows that from 2004-2008 10 new oil and gas permits were issued in Connoquenessing Township, but this number jumped to 51 permits from 2009-2013 (Earth Works, 2014). This has motivated municipalities to be prepared for any incidents involving natural gas extraction.

Figure 4.3.16-1 Unconventional Oil and Gas Wells in Butler County

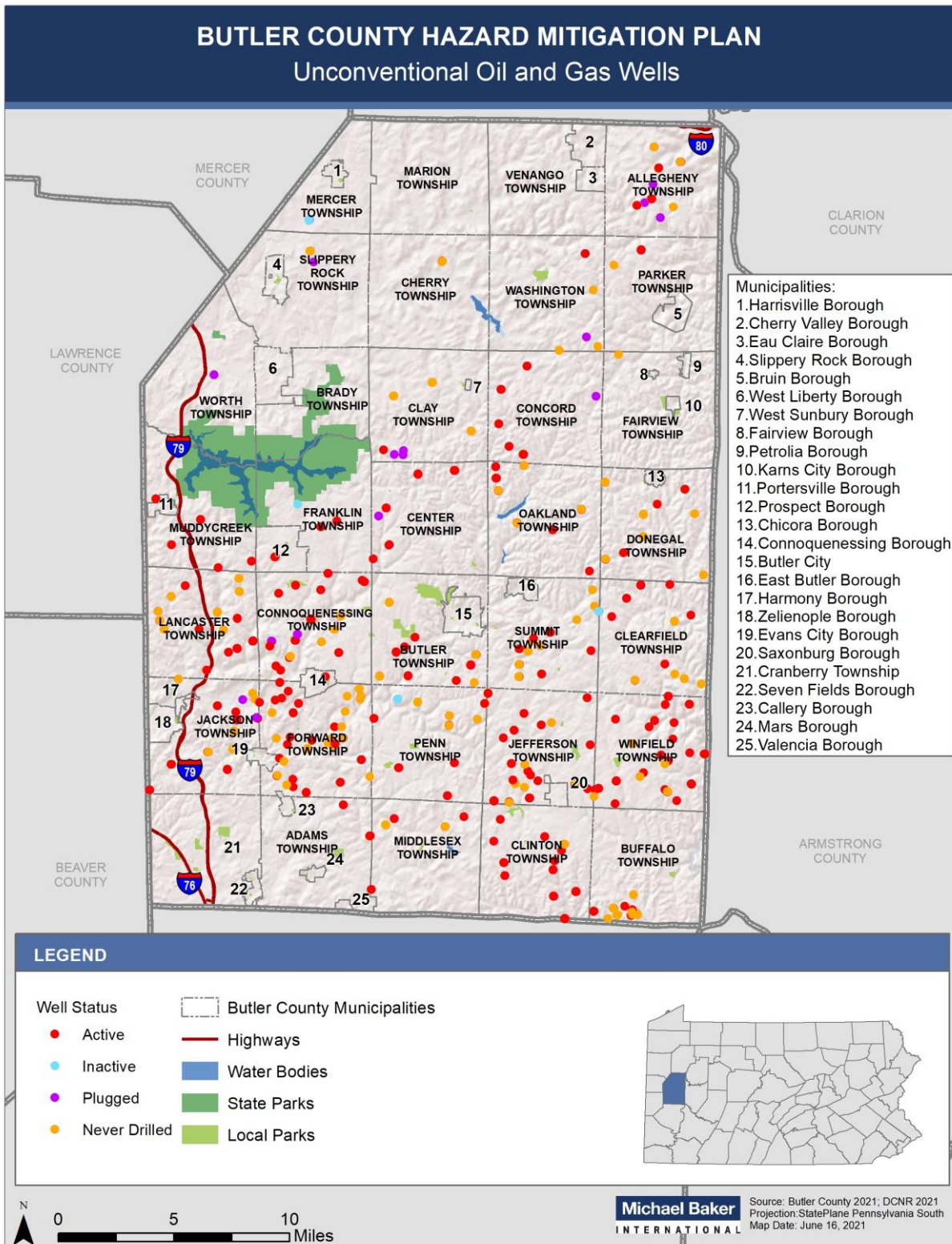


Table 4.3.16-1 Unconventional Oil and Gas Wells in Butler County Municipalities (PA DEP, 2021e)

MUNICIPALITY	NUMBER OF WELLS	MUNICIPALITY	NUMBER OF WELLS
Adams Township	8	Jackson Township	59
Allegheny Township	60	Jefferson Township	59
Buffalo Township	24	Lancaster Township	56
Butler Township	50	Mercer Township	12
Center Township	38	Middlesex Township	17
Cherry Township	12	Muddy Creek Township	13
Clay Township	24	Oakland Township	48
Clearfield Township	41	Parker Township	9
Clinton Township	46	Penn Township	45
Concord Township	35	Prospect Borough	9
Connoquenessing Borough	3	Slippery Rock Township	15
Connoquenessing Township	94	Summit Township	46
Donegal Township	33	Washington Township	15
Fairview Township	1	Winfield Township	84
Forward Township	87	Worth Township	7
Franklin Township	7	TOTAL	1,057

4.3.16.2. Range of Magnitude

There are some similarities in Range of Magnitude for both unconventional wells and conventional wells, though unconventional gas mining presents its own set of hazards as well.

The Marcellus Shale formation exists at a depth normally between 5,000 and 8,000 feet and holds trillions of cubic feet of natural gas. Extraction from this depth was previously not feasible, but as drilling technology has improved over the years, recovering natural gas from Marcellus Shale is now possible (PA DEP-OOGM, 2010). This extraction process is different from traditional natural gas extraction in that it often requires horizontal drilling. Horizontal drilling is accomplished by hydraulic fracturing, which involves pumping one to eight million gallons of water, mixed with sand and other additives, including hydrochloric or muriatic acid, into the shale formation. The fluid or “frac fluid” that is recovered from this process must be properly treated as the water quality is very poor.

Frac fluid is extremely saline and can be three to six times as salty as sea water. Other contaminants can include barium, bromine, lithium strontium, sulfate, ammonium, and very high concentrations of total dissolved solids (TDS). There is also some concern about normally occurring radioactive materials present in shale and potentially present in recovered drilling fluid, but there is very little data available on the radioactivity of frac fluid in Pennsylvania (Kirby, 2010).

Currently there is no known technology to treat water with this level of salinity (Vidic, 2010). High levels of TDSs, though not harmful to humans, can be extremely harmful to aquatic life and can damage industrial equipment. Often recovered frac fluid is stored in earthen impoundments and after treatment is taken to a sewage treatment facility. There is concern surrounding the toxic solid waste that remains after frac fluid is treated.

In addition to the traditional hazards associated with oil and gas well drilling, potential impacts from Marcellus Shale gas well drilling include:

- Surface water depletion from high consumptive use with low return rates affecting drinking water supplies, and aquatic ecosystems and organisms.
- Contaminated surface and groundwater resulting from hydraulic fracturing and the recovery of contaminated hydraulic fracturing fluid.
- Mishandling of solid toxic waste.
- Public health concerns.

The water used for hydraulic fracturing is composed of 87 chemicals, some of which have the potential to cause a danger to health and life (PADEP-OOGM, 2010). Beyond the purely environmental impacts of drilling, Butler County is likely to see significant indirect effects on its transportation infrastructure and land cover.

Natural gas well 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.

The severity of the incident varies with concentration of natural gas released and the distance and related response time for emergency response teams. The areas within closest proximity to the releases are generally at greatest risk, yet a release can travel great distances, resulting in far-reaching effects on people and the environment. Impacts of incidents at natural gas drilling sites can vary from relatively minor to catastrophic. If a large volume of natural gas escapes from a well at the surface, it will expand and spread over a large area. The potential for a major explosion of the gas exists; this explosion could kill hundreds of people, destroy property, spark wildland and urban fires, overwhelm the local EMS services and hospitals with the influx of casualties, force evacuations, close roads, cause utility outages (if a power or telephone transmission line is damaged), etc.

The worst-case scenario for an oil or gas well incident would be if there was a discharge of pollutant material like frac fluid into the waterways of Butler County. This is particularly an issue in the southern portions of the County, where there are a higher number of reported domestic water wells and potentially, a greater number of reliance on these wells for potable water supply.

DOH has indicated some level of concern regarding unconventional drilling. Both unconventional and conventional wells are often located near residential areas, and there are growing concerns among the public, media, and researchers about the environmental contamination of water, air, and soil from drilling and associated operations (e.g., pipelines, compressor stations, wastewater storage). These concerns have raised numerous questions about adverse health impacts associated with unconventional drilling. In March 2017, PA DOH developed a confidential health registry to better track and respond to public health complaints related to these types of wells. 132 total health complaints have been logged by PA DOH since 2011 across the Commonwealth (PA DOH, 2020b).

4.3.16.3. Past Occurrence

Pennsylvania has a long history of oil and gas well drilling and, though relatively infrequent, accidents and incidents have occurred related to the extraction of these natural resources. No comprehensive list of oil and gas related incidents exists for the Commonwealth; however, major gas and oil well incidents in Pennsylvania are captured in PEMA's incident management system, PEMA-KC. While access to this data is restricted, the PA HMP reported in 2018 that one gas and oil incident was recorded between 2013 and 2018 in the County.

Grassroots organization, Marcellus of Butler (MOB), formed in 2010 to educate Butler County residents about the hazards posed by hydraulic fracturing. MOB maintains an archive from 2013 to 2015 of oil and gas well incidents in and around Butler County. MOB notes that there are almost daily reports of high profile and high-volume spills, explosions, accidents, deaths, reported violates, fines, and acknowledgement of old and continuing violations throughout the Marcellus Shale region. Most tracked citations in Butler County involve the failure to properly store, transport, process, or dispose of residual waste. Additional tracked events occurring in Butler County include (MOB, 2015):

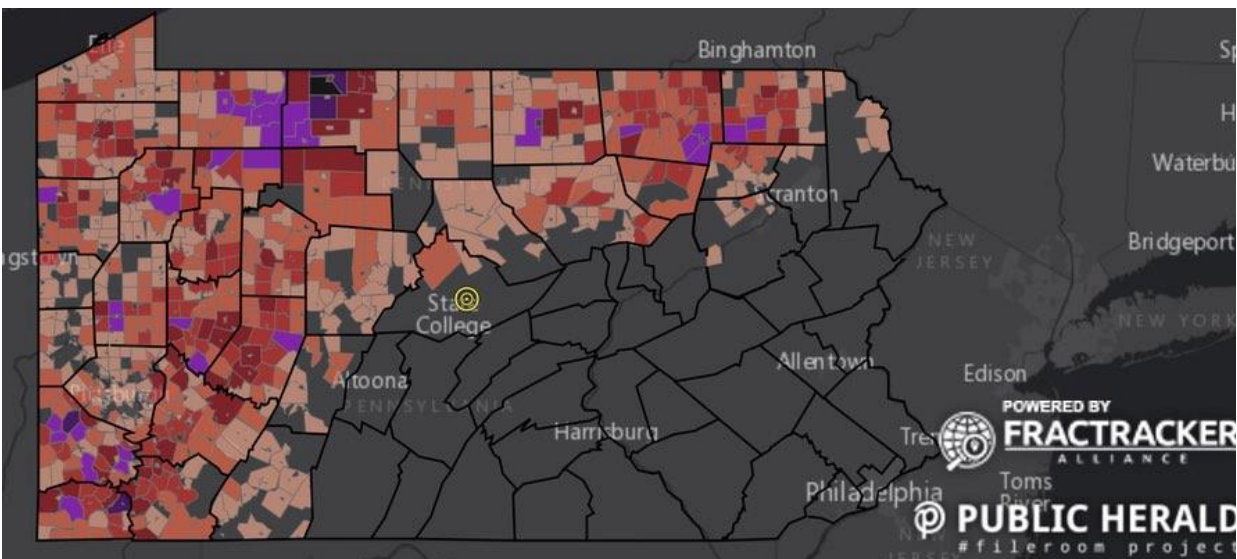
- December 9, 2013: Wastewater spills on a RE Gas Development pad in Jackson Township.
- March 27, 2014: Rex Energy is cited for an improperly lined pit in Lancaster Township.
- February 18, 2014: XTO is cited for improper casing to protect fresh groundwater in Forward Township.
- March 11, 2015: PA DEP cites Dannic for failure to plug the well upon abandoning its Butler County site.

No incidents related to gas transmission and gathering was documented for Butler County in the [Pipeline and Hazardous Materials Safety Administration \(PHMSA\) database](#) for January 2010 to the present. However, there have been numerous complaints issued by residents specific to water issues. A case study in Connoquenessing Township found that one neighborhood experienced negative environmental and health impacts after shale gas drilling began in the area. Water contamination caused several families to get sick, over time

developing rashes, breathing problems, fatigue, eye and throat irritation, and headaches. After about a month, one family noticed strong odors and foam coming from their natural household well. In the months preceding these issues, six wells were being drilled and hydraulically fractures within approximately one mile of the neighborhood. PA DEP inspectors identified casing problems, methane leaks, soil contamination, and observable emissions at nearby wells (Earth Works, 2014).

Between January 2004 and November 2016, PA DEP logged 973 total complaints across the Commonwealth, with 162 specific to water (FracTracker, 2021). A map developed by Public Herald and FracTracker Alliance shows the distribution of complaints with highest densities in the center and southeast of the County (2017) (see Figure 4.3.16-2).

Figure 4.3.16-2 Map of Natural Gas Leak Complaints in Pennsylvania from 2004 to 2016 (FracTracker, 2017)



4.3.16.4. Future Occurrence

The likelihood of an emergency at a natural gas drilling site in Butler County cannot be determined at this time, as there is little historical data to analyze. However, the likelihood of an incident within the County is expected to increase as the number of well sites continues to climb. Future emergencies will occur at well sites as well as along the natural gas transportation network. As drilling activities increase, it is expected key freight routes, such as I-79 and SR-28 will experience increased truck traffic due to the natural gas industry. As more permits are issued, this traffic will increase further. Also, the County will face an increased risk of pipeline emergencies as the related infrastructure is put in place.

Numerous studies have examined the ramifications (primarily the significant impact fracking has on water quality) of drilling for natural gas in a region (the entirety of the Marcellus Shale) that acts as the water supply for over 22 million (Evans and Kiesecker, 2014). The increase of natural gas drilling in Butler County not only implies the increased risk of an incident (that can include a chemical release, a fire, and/or an explosion), but also increased development and deforestation, both which result in more stress on the existing (transportation) infrastructure and impervious surface. The implications of the increased use of the transportation infrastructure are rather straightforward. The natural gas drilling process requires 2,300 to 4,000 truck trips per well (Cassidy, 2014), so that not only are there more trucks on the roads, but they are using roads often designed for heavy use. Increased use of the roads by heavy trucks can increase the wear-and-tear on the roads (which were, in most cases, not designed for that type of traffic) and subsequently increase the likelihood of traffic incidents. Careful consideration of which roads are actually suitable for heavy, industrial use and improved safety measures (including more traffic signals and officers, or a planned trucking schedule) could help reduce traffic incidents and infrastructure degradation (Cassidy, 2014). Additionally, the industry could take responsibility for improving maintenance of the infrastructure and scheduling of their traffic so as to keep heavy truck flow to certain hours and thereby minimize incidents.

Impervious surfaces can increase the risk of flooding (as rain or run-off can no longer readily seep into the ground) and can prove exceedingly detrimental to maintaining a balanced ecosystem. Estimates vary slightly (based on location, technology, etc.), but the average footprint of a well pad is 1.3 hectares and the associated infrastructure is 10.3 hectares (Evans & Kiesecker, 2014) (Ridlington & Rumpler, 2013). If the indirect impacts are considered as well, this then the total land disturbance, and impact on the permeability of the ground, is 20.2 hectares (or about 50 acres) (Evans & Kiesecker, 2014). If this unit is applied to the number of new wells in the past five years in Butler County, then about 3,468 hectares (13.4 square miles), roughly 1.7% of the total area of the County, may have been disturbed by or converted to a fracking use.

The land that is affected by the natural gas industry is predominantly forested, so not only is there significant deforestation, but this deforestation means that 1.7% of the County has become impervious within 5 years due to the natural gas industry. If this trend continues, and the natural gas industry continues to expand, then not only will the likelihood of a natural gas incident increase, but transportation infrastructure incidents and flooding will become greater hazards as well. When planning for future development, there are several measures the County could take to help mitigate the impacts of natural gas drilling on transportation infrastructure and impervious surfaces.

If continued investment and development in the natural gas industry is inevitable, then the County could regulate new well pads siting locations. The design and process of a shale, horizontal well, is such that the placement of the well pad is much more flexible (as there are

multiple lateral wells that extend to a greater area), and the siting has the ability to take impacts to natural habitats into account. In determining more ecologically appropriate locations that reduce potential runoff, the County could require a setback from streams and wetlands, as well as avoidance of development on areas with a steep slope. Additionally, greater care and oversight could be taken to balance future well development with watershed needs and conservation goals.

Overall, the probability of future natural gas drilling incident events can be considered *likely* according to the Risk Factor Methodology (see Table 4.4.1-1).

4.3.16.5. Vulnerability Assessment

Table 4.3.16-2 shows the structures and critical facilities that are vulnerable to unconventional wells incidents. Structures and critical facilities within 1,000 yards of an unconventional well are considered vulnerable. There are 11,754 structures in close proximity to unconventional wells countywide (14% of all structures). Municipalities that have the highest proportion of their structures close to unconventional wells include Winfield township, Portersville Borough and Forward Township. All critical facilities in Connoquenessing Borough, Donegal Township, Franklin Township and Portersville Borough are in close proximity to at least one unconventional well.

When looking at structures by property type, shown in Table 4.3.16-3, the majority of vulnerable structures are unsurprisingly residential in nature, followed by agricultural uses. A complete listing of critical facilities is in **Appendix E**.

Table 4.3.16-2 Structures and Critical Facilities Vulnerable to Unconventional Wells

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES VULNERABLE TO UNCONVENTIONAL WELLS (WITHIN 1,000 YARDS)	PERCENT STRUCTURES VULNERABLE TO UNCONVENTIONAL WELLS (WITHIN 1,000 YARDS)	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES VULNERABLE TO UNCONVENTIONAL WELLS (WITHIN 1,000 YARDS)	PERCENT CRITICAL FACILITIES VULNERABLE TO UNCONVENTIONAL WELLS (WITHIN 1,000 YARDS)
Adams Township	6,126	183	3%	25	0	0%
Allegheny Township	414	85	21%	1	0	0%
Brady Township	661	0	0%	1	0	0%
Bruin Borough	245	0	0%	2	0	0%
Buffalo Township	3,336	307	9%	8	1	13%
Butler, City	5,933	0	0%	18	0	0%
Butler Township	7,644	1,292	17%	44	2	5%
Callery Borough	168	6	4%	4	0	0%
Center Township	3,788	287	8%	5	0	0%
Cherry Township	570	24	4%	2	0	0%
Cherry Valley Borough	42	0	0%	0	0	0%
Chicora Borough	473	0	0%	5	0	0%
Clay Township	1,202	197	16%	3	0	0%
Clearfield Township	1,096	383	35%	1	0	0%
Clinton Township	1,351	472	35%	1	0	0%
Concord Township	749	121	16%	1	0	0%
Connoquenessing Borough	352	180	51%	2	2	100%
Connoquenessing Township	2,146	1,065	50%	4	3	75%

Table 4.3.16-2 Structures and Critical Facilities Vulnerable to Unconventional Wells

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES VULNERABLE TO UNCONVENTIONAL WELLS (WITHIN 1,000 YARDS)	PERCENT STRUCTURES VULNERABLE TO UNCONVENTIONAL WELLS (WITHIN 1,000 YARDS)	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES VULNERABLE TO UNCONVENTIONAL WELLS (WITHIN 1,000 YARDS)	PERCENT CRITICAL FACILITIES VULNERABLE TO UNCONVENTIONAL WELLS (WITHIN 1,000 YARDS)
Cranberry Township	12,665	11	0%	21	0	0%
Donegal Township	765	223	29%	2	2	100%
East Butler Borough	331	0	0%	3	0	0%
Eau Claire Borough	163	0	0%	2	0	0%
Evans City Borough	776	160	21%	6	0	0%
Fairview Borough	80	0	0%	1	0	0%
Fairview Township	951	14	1%	2	0	0%
Forward Township	1,325	855	65%	3	2	67%
Franklin Township	1,280	282	22%	1	1	100%
Harmony Borough	459	0	0%	3	0	0%
Harrisville Borough	380	0	0%	4	0	0%
Jackson Township	2,422	717	30%	7	1	14%
Jefferson Township	2,103	1,057	50%	5	3	60%
Karns City Borough	111	0	0%	1	0	0%
Lancaster Township	1,346	627	47%	3	2	67%
Marion Township	621	0	0%	2	0	0%
Mars Borough	541	0	0%	2	0	0%
Mercer Township	560	37	7%	2	1	50%
Middlesex Township	3,046	428	14%	6	0	0%
Muddy Creek Township	1,144	179	16%	4	1	25%

Table 4.3.16-2 Structures and Critical Facilities Vulnerable to Unconventional Wells

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES VULNERABLE TO UNCONVENTIONAL WELLS (WITHIN 1,000 YARDS)	PERCENT STRUCTURES VULNERABLE TO UNCONVENTIONAL WELLS (WITHIN 1,000 YARDS)	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES VULNERABLE TO UNCONVENTIONAL WELLS (WITHIN 1,000 YARDS)	PERCENT CRITICAL FACILITIES VULNERABLE TO UNCONVENTIONAL WELLS (WITHIN 1,000 YARDS)
Oakland Township	1,282	149	12%	3	0	0%
Parker Township	359	30	8%	1	0	0%
Penn Township	2,281	499	22%	8	1	13%
Petrolia Borough	125	0	0%	2	0	0%
Portersville Borough	146	96	66%	2	2	100%
Prospect Borough	566	76	13%	3	0	0%
Saxonburg Borough	784	84	11%	5	0	0%
Seven Fields Borough	1,227	0	0%	1	0	0%
Slippery Rock Borough	1,240	1	0%	13	0	0%
Slippery Rock Township	1,904	33	2%	8	0	0%
Summit Township	2,018	618	31%	5	2	40%
Valencia Borough	266	0	0%	0	0	0%
Venango Township	433	0	0%	1	0	0%
Washington Township	644	76	12%	2	0	0%
West Liberty Borough	157	0	0%	0	0	0%
West Sunbury Borough	103	0	0%	0	0	0%
Winfield Township	1,335	880	66%	1	0	0%
Worth Township	790	20	3%	2	0	0%
Zelienople Borough	1,853	0	0%	3	0	0%
TOTAL	84,878	11,754	14%	265	26	10%

Table 4.3.16-3 Structures Vulnerable to Unconventional Wells by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Adams Township	16	1	0	0	0	0	0	113	0	0	0	53	183
Allegheny Township	20	0	0	0	0	0	0	61	0	0	0	4	85
Brady Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Bruin Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Buffalo Township	33	5	0	0	1	0	0	268	0	0	0	0	307
Butler, City	0	0	0	0	0	0	0	0	0	0	0	0	0
Butler Township	41	46	0	2	6	2	4	1181	0	0	1	9	1292
Callery Borough	2	1	0	0	0	0	0	3	0	0	0	0	6
Center Township	51	3	1	0	1	0	0	225	0	0	0	6	287
Cherry Township	8	0	0	0	0	0	0	15	0	0	0	1	24
Cherry Valley Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Chicora Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Clay Township	37	7	0	0	0	0	0	149	0	0	0	4	197
Clearfield Township	54	4	0	0	1	0	0	313	0	0	0	11	383
Clinton Township	69	5	1	6	2	0	0	383	0	0	0	6	472
Concord Township	40	0	0	0	0	0	0	79	0	0	0	2	121
Connoquenessing Borough	9	5	0	1	3	0	0	158	0	0	1	3	180

Table 4.3.16-3 Structures Vulnerable to Unconventional Wells by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Connoquenessing Township	83	85	0	0	4	0	0	838	0	0	1	54	1065
Cranberry Township	1	0	0	0	0	0	0	10	0	0	0	0	11
Donegal Township	52	2	0	0	0	0	0	156	1	0	0	12	223
East Butler Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Eau Claire Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Evans City Borough	0	4	0	0	0	0	0	154	0	0	0	2	160
Fairview Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Fairview Township	4	0	0	0	0	2	0	7	0	0	0	1	14
Forward Township	147	33	3	1	6	0	0	636	0	0	0	27	853
Franklin Township	32	9	0	0	1	0	1	235	0	0	0	4	282
Harmony Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Harrisville Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Jackson Township	71	49	3	3	1	0	6	541	0	0	0	41	715
Jefferson Township	98	31	1	6	7	0	0	900	0	1	0	12	1056
Karns City Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Lancaster Township	70	13	0	0	3	0	1	386	0	0	0	154	627
Marion Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Mars Borough	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4.3.16-3 Structures Vulnerable to Unconventional Wells by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Mercer Township	4	0	0	0	0	0	0	32	0	0	0	1	37
Middlesex Township	41	1	0	0	0	0	1	382	0	0	0	3	428
Muddy Creek Township	30	10	0	0	0	0	0	134	0	0	0	5	179
Oakland Township	43	0	0	0	1	0	0	101	0	0	0	4	149
Parker Township	7	0	0	0	0	0	0	19	0	0	0	4	30
Penn Township	79	8	0	1	1	0	0	399	0	0	0	10	498
Petrolia Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Portersville Borough	1	7	0	1	1	0	0	84	0	0	1	1	96
Prospect Borough	9	0	0	0	0	0	0	65	1	0	0	1	76
Saxonburg Borough	0	2	0	0	0	0	0	75	0	0	0	7	84
Seven Fields Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Slippery Rock Borough	0	0	0	0	0	0	0	1	0	0	0	0	1
Slippery Rock Township	11	0	0	0	0	0	0	21	0	0	0	1	33
Summit Township	65	17	3	0	2	0	0	519	0	0	0	12	618
Valencia Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Venango Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Washington Township	16	4	0	0	1	0	0	49	0	0	0	6	76

Table 4.3.16-3 Structures Vulnerable to Unconventional Wells by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
West Liberty Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
West Sunbury Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Winfield Township	98	29	3	2	1	0	0	727	0	0	1	17	878
Worth Township	7	0	0	0	0	0	0	13	0	0	0	0	20
Zelienople Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1,349	381	15	23	43	4	13	9,432	2	1	5	478	11,746



4.3.17. Nuclear Incident

4.3.17.1. Location and Extent

Nuclear accidents generally refer to events involving the release of significant levels of radioactivity or exposure of workers or the general public to radiation. The primary concern following such an incident or accident is the extent of radiation, inhalation, or ingestion of radioactivity isotopes which can cause acute health effects (e.g. death, burns, severe impairment), chronic health effects (e.g. cancer), and psychological effects (US EPA, 2021 b).

Following the accident at the Three Mile Island Nuclear Generating Station in 1979, the NRC reexamined the role of emergency planning for protection of the public in the vicinity of nuclear power plants. The NRC issued regulations requiring that before a plant could be licensed to operate, the NRC must have “reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency.” The regulations set forth 16 emergency planning standards and define the responsibilities of the licensee, and the state and local organizations involved in emergency response. The added feature of emergency planning to the NRC’s “defense-in-depth” philosophy provides that, even in the unlikely event of a release of radioactive materials to the environment, there is reasonable assurance that actions can be taken to protect the population around nuclear power plants.

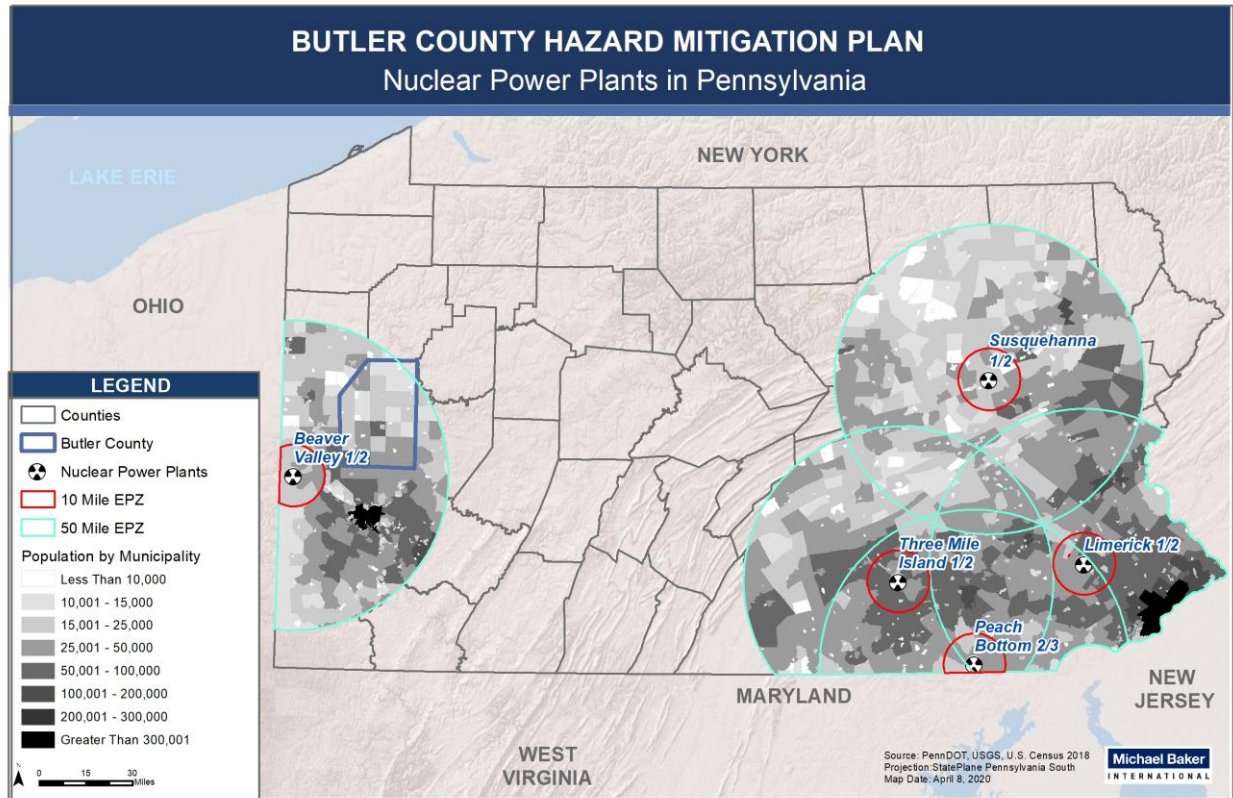
Through a Memorandum of Understanding (MOU), the NRC and FEMA share federal oversight for nuclear/radiological emergency response planning matters for licensed nuclear power plants. Their mutual efforts will be directed toward more effective plans and related preparedness measures at and in the vicinity of nuclear reactors and fuel cycle facilities. The MOU between the agencies was signed on January 14, 1980, in response to the president’s decision of December 7, 1979, stating that FEMA will coordinate all federal planning for the off-site impact of nuclear/radiological emergencies; take the lead for assessing off-site nuclear/radiological emergency response plans and preparedness; make findings and determinations as to the adequacy and capability of implementing off-site plans; and communicate those findings and determinations to the NRC. The NRC reviews those FEMA findings and determinations, in conjunction with the NRC’s on-site findings, to determine the overall state of emergency preparedness. A separate MOU, dated October 22, 1980, deals with NRC and FEMA cooperation and responsibilities in response to an actual or potential nuclear/radiological emergency. Operations Response Procedures have been developed that implement the provisions of the Incident Response MOU. These documents are intended to be consistent with the Federal Radiological Emergency Response Plan, which describes the relationships, roles, and responsibilities of federal agencies for responding to accidents involving peacetime nuclear/radiological emergencies.

The NRC encourages the use of Probabilistic Risk Assessments to quantitatively estimate the potential risk to public health and safety considering the design, operations, and maintenance practices at nuclear power plants. Probabilistic Risk Assessments typically focus on accidents

that can severely damage the core and that may challenge containment. FEMA, PEMA, and County governments have formulated Radiological Emergency Response Plans to prepare for radiological emergencies at the five nuclear power generating facilities in the Commonwealth of Pennsylvania. These plans include a *Plume Exposure Pathway Emergency Planning Zone (EPZ)* with a radius of ten miles from each nuclear power facility and an *Ingestion Exposure Pathway EPZ* with a radius of fifty miles from each facility. The exact size and configuration of the EPZ may vary in relation to local emergency response capabilities, topography, road networks, and political boundaries.

Almost the entirety of Butler County falls within the Ingestion Exposure Pathway EPZ (within 50 miles) of the Beaver Valley Nuclear Power Station in Beaver County. This EPZ covers a radius around the plant that may receive some contamination in very small amounts in the event of a radioactive release. Thousands of County residents reside within this zone. The other four nuclear plants in Pennsylvania are more than 50 miles away from Butler County; this distance exceeds the Plume Exposure and Ingestion Exposure Pathway EPZs for radiological emergencies, so these other facilities are considered a minimal threat to the County. However, in the event of an emergency, evacuees from distant EPZs may seek shelter in Butler County. Figure 4.3.17-1 illustrates the location of the nuclear facilities in the Commonwealth and their associated plume and ingestion areas.

Figure 4.3.17-1 Location of Butler County in Relation to Pennsylvania Nuclear Power Stations, their Emergency Planning Zones (EPZs), and the Population Density of Affected Municipalities



4.3.17.2. Range of Magnitude

Nuclear accidents themselves are classified into three categories:

- **Criticality accidents:** Involves loss of control of nuclear assemblies or power reactors.
- **Loss-of-coolant accidents:** Occurs whenever a reactor coolant system experiences a break or opening large enough so that the coolant inventory in the system cannot be maintained by the normally operating make-up system.
- **Loss-of-containment accidents:** Involves the release of radioactivity from materials such as tritium, fission products, plutonium, and natural, depleted, or enriched uranium. Points of release have been containment vessels at fixed facilities or damaged packages during transportation accidents.

The magnitude of a nuclear incident differs for those within the Plume Exposure Pathway EPZ and those within the Ingestion Exposure Pathway EPZ. The Plume Exposure Pathway refers to whole-body external exposure to gamma radiation from a radioactive plume and from deposited materials and inhalation exposure from the passing radioactive plume. The

duration of primary exposures could range in length from hours to months depending on the proximity to the point of radioactive release.

The Ingestion Exposure Pathway refers to exposure primarily from ingestion of water or foods such as milk and fresh vegetables that have been contaminated with radiation. This kind of exposure can stem from any of the three categories of nuclear accident. Potential environmental impacts specific to the 50-mile Ingestion Exposure Pathway EPZ include the long-term effects of radioactive contamination in the environment and in agricultural products (US EPA, 2021b). Butler County can expect some radioactive contamination in very small amounts in the case of a nuclear incident at the nuclear plant in Beaver County. This is not a significant concern in terms of external exposure and immediate health risks, but even a small amount of radiation will require the protection of the food chain, particularly milk supplies. Small amounts of radiation ingested over time could lead to future health issues in humans. There is an increased cancer risk over decades for people who have ingested radiation. The damage to cells and internal organs may be mild to severe, depending on the amount of radiation ingested and the number of years over which the ingestion occurred. As a result, in the case of a nuclear incident, foodstuffs, crops, milk, livestock feed and forage, and farm water supplies will need to be protected from and tested for contamination. Additionally, spills and releases of radiologically active materials from accidents can result in the contamination of soil and public water supplies. Areas underlain by limestone and some types of glacial sediments are particularly susceptible to contamination. Butler County Department of Emergency Services may be asked to assist in gathering samples, and if requested by the state agencies, also participate in implementing control of foods, foodstuffs and water.

Nuclear facilities must notify the appropriate authorities in the event of an accident. The Nuclear Regulatory Commission uses four classification levels for nuclear incidents (NRC, 2021a):

- **Unusual Event:** Under this category, events are in process or have occurred which indicate *potential degradation in the level of safety of the plant*. No release of radioactive material requiring offsite response or monitoring is expected unless further degradation occurs.
- **Alert:** If an alert is declared, events are in process or have occurred which involve an actual or potential substantial degradation in the level of safety of the plant. Any releases of radioactive material from the plant are expected to be limited to a small fraction of the EPA Protective Action Guides (PAGs).
- **Site Area Emergency:** A site area emergency involves events in process, or which have occurred that result in actual or likely major failures of plant functions needed for protection of the public. Any releases of radioactive material are not expected to exceed the EPA PAGs, except near the site boundary.

- **General Emergency:** A general emergency involves actual or imminent substantial core damage or melting of reactor fuel with the potential for loss of containment integrity. Radioactive releases during a general emergency can reasonably be expected to exceed the EPA PAGs for more than the immediate site area.

A worst-case scenario for Butler County would be if a General Emergency occurred at the Beaver Valley Nuclear Power Station in Beaver County that leaked enough radiation to create a longer-term and widespread damage in the form of contaminated water, soil, and food supplies in the region.

The accident at the Three Mile Island Generating Station in March 1979 remains the nation's only nuclear incident at the General Emergency level and remains the worst nuclear incident on record in Pennsylvania, and in the nation. During the incident, equipment malfunctions, design-related problems, and worker errors led to a partial meltdown of the TMI Unit 2 reactor core at TMI (NRC, 2021b).

The nuclear industry has adopted pre-determined, site-specific Emergency Action Levels (EALs). The EALs provide the framework and guidance to observe, address, and classify the severity of site-specific events and conditions that are communicated to off-site emergency response organizations (NRC, 2021c). There are additional EALs that specifically deal with issues of security, such as threats of airborne attack, hostile action within the facility, or facility attack. These EALs ensure that appropriate notifications for the security threat are made in a timely manner. Each facility is also equipped with a public alerting system, which includes a number of sirens to alert the public located in the Plume Ingestion Pathway EPZ. This alerting system is activated by the counties of each specific EPZ. Emergency notifications and instructions are communicated to the public via the Emergency Alert System as activated by the Commonwealth of Pennsylvania Emergency Operations Center. State officials also have the capability to send emergency messages as text messages to mobile devices.

4.3.17.3. Past Occurrence

There have been no failures at the Beaver Valley Nuclear Power Station in Beaver County that have resulted in damages, injuries, or fatalities.

Nuclear incidents rarely occur, but the incident at Three Mile Island is the worst fixed-nuclear facility accident in US history. The resulting contamination and state of the reactor core led to the development of a fourteen-year cleanup and scientific effort. Additionally, the Presidents' Commission on the Accident at Three Mile Island examined the costs of the accident, concluding, "The accident at Three Mile Island on March 28, 1979, generated considerable economic disturbance. Some of the impacts were short term, occurring during the first days of the accident. Many of the impacts were experienced by the local community; others will be felt at the regional and national levels." The report concluded: "It appears clear that the major costs of the TMI Unit 2 accident are associated with the emergency management replacement

power and the plant refurbishment or replacement. The minimum cost estimate of nearly \$1 billion supports the argument that considerable additional resources can be cost effective if spent to guard against future accidents" (US DHS, 1979).

Despite the severity of the damage, no injuries due to radiation exposure occurred. However, numerous studies were conducted to determine the measurable health effects related to radiation and/or stress. More than a dozen epidemiological and stress related studies conducted to date have found no discernible direct health effects to the population in the vicinity of the plant. However, one study conducted by the DOH's Three Mile Island Health Research Program did find evidence of psychological stress, "lasting in some cases for five to six years." According to the program chief, "the people suffering from stress perceived their health as being poorer than it actually was when the Health Department checked the medical records" (Tokuhata, 1980).

The accident at Three Mile Island had a profound effect on the residents, emergency management community government officials, and nuclear industry, not only in Pennsylvania, but nationwide. There were minimal requirements for off-site emergency planning for nuclear power stations prior to this accident. Afterwards, comprehensive, coordinated, and exercised plans were developed for the state, counties, school districts, special facilities (hospitals, nursing homes, and detention facilities) and municipalities to assure the safety of the population. Costs associated with an event at a nuclear facility, be it real or perceived, are significant. The mitigation efforts put in place immediately following 1979 continue today. The Commonwealth Nuclear/Radiological plan which is a successor of the original "Annex E" is a result of the Commonwealth's efforts to address the many components of mitigation planning. The comprehensive planning involved with the five nuclear facilities is an ongoing effort. Plans are reviewed and amended on an annual basis. Recent amendments to various planning documents and station procedures include the efforts to enhance station security measures and the means to bolster communications and response in the event of terrorist activities.

The most recent nuclear incident to occur worldwide was that which involved the Fukushima Daiichi nuclear reactor in Okuma, Fukushima, Japan. This incident occurred on March 11, 2011. An earthquake in the area resulted in a series of equipment failures, nuclear meltdowns, and releases of radioactive materials. These failures and releases were largely attributed to the water that penetrated the structures following a tsunami that was generated by the earthquake. The flooding caused the failure of multiple generators meant to keep the systems operating safely after the automatic shutdown. No deaths have been directly attributed to the incidents at the reactor at this time. The World Health Organization completed a report that indicated there were only small proportional increases in occurrence of certain cancers following the radiation exposure from the plants (WNA, 2021).

Following this incident, the United States NRC developed a set of recommendations based on the lessons learned from the Fukushima incident. These recommendations are meant to

enhance reactor safety for US-based nuclear reactors against a variety of factors. Recommendations included the categories of regulatory framework, ensuring protection (of the facilities and equipment), enhancing mitigation, strengthening emergency preparedness, and improving the efficiency of NRC programs. One of the specific recommendations involved the re-evaluation and upgrade of seismic and flooding protection of structures, systems and components for each reactor. As more information comes out, and more lessons learned are developed, it should only serve to reinforce the protections in place against any type of incident involving nuclear power stations.

4.3.17.4. Future Occurrence

Pennsylvania is home to the only nuclear power plant *General Emergency* in the nation. Since the Three Mile Island incident, nuclear power has become significantly safer and is one of the most heavily regulated industries in the nation. Despite the knowledge gained since then, there is still the potential for a similar accident to occur again at one of the five nuclear generating facilities in the Commonwealth. The Nuclear Energy Agency of the Organization for Economic Co-Operation and Development notes that studies estimate the chance of protective barriers in a modern nuclear facility at less than one in 100,000 per year (NEA, 2005). Nuclear incident occurrences may also occur as a result of intentional actions; these acts are addressed under **Section 4.3.18: Terrorism**.

Butler County is identified as a support County in the event of an emergency at the Beaver Valley Power Station requiring evacuation. Slippery Rock University can support 3,009 residents and Slippery Rock High School can receive relocated student populations and serve as a decontamination center (PEMA, n.d.)

Across the United States, several *Unusual Event* and *Alert* classification level events occur each year at the 100+ nuclear facilities that warrant notification of local emergency managers. Of these, *Alert* emergencies occur less frequently. For example, in 1997, there were 40 notifications of *Unusual Events* and three *Alert* events nationwide. Based on historical events, Site Area Emergency and General Emergency incidents are very rare. Therefore, the future occurrence of nuclear incidents that affect Butler County can be considered *unlikely* as defined by the Risk Factor methodology probability criteria (see Table 4.4.1-1).

4.3.17.5. Vulnerability Assessment

All municipalities in Butler County are located within the 50-mile Ingestion Exposure Pathway EPZ of the Beavery Valley Power Station. Note that Allegheny Township is only partially located in the 50-mile EPZ. The entirety of Butler County is vulnerable to the contamination effects possible in a nuclear incident.

The health effects reported from the psychological stress of individuals living in the immediate area will strain stress management and disaster psychology resources to the limit.

Radionuclide ingestion by domesticated farm animals could force agricultural product embargos, placing severe strain on the economy. Radiological particulate contamination of

the environment could impact natural resources; disrupt service delivery; and cause work cessation and evacuations. Other response measures that result from the event could damage the local economy. In the event of a release, national-level repercussions may produce anti-nuclear activism, widespread concern over public health, and a moratorium on new or renewed nuclear facilities around the nation.

As stated above, the County's primary vulnerability to nuclear incidents comes in the form of food, soil, and water contamination. In terms of vulnerable land, 133,954 acres of farmland held in the County's 955 farms are vulnerable to radiological contamination in a nuclear incident. In 2017, the market value of all agricultural products of these farms exceeded \$49 million (USDA, 2017).

Water contamination is also a concern in nuclear incidents. There are several public water suppliers that operate in Butler County or provide water to municipalities. Suppliers include the Buffalo Township Waste Water Plant, Butler Area Sewer Authority, Evans City Water & Sewer Authority, Mars Borough Water Department, the Municipal Water Authority of Adams Township, Pennsylvania American Water Company, Petroleum Valley Regional Water, and the Slippery Rock Municipal Authority.

The loss experienced by each jurisdiction in the case of a nuclear incident will depend on the magnitude of the event. The example of the Three Mile Island incident gives an indication of local and regional economic loss, however. The President's Commission on the Three Mile Island Incident calculated the economic impact of the accident, looking at direct and indirect losses and other potential growth impacts. Direct impacts to the manufacturing sector were estimated at \$6.3 million. These losses occurred within a few days after the accident and quickly subsided thereafter with no evidence of permanent layoffs resulting. Food processors also incurred expenses with some farms purchasing equipment to detect radiation levels and converting dairy production to powdered milk.

The utility itself incurred significant costs in the areas of emergency management and plant refurbishment and replacement power. Emergency management costs ran in the hundreds of millions of dollars and replacement power for both units at a cost of \$24 million a month. The unaffected TMI Unit 1 was shut down for 6.5 years. During this time, more than \$100 million in plant upgrades and refurbishment took place. Replacement power costs today are estimated at nearly twice the 1979 dollars. Cost of the accident cleanup and placing the facility in monitored storage cost approximately \$1 billion.

The impact to tourism was estimated at approximately \$6.5 million with lost wages in this sector estimated from \$2.8 million to \$3.8 million. Losses to the agricultural sector appeared to be minimal due to off-growing season. The Pennsylvania Department of Agriculture indicated that losses were significantly less than \$1 million.



4.3.18. Terrorism

4.3.18.1. Location and Extent

Terrorism is use of force or violence against persons or property with the intent to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives (28 CFR §0.85). Acts of terrorism include threats of terrorism; assassinations; kidnappings; hijackings; bomb scares and bombings; cyber-attacks (computer-based); and the use of chemical, biological, nuclear, and radiological weapons (FEMA, 2021e). 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 Federal Bureau of Investigation (FBI) further characterizes terrorism as either domestic or international, depending on the origin, base, and objectives of the terrorist organization. However, the origin of the terrorist or person causing the hazard is far less relevant to mitigation planning than the hazard itself and its consequences

4.3.18.2. Range and 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 and intentional hazardous materials releases; and “cyber-terrorism”. Within these general categories, however, there are many variations. Particularly in the area of biological and chemical weapons, there are a wide variety of agents and ways for them to be disseminated.

4.3.18.3. Past Occurrence

Butler County has had its share of domestic terrorism incidents. Whether it was a prison uprising, a hostage situation, gang activity, a protest, civil unrest or bomb threats the County has been able to respond and resolve the situation with minimal impact on the public as a whole. Refer to the 2015 HMP for more details on these incidents.

4.3.18.4. Future Occurrence

The probability of terrorism occurring cannot be quantified with as great a level of accuracy as that of many natural hazards. Furthermore, these incidents generally occur at a specific location, such as a government building, rather than encompassing an area such as a floodplain. Thus, planning should be asset-specific, identifying potentially at-risk critical facilities and systems in the community.

Although the probability of Butler County being the target of a direct Domestic Terrorist attack is greater than being the direct target of an International Terrorist Attack, it should be equally prepared for both. It is hard to determine at this point what the actual probability of a terrorist

attack occurring within the County is. Overall, the future occurrence of nuclear incidents that affect Butler County can be considered *unlikely* as defined by the Risk Factor methodology probability criteria (see Table 4.4.1-1).

4.3.18.5. Vulnerability Assessment

Since the probability of terrorism occurring cannot be quantified in the same way as that of many natural hazards, 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 attack.



4.3.19. Transportation Incidents and Crashes

4.3.19.1. Location and Extent

For this analysis a transportation incident or crash is defined as an incident involving highway, air, and rail travel. Incidents involving hazardous materials are considered under **Section 4.3.15** of this report. This analysis includes the location of all public airports, passenger and freight rail lines, and highways where major incidents are likely to occur.

Within Butler County, there are over 2,374 miles of roads and 501 bridges (PennDOT, 2019a) (PennDOT, 2021). A total of 71 of these bridges (14.2 percent) are classified as in poor condition by PennDOT. Key freight routes include I-76, I-79, US 422, US-19, SR-8, SR-28, SR-38, SR-58, SR-68, SR-356, and SR-528. In 2020, the Southwestern Pennsylvania Commission produced a Corridor Study on Route 28. The study concluded that Route 28 is expected to operate at acceptable Levels of Service through 2045, most trips along the route were local and not pass-through traffic, and most crashes involved fixed objects and safety was a major concern of stakeholders along the route. In 2019, PennDOT statistics indicated over 5.2 million daily vehicle miles traveled within Butler County. Highway transportation is by far the greatest method of transportation in Butler County. There are approximately 125 miles of railroads in Butler County. Railroad systems are serviced regularly by Bessemer & Lake Erie (B&LE), ConRail, CSX, and Buffalo & Pittsburgh (B&P). There is a potential for major incidents on any of these roads, bridges, or railways. Officials in Concord Township note that SR-38 is a heavily traveled PennDOT maintained road that is particularly vulnerable to transportation incidents.

There are nine airports and four helipads in the jurisdiction of Butler County. Major airports are described in Table 4.3.19-1 below. These facilities provide hangar facilities, aircraft rental, fuel and repair services, and flight instruction. Additionally, Butler County Airport provides a charter service.

Table 4.3.19-1 Airports in Butler County

AIRPORT	OWNER	LOCATION	DESCRIPTION
Butler County Airport	Butler County Airport Authority	Penn Township	4,000' east-west surface runway
Butler County Farm Show Airport	Private	Butler Township	2,600' north-south surface runway
Zelienople Municipal Airport	Zelienople Borough	Zelienople Borough	4,100' surface runway
Lakehill Airport	Private	Middlesex Township	2,800' east-west turf runway

Numerous major air traffic routes for the northern United States also pass over Butler County. Aviation incidents typically occur within 5 miles of take-off or landing but can occur

countywide. Minor aircraft accidents have resulted in a few deaths throughout the County. However, there have not been any major accidents like Flight 427 in Allegheny County or Flight 93 in Somerset County. Aviation accidents are the third form of transportation accident relevant in Butler County. Figure 4.3.19-1 illustrates the major transportation systems in the County.

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 (FHA, 2005). Figure 4.3.19-2 shows the traffic volume on key roadways.

Figure 4.3.19-1 Butler County Transportation Network

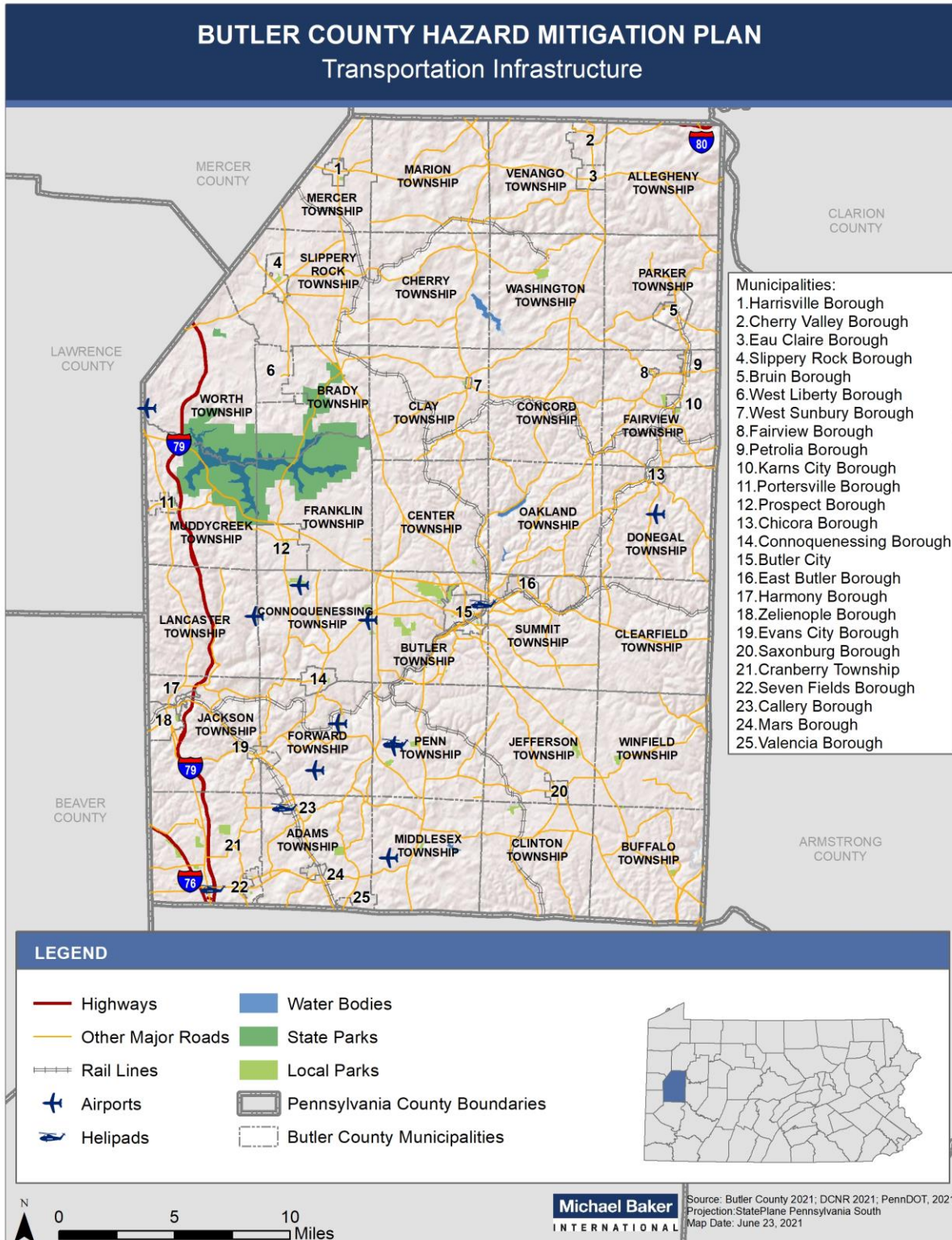
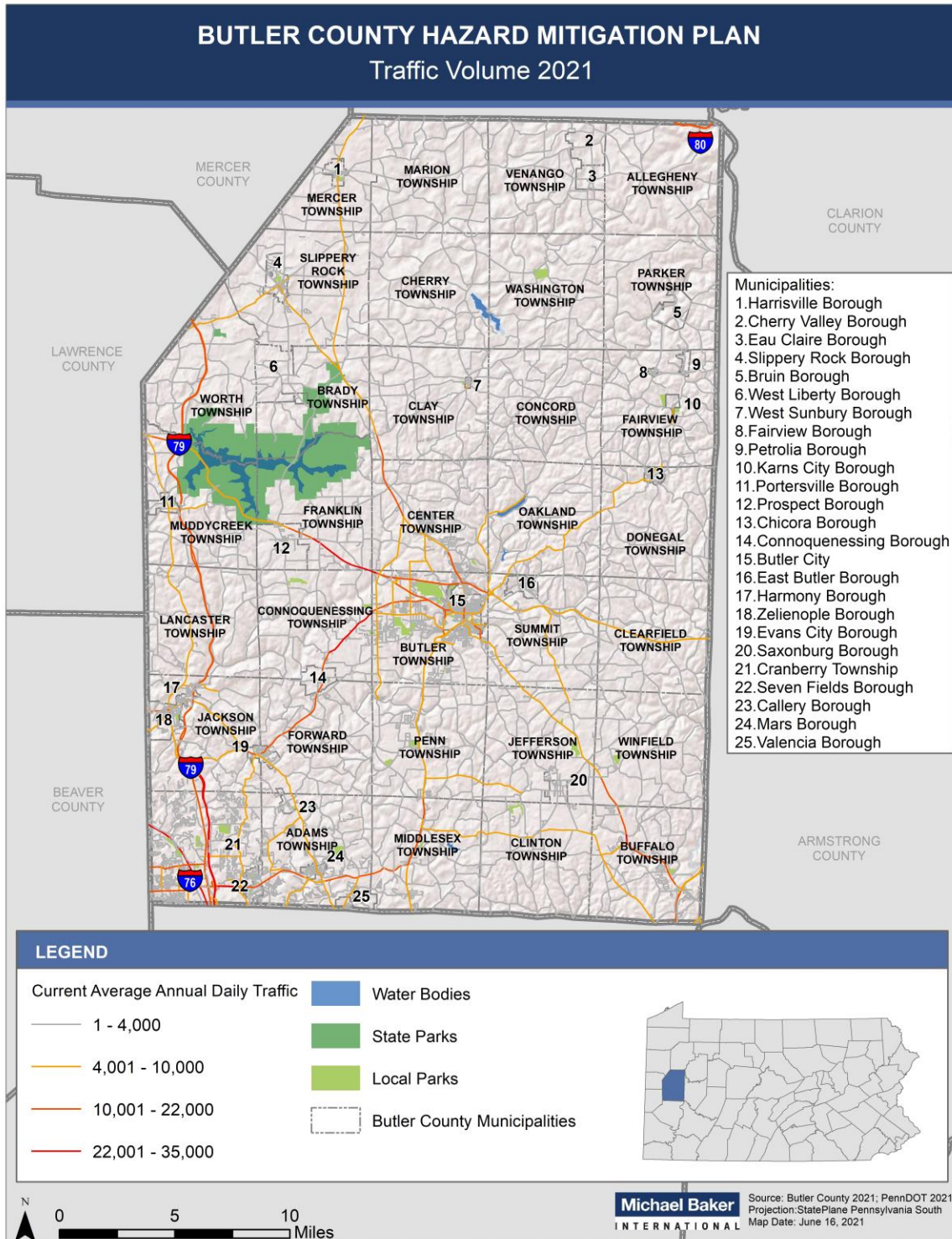


Figure 4.3.19-2 Traffic Volume on State Roads in Butler County.



4.3.19.2. Range of Magnitude

At minimum, transportation incidents can result in damage to the vehicles and minor injuries to passengers and drivers. At worst, significant transportation incidents can result in death or serious injury or extensive property loss or damage couples with business interruptions and hours of congestion. Road and railway incidents in particular have the potential to result in hazardous materials releases if the vehicle involved in an accident is hauling hazardous materials (see **Section 4.3.15**). The expected impacts of transportation accidents are amplified by the fact that there is often little warning of incidents.

Traffic incidents and crashes are measured two ways. First, insurance companies look at the level of damage sustained to the vehicle. They identify them as undamaged, damage has occurred that is cost effective to repair, or the vehicle is considered a complete loss, as it would cost more to fix than it is currently worth. Secondly, deaths or injuries that have occurred as a result of the event must be considered. For the purpose of this community-oriented analysis, consideration of what damage has occurred to the motor vehicle is not included. Table 4.3.19-2 below lists the different types of identified traffic and rail incidents.

Table 4.3.19-2 Identified Types of Traffic and Rail Incidents (PennDOT, 2020; FRA, 2021)

MODE	TYPE OF INCIDENT	DESCRIPTION
Traffic	Non-collision	A harmful event that does not involve a collision, such as a fire, explosion, or overturn.
	Angle	A crash in which two vehicles on opposite roadways collide at an intersection, driveway, or ramp.
	Rear-end	A crash in which vehicles traveling in the same direction on the same road collide.
	Head-on	A crash in which vehicles traveling in opposite directions on the same road collide.
	Sideswipe	A crash between two vehicles in which the sides of the vehicles engage.
	Hit fixed object	A collision in which a vehicle hits a stationary object on or adjacent to the roadway.
	Hit pedestrian	A collision between a motor vehicle and any person not in or upon the vehicle.
Rail	Derailment	An incident on a railway in which a train leaves the rails.
	Collision	An incident in which a train strikes something such as another train or highway motor vehicle.
	Other	Incidents caused by other circumstances like obstructions on rails, fire, or explosion.

Most car incidents are non-fatal and cause minor injuries or property damage. The majority of motor vehicle crashes are non-fatal in Pennsylvania, but PennDOT estimates that every hour there are about 12 incidents and seven injuries. There is one fatality every eight hours as a result of a car crash (PennDOT, 2020). Most fatal crashes occur in the summer months of June, July, and August.

Railway and roadway incidents in particular have the potential to result in hazardous materials release. Transportation incidents can also result in broader infrastructure damage. Like the range of magnitude, the environmental impacts of transportation incidents can vary greatly. In the case of a simple motor vehicle crash, train derailment, or aviation incident, the environmental impact is minimal. However, if the incident involves any type of vehicle moving chemicals or other hazardous materials, the impact will be considerably larger and may include an explosion or the release of potentially hazardous material. For a complete discussion of the environmental impacts of hazardous materials releases, see **Section 4.3.15**.

The worst-case scenario for a transportation incident would be if a truck carrying hazardous materials derailed on one of Butler County’s high traffic roadways, like I-79. This kind of event would damage highway infrastructure and expose residents and visitors to potentially toxic chemicals. An event of this nature would cause environmental harm, endanger human health, and disrupt Butler County’s economy since transportation would need to be re-routed for the duration of the incident and its damage.

4.3.19.3. Past Occurrence

The most common transportation incidents in Butler County are highway incidents involving motor vehicles. Vehicular transportation incidents like this are a daily occurrence throughout Pennsylvania. Table 4.3.19-3 shows PennDOT data on traffic incidents from 1999 to 2020, including the number of vehicle incidents and fatalities. The number of incidents has remained relatively the same throughout this period.

Table 4.3.19-3 Butler County Crash Statistics from 1999-2020 (PennDOT, 2020)

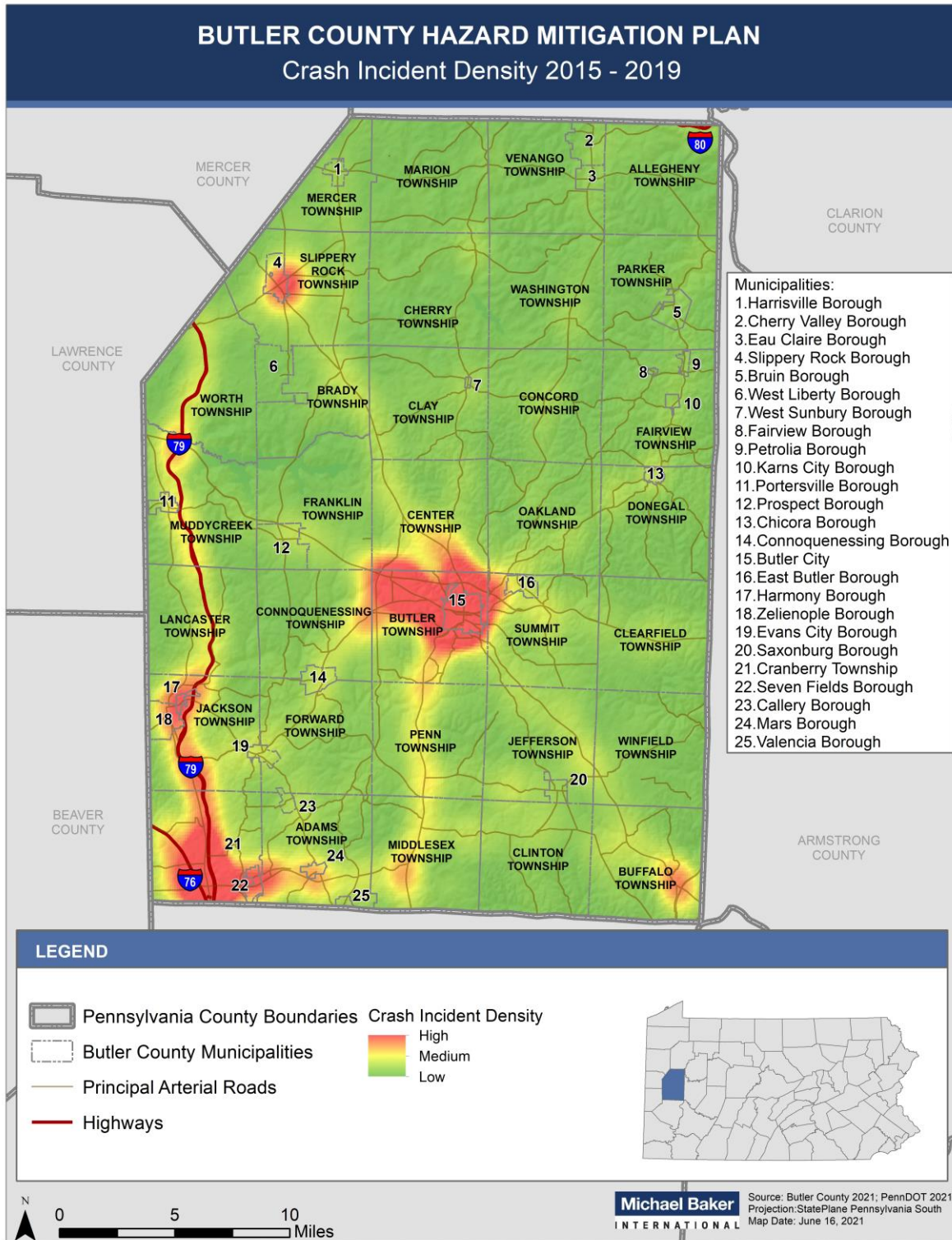
YEAR	TOTAL CRASHES	FATALITIES	YEAR	TOTAL CRASHES	FATALITIES
1999	1,968	18	2011	1,833	17
2000	2,113	32	2012	1,969	28
2001	1,951	19	2013	2,092	18
2002*	-	-	2014	1,951	25
2003	2,209	28	2015	1,847	16
2004	2,035	35	2016	1,832	30
2005	1,965	21	2017	1,871	17
2006	1,858	26	2018	1,874	18
2007	1,936	28	2019	1,748	16
2008	1,937	23	2020	1,507	10
2009	1,742	21	TOTAL	39,951	475
2010	1,713	29	<i>*Data unavailable</i>		

A comprehensive list of rail incidents and crashes is not available for Butler County. However, these incidents have led to fatalities and injuries in addition to environmental contamination. Butler County's worst railroad incident occurred in 1910, causing 24 fatalities and 35 injuries. A passenger train and a freight train that should have been on separate railroad several miles apart collided head on (Blount, 2010). In 2013, an Allegheny Valley Railroad train struck a Butler Area Rural Transit bus that stopped for an unknown reason on the tracks while the train was approaching. Eleven people were injured and there was one fatality as a result of this incident. The incident occurred in Evans City Borough. Local officials note that CSX trains run along the railways about three to four times per day, but that this was the first incident at the intersection (Sinichak, 2013). In 2013, a man was struck by a train in Penn Township when he was unconscious on the tracks (Bauer, 2013). In 2020, 12 to 16 of over 40 train cars on a Norfolk Southern train derailed causing closures to US-127 in Wayne Township. Luckily, there were no injuries or reports of hazardous materials release (Graham, 2020).

Crashes involving aircrafts have also occurred in Butler County. A comprehensive list is not available for these incidents. In 2003, a man was killed when his private plane crashed on its approach about 1.5 miles from the Butler County Airport (Ackerman, 2003). In 2007, an aircraft that was going to pick up a patient at Butler County for an air ambulance transportation flight crashed after landing on the runway. The pilot noted coming in too fast on the approach. The airplane touched down about halfway down the runway and continued off the departure end where it struck a wooden localizer antenna platform and the airport perimeter fence before crossing a road and coming to arrest about 400 feet from the end of the runway. This incident did not result in any injuries or fatalities (ASN, 2007). In 2018, a small homemade plane crashed into a horse pasture in Penn Township, just three miles from the Butler Airport. No injuries were reported, although one man was almost hit by the crash and did not hear it over his lawnmower (WPXI, 2018). There is a need for a control tower at Butler Airport. While only minor incidents have been reported in Butler County, there is the possibility for aircraft crashes of higher magnitude. In 1994, USAir Flight 427 from Chicago crashed in neighboring Beaver County on approach to Pittsburgh International Airport. All 127 passengers and five crew members were killed in the incident (Martinelli & Fiorilli, 2019). It is possible that this type of event could occur in Butler County.

Figure 4.3.19-3 displays the density of transportation crashes throughout Butler County. Red and yellow areas show roadways where the most crashes occurred between 2015 and 2019. In Butler County, most incidents occur along Routes 76 and 79. Crashes are also densely concentrated around the City of Butler and Butler Township, the most populated park of the County.

Figure 4.3.19-3 Butler County Transportation Incident Density (2015-2019)



4.3.19.4. Future Occurrence

Transportation incidents have little to no warning time and are nearly impossible to predict. While some roads or intersections may gain a reputation as being dangerous, and others are quantitatively shown to be so, this does not necessarily mean an incident will occur with any frequency or guarantee. It represents an elevation in the probability that an incident may occur. As such, it can be said with certainty that if no changes occur in the County then motor vehicle incidents are as likely to occur in the future as they were in the past.

As Table 4.3.16-3 shows, the amount of traffic incidents has remained relatively constant in recent years. Additionally, the trucking industry is expected to continue to grow increasing the number of long-haul trucks operating in the County on a daily basis. The increase in Bakken crude oil transportation by rail represents an increase in risk to future transportation incidents by rail. Based on all of these factors, the probability of transportation incidents and crashes in Butler County are characterized as *likely* according to the Risk Factor Methodology (see Table 4.4.1-1).

4.3.19.5. Vulnerability Assessment

A transportation related incident can occur on any stretch of road or railway in Butler County. However, severe incidents are more likely along highways such as I-76 and I-79, which experience heavier traffic volumes including heavy freight vehicles. The combination of high traffic volume, severe winter weather in the County, and large numbers of hazardous materials haulers increase the chances of traffic incidents occurring.

Like highway incidents, rail incidents can impact population living near rail lines. Crude oil shipping across the United States has grown by a factor of seventeen in the last five years, increasing the risk for a derailment or rail incident to involve this material. Additionally, recent rail incidents from 2013 to 2015 have shown a high risk for trains carrying crude oil to explode upon derailment (FracTracker, 2021). The average rate of aviation incidents nation-wide is 8.47 incidents per 100,000 flight hours. Therefore, the likelihood of a serious aviation incident in the County is considered low.

Tables 4.3.19-4 through 4.3.19-8 provide information on the vulnerability of structures in Butler County to highway, rail and air incidents by municipality and land use.

Table 4.3.19-4 Critical Facilities Vulnerable to Transportation Incidents (Highway, Rail, and Air)

MUNICIPALITY	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN .5 MI OF A MAJOR HIGHWAY	PERCENT CRITICAL FACILITIES WITHIN .5 MI OF A MAJOR HIGHWAY	CRITICAL FACILITIES WITHIN .5 MI OF AN ACTIVE RAIL LINE	PERCENT CRITICAL FACILITIES WITHIN .5 MI OF AN ACTIVE RAIL LINE	CRITICAL FACILITIES WITHIN 5 MI OF AN AIRPORT	PERCENT CRITICAL FACILITIES WITHIN 5 MI OF AN AIRPORT
Adams Township	25	25	100%	1	4%	25	100%
Allegheny Township	1	1	100%	0	0%	0	0%
Brady Township	1	0	0%	0	0%	0	0%
Bruin Borough	2	2	100%	2	100%	0	0%
Buffalo Township	8	8	100%	0	0%	0	0%
Butler, City	18	18	100%	16	89%	18	100%
Butler Township	44	44	100%	4	9%	42	95%
Callery Borough	4	4	100%	4	100%	4	100%
Center Township	5	5	100%	0	0%	3	60%
Cherry Township	2	2	100%	0	0%	0	0%
Cherry Valley Borough	0	0	0%	0	0%	0	0%
Chicora Borough	5	5	100%	5	100%	5	100%
Clay Township	3	3	100%	2	67%	0	0%
Clearfield Township	1	1	100%	0	0%	0	0%
Clinton Township	1	1	100%	1	100%	0	0%
Concord Township	1	1	100%	1	100%	0	0%
Connoquenessing Borough	2	2	100%	0	0%	2	100%
Connoquenessing Township	4	3	75%	0	0%	4	100%
Cranberry Township	21	21	100%	0	0%	0	0%

Table 4.3.19-4 Critical Facilities Vulnerable to Transportation Incidents (Highway, Rail, and Air)

MUNICIPALITY	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN .5 MI OF A MAJOR HIGHWAY	PERCENT CRITICAL FACILITIES WITHIN .5 MI OF A MAJOR HIGHWAY	CRITICAL FACILITIES WITHIN .5 MI OF AN ACTIVE RAIL LINE	PERCENT CRITICAL FACILITIES WITHIN .5 MI OF AN ACTIVE RAIL LINE	CRITICAL FACILITIES WITHIN 5 MI OF AN AIRPORT	PERCENT CRITICAL FACILITIES WITHIN 5 MI OF AN AIRPORT
Donegal Township	2	2	100%	0	0%	2	100%
East Butler Borough	3	3	100%	3	100%	0	0%
Eau Claire Borough	2	2	100%	0	0%	0	0%
Evans City Borough	6	6	100%	6	100%	6	100%
Fairview Borough	1	1	100%	0	0%	0	0%
Fairview Township	2	2	100%	2	100%	2	100%
Forward Township	3	2	67%	2	67%	3	100%
Franklin Township	1	1	100%	0	0%	1	100%
Harmony Borough	3	3	100%	3	100%	2	67%
Harrisville Borough	4	4	100%	0	0%	0	0%
Jackson Township	7	7	100%	4	57%	7	100%
Jefferson Township	5	5	100%	0	0%	0	0%
Karns City Borough	1	1	100%	1	100%	1	100%
Lancaster Township	3	2	67%	0	0%	3	100%
Marion Township	2	2	100%	2	100%	0	0%
Mars Borough	2	2	100%	2	100%	2	100%
Mercer Township	2	1	100%	0	0%	0	0%
Middlesex Township	6	6	100%	0	0%	6	100%
Muddy Creek Township	4	4	100%	0	0%	4	100%
Oakland Township	3	3	100%	2	67%	2	67%
Parker Township	1	1	100%	0	0%	0	0%

Table 4.3.19-4 Critical Facilities Vulnerable to Transportation Incidents (Highway, Rail, and Air)

MUNICIPALITY	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN .5 MI OF A MAJOR HIGHWAY	PERCENT CRITICAL FACILITIES WITHIN .5 MI OF A MAJOR HIGHWAY	CRITICAL FACILITIES WITHIN .5 MI OF AN ACTIVE RAIL LINE	PERCENT CRITICAL FACILITIES WITHIN .5 MI OF AN ACTIVE RAIL LINE	CRITICAL FACILITIES WITHIN 5 MI OF AN AIRPORT	PERCENT CRITICAL FACILITIES WITHIN 5 MI OF AN AIRPORT
Penn Township	8	4	50%	1	13%	8	100%
Petrolia Borough	2	2	100%	2	100%	0	0%
Portersville Borough	2	2	100%	0	0%	2	100%
Prospect Borough	3	3	100%	0	0%	3	100%
Saxonburg Borough	5	5	100%	0	0%	0	0%
Seven Fields Borough	1	1	100%	0	0%	0	0%
Slippery Rock Borough	13	13	100%	0	0%	0	0%
Slippery Rock Township	8	8	100%	0	0%	0	0%
Summit Township	5	5	100%	1	20%	0	0%
Valencia Borough	0	0	0%	0	0%	0	0%
Venango Township	1	1	100%	0	0%	0	0%
Washington Township	2	1	50%	0	0%	0	0%
West Liberty Borough	0	0	0%	0	0%	0	0%
West Sunbury Borough	0	0	0%	0	0%	0	0%
Winfield Township	1	1	100%	0	0%	0	0%
Worth Township	2	1	50%	0	0%	2	100%
Zelienople Borough	3	3	100%	2	67%	0	0%
TOTAL	265	256	96%	69	27%	159	62%

Table 4.3.19-5 Critical Facilities Vulnerable to Transportation Incidents (Highway, Rail, and Air)

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES WITHIN .5 MI OF A MAJOR HIGHWAY	PERCENT STRUCTURES WITHIN .5 MI OF A MAJOR HIGHWAY	STRUCTURES WITHIN .5 MI OF AN ACTIVE RAIL LINE	PERCENT STRUCTURES WITHIN .5 MI OF AN ACTIVE RAIL LINE	STRUCTURES WITHIN 5 MI OF AN AIRPORT	PERCENT STRUCTURES WITHIN 5 MI OF AN AIRPORT
Adams Township	6126	5,159	84%	1,105	18%	5,177	85%
Allegheny Township	414	271	65%	0	0%	0	0%
Brady Township	661	568	86%	78	12%	0	0%
Bruin Borough	245	244	100%	168	69%	0	0%
Buffalo Township	3336	2,929	88%	30	1%	0	0%
Butler, City	5933	5,933	100%	3,618	61%	5,893	99%
Butler Township	7644	7,267	95%	1,445	19%	7,305	96%
Callery Borough	168	167	99%	168	100%	168	100%
Center Township	3788	2,890	76%	314	8%	1,928	51%
Cherry Township	570	383	67%	108	19%	0	0%
Cherry Valley Borough	42	41	98%	0	0%	0	0%
Chicora Borough	473	473	100%	421	89%	473	100%
Clay Township	1202	886	74%	557	46%	0	0%
Clearfield Township	1096	791	72%	177	16%	407	37%
Clinton Township	1351	906	67%	389	29%	257	19%
Concord Township	749	585	78%	314	42%	70	9%
Connoquenessing Borough	352	349	99%	0	0%	352	100%
Connoquenessing Township	2146	1,513	71%	1	0%	2,146	100%
Cranberry Township	12665	11,131	88%	0	0%	2,191	17%

Table 4.3.19-5 Critical Facilities Vulnerable to Transportation Incidents (Highway, Rail, and Air)

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES WITHIN .5 MI OF A MAJOR HIGHWAY	PERCENT STRUCTURES WITHIN .5 MI OF A MAJOR HIGHWAY	STRUCTURES WITHIN .5 MI OF AN ACTIVE RAIL LINE	PERCENT STRUCTURES WITHIN .5 MI OF AN ACTIVE RAIL LINE	STRUCTURES WITHIN 5 MI OF AN AIRPORT	PERCENT STRUCTURES WITHIN 5 MI OF AN AIRPORT
Donegal Township	765	643	84%	245	32%	765	100%
East Butler Borough	331	331	100%	317	96%	0	0%
Eau Claire Borough	163	163	100%	0	0%	0	0%
Evans City Borough	776	775	100%	767	99%	776	100%
Fairview Borough	80	80	100%	0	0%	0	0%
Fairview Township	951	837	88%	483	51%	608	64%
Forward Township	1325	1,043	79%	499	38%	1,325	100%
Franklin Township	1280	920	72%	0	0%	1,263	99%
Harmony Borough	459	459	100%	459	100%	292	64%
Harrisville Borough	380	380	100%	0	0%	0	0%
Jackson Township	2422	1,962	81%	672	28%	1,246	51%
Jefferson Township	2103	1,724	82%	134	6%	247	12%
Karns City Borough	111	111	100%	111	100%	106	95%
Lancaster Township	1346	792	59%	0	0%	1,311	97%
Marion Township	621	478	77%	170	27%	0	0%
Mars Borough	541	541	100%	500	92%	541	100%
Mercer Township	560	462	83%	187	33%	0	0%
Middlesex Township	3046	1,726	57%	0	0%	3,046	100%
Muddy Creek Township	1144	972	85%	0	0%	1,083	95%
Oakland Township	1282	1,057	82%	219	17%	721	56%
Parker Township	359	257	72%	30	8%	0	0%
Penn Township	2281	1,602	70%	470	21%	2,281	100%

Table 4.3.19-5 Critical Facilities Vulnerable to Transportation Incidents (Highway, Rail, and Air)

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES WITHIN .5 MI OF A MAJOR HIGHWAY	PERCENT STRUCTURES WITHIN .5 MI OF A MAJOR HIGHWAY	STRUCTURES WITHIN .5 MI OF AN ACTIVE RAIL LINE	PERCENT STRUCTURES WITHIN .5 MI OF AN ACTIVE RAIL LINE	STRUCTURES WITHIN 5 MI OF AN AIRPORT	PERCENT STRUCTURES WITHIN 5 MI OF AN AIRPORT
Petrolia Borough	125	125	100%	125	100%	0	0%
Portersville Borough	146	146	100%	0	0%	146	100%
Prospect Borough	566	540	95%	0	0%	566	100%
Saxonburg Borough	784	784	100%	0	0%	0	0%
Seven Fields Borough	1227	1,189	97%	0	0%	14	1%
Slippery Rock Borough	1240	1,231	99%	0	0%	0	0%
Slippery Rock Township	1904	1,703	89%	361	19%	0	0%
Summit Township	2018	1,781	88%	428	21%	83	4%
Valencia Borough	266	266	100%	266	100%	266	100%
Venango Township	433	313	72%	8	2%	0	0%
Washington Township	644	492	76%	55	9%	0	0%
West Liberty Borough	157	130	83%	0	0%	2	1%
West Sunbury Borough	103	103	100%	0	0%	0	0%
Winfield Township	1335	745	56%	0	0%	0	0%
Worth Township	790	501	63%	0	0%	693	88%
Zelienople Borough	1853	1,853	100%	1,388	75%	0	0%
TOTAL	84,878	71,703	84%	16,787	20%	43,748	52%

Table 4.3.19-6 Structures Vulnerable to Highway Incidents by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Adams Township	90	152	8	15	20	0	5	4,519	1	90	4	248	5,152
Allegheny Township	51	16	0	5	5	0	0	181	0	0	0	12	270
Brady Township	38	13	2	0	1	0	6	497	0	0	0	10	567
Bruin Borough	8	6	1	0	4	0	0	219	0	0	1	5	244
Buffalo Township	127	119	4	3	22	0	1	2,544	1	13	1	92	2,927
Butler, City	3	456	73	7	42	0	0	5,171	9	2	0	165	5,928
Butler Township	50	424	47	5	94	4	5	6,545	1	10	4	77	7,266
Callery Borough	3	7	1	2	5	0	0	147	0	0	0	2	167
Center Township	137	218	11	0	10	0	1	2,438	0	13	0	62	2,890
Cherry Township	77	11	0	1	5	0	1	251	0	0	1	36	383
Cherry Valley Borough	12	1	0	0	1	1	0	24	0	0	0	2	41
Chicora Borough	1	31	7	0	7	0	0	405	0	0	1	21	473
Clay Township	122	18	2	2	6	0	0	694	0	0	0	42	886
Clearfield Township	93	32	0	0	1	0	0	647	0	0	0	18	791
Clinton Township	113	18	2	7	5	0	1	737	0	2	0	21	906
Concord Township	128	8	0	0	3	0	0	422	0	0	0	24	585
Connoquenessing Borough	10	5	0	1	4	0	0	291	0	0	1	37	349
Connoquenessing Township	72	117	0	4	5	0	0	1,264	0	2	1	48	1,513

Table 4.3.19-6 Structures Vulnerable to Highway Incidents by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Cranberry Township	34	1045	36	54	52	2	4	9,628	0	93	6	167	11,121
Donegal Township	94	19	0	2	1	1	1	496	1	0	0	28	643
East Butler Borough	1	13	0	11	4	0	0	299	0	0	0	3	331
Eau Claire Borough	4	16	0	0	5	0	0	126	0	0	1	11	163
Evans City Borough	0	61	14	2	8	0	0	673	0	0	1	15	774
Fairview Borough	0	1	0	0	4	0	0	74	0	0	0	1	80
Fairview Township	83	21	0	2	10	0	0	683	1	0	0	37	837
Forward Township	142	40	0	1	6	0	0	768	0	0	0	83	1,040
Franklin Township	50	42	1	1	3	1	10	770	0	17	0	24	919
Harmony Borough	0	30	3	2	6	0	0	413	0	0	0	5	459
Harrisville Borough	2	37	11	0	7	0	0	312	0	0	0	11	380
Jackson Township	117	143	7	10	11	1	10	1,431	0	29	0	194	1,953
Jefferson Township	118	51	2	7	12	0	0	1,515	0	4	0	14	1,723
Karns City Borough	0	12	0	0	2	0	0	90	0	0	0	7	111
Lancaster Township	74	20	0	0	3	0	0	563	0	4	0	127	791
Marion Township	72	11	1	0	14	1	0	342	0	0	0	37	478
Mars Borough	1	51	2	0	8	0	0	472	0	0	2	5	541
Mercer Township	45	12	2	0	2	0	0	340	0	0	0	61	462
Middlesex Township	81	74	5	3	8	0	3	1,454	0	1	1	96	1,726
Muddy Creek Township	87	40	7	1	0	0	7	812	0	3	0	13	970

Table 4.3.19-6 Structures Vulnerable to Highway Incidents by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Oakland Township	147	20	0	0	2	0	0	861	0	0	0	27	1,057
Parker Township	34	7	0	0	1	0	1	193	0	0	0	21	257
Penn Township	95	97	6	1	7	0	1	1,237	1	119	1	35	1,600
Petrolia Borough	0	6	1	3	3	0	0	101	0	0	1	9	124
Portersville Borough	3	18	1	1	2	0	0	115	0	0	1	5	146
Prospect Borough	13	15	3	0	7	0	0	491	0	0	1	10	540
Saxonburg Borough	1	72	3	1	10	0	0	643	0	37	1	16	784
Seven Fields Borough	0	29	0	0	5	0	1	1,130	0	0	0	24	1,189
Slippery Rock Borough	2	148	10	1	30	0	0	1,023	0	1	1	13	1,229
Slippery Rock Township	114	83	244	4	12	0	0	1,145	0	0	0	101	1,703
Summit Township	128	118	5	7	7	1	0	1,476	0	0	0	38	1,780
Valencia Borough	3	3	0	0	2	0	0	210	0	0	0	48	266
Venango Township	65	6	0	0	1	0	0	218	1	0	0	22	313
Washington Township	59	8	0	0	7	0	2	382	0	0	1	33	492
West Liberty Borough	18	2	2	0	1	0	0	106	0	0	0	1	130
West Sunbury Borough	2	8	5	0	2	0	0	82	0	0	1	3	103
Winfield Township	50	28	3	2	4	0	0	637	0	0	1	18	743
Worth Township	45	28	123	1	2	0	3	283	0	0	0	16	501
Zelienople Borough	2	229	56	16	24	2	1	1,490	0	0	1	30	1,851
TOTAL	2,921	4,316	711	185	535	14	64	60,080	16	440	35	2,331	71,648

Table 4.3.19-7 Structures Vulnerable to Rail Incidents by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Adams Township	23	76	6	15	3	0	1	914	0	4	2	58	1,102
Allegheny Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Brady Township	8	4	1	0	1	0	0	60	0	0	0	4	78
Bruin Borough	4	5	1	0	4	0	0	150	0	0	1	3	168
Buffalo Township	3	1	0	0	0	0	0	23	0	0	0	2	29
Butler, City	0	393	59	7	35	0	0	2,988	7	2	0	122	3,613
Butler Township	5	103	16	4	5	0	0	1,283	1	0	1	26	1,444
Callery Borough	3	7	1	2	5	0	0	148	0	0	0	2	168
Center Township	19	12	4	0	1	0	0	266	0	0	0	11	313
Cherry Township	23	2	0	1	0	0	0	74	0	0	0	8	108
Cherry Valley Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Chicora Borough	0	31	7	0	7	0	0	355	0	0	1	20	421
Clay Township	63	4	2	0	2	0	0	449	0	0	0	37	557
Clearfield Township	28	3	0	0	2	0	0	133	0	0	0	11	177
Clinton Township	44	21	0	9	3	0	0	301	0	0	0	11	389
Concord Township	69	2	0	0	2	0	0	224	0	0	0	17	314
Connoquenessing Borough	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4.3.19-7 Structures Vulnerable to Rail Incidents by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Connoquenessing Township	0	0	0	0	0	0	0	1	0	0	0	0	1
Cranberry Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Donegal Township	18	13	0	0	0	1	1	205	0	0	0	7	245
East Butler Borough	0	13	0	11	4	0	0	286	0	0	0	3	317
Eau Claire Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Evans City Borough	0	60	14	2	8	0	0	666	0	0	1	15	766
Fairview Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Fairview Township	50	17	0	2	9	0	0	379	1	0	0	25	483
Forward Township	65	25	0	1	4	0	0	344	0	0	0	59	498
Franklin Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Harmony Borough	0	30	3	2	6	0	0	413	0	0	0	5	459
Harrisville Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Jackson Township	69	92	4	4	6	1	9	453	0	0	0	33	671
Jefferson Township	23	1	0	0	0	0	0	107	0	0	0	3	134
Karns City Borough	0	12	0	0	2	0	0	90	0	0	0	7	111
Lancaster Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Marion Township	10	6	0	0	6	0	0	140	0	0	0	8	170
Mars Borough	1	51	2	0	8	0	0	433	0	0	2	3	500
Mercer Township	15	3	0	0	2	0	0	155	0	0	0	12	187

Table 4.3.19-7 Structures Vulnerable to Rail Incidents by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Middlesex Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Muddy Creek Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Oakland Township	29	2	0	0	1	0	0	183	0	0	0	4	219
Parker Township	4	0	0	0	0	0	0	23	0	0	0	3	30
Penn Township	29	13	0	1	1	0	0	419	0	0	0	6	469
Petrolia Borough	0	6	1	3	3	0	0	101	0	0	1	9	124
Portersville Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Prospect Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Saxonburg Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Seven Fields Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Slippery Rock Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Slippery Rock Township	27	17	0	3	2	0	0	296	0	0	0	16	361
Summit Township	27	86	2	7	1	0	0	295	0	0	0	9	427
Valencia Borough	3	3	0	0	2	0	0	210	0	0	0	48	266
Venango Township	1	0	0	0	0	0	0	5	0	0	0	2	8
Washington Township	2	0	0	0	2	0	0	41	0	0	0	10	55
West Liberty Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
West Sunbury Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Winfield Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Worth Township	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4.3.19-7 Structures Vulnerable to Rail Incidents by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Zelienople Borough	2	103	54	15	19	0	1	1,166	0	0	1	25	1,386
TOTAL	667	1,217	177	89	156	2	12	13,779	9	6	10	644	16,768

Table 4.3.19-8 Structures Vulnerable to Air Incidents by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Adams Township	119	122	8	15	23	0	8	4484	1	97	5	288	5170
Allegheny Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Brady Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Bruin Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Buffalo Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Butler, City	3	456	73	7	42	0	0	5131	9	2	0	165	5888
Butler Township	55	414	47	5	95	4	5	6593	1	10	3	72	7304
Callery Borough	3	7	1	2	5	0	0	148	0	0	0	2	168
Center Township	42	227	3	0	6	0	0	1597	0	13	0	40	1928
Cherry Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Cherry Valley Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Chicora Borough	1	31	7	0	7	0	0	405	0	0	1	21	473
Clay Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Clearfield Township	50	6	0	0	2	0	0	327	0	0	0	22	407
Clinton Township	44	0	0	0	1	0	0	198	0	0	0	14	257
Concord Township	22	0	0	0	0	0	0	42	0	0	0	6	70
Connoquenessing Borough	11	5	0	1	4	0	0	293	0	0	1	37	352

Table 4.3.19-8 Structures Vulnerable to Air Incidents by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Connoquenessing Township	126	173	0	4	6	0	0	1757	0	2	1	77	2146
Cranberry Township	23	5	3	0	8	0	2	2051	0	12	0	86	2190
Donegal Township	128	20	0	2	1	1	1	575	1	0	0	36	765
East Butler Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Eau Claire Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Evans City Borough	0	61	14	2	8	0	0	674	0	0	1	15	775
Fairview Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Fairview Township	77	13	0	0	9	0	0	484	0	0	0	25	608
Forward Township	192	41	3	1	6	0	0	989	0	0	0	90	1322
Franklin Township	85	45	1	1	3	1	10	1069	0	17	0	30	1262
Harmony Borough	0	24	2	1	1	0	0	260	0	0	0	4	292
Harrisville Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Jackson Township	137	72	5	5	11	1	9	951	0	0	0	46	1237
Jefferson Township	55	0	1	0	1	0	0	186	0	0	0	4	247
Karns City Borough	0	12	0	0	2	0	0	85	0	0	0	7	106
Lancaster Township	220	23	0	0	4	0	1	884	0	4	0	174	1310
Marion Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Mars Borough	1	51	2	0	8	0	0	472	0	0	2	5	541

Table 4.3.19-8 Structures Vulnerable to Air Incidents by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Mercer Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Middlesex Township	217	187	5	3	11	0	3	2508	0	1	1	110	3046
Muddy Creek Township	114	40	7	1	0	0	10	891	0	3	0	15	1081
Oakland Township	96	7	0	0	1	0	0	602	0	0	0	15	721
Parker Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Penn Township	177	101	6	1	10	0	2	1812	2	119	1	48	2279
Petrolia Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Portersville Borough	3	18	1	1	2	0	0	115	0	0	1	5	146
Prospect Borough	16	15	3	0	7	0	0	512	1	0	1	11	566
Saxonburg Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Seven Fields Borough	0	0	0	0	0	0	0	14	0	0	0	0	14
Slippery Rock Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
Slippery Rock Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Summit Township	12	2	0	0	0	0	0	67	0	0	0	2	83
Valencia Borough	3	3	0	0	2	0	0	210	0	0	0	48	266
Venango Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Washington Township	0	0	0	0	0	0	0	0	0	0	0	0	0
West Liberty Borough	1	0	0	0	0	0	0	1	0	0	0	0	2
West Sunbury Borough	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4.3.19-8 Structures Vulnerable to Air Incidents by Land Use Type

MUNICIPALITY	AGRICULTURE	COMMERCIAL	COMMERCIAL MIXED USE	INDUSTRIAL	INSTITUTIONAL	OTHER	RECREATION	RESIDENTIAL	TRANSPORTATION	UNKNOWN	UTILITY	VACANT	TOTAL
Winfield Township	0	0	0	0	0	0	0	0	0	0	0	0	0
Worth Township	132	25	123	1	2	0	18	374	0	0	0	18	693
Zelienople Borough	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	2,165	2,206	315	53	288	7	69	36,761	15	280	18	1,538	43,715

Freight transportation through Butler County is facilitated through highways, freight railroads, and air service. The PennDOT Comprehensive Freight Movement Plan estimates that freight shipments through and within Pennsylvania are expected to increase 46% in tonnage and 95% in value from 2011 to 2040 (PennDOT, 2016). Continued increases in freight transportation require planning and regulatory efforts to ensure keep transportation routes safe.

Butler County's future population growth and land use will be significantly impacted by the safety and capacity of the transportation systems traversing the County. Most residents, visitors, and tourists will use automobiles as their primary transportation throughout the community. Immigration and commercial development are also largely dependent on motor vehicle transportation systems. As discussed in **Section 4.3.16.4** increased heavy use of the roads by natural gas associated vehicles (an average of 44 trucks pass through a natural gas drilling site a day (Cassidy, 2014), will significantly impact and degrade the road infrastructure, resulting in thousands to millions of dollars of repair costs, as well as increased traffic fatalities. For example, a study by Resources for the Future shows that with one additional well drilled in a county, the number of incidents involving a fatality increase by 0.6 percent (Muehlenbachs and Krupnick, 2013).

All critical infrastructure within Butler County is vulnerable to traffic incidents, in that facility operators may be injured or delayed in performing their duties due to traffic incidents. Transportation infrastructure may be directly affected by being damaged during the incident.

Given the importance of motor vehicle traffic to the future of Butler County, traffic and road infrastructure planning must be a high priority for community planners and development officials. Given the opportunity to establish long-term traffic planning programs and mitigate incidents by improving safety at dangerous intersections, Butler County can greatly enhance the safety of its residents and visitors alike. Furthermore, taking the opportunity to learn from other high-growth areas, Butler County can take steps now to promote the proper balance between development and road infrastructure growth, to mitigate future problems.

PennDOT has eight facilities that are strategically located throughout the County in an effort to provide quick response to emergencies and enhance our operational efficiency. These sites are located at Butler Township, North Washington, Karns City, near I-79 in Portersville, Zelienople, Cranberry Township, Glade Mills, and Slippery Rock.

PennDOT uses a proactive approach to provide a safe, smooth, swift intermodal transportation system by performing life cycle analysis, applying asset management principles, pavement predictability modeling, scenario analysis, and performing preventive maintenance activities.

PennDOT is undertaking a planning process to create four Regional Operation Plans (ROPs) in the Commonwealth. These plans will inventory existing ITS and Operations infrastructure, needs, vision, and goals to help guide district level transportation and response decisions. The

Western Region's ROP, which includes Butler County, was developed in 2019 and has not yet been adopted. PennDOT District 10 is planning to implement various ITS field devices to make the roadway system more efficient. Improvements include de-icing technology, dynamic curve warning systems, and queue warning systems. These devices are helping District 10 better monitor and respond to incidents on the key transportation corridors throughout Butler County (PennDOT, 2019b).

The Western Region ROP identifies planned infrastructure projects that when implemented will reduce the risk of transportation incidents and crashes. One proposed project is to widen and add safety improvements on SR 228 (Mars-Cider Road) in Middlesex Township. The project will straighten out a sharp curve near the intersection of Harbison Road and widen existing SR 228 from two lanes (one lane in each direction) to four lanes (two lanes in each direction). Additionally, PA-28 over Buffalo Creek in Butler and Armstrong Counties is a potential candidate for bridge de-icing technology to decrease winter-related crashes often seen on the bridge. A Dynamic Curve Warning system is proposed for installation I-79 near MM 91 in Butler County, which will allow for greater driver understanding (PennDOT, 2019b).



4.3.20. Urban Fire and Explosion

4.3.20.1. Location and Extent

Fires can be caused by any number of sources- weather, human-made, or natural- and can cause extensive loss of life and property. Fires can be triggered or exacerbated by other disaster events such as floods, storms, drought, transportation accidents and hazardous materials incidents. Thus, fire as a secondary event may result in a very complex situation.

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

4.3.20.2. Range and Magnitude

Severe urban fires result in extensive damage to residential, commercial, and/or public property. Lives may be lost, and people are often displaced for several months to years depending on the magnitude of the event. The worst year on record for fire hazards in Butler County was 2005, when 5 people lost their lives due to fires (BCDES, 2009). For other urban fire events in Butler County between 1999 and 2009 reference the Butler 2015 HMP.

4.3.20.3. Past Occurrence

There have been a number of fires in the County. Most of these incidents have resulted in one or more the following: extensive use of resources, loss of jobs, or a significant impact on the community. Refer to tables in the 2015 HMP for detailed information on these incidents.

4.3.20.4. Future Occurrence

Minor fire hazards occur often primarily due to human error. Urban fires occur as a result of human error, outdated wiring, and sabotage. These events have occurred in Butler County in the past and are likely to continue to occur in the future. However, the risk should begin to decrease as older, non-code compliant buildings are phased out. Currently, the probability of urban fire and explosion in Butler County are characterized as *possible* according to the Risk Factor Methodology (see Table 4.4.1-1).

4.3.20.5. Vulnerability Assessment

The potential for fire damage is not limited to any one area of the County. However, human error can play an important role in creating the potential for a major urban or forest fire. The vulnerability of the citizens and property of Butler County to fire and related incidents depends on many factors. The number of fire incidents and fatalities should remain at the same level for the foreseeable future.



4.3.21. Utility Interruption

4.3.21.1. Location and Extent

Utility interruptions include any impairment of the functioning of telecommunication, gas, electric, water, or waste networks. Interruptions or outages occur because of geomagnetic storms, fuel or resources shortage, electromagnetic pulses, information technology failures, transmission facility or linear utility accident, and major energy, power, or utility failure.

The focus of utility interruptions as a hazard lies in fuel, energy, or utility failure. These kinds of interruptions rarely spontaneously occur on their own; this hazard is often secondary to other natural hazard events, particularly transportation crashes and incidents, lightning strikes, extreme heat or cold events, and coastal and winter storms. The causes for outages are usually downed power wires or utility poles as a result of inclement weather or vehicle incidents. Additionally, outages can be caused by blown transformers or tripped circuit breakers. Most often, there is no cause reported and power is restored within the hour.

4.3.21.2. Range and Magnitude

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

4.3.21.3. Past Occurrence

Power outages in Butler County have been caused by winter storms, wind, vehicle incidents, and other factors. Minor power outages occur annually in Butler County. Utility interruptions are largely minor, routine events, but there have been Presidential and Gubernatorial Disaster Declarations in which a utility interruption was a major component of a disaster. There have been no localized energy emergencies recorded in Butler County.

4.3.21.4. Future Occurrence

Utility interruptions will continue to occur annually with minimal impact. Widespread utility interruption events usually occur approximately once every five years, usually as a secondary effect of an extreme weather event. These interruptions should be anticipated, and first responders should be prepared during severe weather events. The probability of utility interruption in Butler County are characterized as *highly likely* according to the Risk Factor Methodology (see Table 4.4.1-1).

4.3.21.5. Vulnerability Assessment

All jurisdictions are vulnerable on some level to utility interruptions, but because this hazard often occurs in conjunction with other hazards, jurisdictions that have been identified as more vulnerable to winter storms, windstorms, tornado, flooding, and other natural hazard events may be more vulnerable to a utility interruption. Many municipalities reported through filling

out the Hazard Risk Ranking Review Form that their vulnerability to utility interruption has increased over the past five years.

Utility outages pose the greatest threat to special needs populations in Butler County. Resources such as electricity, communications, gas, and water supply are critical to ensure the health, safety, and general welfare of the citizenry. All critical infrastructure is vulnerable to the effects of a power outage. Special needs populations can be vulnerable to loss of heat or air conditioning during extreme heat; likewise, they can be vulnerable to periods of severe cold if they use electric heat and there is a power outage.

4.4. Hazard Vulnerability Summary

4.4.1. Methodology

A vulnerability assessment applies the information collected through hazard profiling to Butler County's assets to summarize the impacts from hazards on the community and its vulnerable structures. These impacts are represented by measures such as population at risk, percent damages, and dollar loss estimation. The purpose of this analysis is to identify weaknesses or vulnerabilities prior to an event so that mitigation action plans may prevent or reduce the predicted impact of disasters. The primary objective of the vulnerability assessment is to prioritize hazards of concern to provide a framework for the mitigation strategy and policy development.

A strong analysis includes both quantitative and qualitative methodologies. For instance, geographic information systems (GIS)-based analysis and local knowledge are both important inputs to identifying vulnerabilities. As part of this hazard vulnerability analysis, the Butler County conducted the following steps:

- ✓ Inventory and summarize vulnerable assets
- ✓ Characterize repetitive flood loss properties
- ✓ Estimate loss
- ✓ Develop risk factor for each profiled hazard
- ✓ Describe asset vulnerability to future development

Ranking hazards helps communities set goals and priorities for mitigation based on their vulnerabilities. Based on the findings from the vulnerability assessment, hazards were ranked in order to provide structure and prioritize the mitigation goals and actions discussed in this plan. Ranking was both quantitative and qualitative. First, the quantitative analysis considered all the GIS and HAZUS data available. A HAZUS report on flooding was run and analyzed. The results are presented in **Appendix F**.

Then, a qualitative approach, the Risk Factor (RF) approach, was used to provide additional insights on the specific risks associated with each hazard. This process can also be a valuable cross-check or validation of the quantitative analysis performed. A Risk Factor (RF) is a tool used to measure the degree of risk for identified hazards in a planning area. The RF can also be used to assist local community officials in ranking and prioritizing those hazards that pose the most significant threat to their area based on a variety of factors deemed important by the planning team and other stakeholders involved in the hazard mitigation planning process. The RF system relies mainly on historical data, local knowledge, and consensus from the planning team and information collected through development of the hazard profiles included in **Section 4.3**. The RF approach produces numerical values that allow identified hazards to be ranked against one another; the higher the RF value, the greater the hazard risk.

RF values were obtained by assigning varying degrees of risk to five categories for each of the hazards profiled in the 2021 HMP Update. Those categories include *probability*, *impact*, *spatial extent*, *warning time*, and *duration*. Each degree of risk was assigned a value ranging from 1 to 4. The weighting factor is shown in Table 4.4.1-1. To calculate the RF value for a given hazard, the assigned risk value for each category was multiplied by the weighting factor. The sum of all five categories equals the final RF value, as demonstrated in the example equation:

$$\text{Risk Factor Value} = [(\text{Probability} \times .30) + (\text{Impact} \times .30) + (\text{Spatial Extent} \times .20) + (\text{Warning Time} \times .10) + (\text{Duration} \times .10)]$$

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

Table 4.4.1-1 Summary of Risk Factor Approach Used to Rank Hazard Risk

RISK ASSESSMENT CATEGORY	DEGREE OF RISK			WEIGHT VALUE
	LEVEL	CRITERIA	INDEX	
Probability <i>What is the likelihood of a hazard event occurring in a given year?</i>	Unlikely	Less than 1% Annual Probability	1	30%
	Possible	Between 1% & 49.9% Annual Probability	2	
	Likely	Between 50% & 90% Annual Probability	3	
	Highly Likely	Greater than 90% Annual Probability	4	
Impact <i>In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?</i>	Minor	Very few injuries, if any. Only minor property damage & Minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.	3	
	Catastrophic	High number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent <i>How large of an area could be impacted by a hazard event? Are impacts localized or regional?</i>	Negligible	Less than 1% of area affected.	1	20%
	Small	Between 1 & 10.9% of area affected.	2	
	Moderate	Between 11 & 25% of area affected.	3	
	Large	Greater than 25% of area affected.	4	
Warning Time <i>Is there usually some lead time associated with the hazard event? Have warning measures been implemented?</i>	More than 24 Hours	Self-Defined	1	10%
	12 to 24 Hours	Self-Defined	2	
	6 to 12 Hours	Self-Defined	3	
	Less than 6 Hours	Self-Defined	4	
Duration <i>How long does the hazard event usually last?</i>	LESS THAN 6 HRS	Self-Defined	1	10%
	LESS THAN 24 HRS	Self-Defined	2	
	LESS THAN 1 WEEK	Self-Defined	3	
	MORE THAN 1 WEEK	Self-Defined	4	

4.4.2. Ranking Results

Using the methodology described in Section 4.4.1, Table 4.4.2-1 lists the Risk Factor calculated for each of the 21 hazards identified in the 2021 HMP Update. Hazards identified as *high* risk have risk factors of 2.5 or greater. Risk Factors ranging from 2.0 to 2.4 were deemed *moderate* risk hazards. Hazards with Risk Factors 1.9 and less are considered *low* risk.

Table 4.4.2-1 2021 Risk Factor Ranking

HAZARD RISK	HAZARD NATURAL OR MAN-MADE (N OR M)	RISK ASSESSMENT CATEGORY (RANKED 1-4)					RISK FACTOR
		PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	
High	Transportation Incidents (M)	3	3	3	4	2	3.0
	Winter Storm (N)	3	2	4	2	3	2.8
	Environmental Hazards: Unconventional Oil and Gas Well Incidents (M)	3	3	2	2	3	2.7
	Tornado & Windstorm (N)	2	3	3	4	2	2.7
	Flood, Flash Flood, Ice Jam (N)	3	2	3	3	2	2.6
	Environmental Hazards: Conventional Oil and Gas Well Incidents (M)	3	3	2	2	2	2.6
	Environmental Hazards: Hazardous Material Release	3	3	2	2	2	2.6
	Environmental Hazards: Coal Mining Incidents (M)	2	2	3	3	2	2.5
	Nuclear Incidents (M)	1	3	3	4	3	2.5
	Pandemic (N)	2	3	3	1	3	2.5
Medium	Utility Interruption (M)	4	2	1	2	2	2.4
	Dam Failure (M)	2	2	2	4	3	2.3
	Urban Fire and Explosion (M)	2	2	2	4	2	2.2
	Radon Exposure (N)	3	1	3	1	3	2.2
	Subsidence, Sinkhole (M)	2	2	1	4	2	2.0
Low	Wildfire (N)	2	1	2	4	2	1.9
	Terrorism (M)	1	2	2	4	2	1.9
	Landslide (N)	2	1	2	3	2	1.8

Table 4.4.2-1 2021 Risk Factor Ranking

HAZARD RISK	HAZARD NATURAL OR MAN-MADE (N OR M)	RISK ASSESSMENT CATEGORY (RANKED 1-4)					RISK FACTOR
		PROBABILITY	IMPACT	SPATIAL EXTENT	WARNING TIME	DURATION	
	Earthquakes (N)	1	2	2	3	2	1.8
	Drought (N)	1	1	2	1	4	1.5
	Civil Disturbance	1	1	1	4	1	1.3

Based on these results, there are ten *high* risk hazards, five *moderate* risk hazards and six *low* risk hazards in Butler County. Mitigation actions were developed for all high, moderate, and low risk hazards (see **Section 6.4**).

A risk assessment result for the entire County does not mean that each municipality has the same risk to each hazard. Municipalities completed a *Hazard Risk Assessment Survey* to during the planning process evaluate their jurisdictional risk to each hazard. Results from these surveys were reassessed by the HMPT, and the update risk assessment was used to complete Table 4.4.2-2 which shows the different municipalities in Butler County and whether their risk is greater than (>), less than (<), or equal to (=) the risk factor assigned to the County as a whole. The table cells that are highlighted in grey were specific updates provided by municipalities through the Hazard-Risk Evaluation forms, the Jurisdictional Hazard Risk Ranking forms and the Risk Assessment and Mitigation Solutions Workshop.

Table 4.4.2-2 Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk

JURISDICTION	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR																				
	TRANSPORTATION INCIDENTS	WINTER STORM	UNCONVENTIONAL WELL INCIDENTS	TORNADO & WINDSTORM	FLOOD, FLASH FLOOD, ICE JAM	CONVENTIONAL WELL INCIDENTS	HAZARDOUS MATERIALS RELEASE	COAL MINING INCIDENTS	NUCLEAR INCIDENTS	PANDEMIC	UTILITY INTERRUPTION	DAM FAILURE	URBAN FIRE & EXPLOSION	RADON EXPOSURE	SUBSIDENCE, SINKHOLE	WILDFIRE	TERRORISM	LANDSLIDE	EARTHQUAKES	DROUGHT	CIVIL DISTURBANCE
	3	2.8	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.5	2.4	2.3	2.2	2.2	2	1.9	1.9	1.8	1.8	1.5	1.3
Adams Township	>	=	=	=	=	=	>	=	=	=	=	<	=	=	=	>	>	=	=	=	>
Allegheny Township	=	>	=	=	>	=	=	=	<	=	>	<	<	=	=	>	=	<	=	=	<
Brady Township	=	>	<	=	=	=	=	=	=	=	=	>	=	=	=	=	=	=	=	=	=
Bruin Borough	=	=	<	=	=	=	=	=	=	=	=	>	=	=	>	=	=	=	=	=	=
Buffalo Township	=	=	=	=	=	=	>	=	=	=	=	>	=	=	>	>	=	=	=	=	=
Butler, City	=	=	<	=	>	<	=	<	=	=	=	>	>	=	=	=	>	=	=	>	=
Butler Township	=	=	=	=	=	=	>	<	=	=	=	<	=	=	=	=	=	=	=	=	=
Callery Borough	>	=	<	=	>	<	>	<	=	=	>	>	>	=	=	<	=	=	=	=	>
Center Township	>	=	=	>	>	=	=	=	=	=	>	=	>	=	=	<	=	=	=	=	=
Cherry Township	=	=	=	=	=	=	=	=	=	=	=	<	=	=	>	>	=	=	=	=	=
Cherry Valley Borough	<	=	<	=	<	=	=	=	=	=	=	>	=	=	=	=	=	=	=	=	=
Chicora Borough	<	=	<	=	=	<	=	<	=	=	>	>	=	=	>	=	=	=	=	=	=
Clay Township	=	=	=	=	=	=	=	=	=	=	=	>	=	=	>	>	=	=	=	=	=
Clearfield Township	>	>	=	>	<	=	>	=	<	=	<	<	<	=	>	<	<	<	>	>	=
Clinton Township	=	>	=	>	>	=	>	=	=	=	>	<	=	=	>	>	=	=	=	>	=
Concord Township	=	<	=	<	=	=	<	<	=	=	=	>	=	=	=	=	=	=	=	<	=

Table 4.4.2-2 Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk

JURISDICTION	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR																				
	TRANSPORTATION INCIDENTS	WINTER STORM	UNCONVENTIONAL WELL INCIDENTS	TORNADO & WINDSTORM	FLOOD, FLASH FLOOD, ICE JAM	CONVENTIONAL WELL INCIDENTS	HAZARDOUS MATERIALS RELEASE	COAL MINING INCIDENTS	NUCLEAR INCIDENTS	PANDEMIC	UTILITY INTERRUPTION	DAM FAILURE	URBAN FIRE & EXPLOSION	RADON EXPOSURE	SUBSIDENCE, SINKHOLE	WILDFIRE	TERRORISM	LANDSLIDE	EARTHQUAKES	DROUGHT	CIVIL DISTURBANCE
	3	2.8	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.5	2.4	2.3	2.2	2.2	2	1.9	1.9	1.8	1.8	1.5	1.3
Connoquenessing Borough	=	=	=	=	>	=	=	<	=	=	>	>	=	=	=	>	=	=	=	=	=
Connoquenessing Township	=	=	=	=	=	=	=	=	=	=	>	>	=	=	=	>	=	=	=	=	=
Cranberry Township	>	>	<	>	=	=	>	=	=	=	=	<	=	=	=	=	=	=	=	=	>
Donegal Township	<	=	<	=	=	=	<	<	=	=	>	>	=	=	>	>	=	=	=	=	=
East Butler Borough	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Eau Claire Borough	<	=	<	=	<	=	=	=	=	=	=	>	=	=	=	=	=	=	=	=	=
Evans City Borough	>	=	<	=	>	<	=	<	=	=	>	>	=	=	=	>	=	=	=	=	=
Fairview Borough	=	=	<	=	<	<	=	<	=	=	=	>	=	=	=	>	=	=	=	=	=
Fairview Township	=	=	=	=	=	=	>	=	=	=	=	<	=	=	=	=	=	=	=	=	=
Forward Township	=	=	=	>	>	=	>	=	=	=	=	=	=	=	=	>	=	>	=	=	=
Franklin Township	>	=	=	=	=	=	>	<	=	=	>	=	=	=	=	=	=	=	=	=	=
Harmony Borough	>	=	<	=	=	=	=	<	=	=	=	>	=	=	=	=	=	=	=	=	=
Harrisville Borough	=	=	<	=	<	<	=	<	=	=	=	>	=	=	=	=	=	=	=	=	=
Jackson Township	>	=	=	=	=	=	>	=	=	=	=	<	=	=	=	>	=	=	=	=	=
Jefferson Township	>	>	=	>	>	=	>	<	=	=	>	<	=	=	=	>	=	=	=	>	=

Table 4.4.2-2 Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk

JURISDICTION	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR																				
	TRANSPORTATION INCIDENTS	WINTER STORM	UNCONVENTIONAL WELL INCIDENTS	TORNADO & WINDSTORM	FLOOD, FLASH FLOOD, ICE JAM	CONVENTIONAL WELL INCIDENTS	HAZARDOUS MATERIALS RELEASE	COAL MINING INCIDENTS	NUCLEAR INCIDENTS	PANDEMIC	UTILITY INTERRUPTION	DAM FAILURE	URBAN FIRE & EXPLOSION	RADON EXPOSURE	SUBSIDENCE, SINKHOLE	WILDFIRE	TERRORISM	LANDSLIDE	EARTHQUAKES	DROUGHT	CIVIL DISTURBANCE
	3	2.8	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.5	2.4	2.3	2.2	2.2	2	1.9	1.9	1.8	1.8	1.5	1.3
Karns City Borough	=	=	<	=	=	<	>	=	=	=	=	>	>	=	=	=	>	=	=	=	=
Lancaster Township	>	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	=	=	=	=	=
Marion Township	=	=	<	=	=	=	=	=	=	=	=	>	=	=	>	>	=	=	=	=	=
Mars Borough	=	=	<	=	=	<	=	<	=	=	=	>	=	=	=	=	=	=	=	=	=
Mercer Township	=	=	=	>	<	=	=	=	<	=	=	<	<	=	>	=	>	=	=	=	<
Middlesex Township	>	>	=	>	>	=	>	<	=	=	>	<	=	=	>	>	>	=	=	>	=
Muddy Creek Township	>	=	=	=	=	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=	=
Oakland Township	=	=	=	=	=	=	=	=	=	=	=	<	=	=	>	>	=	=	=	=	=
Parker Township	=	=	=	=	=	=	=	=	=	=	=	>	=	=	=	>	=	=	=	=	=
Penn Township	>	=	=	=	>	=	>	<	<	=	<	=	<	=	=	<	<	>	<	<	<
Petrolia Borough	=	=	<	=	=	=	=	<	=	=	=	<	=	=	=	=	=	=	=	=	=
Portersville Borough	>	=	<	=	<	=	=	<	=	=	=	>	=	=	=	=	=	=	=	=	=
Prospect Borough	<	=	=	=	=	=	=	<	=	=	>	>	=	=	=	=	=	=	=	=	=
Saxonburg Borough	<	>	<	>	>	=	>	<	=	=	>	>	=	=	=	=	=	=	=	=	>
Seven Fields Borough	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Slippery Rock Borough	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Slippery Rock Township	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=

Table 4.4.2-2 Calculated Countywide Risk Factor by Hazard and Comparative Jurisdictional Risk

JURISDICTION	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR																				
	TRANSPORTATION INCIDENTS	WINTER STORM	UNCONVENTIONAL WELL INCIDENTS	TORNADO & WINDSTORM	FLOOD, FLASH FLOOD, ICE JAM	CONVENTIONAL WELL INCIDENTS	HAZARDOUS MATERIALS RELEASE	COAL MINING INCIDENTS	NUCLEAR INCIDENTS	PANDEMIC	UTILITY INTERRUPTION	DAM FAILURE	URBAN FIRE & EXPLOSION	RADON EXPOSURE	SUBSIDENCE, SINKHOLE	WILDFIRE	TERRORISM	LANDSLIDE	EARTHQUAKES	DROUGHT	CIVIL DISTURBANCE
	3	2.8	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.5	2.4	2.3	2.2	2.2	2	1.9	1.9	1.8	1.8	1.5	1.3
Summit Township	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Valencia Borough	=	>	<	=	>	<	=	<	=	=	>	>	=	=	=	=	=	>	=	=	=
Venango Township	=	=	<	=	=	=	=	=	=	=	=	>	=	=	>	>	=	=	=	=	=
Washington Township	=	=	=	=	=	=	=	=	=	=	=	=	=	=	>	>	=	=	=	=	=
West Liberty Borough	<	=	<	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
West Sunbury Borough	=	=	<	=	<	<	=	<	=	=	=	>	=	=	=	=	=	=	=	=	=
Winfield Township	>	>	=	>	>	=	>	=	=	=	>	=	=	=	>	>	=	=	=	>	=
Worth Township	>	=	=	>	>	=	=	=	=	=	>	>	=	=	>	>	=	=	=	>	>
Zelienople Borough	>	=	<	=	=	=	>	<	=	=	=	>	=	=	=	=	=	=	=	=	=

Key stakeholders and several members of the Hazard Mitigation Planning Team also provided input on the evaluation of jurisdictional risk for each hazard, as seen below in Table 4.4.2-3.

Table 4.4.2-3 Calculated Risk Factor by Hazard and Stakeholder Risk

JURISDICTION	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR																				
	TRANSPORTATION INCIDENTS	WINTER STORM	UNCONVENTIONAL WELL INCIDENTS	TORNADO & WINDSTORM	FLOOD, FLASH FLOOD, ICE JAM	CONVENTIONAL WELL INCIDENTS	HAZARDOUS MATERIALS RELEASE	COAL MINING INCIDENTS	NUCLEAR INCIDENTS	PANDEMIC	UTILITY INTERRUPTION	DAM FAILURE	URBAN FIRE & EXPLOSION	RADON EXPOSURE	SUBSIDENCE, SINKHOLE	WILDFIRE	TERRORISM	LANDSLIDE	EARTHQUAKES	DROUGHT	CIVIL DISTURBANCE
	3	2.8	2.7	2.7	2.6	2.6	2.6	2.5	2.5	2.5	2.4	2.3	2.2	2.2	2	1.9	1.9	1.8	1.8	1.5	1.3
Butler County Community College	=	=	=	=	>	=	=	=	=	=	>	=	=	=	=	=	=	=	=	=	>
Herman Volunteer Fire Company	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Morain State Park	=	<	=	>	>	=	=	=	=	=	>	=	=	=	=	=	=	=	=	=	=

4.4.3. Potential Loss Estimates

Based on various kinds of available data, potential loss estimates were established for flood. Estimates provided in this section are based on Hazus version 4.2, 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.

This plan employed an enhanced Hazus analysis for floods. As opposed to basic analysis using only default data, enhanced analysis incorporates more recent, up-to-date, or specific data for inclusion in the hazard models. The enhanced data incorporated into this plan update include:

- Updated essential facilities data from the County
- Updated user defined facilities data from the County
- Updated flood depth grids

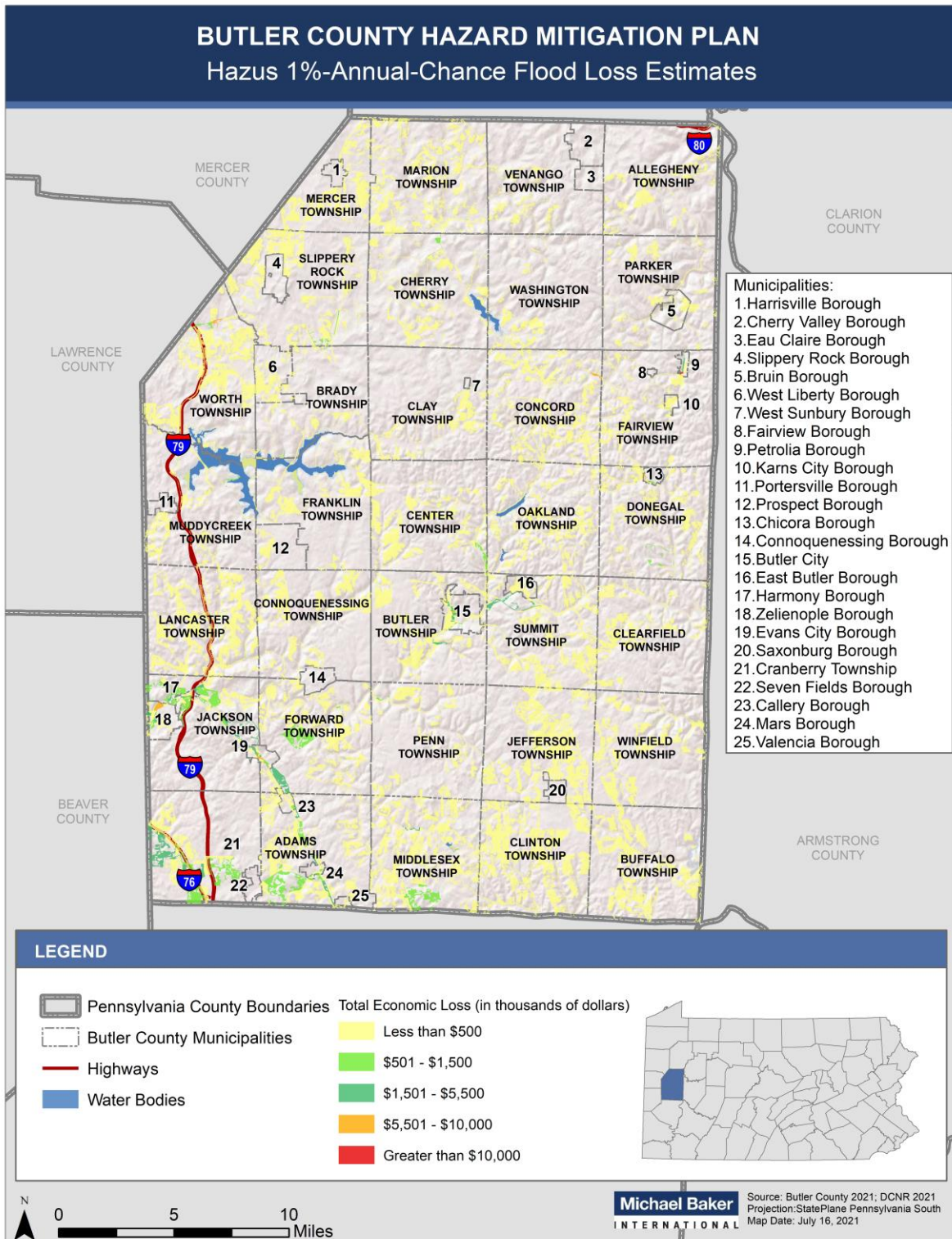
Using these datasets in Hazus, total building-related losses from a 1%-annual-chance flood in Butler County are estimated to equal \$189.81 million. Residential occupancies make up almost 45% of the total estimated building-related losses. Total economic loss, including replacement value, content loss, functional loss and displacement cost, from a countywide 1%-annual-chance flood are estimated to equal \$383.42 million. This scenario estimates that about 375 buildings will be at least moderately damaged. This is over 84% of the total number of buildings in the scenario. There are an estimated 25 buildings that will be completely destroyed.

In addition, an estimated 94 households would be displaced, and 3,840 people would require shelter. Essential facilities would largely remain undamaged in this scenario, but one police station is estimated to have at least moderate damage and this facility would also experience loss of use. For more details on the Hazus methodology used and additional results reports, see **Appendix F**.

Losses associated with natural hazard events are sometimes reported to the NCEI with the event. The reporting time frame is 1950-2021. While these historic losses give a glimpse of

potential losses in hazard events, they are not reported for all events and should be considered a broad estimate. Millions of dollars' worth of property damage have been caused by floods, flash floods, or ice jams in Butler County. Below, Figure 4.4.3-1 shows Hazus modeled potential flood losses in Butler County. This model is consistent with other data found for flood risk in the County.

Table 4.4.3-1 Annual Chance Flood Loss Estimates for Butler County



4.4.4. Future Development and Vulnerability

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

Population change is a main indicator of vulnerability change in Butler County. As discussed in **Section 2.3**, the total population of Butler County is estimated to have increased by 2 percent from 2010-2019. Twenty-seven municipalities increased in population while thirty decreased in population during this time period. Table 2.3-2 provides details on population change from 2010 to 2019, providing insight into local change. Areas of higher density, in the larger municipalities and growing municipalities, face increased vulnerability and increased exposed structures with most hazard events. Larger populations result in increased vulnerability to hazards such as floods, tornados and winter storms as more people will be impacted.

Roughly eighteen percent of Butler County’s population is over the age of 65. Older residents pose unique challenges when it comes to evacuation and/or mobility during the rescue and recovery processes that typically occur in the case of a hazard event. Officials may consider partnering with human services organizations to specifically plan for this vulnerable population.

Throughout the plan vulnerability of structures and critical facilities in each municipality related to different hazards is detailed. The mitigation strategy is focused on targeting localities identified as being most vulnerable to each different hazard.

Section 2.4 discusses plans for future development in Butler County’s Comprehensive Plan. Most of the County’s growth is confined to areas around Butler City and Cranberry Township. Both of these municipalities have experienced significant growth over the past 5 years. The rest of the County is classified as small towns, suburban or rural and is planned to remain that way. Future development is focused on revitalization of the existing cities and small towns with a focus on redevelopment and conserving existing development. A map showing the land use policy plan pulled from the County’s comprehensive plan is shown in Figure 2.4-2. As mentioned in **Section 2.4** and detailed in **Section 5**, many municipalities have reported having a local comprehensive and/or land use plan, and these plans help guide local development.

The rural nature of a lot of the County impacts vulnerability because remote and sparsely populated municipalities also face higher vulnerability to certain hazards because they may not have as easy access to care facilities or response personnel. The table below shows population density by municipality. The average population density in the United States is 90 people per square mile, and 13 municipalities in Butler County are lower than average. The

less populated municipalities face increased vulnerability to winter storms due to isolation, access issues, and longer emergency response times.

Table 4.4.4-1 Population Density by Municipality

MUNICIPALITY	PEOPLE PER SQUARE MILE	MUNICIPALITY	PEOPLE PER SQUARE MILE
Adams Township	608	Jackson Township	183
Allegheny Township	26	Jefferson Township	231
Brady Township	67	Karns City Borough	513
Bruin Borough	265	Lancaster Township	113
Buffalo Township	302	Marion Township	46
Butler, City	4,815	Mars Borough	2,856
Butler Township	764	Mercer Township	106
Callery Borough	730	Middlesex Township	244
Center Township	314	Muddy Creek Township	91
Cherry Township	39	Oakland Township	120
Cherry Valley Borough	24	Parker Township	26
Chicora Borough	1,836	Penn Township	202
Clay Township	103	Petrolia Borough	385
Clearfield Township	109	Portersville Borough	357
Clinton Township	118	Prospect Borough	267
Concord Township	55	Saxonburg Borough	1,781
Connoquenessing Borough	406	Seven Fields Borough	3,417
Connoquenessing Township	174	Slippery Rock Borough	2,157
Cranberry Township	1,345	Slippery Rock Township	244
Donegal Township	75	Summit Township	210
East Butler Borough	727	Valencia Borough	1,597
Eau Claire Borough	233	Venango Township	43
Evans City Borough	454	Washington Township	54
Fairview Borough	1,716	West Liberty Borough	89
Fairview Township	82	West Sunbury Borough	1,690
Forward Township	118	Winfield Township	144
Franklin Township	119	Worth Township	55
Harmony Borough	2,983	Zelienople Borough	1,747
Harrisville Borough	1,155		

5. Capability Assessment

5.1. Update Process Summary

The purpose of the Capability Assessment is to identify strengths and weaknesses that will affect the ability of the County and participating jurisdictions to implement mitigation actions. It is important to perform a mitigation capability assessment in order to develop a comprehensive and implementable mitigation strategy. Capabilities include a variety of regulations, existing planning mechanisms, and administrative capabilities provided through established agencies or authorities. This assessment will allow Butler County to better evaluate its current resources to implement its mitigation strategy to address the potential hazards which make the County and its local municipalities vulnerable. 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.

The 2004 HMP identified the presence of local plans, ordinances, codes, and community resources in each municipality. It also specific local, state, and federal resources available for mitigation efforts. Through responses to the Capability Assessment Survey distributed to all municipalities and input from the HMSC, the 2010 HMP provided an updated inventory of the most critical local planning tools available and a summary of the fiscal and technical capabilities available through programs and organizations outside of the County. It also identified emergency management capabilities and the processes used for administering the NFIP. The 2015 HMP provided an update to the 2010 findings, through data collected from the County and participating municipalities. The 2021 Capability Assessment provides an updated inventory of local planning and regulatory tools available, a summary of fiscal and technical capabilities, and discusses opportunities to integrate the HMP into other plans and programs to promote implementation.

To accomplish this, a number of documents were reviewed as part of this Plan Update. While some information has been derived from the 2010 and 2015 Plans and updated where applicable, additional documents have been identified and reviewed for the purposes of integration into other local planning mechanisms. Several plans and ordinances at the County and municipal level were reviewed, and a summary of options to integrate the data, information, and hazard mitigation goals and actions into other planning mechanisms is provided.

The Mitigation Strategy, including the goals and actions, should be incorporated into relevant planning mechanisms based on their pertinence and relevance to specific plans and ordinances. For example, all structural projects should be included in the Capital Improvement Program. Land use and zoning related projects should be incorporated into the

next update of the Community’s Comprehensive Plan and Zoning Ordinance through collaboration with Planning and Zoning departments. Likewise, information from relevant planning documents was used to inform the 2021 HMP Update. A general list of relevant plans and documents and corresponding areas for incorporation are listed below:

Table 5.1.1-1 Relevant Departments and Documents

RELEVANT DOCUMENTS	HAZARD MITIGATION PLANNING ELEMENTS
Comprehensive Plan/Land Use Plan, Zoning/Subdivision Regulations, Floodplain Ordinance	Demographic data, land use, development trends and regulations, and floodplain management information
Stormwater Management Plan, Sediment and Erosion Control Plan, Long Range Transportation Plan	Stormwater management and infrastructure data and projects
Evacuation Plan, Emergency Operations/Response Plan	All-hazards information for evacuation, response, and recovery
Climate Action Plans, Dam Safety Regulations	Risk and vulnerability data, and storm/floodwater management
Open Space, Recreation, and Greenway Plans	Land preservation strategies

5.2. Capability Assessment Findings

Butler County and participating jurisdictions have a wide variety of plans, tools, and resources in place to support the goals of hazard mitigation planning, and the specific mitigation strategy presented in this HMP Update.

5.2.1. Planning and Regulatory Capability

The purpose of a plan/ordinance review as part of this planning process is trifold:

- To identify existing Commonwealth, Regional/County, and Municipal initiatives;
- To provide an inventory and review of sample plans and ordinances and identify sections in these documents that address hazard mitigation-related issues; and
- To provide a platform to integrate plans and other documents so recommendations and strategies are not in contradiction with one another (e.g., between the hazard mitigation plan and comprehensive plan).

A review of current zoning and subdivision ordinances, comprehensive plans, open space and recreation plans, stormwater management plans, sediment and erosion control plans, and emergency operations plans, among others, are summarized below by level of administration (Commonwealth, Regional/County, and Municipal). Plans and regulations are bolded for easy identification.

COMMONWEALTH OF PENNSYLVANIA DOCUMENT REVIEW

- The 2018 **Pennsylvania State All-Hazard Mitigation Plan** goals and objectives that are applicable to this Butler County Plan Update including (PEMA, 2019):
 - Protect lives, property, environmental quality, and resources of the Commonwealth;
 - Enhance consistent coordination, collaboration, and communications among stakeholders;
 - Provide a framework for active hazard mitigation planning and implementation; and
 - Increase awareness, understanding, and preparedness across all sectors.

Hazard identification and risk assessment data for Butler County has been incorporated into the appropriate sections of this Plan update from the 2018 PA All-Hazard Mitigation Plan.

- The **Uniform Construction Code (UCC)** is the statewide building code (Act 45 of 1999) that took effect in Pennsylvania in April of 2004. The UCC is mandated by the State for all municipalities in Pennsylvania and establishes minimum regulations for most new construction, including additions and renovations to existing structures. All new construction is required to meet the UCC requirements statewide (PA DLI, 2021).
- The **Commonwealth of Pennsylvania Governor's Executive Order 1999-1 (Land Use Planning)** provides the basis for the requirement to integrate hazard mitigation into comprehensive land use planning. As part of this executive order, the Interagency Land Use Team was established, comprising the following state agencies: Department of Agriculture; Department of Community and Economic Development; Department of Conservation and Natural Resources; Department of Environmental Protection; Governor's Green Government Council; Fish and Boat Commission; Game Commission; Department of Transportation; and the Pennsylvania Emergency Management Agency. One of the most significant outcomes of PEMA's participation on the team is the integration of hazard mitigation goals and objectives into the comprehensive land use planning process.
- The **Pennsylvania Erosion and Sediment Control Code** requires all earthmoving projects in the Commonwealth to develop an erosion and sediment pollution control plan to ensure that proper site development practices are employed for land development and implement best management practices for the control of sediment pollution during construction. Pennsylvania DEP requires a National Pollution Discharge Elimination System (NPDES) permit for earthmoving activities exceeding one acre. As well as erosion and sediment pollution control during construction, the permit also addresses post-construction stormwater management.
- **Act 165: Hazardous Materials Emergency Planning and Response Act**, amended in 2001, established a Statewide hazardous materials safety program. This created the Hazardous Materials Response Fund, County Hazardous Material Emergency Response Accounts, and further provided duties to PEMA and the Pennsylvania Emergency

Management Council. This Act requires facilities with extremely hazardous chemicals on site to create Off-site Emergency Response Plans, which are then presented to Local Emergency Planning Committees (PEMA, 2021a).

REGIONAL/COUNTY DOCUMENT REVIEW

- Phase I of the **Butler County Comprehensive Plan**, the Reconnaissance Report, was adopted in 1997. Phase II, the Plan Recommendations, was adopted in 2002. A comprehensive plan is a policy document identifying community goals and objectives for future growth and development. In Butler County, this is the policy basis for zoning decisions and other land development policies countywide. The County Comprehensive Plan was updated and adopted in 2017, providing updated land use goals for specific planning regions in the County. Recommendations are made for each planning region around land use policies and programs to guide regional growth and development. The plan analyzes aspects of development trends, community facilities, health and safety, the physical environment, and transportation to inform goals and objectives.
- *SmartMoves for a Changing Region* is the official **long range transportation plan (LRTP)** for the Southwestern Pennsylvania metropolitan area. LRTPs are used to guide a region’s planning for a 20-year horizon. The LRTP documents current and future transportation demand and identifies long-term improvements and projects to meet those needs. The current long-range plan was adopted in June 2019 (SPC, 2019a).
- After FEMA provides a municipality with regulatory flood hazard information, they are required to adopt a **floodplain ordinance** that meets or exceeds the minimum NFIP requirements in order to participate in the NFIP. The purpose of these overriding regulations is to ensure that participating communities that flood hazard data into account when acting on land use and management. Floodplain ordinances in Butler County are included in the zoning ordinance of individual municipalities. The required free board is 1.5 feet above the base flood elevation and no building permits are issued for structures in the floodway. Elevation certificates are required by all municipalities for structures in the floodplain (FEMA, 2020). More on floodplain ordinance administration can be found below in **Section 4.2.1.3**.
- Subdivision and land development ordinances are intended to regulate the development of housing, commercial, industrial, or other uses, including associated public infrastructure, as land is subdivided into buildable lots for sale or future development. Within these ordinances, guidelines on how land will be divided, the placement and size of roads, and the location of infrastructure can reduce exposure of development to hazard events. Subdivision regulations for municipalities that have not adopted their own Ordinance, are administered through the **Butler County Subdivision and Land Development Ordinance (SALDO)** (Butler County, 2012). The Ordinance in effect is from 2012 but is currently in the process of being updated and should be in effect in late 2021. Communities can elect to opt-in and have the County administer

their zoning and subdivision regulations or opt-out and develop their own zoning and subdivision ordinance. While the County has no control over the municipalities that have their own zoning ordinances, these municipalities must meet the Act 247 guidelines – State Municipal Planning Code.

- o The BCPC oversees the administration of subdivision regulations for 22 of the County’s municipalities under the Butler County SALDO. 35 municipalities in the County administer their own Subdivision Ordinances. The following municipalities have not adopted municipal level ordinances and fall under the County-level SALDO:
 - Allegheny Township
 - Bruin Borough
 - Butler City
 - Cherry Township
 - Cherry Valley Borough
 - Chicora Borough
 - Concord Township
 - East Butler Borough
 - Eau Claire Borough
 - Evans City Borough
 - Fairview Borough
 - Fairview Township
 - Harrisville Borough
 - Karns City Borough
 - Mars Borough
 - Mercer Township
 - Parker Township
 - Petrolia Borough
 - Valencia Borough
 - Venango Township
 - Washington Township
 - West Sunbury Borough
- o 23 municipalities in the County have adopted and enforce a zoning ordinance. Butler County does not have an adopted countywide zoning ordinance.
- **Stormwater Management Plans** are prepared to comply with the Pennsylvania Stormwater Management Act (Act 167). These plans are intended to improve stormwater management practices, mitigate potential negative impacts from future land uses, and to improve the condition of impaired waterways. This type of plan provides local ordinances that incorporate standards and criteria to manage and maintain peak runoff flows throughout the combined watersheds as development occurs. Butler County has a Countywide Stormwater Management Plan that includes a Model Stormwater Management Ordinance. The plan identifies problem areas and recommendations as well as design guidelines to mitigate stormwater issues in existing and future development (Butler County, 2010). **Sediment and Erosion Control regulations** are included under the Countywide Stormwater Management Model Ordinance. All municipalities are required to adopt the model ordinance or amend existing ordinances to be consistent with the standards and criteria set forth in the Plan. If municipalities do not have the capabilities to review plans for consistency with the standards and criteria set forth in the Plan, they will be responsible to designate a representative organization that can complete the review on the municipality’s behalf.

- The Commonwealth has adopted the 2018 **UCC**, which is the most recent update. All 57 municipalities in Butler County have since adopted these **building codes** (see Commonwealth of Pennsylvania Document Review, Bullet “B”). However, not all have elected to administer enforcement. Cherry Valley, Fairview, Petrolia, and West Sunbury Boroughs have elected not to enforce the UCC. Those municipalities have contracted with the Middle Department Inspection Agency (MDIA) to administer the building code. Residential construction in Butler County is also regulated by the **International Residential Code (IRC)**, which was most recently updated in 2018. The IRC regulates the construction, alteration, movement, enlargement, replacement, repair, renovation, and demolition of one- or two-family dwellings and townhouses not more than three stories above grade in height. Building codes relate to hazard mitigation through requirements about building materials and methods that have been professionally evaluated for quality and safety, as well as inspection requirements. Municipalities have the option to adopt more stringent requirements that enhance resistant or resilient building design practices.
- **The Butler County Emergency Operations Plan (EOP)** was most recently updated and adopted in 2017. The County reviews and updates this plan every five years; it is scheduled for review and update in 2022. This plan describes emergency response coordination guidelines for the County, serving as an emergency management link between local municipalities and state government while incorporating the federal organizational concepts of the National Response Framework (NRF). The Emergency Management Services Code (PA Title 35) requires that all municipalities in the Commonwealth have a Local EOP which is reviewed every two years. Butler County supports municipalities in this process by encouraging adoption of the Countywide EOP and requiring municipalities to develop the Notification and Resource Section of the plan for their jurisdictions. **Only 16 municipalities** have confirmed their compliance with this requirement with Butler County (see Table 5.2-1). A copy of each EOP is on file with the Department of Emergency Services. Butler County operates emergency services through the Emergency Communications Center / 911. The County Emergency Services website includes listing for resources available from County assets.
 - Two regional stakeholders participated in the 2021 Hazard Mitigation Planning Update process by submitting Capability Assessment Forms: Bucks County Community College (BC3) and Moraine State Park.
 - BC3 has an EOP in place, maintained by the Executive Director of Operations.
 - Moraine State Park annually updates the Moraine State Park Emergency Manual with the Pennsylvania Bureau of State Parks.
- The Army Corps of Engineers requires to owners of all dams, no matter what their use, to conduct periodic inspections of the dam and to develop an **Emergency Action Plan (EAP)** to provide for the safety of people and property that might be flooded should

the dam fail. Each EAP addresses ways to safeguard lives and reduce property damage within the inundation area; procedures for effective dam surveillance; procedures for prompt notification of emergency management officials; warning and evacuation procedures; and emergency response actions that will be taken in the event of potential or imminent failure of the dam (FEMA, 2007). The Pennsylvania Department of Environmental Protection (DEP), in conjunction with PEMA, administers the program. DEP reviews inspection reports to make recommendations for maintenance and periodically reviews the EAP. In addition, PEMA and the County EMA will review the plan for operational effectiveness. All high-hazard dams plans are required to be created in CEM Planner, an online software designed to enhance planning and resource management capabilities. Previously, EAPs were only required for high hazard dams (PEMA, 2021b). Butler County maintains records for dams located in the County as well as those for which the inundation area includes part of Butler County. Plans are typically prepared by dam owners and are reviewed by Butler County officials. Plans are not available to the public because they include sensitive information.

- Butler County is currently in the process of contracting an environmental consultant for a **Community-Wide Brownfield Assessment**. The assessment will include Phase I and Phase II Assessments, Remedial Action Plans, Quality Assurance Project Plans, and Sampling and Analysis Plans. Funds awarded from the US EPA will be used to identify, inventory, characterize, rank, and select existing brownfield sites contaminated with hazardous substances within the County for site-specific assessment, and develop liability management and remedial strategies that allow for the safe and viable monitoring, redevelopment, and/or reuse of the identified properties (Butler County, 2018).
- The Southwestern Pennsylvania Commission (SPC), the areas MPO, maintains a variety of plans for transportation management in Butler County and surrounding counties. These plans identify the transportation needs for individuals with disabilities, older adults, and people with low incomes and provide strategies for accommodation. During hazard response, these populations should be prioritized for assistance in evacuations. SPC plans that identify mitigation strategies for transportation incidents or response measures for special populations include:
 - The 2019 Regional Active Transportation Plan (2019)
 - Public Transit-Human Services Coordinated Transportation Plan (2019)
 - Southwestern PA Regional Freight Plan (2016)
 - Transportation Demand Management Strategic Action Plan (2019)
 - Butler County Transit Development Plan (2016)
- The SPC Water Resource Center maintains conservation plans, creek restoration plans and reports, and total maximum daily load reports. These technical reports are essential to inform floodplain management and planning at the watershed level. Plans

from the WRC that can assist Butler County stakeholders in water resource management include:

- Allegheny River Conservation Plan (2005)
- Assessment of Nonpoint Source Pollution for the Buffalo Creek Watershed (2000)
- Blacks Creek Restoration Plan (2007, 2017 Update)
- Buffalo Creek Watershed Conservation Plan (2008, 2019 Update)
- Connoquenessing Creek Watershed Conservation Plan (2008)
- Slippery Rock Creek Water Conservation Plan (2011)
- Butler County is split into five Planning Regions, as shown in Figure 2.4-1: 1 - Northwest, 2 - Northwest, 3 - Central, 4 - Southwest, and 5 - Southeast. X of 57 municipalities have adopted a comprehensive plan, some of which have created multi-municipal plans together. Multi-municipal comprehensive plans include (BCPC, 2017):
 - **Northwestern Butler County Comprehensive Plan (2007)**, covering Brady Township, Slippery Rock Borough, Slippery Rock Township, West Liberty Borough, and Worth Township.
 - **Muddy Creek Lancaster Township Multi-Municipal Comprehensive Plan (2004)**, covering Muddy Creek Township and Lancaster Township.
 - **Portersville-Prospect Joint Comprehensive Plan (1970s)**, covering Portersville Borough and Prospect Borough
 - **Butler Area Multi-Municipal Plan (Regular updates)**, covering Butler City, Butler Township, East Butler Borough, Penn Township, and Summit Township.
 - **Connoquenessing Borough & Connoquenessing Township Joint Comprehensive Plan (2007)**, covering Connoquenessing Borough and Connoquenessing Township.
 - **Harmony and Zelienople Boroughs Multi-municipal Comprehensive Plan (2010)**, covering Harmony Borough and Zelienople Borough.
 - **Buffalo and Clinton Townships Multi-municipal Comprehensive Plan (2005)**, covering Buffalo Township and Clinton Township.
 - Additionally, Middlesex Township is covered by a joint comprehensive plan with Richland Township in Allegheny County.
- While there are a series of very outdated plans, a number of municipalities have recently updated their comprehensive plan or are currently in the update process, including Adams Township, Center Township, Cranberry Township, Forward Township, Saxonburg Borough, and Valencia Borough.

- Butler County has a few open space, greenway and recreation plans (BCPC, 2017). They are:
 - **Butler County Comprehensive Parks, Recreation, and Open Space Plan (2014)**
 - **Butler County Greenway and Trails Plan**
 - **Alameda Park Master Site Plan**, for Alameda park, which is owned by the County
- Moraine State Park notes working with the Pennsylvania Bureau of State Parks to develop and maintain a **Park and Resource Conservation Plan**. This is reviewed every three-four years and was most recently updated and adopted in 2020.
- Municipalities also plan for and manage open space based on their own standards. Open space plans assist in creating networks of greenways both for human activity and natural infrastructure. They identify areas offering opportunities for preserving and protecting natural resources. Several municipalities have adopted their own open space plans to aid in this process:
 - **Northwestern Butler County Multi-Municipal Comprehensive Parks and Recreation Plan (2010)**, covering Brady Township, Slippery Rock Borough, Slippery Rock Township, West Liberty Borough, and Worth Township.
 - **The Butler Area Multi-Municipal Comprehensive Recreation, Parks, and Open Space Plan (2010)**, which covers Butler City, Butler Township, East Butler Borough, Penn Township, and Summit Township.
 - **A Comprehensive Recreation, Parks, and Open Space Plan (2017)**, covering Harmony Borough, Jackson Township, and Zelienople Borough.
- The Office of Farmland Preservation assists the Butler County Agricultural Land Preservation Board to promote the preservation of viable agricultural land in Butler County. This is accomplished through the Butler County Agricultural Land Preservation Program, and when possible, by cooperating with other stakeholders. The program protects viable agricultural lands by acquiring agricultural conservation easements which prevent the development or improvement of the land for any purpose of than agricultural production and related activities. It is up to individual landowners to apply to this program. There are currently recorded conservation easements on 65 farms, totaling 6,800 acres in 25 municipalities (BCPC, 2017).
- All municipalities have subdivision regulations, either their own or administered by the Butler County Planning Commission, and 23 municipalities have adopted a zoning ordinance.
 - Seven Fields Borough noted in the 2021 Capability Assessment Survey that their land use controls include a streambank buffer protection program.

5.2.1.1. Participation in the National Flood Insurance Program

The Pennsylvania Floodplain Management Act (Act 166 of 1978) requires every municipality with flood hazard areas identified by FEMA to participate in the NFIP and permits all municipalities to adopt floodplain management regulations. 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.

FEMA Region 3 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 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), based on their 44 CFR 60.3 level of regulations. As new Flood Insurance Rate Maps (FIRMs) 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. In addition, DCED provides guidance and technical support through Community Assistance Contacts (CAC) and Community Assistance Visits (CAV).

As stated in **Section 4.3.4**, 52 of 57 municipalities in Butler County participate in the NFIP. Table 5.2.1-1 shows whether the municipality is participating in the NFIP, whether the municipality is in good standing, the number of policies they have, and the total amount of premium and coverage for each municipality.

Table 5.2.1-1 Butler County NFIP Information by Municipality

COMMUNITY	PARTICIPATION STATUS	COMMUNITY IN GOOD STANDING	POLICIES IN FORCE	TOTAL PREMIUM COVERAGE
Adams Township	Participating	Yes	23	\$6,096,333
Allegheny Township	Participating	Yes	0	\$0
Brady Township	Participating	Yes	3	\$422,685
Bruin Borough	Participating	Yes	2	\$350,732
Buffalo Township	Participating	Yes	10	\$2,235,669
Butler, City of	Participating	Yes	109	\$15,733,950
Butler Township	Participating	Yes	13	\$3,678,103
Callery Borough	Participating	Yes	2	\$455,719
Center Township	Participating	Yes	5	\$386,986
Cherry Township	Participating	Yes	3	\$297,335
Cherry Valley Borough	Not participating			
Chicora Borough	Participating	Yes	0	\$0
Clay Township	Participating	Yes	1	\$350,442
Clearfield Township	Participating	Yes	0	\$0
Clinton Township	Participating	Yes	4	\$616,663
Concord Township	Participating	Yes	2	\$168,513

Table 5.2.1-1 Butler County NFIP Information by Municipality

COMMUNITY	PARTICIPATION STATUS	COMMUNITY IN GOOD STANDING	POLICIES IN FORCE	TOTAL PREMIUM COVERAGE
Connoquenessing Borough	Participating	Yes	1	\$175,349
Connoquenessing Township	Participating	Yes	2	\$267,359
Cranberry Township	Participating	Yes	61	\$15,031,812
Donegal Township	Participating	Yes	4	\$342,088
East Butler Borough	Participating	Yes	1	\$171,751
Eau Clair Borough	Participating	Yes	0	\$0
Evans City Borough	Participating	Yes	45	\$9,048,857
Fairview Borough	Not participating			
Fairview Township	Participating	Yes	2	\$182,713
Forward Township	Participating	Yes	23	\$3,891,612
Franklin Township	Participating	Yes	2	\$700,936
Harmony Borough	Participating	Yes	24	\$3,273,577
Harrisville Borough	Participating	Yes	0	\$0
Jackson Township	Participating	Yes	19	\$3,621,565
Jefferson Township	Participating	Yes	7	\$1,299,656
Karns City Borough	Participating	Yes	0	\$0
Lancaster Township	Participating	Yes	5	\$880,682
Marion Township	Participating	Yes	4	\$524,510
Mars Borough	Participating	Yes	4	\$1,146,656
Mercer Township	Participating	Yes	1	\$28,121
Middlesex Township	Participating	Yes	15	\$4,296,302
Muddy Creek Township	Participating	Yes	2	\$420,734
Oakland Township	Participating	Yes	1	\$210,406
Parker Township	Participating	Yes	0	\$0
Penn Township	Participating	Yes	12	\$2,085,701
Petrolia Borough	Participating	Yes	0	\$0
Portersville Borough	Not participating			
Prospect Borough	Participating	Yes	0	\$0
Saxonburg Borough	Participating	Yes	2	\$700,442
Seven Fields Borough	Not participating			
Slippery Rock Borough	Participating	Yes	1	\$42,189
Slippery Rock Township	Participating	Yes	23	\$3,970,397
Summit Township	Participating	Yes	6	\$1,898,911
Valencia Borough	Participating	Yes	0	\$0
Venango Township	Participating	Yes	1	\$175,428
Washington Township	Participating	Yes	0	\$0

Table 5.2.1-1 Butler County NFIP Information by Municipality

COMMUNITY	PARTICIPATION STATUS	COMMUNITY IN GOOD STANDING	POLICIES IN FORCE	TOTAL PREMIUM COVERAGE
West Liberty Borough	Participating	Yes	1	\$165,281
West Sunbury Borough	Not participating			
Winfield Township	Participating	Yes	3	\$323,474
Worth Township	Participating	Yes	16	\$1,581,088
Zelienople Borough	Participating	Yes	33	\$13,862,523
TOTAL			498	\$101,113,250.00

For a community to participate in the NFIP, it must adopt and enforce floodplain management regulations that meet or exceed the minimum NFIP standards and requirements. These standards are intended to prevent loss of life and property, as well as economic and social hardships that result from flooding. Once FEMA provides communities with flood hazard information upon which floodplain management regulations are based, the community is required to adopt a floodplain ordinance that meets or exceeds the minimum NFIP requirements. All NFIP participating communities in Butler County have either adopted a stand-alone ordinance or have arranged for County administration of floodplain regulations.

The overriding purpose of the minimum floodplain management regulations, as outlined by the Code of Federal Regulations (44 CFR), is to ensure that participating communities consider flood hazards, to the extent that they are known, in all official actions relating to land management and use. Municipalities range from “A” to “E” levels of regulations based on their identified flood zones. In Butler County, 7 municipalities are Level “A” indicating they have no FEMA identified flood hazard areas, 15 are level “B”, 5 are level “C”, and 30 are Level “D” indicating that a floodway has been designated for certain flooding sources. Regulations become more comprehensive as you move from A to E and are dependent on whether a municipality has identified flood hazard areas, flood elevations or floodways.

A total of 25 municipalities submitted the 2021 NFIP Survey. The following information is summarized to document how the County currently assists municipalities in addressing NFIP compliance and requirements:

- The County makes the FIRM and FIS Reports available to the public for review at the Butler County Mapping Department, located at the 124 West Diamond St in the City of Butler. The Office serves as the depository for all County plans and ordinances and includes most flood-related information.
- Publication of the effective countywide FIRM occurred on August 2, 2018. Digital flood hazard information provided by FEMA greatly enhances mitigation capabilities as they relate to identifying flood hazards. Residents and municipal officials are provided with

mapping assistance from the Butler County Mapping Department and the Butler County Planning Department upon request.

- As shown in Table 5.2-1, out of 57 total municipalities, 22 are under the jurisdiction of the Butler County SALDO. Remaining municipalities administer their own subdivision and land development regulations. Local municipalities, not under the jurisdiction of the County, are responsible for all third party LOMR requests to either be: 1) submitted to FEMA through the local municipality, or 2) provided with evidence that the local municipality has been notified of the LOMR requests to FEMA.
- Several communities that administer their own zoning and floodplain regulations locally contract with private consulting firms to support these functions. For example, Center Township utilizes an engineering consultant to serve as the local engineer and zoning officer.
- All but four municipalities have adopted a floodplain ordinance. Those without ordinances identified are Cherry Valley Borough, Fairview Borough, Portersville Borough, and West Sunbury Borough.
- Butler County Department of Economic Development and Planning and some municipalities provide information to the public regarding elevation certifications and LOMAs. However, the NFIP is a program administered through FEMA. Through its Flood Hazard Mapping Program, FEMA maintains and updates data through FIRMs. Copies of documents that pertain to changing or correcting the FIRM are available through FEMA and are also available in the offices of local municipalities.
- Butler County Planning and Development provides advice and guidance to the public in interpreting the FIRM and flood studies.

In addition, some local ordinances include measures that go beyond the minimum standards and requirements for floodplain management.

- Cranberry and Muddy Creek Townships require BFE data for subdivision proposals and other development proposals larger than 50 lots or 5 acres.
- Seven Fields Borough identified that their ordinance includes a streambank protection buffer program.

Table 5.2-1 Planning Tools in Butler County Municipalities

MUNICIPALITY	LEVEL OF REGULATIONS	COMPREHENSIVE PLAN	EMERGENCY OPERATIONS PLAN	AGRICULTURAL SECURITY AREAS (FROM COUNTY COMP PLAN)	ZONING ORDINANCE
NORTHWEST PLANNING REGION					
Brady Township	B	X		X	
Franklin Township	D			X	X
Harrisville Borough	B	X			
Mercer Township	D			X	

Table 5.2-1 Planning Tools in Butler County Municipalities

MUNICIPALITY	LEVEL OF REGULATIONS	COMPREHENSIVE PLAN	EMERGENCY OPERATIONS PLAN	AGRICULTURAL SECURITY AREAS (FROM COUNTY COMP PLAN)	ZONING ORDINANCE
Muddy Creek Township	B	X		X	X
Portersville Borough	A	X			X
Prospect Borough	D	X			X
Slippery Rock Borough	A		X		
Slippery Rock Township	B	X		X	
West Liberty Borough	D				
Worth Township	B			X	
NORTHEAST PLANNING REGION					
Allegheny Township	D				X
Bruin Borough	D	X			
Cherry Township	D	X		X	
Cherry Valley Borough	A	X			
Clay Township	D			X	X
Concord Township	B	X		X	
Eau Claire Borough	A	X			
Fairview Borough	A	X			
Fairview Township	D	X			
Karns City Borough	D	X			
Marion Township	B			X	
Parker Township	B	X			
Petrolia Borough	C				
Venango Township	B				
Washington Township	B	X		X	
West Sunbury Borough	A	X			
CENTRAL PLANNING REGION					
Butler City	D	X			X
Butler Township	D			X	X
Center Township	C	X		X	X
Chicora Borough	B	X			
Clearfield Township	D		X	X	X
Donegal Township	B	X		X	
East Butler Borough	D		X		
Oakland Township	C			X	
Summit Township	D		X	X	X
SOUTHWEST PLANNING REGION					
Adams Township	D	X	X	X	X
Callery Borough	D	X			

Table 5.2-1 Planning Tools in Butler County Municipalities

MUNICIPALITY	LEVEL OF REGULATIONS	COMPREHENSIVE PLAN	EMERGENCY OPERATIONS PLAN	AGRICULTURAL SECURITY AREAS (FROM COUNTY COMP PLAN)	ZONING ORDINANCE
Connoquenessing Borough	D		X		
Connoquenessing Township	D		X	X	
Cranberry Township	D	X	X	X	X
Evans City Borough	D		X		
Forward Township	D	X	X	X	
Harmony Borough	D	X			X
Jackson Township	D	X		X	X
Lancaster Township	D	X		X	X
Mars Borough	C	X	X		X
Seven Fields Borough	D	X	X		
Valencia Borough	D	X	X		
Zelienople Borough	D	X			X
SOUTHEAST PLANNING REGION					
Buffalo Township	D			X	X
Clinton Township	B			X	X
Jefferson Township	B	X		X	
Middlesex Township	D			X	X
Penn Township	C	X	X	X	X
Saxonburg Borough	A	X	X		
Winfield Township	B	X		X	X

Many of the above stated higher standards adopted by municipalities such as freeboard requirements and addressing repetitive loss properties could be eligible for credit under the Community Rating System (CRS). The NFIP’s CRS provides discounts on flood insurance premiums in those communities that establish floodplain management programs that go beyond NFIP minimum requirements. Under the CRS, communities receive credit for more restrictive regulations; acquisition; relocation, or flood-proofing of flood-prone buildings, preservation of open space; and other measures that reduce flood damage or protect the natural resources and functions of floodplains.

The CRS was implemented in 1990 to recognize and encourage community floodplain management activities that exceed the minimum NFIP standards. Section 541 of the 1994 Act amends Section 1315 of the 1968 Act to codify the CRS in the NFIP and expands the CRS goals to specifically include incentives to reduce the risk of flood-related erosion and to encourage measures that protect natural and beneficial floodplain functions. These goals have

been incorporated into the CRS, and communities now receive credit toward premium reductions for activities that contribute to them.

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

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

There are 10 CRS classes that provide varied reduction in insurance premiums for property owners in both the SFHA and non-SFHA. Class 1 requires the most credit points and gives the largest premium reduction; Class 10 receives no premium reduction. CRS premium discounts on flood insurance range from 5 percent for Class 9 communities up to 45 percent for Class 1 communities. The CRS recognizes 19 creditable activities that are organized under four categories: Public Information, Mapping and Regulations, Flood Damage Reduction, and Flood Preparedness (FEMA, 2018c).

No Butler County municipalities participate in this program. Input provided during the Plan Update process indicates that the administrative documentation procedures and their associated costs may be a hindrance to municipalities in using this program.

For communities that participate in the NFIP, substantial damage determinations are required by local floodplain management ordinances. These rules must be in place for residents of a community to purchase flood insurance through the NFIP. The determination about whether a structure is “substantially damaged” is made at the local government level, generally by a building official or floodplain manager. Substantial damage applies to a structure in the SFHA for which the total cost of repairs is 50 percent or more of the structure’s market value before the disaster occurred, regardless of the cause of damage. This percentage could vary among jurisdictions but must not be below NFIP standards. Preliminary damage assessments conducted by Butler County after a disaster can be used when making substantial damage determinations. If a building within the floodplain is determined to be substantially damaged after a disaster, it will need to be brought into compliance through methods such as elevating the structure and floodproofing utilities. This should be monitored by the local community in order to stay in compliance with the NFIP.

5.2.2. Administrative and Technical Capability

Administrative capability is described by an adequacy of departmental and personnel resources for the implementation of mitigation-related activities. Technical capability relates to an adequacy of knowledge and technical expertise of local government employees or the ability to contract outside resources for this expertise in order to effectively execute mitigation activities. Common examples of skill sets and technical personnel needed for hazard mitigation include: planners with knowledge of land development/ management practices, engineers or professionals trained in construction practices related to buildings and/or infrastructure (e.g. building inspectors), planners or engineers with an understanding of natural and/or human caused hazards, emergency managers, floodplain managers, land surveyors, scientists familiar with hazards in the community, staff with the education or expertise to assess community vulnerability to hazards, personnel skilled in GIS, resource development staff or grant writers, and fiscal staff that can handle complex grant application processes.

A variety of administrative capabilities, bolded, are established in Butler County and its jurisdictions. These capabilities can support the implementation of mitigation actions that are proposed in this plan. These capabilities include:

- **The Butler County Department of Economic Development and Planning** provides professional planning services to citizens, communities, and municipalities in Butler County. The office is responsible for carrying out duties set forth in the Pennsylvania Municipalities Planning Code (PA Act 247 of 1968, amended and reenacted in 2017). Duties related to hazard mitigation planning include:
 - Preparing and updating the Butler County Comprehensive Plan
 - Administering the County’s SALDO
 - Administering the Butler County Agricultural Land Preservation Board’s PA Agricultural Conservation Easement (PACE) program
 - Assisting municipalities with preparing, modifying, or reviewing plans and ordinances, including comprehensive plans, capital improvements, zoning and subdivision ordinances, and the NFIP.
 - Providing technical planning assistance to the County’s municipalities
 - Representing the County on various committees, boards, and organizations throughout the County and region
 - Coordinating with the Butler County Department of Emergency Services / 911
 - Offering technical assistance to public agencies and organizations including grant writing and administration
 - Providing staff support to the Southwestern Pennsylvania Commission
 - Applying for and administering the County’s Community Development Block Grant Program, including the administration of Entitlement funding.

- Administering all County responsibilities for waste and recycling as required by Pa. Act 101, including the maintenance of landfill contracts and a database of disposal options for various types of waste.
- **The Butler County Mapping Office** is housed in the Department of Economic Development and Planning. This office performs mapping and spatial database maintenance work for various County departments, but primarily Planning and Emergency Services. The office provides several open data resources for municipalities to use and can assist municipalities and other entities in specific projects.
- Transportation planning in the region is conducted through the **Southwestern Pennsylvania Commission (SPC)**, the regional MPO. The MPO decides how the Federal and State transportation funds will be allocated in the ten-county southwest region of the Commonwealth. One of the primary roles and responsibilities of SPC is to develop and update the LRTP, as mandated by federal transportation and authorization legislation.
- The **Butler County Department of Emergency Services / 911** 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. A significant amount of information used to develop this plan was obtained from the emergency management coordinators. The 911 division serves residents and businesses across the County with various types of emergency and non-emergency situations. This division maintains up to date telephone and mapping systems, and act as the primary contact for those needing police, ambulance, or fire assistance.
- The OES also contains a **Local Emergency Planning Committee (LEPC)**, which is responsible for overseeing Hazardous Materials Response Account and approving Off-site Emergency Response Plans. The LEPC is comprised of volunteers from Butler County DES, and a variety of agencies including police departments, fire companies, local elected officials, transportation officials, and the general public.
- **The Butler County Conservation District** provides local assistance to individuals and organizations that interact with the County's natural resources. Their mission is to work collectively to sustain and improve natural resources in Butler County.
- There are a number of **watershed associations** in the Butler County region, including:
 - Audubon Society of Western Pennsylvania
 - Connoquenessing Watershed Alliance
 - Slippery Rock Watershed Alliance
 - Allegheny Aquatic Alliance
 - Wild Waterways Conservancy
 - Glade Run Lake Conservancy
- Natural and human-made hazards' characteristics and impacts can be highly technical. Having access to a scientist who can describe the technical aspects of hazards in lay

terms is important to having a sound mitigation strategy. **Butler County Community College, Slippery Rock University,** and the **Penn State Extension Service Butler County** campus could provide significant academic support by offering programs and research in relevant fields including meteorology, floodplain management, architecture, engineering, forest management, and city planning.

- Butler County is certified as a **StormReady Community** by NWS. The Storm Ready program was established to help local governments improve the timeliness and effectiveness of hazardous weather-related warnings for the public. By participating in this program, local agencies can earn recognition for their jurisdiction by meeting the guidelines established by NWS in partnership with Federal, State, and local emergency management professionals. If any municipalities were to become certified, they would be eligible for 25 points in the Community Rating System, awarded to local governments that meet the flood threat recognition system.
- **The Pennsylvania State Association of Township Supervisors (PSATS)** strives to preserve and strengthen township government and to improve involvement for townships in the state. PSATS sponsors training opportunities to provide township officials with the information and skills they need to meet the challenges of township office.

Based on assessment results, municipalities in Butler County have moderate to limited administrative and technical staff needed to conduct hazard mitigation-activities. The municipalities vary in staff size, resource availability, fiscal status, service provision, population, overall size, and vulnerability to the profiled hazards. Generally, those municipalities in the northern rural lands of the County tend to have fewer residents, less staff, and a more limited supply of available resources than those municipalities with higher populations that are located in the central and southern portions of the County. Each municipality carries out its own daily operations and provide various community services according to their local needs and limitations. Some of these municipalities have formed cooperative agreements and work jointly with their neighboring municipalities to provide such services as police protection, fire and emergency medical response, recreational opportunities, wastewater treatment, water supply management, and infrastructure maintenance. Much of the planning, engineering, and land surveying capabilities are provided by consulting firms. All municipalities have an identified emergency management coordinator, although some of these coordinators are responsible for more than one jurisdiction. Main findings on technical capabilities from the 35 returned Capability Assessment Forms include:

- 17 municipalities reported having an Engineering Department or a municipal engineer (contracted or employed by the municipality). Six municipalities reported that they did not: Chicora Borough, Clearfield Township, East Butler Borough, Penn Township, Saxonburg Borough, and Slippery Rock Borough.
 - Moraine State Park notes having access to engineering services as needed through the Bureau of Facility Design and Construction in partnership with the

PA Department of Conservation and Natural Resources. This enhances capability to address engineering and construction services needed in the park.

- Floodplain Administrators (FPAs) are experts in the rules and regulations of development in a floodplain and can provide vast amounts of information on the risks and impacts of building within those hazard areas. They are an integral part of the mitigation planning team and can make recommendations based on the needs and conditions of the community. 19 of the 25 municipalities that responded to the NFIP Survey reported that they participate in the NFIP and have a designated FPA. Those municipalities that are under the County SALDO utilize the County FPA.
- Many of the funding streams that can be used for hazard mitigation have substantial management and reporting requirements. Employing or having access to staff specializing in grants management will help the community ensure that it does not lose a grant opportunity because it did not meet the administrative requirements of that grant. Only five municipalities noted this capability in the survey, meaning the majority of municipalities have to rely on assistance from the County or contracting grant writing projects to outside sources.

Within Butler County, administrative and technical capability varies widely between the municipalities due mainly to population size and resources. Even neighboring municipalities may exhibit extreme variations in technical capability.

Several communities noted they would like training in various areas in order to build their technical and administrative capabilities. Requested topics include detailed information on floodplains and flood areas and the CRS program. Conducting more frequent technical training sessions with state and regional partners is one way to increase these capabilities.

Butler County Community College (BC3) submitted a Capability Assessment Form, which notes that there is a BC3 Emergency Response Team in place to deal with any potential emergency response effort needed on or near any BC3 campuses. The response team is led by the Executive Director of Operations, who also acts as the chief building officer for BC3 campuses.

State agencies can provide technical assistance for mitigation activities. For example, in 2018, PA DEP helped Butler County begin the process for a Community Wide Brownfield Assessment. State agencies that can provide hazard assistance include, but are not limited to:

- Pennsylvania Department of Community and Economic Development;
- Pennsylvania Department of Conservation and Natural Resources;
- Pennsylvania Department of Environmental Protection;
- Pennsylvania Department of Health; and
- Pennsylvania Department of Transportation.

Butler County can also partner with Federal agencies for technical assistance on mitigation activities. These agencies include but are not limited to:

- Federal Emergency Management Agency;
- United States Army Corp of Engineers;
- Department of Housing and Urban Development;
- United States Department of Agriculture;
- Economic Development Administration;
- FEMA's Emergency Management Institute;
- United States Environmental Protection Agency; and
- Small Business Administration.

5.2.3. Financial Capability

A critical part to the implementation of any plan is the financial resources to accomplish the priority projects identified. The implementation of mitigation actions requires time and fiscal 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 utilize state or federal mitigation grant funding opportunities that require local-match contributions. Based on the Capability Assessment Survey results received, most municipalities within the County perceive fiscal capability to be limited.

In general, the more financial resources a municipality has, the more technically capable it will be from a resource availability perspective. This is not necessarily the case, however when analyzing technical capability from a knowledge/skill level perspective. As such, technical capability must be analyzed by each municipality prior to implementing any hazard mitigation activity. It is important to note; however, that much like fiscal capability, shortfalls in technical capability may be overcome by cooperative arrangements, coordinated efforts, and/or resource efficiency.

Every jurisdiction must operate within the constraints of limited financial resources. During the 1960s and 1970s, state and federal grants-in-aid were available to finance many programs, including street improvements, water and sewer facilities, airports, and parks and playgrounds. During the early 1980s, there was a significant change in federal policy, based on rising deficits and a political philosophy that encouraged states and local governments to raise their own revenues for capital programs, resulting in the need to identify alternate means to augment revenue. After the COVID-19 pandemic, communities across the country will face new challenges in balancing community economic recovery while also implementing hazard mitigation.

Support for mitigation planning actions is most often provided by the Commonwealth of Pennsylvania and the Federal Government. Programs, bolded, that complement Butler County mitigation planning initiatives include the following state and federal programs.

- Pennsylvania Administered programs including:
 - **Municipal Assistance Program**, which provides funding to assist local governments to plan for and efficiently implement a variety of services and improvements, and soundly manage development with an emphasis on intergovernmental approaches.
 - In Spring 2021, Butler County Commissioners were awarded \$12,000 under the MAP Shared Services and Planning Program. This will fund various professional consultant fees needed to perform a SALDO update (PA DCED, 2021a).
 - **Shared Municipal Services**, which provides grant funds to promote cooperation among municipalities.
 - **Land Use Planning and Technical Assistance Program**, which provides grant funds for the preparation of community comprehensive plans and ordinances to implement them.
 - **Floodplain Land Use Assistance Program**, which provides grants and technical assistance to improve management of floodplain lands.
 - **Community Revitalization Program**, which provides grant funds to support local initiatives that promote social and economic diversity to ensure a productive tax base and good quality of life.
 - **The Growing Green Plus Grants Program** is an extension to the Growing Greener Grants Program administered by PA DEP. Programs covered with these funds are: Growing Greener Watershed Restoration and Protection, Surface Mining Conservation and Reclamation Act Bond Forfeiture, and Abandoned Mine Drainage Set-Aside Grants.
 - In 2019, Stream Restoration Incorporated in Butler County was awarded over \$920,000 under this program for passive treatment rehabilitation and maintenance on Slippery Rock Creek (PA DEP, 2019c).
 - In 2020, several grants were awarded in Butler County (PA DEP, 2020).
 - Adams Township and Valencia Borough were awarded \$30,000 for a MS4 Stream/Floodplain Restoration Project.
 - Adams Township was awarded \$300,000 for an additional stream/floodplain restoration project.
 - Stream Restoration Incorporated was awarded over \$260,000 to complete Datashed 4, which will assist in future restoration projects.
 - **The Environmental Education grant** administered by the PA DEP was established by the Environmental Education Act of 1993, which mandates that

five percent of all pollution fines and penalties collected annually be set aside for environmental education.

- The **Alternative Fuels Incentive Grant (AFIG) Program** was established by PA DEP in 1992 under Act 166. This program provides funding to create new markets for alternative fuels in Pennsylvania. Municipalities and agencies are eligible to apply for grant funding for alternative fuels through this grant program.
- **Pennsylvania Infrastructure Investment Authority (PennVEST)** administers a low interest loan and grant program for new construction or improvements to publicly or privately-owned drinking water, storm water, or sewage treatment facilities, as well as non-point source pollution prevention best management practices (BMPs).
- DCNR administers **Community Conservation Partnerships Program Grants**. This program is funded with a variety of state and federal funding sources, including the Keystone Recreation, Park and Conservation Fund (Key 93) which encompasses several environmental and conservation related funds.
- DCED manages the **PA Small Water and Sewer Grant** which funds small water, sewer, storm sewer, and flood control infrastructure projects. Funding is made available by the Commonwealth Financing Authority.
- DCED manages the **Abandoned Main Drainage (AMD) Abatement and Treatment Program** which funds projects which involve the reclamation of abandoned mine wells, construction of a new AMD site, remediation and repair of existing AMD sites, operation and maintenance maintaining current AMD remediation sites, establishment of a trust fund to ensure ongoing maintenance is achieved, and monitoring of water quality to track or continue to trace non-point load reductions resulting from AMD remediation projects.
- Federal Government programs including:
 - **Hazard Mitigation Assistance Programs**, which provide grants for cost-effective mitigation projects either in the absence of a disaster or after a disaster declaration has occurred:
 - Flood Mitigation Assistance Program (FMA)
 - Hazard Mitigation Grant Program (HMPG)
 - In 2007, HMPG funds were awarded to Harmony Borough for the acquisition of private real property including the structures and the land subject to riverine flooding (FEMA, 2021f).
 - Forward Township has been awarded funding for an acquisition project.
 - The **Building Resilient Infrastructure and Communities (BRIC) Program** is a new funding program that will support states, local communities, tribes, and territories undertake hazard mitigation projects. BRIC

replaced the prior Pre-Disaster Mitigation (PDM) program that was previously housed under HMA programs.

- **Community Development Block Grants (CDBG)**, which provides funds to address a wide range of community development needs, including community development activities directed toward revitalizing neighborhoods, economic development, and providing improved community facilities and services. CDBG funds may be used for activities such as acquisition of real property; relocation and demolition; rehabilitation of residential and non-residential structures; and construction of public facilities and improvements to facilities such as water, sewer, and streets. There is an extra CDBG fund set aside for post-disaster recover costs.
- **Small Communities Program Fund**, which supports water quality infrastructure projects.
- **Weatherization Assistance Program**, which enables low-income households to make their homes more energy efficient.
- The US EPA administers the **Community-Wide Brownfields Assessment Grant Project**, which provides funding for recipients to inventory, characterize, assess, conduct planning activities, develop site-specific cleanup plans, and conduct community involvement related to brownfield sites.
 - In 2018 and again in 2021, Butler County was awarded a \$600,000 Community-Wide Brownfield Assessment grant for hazardous substances. Funding will be used to identify, inventory, characterize, rank, and select existing brownfield sites contaminated with hazardous substances within the County for site-specific assessment. It will also allow the County to develop liability management and remedial strategies that allow for the safe and viable monitoring, redevelopment, and/or reuse of the identified properties (Butler County, 2018) (US EPA, 2021c).
- **The CARES Act** was passed in Spring 2020 to financially assist communities, businesses, and families through the economic crisis brought on by the COVID-19 pandemic. Funds allocated to the State were passed on the Butler County to support business relief during closures of non-essential services. These types of funds only come in response to emergencies.
 - Organizations in Butler County were awarded \$1.5 million for rapid rehousing, homelessness prevention, and the opening of an emergency shelter to reduce homelessness as a way to prevent the spread of COVID-19. An additional \$17,000 was awarded for code blue relief during winter months (PA DECED, 2021b).
- The **Emergency Watershed Protection (EWP) Program** is administered by the USDA Natural Resources Conservation Services to help communities quickly address serious and long-lasting damages to infrastructure and the

- environment. These funds are allocated soon after disasters to assist with immediate recovery needs.
- The **Homeland Security Grant Program (HSPG)** assists communities in implementing the National Preparedness System by supporting the building, sustainment, and delivery of core capabilities essential to achieving the National Preparedness Goal of a secure and resilient Nation. The HSPG's allowable costs support efforts to build and sustain core capabilities across the prevention, protection, mitigation, response, and recovery, including priorities towards preventing terrorism and enhancing state and major urban area fusion centers.
 - **The Assistance to Firefighters Grant (AFG)** administered by **FEMA** provides funds to help firefighters and other first responders obtain essential resources to protect the public and emergency responders in hazard events.

Based on Capability Assessment Survey responses, fiscal capabilities of Butler County municipalities vary greatly from community-to-community. Of the 35 responses, only ten municipalities indicated that they maintain a Capital Improvements Program (CIP). The CIP is a multiyear policy guide that identifies needed capital projects and is used to coordinate the financing and timing of public improvements. Capital improvements relate to streets, stormwater systems, water distribution, sewage treatment, and other major public facilities.

Eight municipalities indicated that they work with water authorities that have implemented utility fees that can be used for stormwater management projects. Water authorities are multipurpose authorities with water projects, many of which operate both water and sewer systems. The financing of water systems for lease back to the municipality is among the principal activities of the local government facilities' financing authorities. An operating water authority issues bonds to purchase existing facilities or to construct, extend, or improve a system. The primary source of revenue is user fees based on metered usage. The cost of constructing or extending water supply lines can be funded by special assessments against abutting property owners. Tapping fees also help fund water system capital costs. Water utilities are directly operated by municipal governments and by privately owned public utilities regulated by the Pennsylvania Public Utility Commission. The PADEP has a program to assist with consolidation of small individual water systems to make system upgrades more cost effective.

Sewer authorities include multipurpose authorities with sewer projects. The authorities issue bonds to finance acquisition of existing systems or to finance construction, extension, and improvements. Sewer authority operating revenues originate from user fees. The fee frequently is based on the amount of water consumed, and payment is enforced by the ability to terminate service or the imposition of liens against real estate. In areas with no public water supply, flat rate charges are calculated on average use per dwelling unit.

The decision and capacity to implement mitigation-related activities is often strongly dependent on availability of local financial resources. While some mitigation actions are less costly than others, it is important that money is available locally to implement policies and projects. Financial resources are particularly important if communities are trying to leverage state or federal mitigation grant funding opportunities that require local-match contributions.

5.2.4. Education and Outreach

Education and outreach programs and methods are used to implement mitigation activities and communicate hazard-related information. Examples include fire safety programs that fire departments deliver to students at local schools; participation in community programs such as Firewise USA® or StormReady® and activities conducted as part of hazard awareness campaigns, such as Tornado or Flood Awareness Month. Some communities have their own public information or communications office to handle outreach initiatives. Overall, programs not relating to certification are not common within the County.

Reported education and outreach activities, bolded, in Butler County are summarized as follows:

- Butler County disseminates critical information through **AlertPA**, a mass notification system by CodeRED. It allows local emergency managers to send out alerts via phone, text, or email in the event of emergency and weather-related alerts, health notifications, building alerts, and other public service announcements to residents who sign up for the program. Additionally, a CodeRED Weather Warning will automatically alert residents whose address falls in the path of severe weather, as determined by the National Weather Service (Ready PA, 2021).
 - Representatives from some municipalities note that not all residents have cell phones and cannot get cell phone alerts, making this service unsuitable for their needs. This is especially present among older populations.
- **Firewise USA** designation is an optional recognition program that empowers neighbors to take action to reduce wildfire risk. It is a five-step, voluntary process that helps communities develop an action plan that minimizes wildfire risk and helps build more safely. Currently, no municipalities in Butler County have received Firewise USA or Firewise Communities Certification. Firewise USA replaced Firewise Communities, which was discontinued in 2019 (NFPA, 2021).
- **StormReady Certification** is an education and outreach program that helps arm communities with the communication and safety skills needed to save lives and property before, during, and after an event. The program is administered by the National Weather Service of the National Oceanic and Atmospheric Administration (NOAA) (NOAA NWS, 2021c). Butler County completed its enrollment in 2016; all communities are covered under the County Certification.

- Butler County has achieved **NOAA Weather-Ready Nation (WRMN) Ambassador** status, which recognizes NOAA partners that are improving resilience against extreme weather events. Partners help unify efforts across government, non-profits, academia, and private industry toward making the community and the nation more ready. NOAA supports Ambassadors by providing outreach content about creating a Weather-Ready Nation, exploring innovative approaches for collaboration, and assisting with StormReady/TsunamiReady opportunities (NOAA NWS, 2021d).
- SPC also runs the **Water Resource Center**, meeting four major goals. (1) Provide needed technical assistance, (2) Provide educational resources, (3) Serve as a regional information clearinghouse, and (4) Provide a forum for regional coordination of issues. SPC helps counties maintain water related plans and provides educational resources and events for stakeholders in Southwest Pennsylvania, as well as other Pennsylvania Counties, and those in Maryland, Ohio, and West Virginia. The WRC provides information about safe drinking water, flood hazards, stormwater management, and watershed planning (WRC, 2021).
- The **Connoquenessing Valley Regional EMA** leverages their social media outlets to share information and educate the community in emergency preparedness and mitigation.
- Butler County utilizes **Code Red** for mass notification.

5.2.5. Plan Integration

Plan integration ensures that hazard mitigation planning is woven into each municipality's planning and regulatory documents. These include the plans, policies, codes, and programs that guide land use and development. Effective integration of hazard mitigation occurs when the planning framework fosters development that does not increase risks from known hazards or leads to redevelopment that reduces risk from known hazards. In Pennsylvania, integrating hazard mitigation into planning tools is afforded through the Municipalities Planning Code in that protecting and promoting safety and health is a purpose of the code. Further, a purpose of the Municipalities Planning Code is "to minimize such problems as may presently exist or which may be foreseen," which is the focus of hazard mitigation planning.

While not all regulatory tools are relevant to every municipality in Butler County, each municipality should evaluate what tools are available to them related to their vulnerability identified in this HMP. Communities should continue to review and revise building codes, zoning ordinances, floodplain ordinances, and subdivision and land use development ordinances with respect to findings in the 2021 HMP risk assessment. For example, a municipality could revise its zoning ordinance to restrict the density of new development in hazard-prone areas or guide development away from these areas. Some tools may also be useful for addressing multiple hazards in these municipalities; for example, the presence of a stormwater management plan would greater enhance mitigation capabilities needed to address both flood and transportation hazards.

Moving forward, each of these documents should not be treated as unrelated and updated separately. The County and each participating municipality are responsible for incorporating the specific mitigation actions recommended in this Plan into the necessary planning documents, including the appropriate comprehensive plan, the County EOP, and any land use ordinances and regulations.

COMPREHENSIVE PLANS

As mentioned above, Butler County adopted its original Comprehensive Plan in 1997, which includes the Phase I Existing Conditions report. The Phase II Recommendations report was adopted in 2002. Both phases were updated and adopted by the County in 2017. It is key that the County integrates findings and recommendations from the 2021 HMP Update into the implementation strategies and projects identified in chapters of the comprehensive plan. The planning elements in these documents relate to risk identified in this plan, for example flooding and environmental hazards from coal mining and the use of oil wells. Chapter One of the County Comprehensive Plan establishes a set of goals relating to future land use and relates these to recommendations for implementation. One of the County's key goals, as outlined in the Comprehensive Plan, is to protect rural landscapes and natural and scenic resources for their environmental and cultural benefits. Specifically, the County aims to balance demands for growth while protecting the County's natural resources, such as its rural landscapes. One tool that the County has used to help preserve open space, prime soils and soils of statewide importance is the use of agricultural conservation easements. To further the objectives of this program, Clinton Township has initiated their own agricultural easement program cooperatively within the County program, the first of its kind in western Pennsylvania and aimed at leveraging more funding towards this program.

The goals, objectives, and recommendations and implementation strategies established in the Comprehensive Plan are to some extent related to the hazard mitigation risks and goals established in this HMP. The Comprehensive Plan includes ten goals, and all of them relate to hazard mitigation planning in some way. A few of the most directly related goals and a description of how they relate are listed below:

- Provide basic information about growth and development patterns in each of the counties five regions - Development and growth directly relate to an areas vulnerability. Thinking about how the county and its communities are growing, and how to implement mitigation efforts as growth is taking place can help reduce vulnerability. **Section 4.4.4** provides more detail on this.
- Provide information about unconventional natural gas development trends within the County - One of the highest ranked hazards in the plan is unconventional oil and gas well incidents. Any mitigation efforts to address unconventional wells can help inform and address this goal, and vice versa.

- Support efforts to protect rural landscapes and natural and scenic resources through voluntary land conservation and maintaining value of rural land for rural uses - Thinking about hazard mitigation is important when considering land preservation. Protecting these landscapes and resources from potential risk can help them thrive. Also, mitigation efforts can help focus on preservation and the mitigation strategy does address this.
- Prioritize continued investments in highway improvements to minimize traffic congestion and assist in developing and rebuilding other local infrastructure - The highest ranked hazard in the plan is transportation incidents. Aligning efforts involved with both plans can strategically help address this risk.

A key opportunity for further integration of hazard mitigation into planning and regulatory tools is to include them in ongoing coordination of implementation strategies that can help to achieve the established goals and objectives of both plans. These strategies can include adopting or amending ordinances, as described with hazard-risk zoning above.

The Butler County Department of Economic Development and Planning (BCDEDP) should develop strategies for implementation using updated information on the physical, social, and economic conditions in the County. As this effort progresses, the HMSC should ensure that the findings of the Risk Assessment and the Mitigation Strategy are shared with BCDEDP. The HMSC will also work to identify actions from the Mitigation Strategy, as well as additional regulatory tools, that can be incorporated into the implementation of the 2017 Comprehensive Plan Update documents. Such strategies could include utilizing hazard information in the 2021 HMP Update to inform future land use and discourage growth in high-hazard areas.

A series of municipalities in Butler County operate under multi-municipal or joint comprehensive plans. Planning agencies that maintain these plans should integrate HMP information and materials throughout regional and municipal planning processes such as these. It is recommended that BCDEDP assist municipalities in this process by bringing HMP information and materials to meetings to share with municipalities. Integrating the discussion of these planning efforts enables better implementation of hazard mitigation strategies. BCDEDP should track all municipal planning efforts in order to integrate hazard mitigation through a variety of plans and regulations. While regional comprehensive plans are developed and updated in the future, communities should consider including hazard mitigation as an element in land use control.

TRANSPORTATION PLANS

The *SmartMoves Long Range Transportation Plan* (LRTP) that covers Butler County and nine other counties in Southwestern Pennsylvania does not specifically address hazard mitigation planning; however, there are segments of the plan that relate to hazard mitigation, such as

goals enhancing road safety and hazard reduction. The environmental analysis section of the LRTP discusses SPC's process for evaluating the potential impacts on community and environmental resources. When impacts are unavoidable, SPC and project sponsors focus on minimizing and mitigating potential impacts of transportation projects, such as through coordination with local resource agencies and educating candidate project sponsors about environmental mitigation strategies.

While this plan was recently adopted, there are several opportunities to integrate hazard mitigation principles and actions in the next update. Important additions can include an inventory of vulnerable transportation assets, a comprehensive group of evacuation routes, and ways hazards may potentially impact each County's transportation system. Further, the environmental impact section could be expanded to describe how reducing impacts on the environment can mitigate some hazards. For example, stormwater management improvements not only reduce pollution in nearby waterways, but also the impacts of flooding from impervious surfaces. Hazard mitigation actions also help to preserve existing transportation infrastructure. The integration of actions from the 2021 HMP Update will ensure projects are prioritized for the Transportation Infrastructure Plan (TIP), which is the official list for upcoming planning transportation projects.

ORDINANCES AND CODES

Hazard mitigation planning can be integrated into Butler County's Stormwater Management Regulations. All municipalities have enacted their own stormwater management ordinances following Butler County's Act 176 Stormwater Management Plan. Municipalities can provide recommendations for proper long-term operation and maintenance of stormwater facilities within the subdivision and land development ordinances, work closely with the County to assure that stormwater facilities are maintained long-term, and can ensure any new hydrology studies are adopted upon completion.

Specific language in the Butler County SALDO (that is currently in the process of being updated) that relates directly to hazard mitigation is documented below. The County administers subdivision and land development regulations for municipalities under its jurisdiction, and the remaining municipalities maintain administration of their own SALDO regulations.

- Upon request, applicants may be required to submit subsurface and drainage conditions of the tract including, but not limited to, the identification of areas previously mined, and soil classifications of the area proposed to be disturbed or developed.
- Land which is unsuitable for development because of hazard(s) to life, health, safety, and/or property shall not be subdivided and/or developed until such hazard(s) have been eliminated or unless adequate safeguards against such hazards are provided for

in the Development Plan. Specific hazards unique to municipalities utilizing this Ordinance may be, but are not limited to:

- Land which is subject to flooding or which has a high ground water table.
- Land which, if developed, will create or aggravate a flooding condition.
- Land which is subject to subsidence or other unstable subsurface conditions.
- Lands with slope greater than sixteen percent.
- Lands which are subject to landslide.
- Land which, because of topography or difficulty of access, is considered to be hazardous by the BCPC.
- Land which is known to be polluted or contaminated with human health-threatening substances as determined by the US EPA.
- Land subject to hazards of life, health, and safety, such as strip mine land, quarry land, open ditches, and land subject to flooding or subsidence, shall not be subdivided for residential purposes until all such hazards have been eliminated, or unless guarantees are given that adequate safeguards against such hazards are provided by the subdivision or land development plan.
- Proposed improvement information shall include a general drainage plan for stormwater and stormwater retention to include proposed flow of stormwater in relation to natural channels and erosion and sedimentation controls.
- The location of all mobile home parks shall comply with the following minimum requirements: (1) not in a designated FEMA flood zone, and (2) not subject to any hazard or nuisance conditions adjacent to the mobile home park, such as excessive noise, vibration, smoke, the storage of toxic material, radiation, heat, odor, or glare.
- For multi-building and multi-use land development, a complete Pedestrian Circulation Plan shall be submitted by the developer, indicating the safe and efficient movement of people within and through the site.

EMERGENCY MANAGEMENT

Butler County has a countywide EOP, which was last reviewed in 2017, and 12 municipalities have identified adoption of a local EOP. These plans embrace an “all-hazards” principle. Most emergency response functions are similar, regardless of the hazard, and the EMC is required to mobilize functions and personnel as required by the emergency. This plan mentions that mitigation opportunities will be considered throughout disaster operations. Implementation includes a combination of conservation tools including land management plans and easements; regulatory methods such as density transfers, zoning overlays, buffer zones, subdivision exactions, land acquisition made possible through donation and purchase, and purchase of development rights. As these plans are updated, they should incorporate relevant information from the Butler County HMP risk assessment to provide a more detailed overview of potential hazards. These plans should also incorporate long-term mitigation strategies, such as those outlined in this HMP Update, in addition to short-term response and recovery.

INTEGRATION CAPABILITIES

Based on the capability assessment results and information from Butler County stakeholders, all of Butler County’s jurisdiction have some form of local land use controls. Any municipalities that have not adopted their own SALDOs are covered under the Butler County SALDO (Butler County, 2012). Some municipalities have adopted their own zoning ordinances. As is discussed in **Section 6.1 – Mitigation Strategy Update Process Summary**, Butler County reviewed the 2015 Mitigation Actions, and determined that the County and several municipalities completed mitigation actions that achieve plan integration by furthering hazard mitigation goals through various land development regulations. Some other land use tools in municipalities have not been updated recently. As municipalities work to update comprehensive plans and land use ordinances, local governments can go further to use land use regulations to direct development away from hazard-prone areas. For example, municipalities should look to the Streambank Buffer provision that Seven Fields Borough has included.

A number of municipalities are currently updating local comprehensive plans and land use controls, including Forward Township and Saxonburg Borough. It is essential to integrate the findings from the 2021 HMP Update into these and future updates of planning and regulatory capabilities.

Multiple communities noted in the 2021 Capability Assessment Survey that they have various technical and administrative capabilities but that they do not currently relate to hazard mitigation. For example, while Connoquenessing Borough has a code enforcement department, it does not review codes or planned development based on hazard mitigation goals in Butler County. Local municipalities should expand these capabilities to include hazard mitigation planning principles. This can be achieved through technical assistance and training focused on joining County planning capabilities with local regulatory capabilities. Partnerships between County planners and municipal code enforcement departments and officers can help municipalities steer development away from hazard zones, for example floodplains or undermined areas.

Many communities release regular newsletters to their residents. Some of these already include safety and hazard mitigation related information. For example, Summit Township’s most recent Fall 2019 newsletter included mitigation strategies and tips for reducing wildfire risk. The integration of hazard mitigation guidelines and tips for residents in these types of regular communication are essential for building widespread consciousness around preparedness and response. Municipalities can draw on the 2021 HMP Update and referenced materials to educate residents about the highest risks in their communities and what can be done to create safer conditions.

A barrier to plan integration is often the lack of resources to accomplish activities that plan integration requires. Several municipalities noted on the Capability Assessment Surveys that

lack of financial resources precludes development of some planning tools. Portions of the survey provided each municipality an opportunity to conduct its own self-assessment of its capability to effectively implement hazard mitigation activities. As part of this process, County and municipal officials were encouraged to consider the barriers to implementing proposed mitigation strategies in addition to the mechanisms that could enhance or further such strategies. In response to the survey questionnaire, local officials identified specific planning, administrative, and financial tools that they have available to them to address hazard mitigation actions. With available resources being limited and stretched into the foreseeable future, plan integration is extremely relevant and will help leverage existing resources to the maximum extent possible.

6. Mitigation Strategy

6.1. Update Process Summary

The mitigation strategy serves as the long-term road map to reduce the potential losses, vulnerabilities, and shortcomings identified in the Hazard Identification and Risk Assessment section. A typical mitigation strategy includes a list of goals and objectives, with mitigation actions to address the goals and objectives, that are then prioritized, based on the community's need.

Goals are long-term aspirations about the resiliency of the community given the potential effects of hazards. **Objectives** are measurable strategies that the Butler County community has determined will be necessary to move closer to attaining each goal. **Actions** are the tasks that are proposed for realizing each objective.

There were 6 goals and 20 objectives identified in the 2015 Butler County Hazard Mitigation Plan Update. The HMPT reviewed goals and objectives during the Risk Assessment and Mitigation Solutions Workshop on June 24, 2021 and determined them all to still be the most applicable. The review of the goals and objectives is summarized below in Table 6.1-1.

Table 6.1-1 List and Review Summary of 2015 Mitigation Strategy Goals and Objectives

GOAL 1: ATTEMPT TO REDUCE THE CURRENT AND FUTURE RISK OF FLOOD DAMAGE IN BUTLER COUNTY.	
<u>Objective 1.1:</u> Reduce flood damage by directing new development away from high hazard areas by reviewing existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas	Review: The HMPT agreed that this goal should be continued into the 2021 plan. Objectives 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, and 1.8 have been continued into the 2021 plan.
<u>Objective 1.2:</u> Municipalities to review all comprehensive plans to ensure that designated growth areas are not in hazard areas	
<u>Objective 1.3:</u> Continued enforcement of statewide Uniform Construction Code (UCC)	
<u>Objective 1.4:</u> Review any capital improvement plans to ensure that infrastructure improvements are not directed towards hazardous areas without adhering to all applicable state, federal, and local regulations	
<u>Objective 1.5:</u> Evaluate and update existing floodplain ordinances to meet or exceed the NFIP standards	
<u>Objective 1.6:</u> Improve the enforcement of existing floodplain regulations	

Table 6.1-1 List and Review Summary of 2015 Mitigation Strategy Goals and Objectives

<p>Objective 1.7: Evaluate existing evacuation shelters to determine adequacy for current and future populations and compliance with the Butler County Emergency Operations Plan</p>	
<p>Objective 1.8: Investigate the possibility of implementing structural projects to reduce the risk of flooding.</p>	
<p>GOAL 2: REDUCE THE POTENTIAL IMPACT OF NATURAL AND MAN-MADE DISASTERS ON PUBLIC AND PRIVATE PROPERTY.</p>	
<p>Objective 2.1: Encourage participation in the National Flood Insurance Program</p>	<p>Review: The HMPT agreed that this goal should be continued into the 2021 plan. Objectives 2.1, 2.2, and 2.3 have been continued into the 2021 plan.</p>
<p>Objective 2.2: Protect Butler County’s most vulnerable populations, buildings and critical facilities through the implementation of cost-effective and technically feasible projects</p>	
<p>Objective 2.3: Make natural gas well locations available to public</p>	
<p>GOAL 3: IMPROVE UPON THE PROTECTION OF THE CITIZENS OF BUTLER COUNTY FROM ALL NATURAL AND MAN-MADE HAZARDS.</p>	
<p>Objective 3.1: Provide adequate training and resources for emergency organizations and personnel for certification</p>	<p>Review: The HMPT agreed that this goal should be continued into the 2021 plan. Objectives 3.1, 3.2, 3.3, and 3.4 have been continued into the 2021 plan.</p>
<p>Objective 3.2: Improve emergency preparedness in Butler County and its municipalities</p>	
<p>Objective 3.3: Improve coordination and communication among disaster response organizations, local, and County governments</p>	
<p>Objective 3.4: Evaluate cost-effective ways of augmenting existing broadcast and communication systems to monitor all-hazard warning information continuously and to disseminate appropriate warnings</p>	
<p>GOAL 4: REDUCE OR REDIRECT THE IMPACT OF NATURAL DISASTERS (ESPECIALLY FLOODS) AWAY FROM AT-RISK POPULATION AREAS.</p>	
<p>Objective 4.1: Research possible mitigation projects to reduce flooding, reduce/eliminate sewage leakage and inflow/infiltration problems. Some projects may include reservoirs, levees, floodwalls, diversions, channel modification and storm sewers</p>	<p>Review: The HMPT agreed that this goal should be continued. Objective 4.1 and has been continued into the 2021 plan.</p>
<p>GOAL 5: PROTECT EXISTING NATURAL RESOURCES AND OPEN SPACE, INCLUDING PARKS AND WETLANDS, WITHIN THE FLOODPLAIN AND WATERSHED TO IMPROVE THEIR FLOOD CONTROL FUNCTION.</p>	

Table 6.1-1 List and Review Summary of 2015 Mitigation Strategy Goals and Objectives

<p>Objective 5.1: Protect Butler County's natural resources through the implementation of cost-effective and technically feasible mitigation projects</p>	<p>Review: The HMPT agreed that this goal should be continued. Objectives 5.1 and 5.2 have been continued into the 2021 plan.</p>
<p>Objective 5.2: Protect Butler County's natural resources through the implementation of recreation planning and storm water management planning</p>	
<p>GOAL 6: PROTECT PUBLIC HEALTH, SAFETY, AND WELFARE BY INCREASING THE PUBLIC AWARENESS OF EXITING HAZARDS AND BY FOSTERING BOTH INDIVIDUAL AND PUBLIC RESPONSIBILITY IN MITIGATING RISKS DUE TO THOSE HAZARDS.</p>	
<p>Objective 6.1: Develop and distribute public awareness materials about natural hazard risks, preparedness, and mitigation</p>	<p>Review: The HMPT agreed that this goal should be continued. Objectives 6.1 and 6.2 have been continued into the 2021 plan.</p>
<p>Objective 6.2: Target owners of properties within identified hazard areas for additional outreach regarding mitigation and disaster preparedness</p>	

Actions provide more detailed descriptions of specific work tasks to help the County and its municipalities achieve prescribed goals and objectives. There were 33 actions identified in the 2015 Butler County Hazard Mitigation Plan.

Mitigation actions have been carried over and developed for the County as well as for each participating jurisdiction. While some actions may be more general in nature and could apply to more than one jurisdiction, most actions are specific to individual jurisdictions. The mitigation actions that were developed were based on the following: issues identified in the Hazard Identification and Risk Assessment, gaps identified in the mitigation capability analysis, input from the HMPT, and feedback from the Risk Assessment and Mitigation Solutions Workshop held June 24, 2021. These mitigation actions may be implemented through a variety of local tools such as: changes in ordinances and policies, inclusion into capital improvements budgets, and grant funding.

County and Municipal actions in the 2015 Plan were distributed for the June 2021 Mitigation Solutions workshop for review and update. Each action has been assigned one of the following categories:

- "Completed" - Actions that were completed since the adoption of the 2015 Plan
- "Cancelled" - Actions that were terminated.
- "Deferred" - Actions that had not been initiated since the adoption of the 2015 Plan
- "On-Going" - Actions that are performed on a regular and continuous basis by the department

The majority of existing mitigation actions have been carried over into the 2021 Hazard Mitigation Plan as they are continuous actions or actions that were not completed. A list of these actions as well as their status is included in Table 6.1-2. Actions were evaluated by the HMPT and municipal officials with the intent of producing a usable mitigation action plan in 2021 with actions and projects that could be completed over the next five years. Comments included by jurisdictions to provide further insight on the status of actions can be found following Table 6.1-2. **Appendix C** contains a summary of responses provided by municipalities to the *Mitigation Action Progress Report Form*.

Table 6.1-2 List and Status of 2015 Mitigation Actions

COMMUNITY	ACTION #	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
				COMPLETED	CANCELED	DEFERRED	ONGOING
¹ Penn Township ² Butler County, Adams Township, Buffalo Township, Clay Township, Connoquenessing Borough, Connoquenessing Township, Evans City Borough, Forward Township, Jackson Township, Mars Borough, Parker Township, Saxonburg Borough, Seven Fields Borough, Slippery Rock Township, Venango Township, West Sunbury Borough, Zelenople Borough ³ Butler Township, Harmony Borough, Mercer Township	1.1.1	Dam Failure, Earthquake, Flood, Landslide, Mining Subsidence, Wildfire	Review regulations to make sure that adequate zoning regulations are in place to reduce future development (including new buildings and infrastructure) in high hazard areas in their jurisdiction.	X ¹		X ²	X ³
¹ Butler County, Buffalo Township, Harmony Borough, Harrisville Borough, Jackson Township, Middlesex Township, Muddy Creek Township, Zelenople Borough ² Butler Township, Harmony Borough, Mercer Township	1.2.1	Dam Failure, Earthquake, Flood, Landslide, Mining Subsidence, Wildfire	Review County and municipal comprehensive plans to ensure that designated growth areas are not in high hazard areas identified in this plan, or regulations are in place to identify hazard areas in large growth areas and development is restricted in these areas.			X ¹	X ²
¹ Butler County, Adams Township, Bruin Borough, Cherry Township, Cherry Valley Borough, Chicora Borough, Donegal Township, Eau Clair Borough, Evans	1.3.1	Dam Failure, Earthquakes, Flooding, Landslides, Mine Subsidence,	Continue to review implementation of Uniform Construction Code to ensure safe enforcement.	X ³		X ¹	X ²

Table 6.1-2 List and Status of 2015 Mitigation Actions

COMMUNITY	ACTION #	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
				COMPLETED	CANCELED	DEFERRED	ONGOING
City Borough, Fairview Borough, Fairview Township, Marion Township, Middlesex Township ² Slippery Rock Borough ³ Butler Township		Tornado, Wind Storm, Urban Fire and Explosion, Wildfire, Winter Storms					
¹ Butler Township ² Butler County, Jackson Township, Middlesex Township	1.4.1	Dam Failure, Earthquake, Flood, Landslide, Mining Subsidence, Wildfire	Review capital improvement plans to ensure that programmed infrastructure improvements are not in high hazard areas.	X ¹		X ²	
¹ Butler Township, Callery Borough, Center Township, Clearfield Township, Harmony Borough, Mercer Township, Penn Township ² Adams Township, Allegheny Township, Brady Township, Bruin Borough, Buffalo Township, Cherry Township, Cherry Valley Borough, Chicora Borough, City of Butler, Clay Township, Clinton Township, Concord Township, Connoquenessing Borough, Connoquenessing Township, Cranberry Township, Donegal Township, East Butler Borough, Eau Clair Borough, Evans City Borough, Fairview Borough, Fairview Township, Forward Township, Franklin	1.5.1	Flood	Review and update floodplain ordinances to be sure that they are in full compliance with the NFIP.	X ¹		X ²	X ³

Table 6.1-2 List and Status of 2015 Mitigation Actions

COMMUNITY	ACTION #	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
				COMPLETED	CANCELED	DEFERRED	ONGOING
Township, Harmony Borough, Harrisville Borough, Jackson Township, Jefferson Township, Karns City Borough, Lancaster Township, Marion Township, Mars Borough, Middlesex Township, Muddy Creek Township, Oakland Township, Parker Township, Petrolia Borough, Portersville Borough, Prospect Borough, Saxonburg Borough, Seven Fields Borough, Slippery Rock Township, Summit Township, Venango Township, Washington Township, West Liberty Borough, West Sunbury Borough, Winfield Township, Worth Township, Zelienople Borough ³ Slippery Rock Borough, Valencia Borough							
Butler County, Cherry Valley Borough, Fairview Borough, Portersville Borough, Seven Fields Borough, West Sunbury Borough	1.5.2	Flood	Encourage municipalities not participating in the NFIP to join in the process of the DFIRM going effective in 2016.			X	
Butler County	1.6.1	Flood	Butler County OES to arrange with PEMA/FEMA/DCED to hold training for Insurance Companies on the NFIP.			X	

Table 6.1-2 List and Status of 2015 Mitigation Actions

COMMUNITY	ACTION #	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
				COMPLETED	CANCELED	DEFERRED	ONGOING
Butler County	1.6.2	Flood	Butler County OES to arrange with PEMA/FEMA/DCED to conduct training on the Community Rating System (CRS) with municipalities.			X	
¹ Clearfield Township ² Summit Township, Venango Township ³ Butler Township	1.7.1	All	Evaluate existing evacuation shelters to determine adequacy for current and future populations and compliance with the Butler County Emergency Operations Plan	X ¹		X ²	X ³
¹ Butler Township ² Callery Borough, East Butler Borough, Jefferson Township	1.8.1	Flood, Landslide	Implement a brush clearing, bank stabilization and debris control program for all flood-prone waterways.			X ¹	X ²
Butler County, Zelienople Borough	1.8.2	Dam Failure, Flood	Breach the dam for the three Raw Water Reservoirs in Zelienople Borough.			X	
Butler County	2.1.1	Flood	County OES and PEMA to conduct outreach efforts to educate municipalities about the NFIP and its requirements, including on standards involving substantially damaged properties.			X	

Table 6.1-2 List and Status of 2015 Mitigation Actions

COMMUNITY	ACTION #	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
				COMPLETED	CANCELED	DEFERRED	ONGOING
¹ Penn Township ² Clearfield Township ³ Butler County, Adams Township, Allegheny Township, Brady Township, Bruin Borough, Buffalo Township, Cherry Township, Cherry Valley Borough, Chicora Borough, City of Butler, Clay Township, Clinton Township, Concord Township, Connoquenessing Borough, Connoquenessing Township, Cranberry Township, Donegal Township, East Butler Borough, Eau Clair Borough, Evans City Borough, Fairview Borough, Fairview Township, Forward Township, Franklin Township, Harmony Borough, Harrisville Borough, Jackson Township, Jefferson Township, Karns City Borough, Lancaster Township, Marion Township, Mars Borough, Mercer Township, Middlesex Township, Muddy Creek Township, Oakland Township, Parker Township, Petrolia Borough, Portersville Borough, Prospect Borough, Saxonburg Borough, Seven Fields Borough, Slippery Rock Township, Summit Township, Venango Township, Washington Township, West	2.2.1	Flood	Identify and conduct cost-benefit analysis, and apply for grants for acquisition, elevation, relocation, wet and dry flooding, and other protection measures as appropriate for residential, critical facilities and other non-residential buildings with high vulnerabilities.	X ¹	X ²	X ³	X ⁴

Table 6.1-2 List and Status of 2015 Mitigation Actions

COMMUNITY	ACTION #	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
				COMPLETED	CANCELED	DEFERRED	ONGOING
Liberty Borough, West Sunbury Borough, Winfield Township, Worth Township, Zelenople Borough ⁴ Butler Township, Callery Borough, Center Township, Slippery Rock Borough, Valencia Borough							
¹ Penn Township ² Butler County, Allegheny Township, Buffalo Township, Butler City, Chicora Borough, Evans City Borough, Forward Township, Harmony Borough, Jackson Township, Lancaster City, Marion Township, Middlesex Township, Prospect Borough, Slippery Rock Township, Winfield Township, Worth Township, Zelenople Borough ³ Butler Township, Center Township, Mercer Township	2.2.2	Flood	When funds become available for hazard mitigation projects, the County will work with municipalities with RL/SRL properties to hold targeted meetings and/or phone calls with the owners of RL/SRL properties. These meetings to determine potential participation in future acquisition, elevation relocation, and other mitigation projects.	X ¹		X ²	X ³
Butler County	2.2.3	Winter Storm	Pursue funding for installing de-icing systems on vulnerable bridges.			X	
¹ Callery Borough ² Brady Township, Cranberry Township, Evans City Borough, Fairview Borough, Marion Township	2.2.4	Winter Storm	Review snow removal procedures to prioritize removal to address vulnerable populations first.	X ¹		X ²	X ³

Table 6.1-2 List and Status of 2015 Mitigation Actions

COMMUNITY	ACTION #	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
				COMPLETED	CANCELED	DEFERRED	ONGOING
¹ Butler Township							
Harmony Borough	2.2.5	Environmental Hazards	Form Source Water Protection Steering Committee	X ¹			
¹ Jackson Township Petrolia Borough, Worth Township ² Butler Township	2.3.1	Environmental Hazards	Document and map natural gas wells and lines			X ¹	X ²
Butler County, Butler Township	3.1.1	All	Butler County CERT Trainers to teach Community Emergency Response Team (CERT) classes to interested citizens in Butler County to assist first responders at specified emergencies throughout the County. Additional trainers need to attend future Train-the-Trainer courses.				X
¹ Butler County, Cherry Township, Harrisville Borough, Marion Township ² Butler Township, Mercer Township	3.1.2	All	OES to work with the Butler Fire Association, Butler Hospital, EMS and the Butler County Police Chiefs Association to increase the number of trained citizen emergency responders by meeting with groups of potential			X ¹	X ²

Table 6.1-2 List and Status of 2015 Mitigation Actions

COMMUNITY	ACTION #	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
				COMPLETED	CANCELED	DEFERRED	ONGOING
			volunteers. All areas of Butler County will benefit.				
¹ Butler County, Harrisville Borough, Oakland Township ² Butler Township, Slippery Rock Borough, Mercer Township	3.1.3	All	OES to provide information about local, regional, state, and federal training opportunities to fire departments, EMS, ambulance services, and other emergency responders. Develop a list of training opportunities that are available and distribute the list to all local emergency responders. Will benefit all areas of Butler County.			X ¹	X ²
¹ Butler Township ² Butler County, Concord Township, Muddy Creek Township, Portersville Borough, Washington Township	3.1.4	Flooding, Tornado, Wind Storm, Winter Storm	Continue to conduct National Weather Service Storm Spotter classes by partnering with the National Weather Service to provide training to people throughout Butler County on Storm Spotting in the areas of Flooding, High Winds, Basic I and II.		X ¹	X ²	

Table 6.1-2 List and Status of 2015 Mitigation Actions

COMMUNITY	ACTION #	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
				COMPLETED	CANCELED	DEFERRED	ONGOING
¹ Butler County, Clinton Township ² Butler Township	3.2.1	All	Review the existing Butler County Emergency Operations Plan (EOP) and update when necessary based on the recommendations of the Butler County Hazard Mitigation Plan. Include participation from all municipalities in the update process by ensuring that their EOPs are reviewed and updated annually.			X ¹	X ²
Butler County Municipalities	3.3.1	All	Plan and host annual HMP review meetings with interdisciplinary team (planners, EMCs, FPAs, other stakeholders).			X	
¹ Clearfield Township ² Butler County, Clearfield Township, Connoquenessing Borough, Harrisville Borough, Summit Township Zelienople Borough ³ Butler Township, Callery Borough, Harmony Borough, Mercer Township	3.4.1	All	Maintain and improve use of AlertPA and other tools to reach all populated areas throughout the County.		X ¹	X ²	X ³
¹ Butler Township	3.4.2	All	Continue to distribute NOAA Weather Radios to Butler County municipalities,		X ¹	X ²	

Table 6.1-2 List and Status of 2015 Mitigation Actions

COMMUNITY	ACTION #	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
				COMPLETED	CANCELED	DEFERRED	ONGOING
² Butler County, Allegheny Township, Oakland Township, Summit Township, Winfield Township			schools, nursing homes, day care centers, and SARA facilities for high-risk events.				
Butler County, Butler Township, Franklin Township, Prospect Borough	4.1.1	All	Continue to review Hazard Mitigation Questionnaires and post-disaster reviews submitted by the municipalities.			X	
¹ Butler County, City of Butler, Cranberry Township, Petrolia Borough ² Slippery Rock Borough ³ Butler Township	5.1.1	Flooding, Landslides, Mine Subsidence	Planning Department to continue the development of the Countywide Stormwater Management Plan within the next 5 years.	X ³		X ¹	X ²
Butler County, Butler Township	5.1.2	Flood	County to work with DEP, conservation agencies, and others, to research avenues for restoring degraded natural resources and open space to improve their flood control functions.				X
Butler County, Butler Township, West Liberty Borough, West Sunbury Borough	6.1.1	Flood	Create a "How To" Mitigation display for use at public events to distribute FEMA's publications, such as: Retrofitting for Homeowners Guide,			X	

Table 6.1-2 List and Status of 2015 Mitigation Actions

COMMUNITY	ACTION #	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
				COMPLETED	CANCELED	DEFERRED	ONGOING
			Elevating Your Flood Prone Home, Elevating Residential Structures, and Information on the NFIP.				
¹ Butler Township ² Butler County, Allegheny Township, Fairview Township	6.1.2	All	Butler OES to work with the Butler Cooperative Extension to develop Animals in Disasters Displays that will be used at 4-H Clubs, Agricultural Fair, in Veterinarians Offices and other places that animal owners may gather. The display will have information about preparing animals for disasters by making a disaster plan and a disaster supply kit for each animal. The display will encourage animal owners to decide ahead of time where animals will be sheltered and to familiarize them with the County's Animals in Disaster Annex of the Emergency Operations Plan.		X ¹	X ²	
Butler County, Butler Township	6.1.3	All	County to develop a Business Continuity Planning Display. The display will be designed to raise awareness level of WHY it is important				X

Table 6.1-2 List and Status of 2015 Mitigation Actions

COMMUNITY	ACTION #	ADDRESSED HAZARD(S)	MITIGATION ACTION	STATUS			
				COMPLETED	CANCELED	DEFERRED	ONGOING
			to have a Business Continuity Plan, how to develop a plan, and will encourage businesses to make sure that their plan fits in with the County's plan. This display will be appropriate for use at local Chamber of Commerce meetings and activities, civic group gatherings such as the Rotary Club, and other business-related gatherings.				
¹ Center Township, Butler Township ² Butler County, City of Butler, Connoquenessing Borough, Fairview Township, Petrolia Borough	6.1.4	All, Urban Fire and Explosion	Continue to use Sparky Fire Safety Program displays for children's programs that teach safety.	X ¹		X ²	

In the *Mitigation Action Progress Report Form*, communities were able to provide additional information regarding the status of their mitigation actions from the previous plan. Communities are able to provide success stories to celebrate completed mitigation actions, provide context on when ongoing actions are implemented, describe in detail why actions are no longer relevant or a priority to the community, and identify why mitigation actions were deferred into the plan. Center Township implements Action 2.2.1 after every heavy rain event and implements Action 2.2.2 to concentrate on residential developments. Clearfield Township opted to remove Actions 2.2.1 because the jurisdiction does not have any flood zones to consider, and Action 3.4.1 because not all of the residents within the jurisdictions have cell phones and opt to contact the township through the 911 system for emergencies.

Based on jurisdictional and stakeholder participation from the Countywide planning team and the Butler HMSC, the mitigation strategy was modified and updated. New actions have been added to address particular hazards facing Butler County and the consensus achieved in how to address those actions. The updated mitigation strategy is presented in **Section 6.4**.

6.1.2. Mitigation Success

A great deal of mitigation progress has been made on hazard mitigation projects and actions in Butler County.

MITIGATION SUCCESS SINCE THE 2015 HMP PLANNING

At the time of the HMP development, the Butler County Planning Commission was updating their Subdivision and Land Development Ordinance. During the four work sessions that had been held to date to update the ordinance, one of the top priorities to be targeted was the inclusion of elements relating to hazard mitigation. Specifically, there are three provisions that are to be included in the updated Subdivision and Land Development Ordinance. A new purpose of the ordinance is: To minimize potential impacts, where possible, as identified in the Hazard Mitigation Plan. The ordinance will also include a section regarding street development that will not inhibit rescue or evacuation and will ensure the protection of water supply. This updated Ordinance will be in effect for municipalities that have not adopted their own Ordinance. It can also serve as a model ordinance for those who wish to update their own existing ordinances.

TRAINING, EDUCATION, AND AWARENESS

Members of the Butler County Steering Committee attended a training the National Weather Service and Western PEMA held. The Building a Weather-Ready Nation presentation contained data for climate change in precipitation and temperature, annual minimum, maximum and average temperatures for the seasons of the regions participating in the training, and annual precipitation and snow averages for the different seasons for each region

participating in the training. Thunderstorm characteristics, including lightning, wind, and hail was discussed as well as different warnings that are issued with severe weather.

STRUCTURE AND INFRASTRUCTURE PROJECTS

The City of Butler contracted with Bauer Excavating in early July 2021 to clean out Sullivan Run. The problem area was full of branches and trees, hindering water flow and water volume, creating flooding from the blocked areas. The project, costing slightly over \$5,000, is anticipated to last three weeks, but a much larger project, Sullivan Run Channel Improvement Project, costing approximately \$4 million will take place in early fall 2021 to greatly minimize the frequency and extent of flooding within the City of Butler. The Sullivan Run contract with Bauer is the second in recent years; an earlier contract in 2019 with the excavating company to clean out a portion of Sullivan Run cost the City approximately \$20,000 (Friel, 2021).

Also, Jackson Township has been working towards its acquisition of property in the floodplain off of Trextor Hill Road. This property is in the Village Acres Plan.

Washington Township has also taken initiative to reduce flood risk. Over the past five years the Township Supervisors worked to apply for and receive funding from PEMA from the Dirt and Gravel Roads Fund. This grant has been used to improve drainage and raise Christy Road to mitigate flood issues.

MITIGATION SUCCESS FROM THE 2015 HMP

Between 1994 and 2014, municipalities in Butler County have received over \$2.3 million in FEMA mitigation grants to implement mitigation projects. Jackson Township and Harmony Borough have received just over \$2.2 million on hazard mitigation grant projects, and Slippery Rock Borough has spent just under \$150,000 on pre-disaster or flood mitigation projects. This history of identifying implementable projects, and receiving grant funding to achieve implementation, demonstrates Butler County's dedication to achieving mitigation success. The subsections below provide details on projects Butler County has implemented in order to mitigate against the identified hazards in the County.

In order to ensure the continued implementation of mitigation projects and maintenance of the HMP, the County has identified the LEPC, a body which has many successes in its primary mission of prevention related to hazardous materials, to broaden its focus to include all-hazard mitigation.

PLANNING

During the 2010 HMP planning process, the County recognized the need to ensure that there was adequate regulations in place to limit new development in places that were vulnerable to high hazards. The County adopted a Subdivision and Land Ordinance in order to increase regulations in these areas, and the County also considers hazards in their municipal Subdivision and Land Ordinance reviews. Due to the success of this process, more

municipalities expressed interest in exploring passing ordinances with more hazard considerations, which is a part of the 2015 Mitigation Strategy.

Another mitigation action identified in the 2010 HMP focused on incorporating vulnerabilities to high hazards into the considerations of focusing development in designated growth areas. The Butler County Comprehensive Plan identifies large growth areas where geographic and economic conditions are favorable to development; additionally, the County identifies areas, some near or encompassed in the growth areas, where development should be discouraged. These areas were designated because they are environmentally significant areas, including areas with steep slopes and floodplains or agricultural security areas. The Comprehensive Plan also identifies all natural resource areas, including state game lands, parks, open space, farmland, waterways, in addition to the environmentally significant areas to help steer development away from these areas as well. Additionally, the Boroughs of Zelenople and Harmony adopted a joint Comprehensive Plan in 2010 which identified actions to reduce flooding by restoring riparian areas and reducing impervious surfaces along Connoquenessing Creek. In the 2015 Mitigation Strategy additional municipalities indicated interest in ensuring high hazard areas and development considerations in these areas are included in their municipal level plans.

Butler County has also achieved successes in other aspects of planning. The County completed their Countywide Stormwater Management Plan Phase II document in 2010, which includes a model stormwater management ordinance for municipalities in Butler County.

TRAINING, EDUCATION, AND AWARENESS

Butler County has also provided multiple opportunities to educate the public and stakeholders about hazards and hazard mitigation. Butler County OES continuously identifies training opportunities related to preparing for and responding to hazards, which it shares with all response agencies throughout the County.

Butler County fire departments provide fire safety trainings for parents and children using the National Fire Protection Association Sparky Fire Safety Program materials. The Sparky program includes activities, stories, cartoons, and mobile applications for children to learn about fire safety. The program also provides resources to parents to adequately plan for fires with their children, including safety checklists, safety tips for sleepovers, and planning guidance for home evacuations.

Butler County OES has worked with the Butler Cooperative Extension to provide information to the public about animals in disasters. They have built on the materials they have been using since 2010, focusing on including animals in the family disaster plan, to provide information about sheltering with animals, including companion animals, during a disaster. The information has been presented at 4-H Clubs, agricultural fairs, as well as in veterinarian offices.

In order to ensure improve the accuracy and timing of weather alert messages, to provide adequate warning time to the public of severe weather, Butler County actively encourages participation in the National Weather Service Skywarn program. The program trains and organizes communication with severe weather spotter volunteers to improve public warnings of tornadoes, severe thunderstorms, and flash floods to better protect lives and property that are vulnerable to these hazards. Butler County has worked with the National Weather Service office in Pittsburgh to organize in-person trainings, and ensure the availability and awareness of online trainings, to increase the number of severe weather spotter volunteers across the County.

6.2. Mitigation Goals and Objectives

Hazard mitigation goals and objectives for the 2021 Plan were developed after the Butler HMSC reviewed the results of the updated Risk Assessment and Capability Analysis. Based on results of the review of the 2015 HMP mitigation goals and objectives established, the goals and objectives were continued into the 2021 HMP. Table 6.2-1 lists the mitigation goals and objectives established for the 2021 plan. A new objective for the 2021 plan relating to High Hazard Potential Dams was created as Objective 2.4.

There are 6 goals and 20 objectives identified.

Table 6.2-1 2021 Mitigation Strategy Goals and Objectives

GOAL 1	ATTEMPT TO REDUCE THE CURRENT AND FUTURE RISK OF FLOOD DAMAGE IN BUTLER COUNTY
Objective 1.1	Reduce damage by directing new development away from high hazard areas by reviewing existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas
Objective 1.2	Municipalities to review all comprehensive plans to ensure that designated growth areas are not in hazard areas
Objective 1.3	Continued enforcement of statewide Uniform Construction Code (UCC)
Objective 1.4	Review any capital improvement plans to ensure that infrastructure improvements are not directed towards hazardous areas without adhering to all applicable state, federal, and local regulations.
Objective 1.5	Evaluate and update existing floodplain ordinances to meet or exceed the NFIP standards
Objective 1.6	Improve the enforcement of existing floodplain regulations
Objective 1.7	Protect Butler County's population through improving shelter planning in vulnerable communities
Objective 1.8	Investigate the possibility of implementing structural projects to reduce the risk of flooding
GOAL 2	REDUCE THE POTENTIAL IMPACT OF NATURAL AND MAN-MADE DISASTERS ON PUBLIC AND PRIVATE PROPERTY
Objective 2.1	Encourage participation in the National Flood Insurance Program

Table 6.2-1 2021 Mitigation Strategy Goals and Objectives

Objective 2.2	Protect Butler County’s most vulnerable populations, buildings and critical facilities through the implementation of cost-effective and technically feasible projects
Objective 2.3	Make natural gas well locations available to public
GOAL 3	IMPROVE UPON THE PROTECTION OF THE CITIZENS OF BUTLER COUNTY FROM ALL NATURAL AND MAN-MADE HAZARDS
Objective 3.1	Provide adequate training and resources for emergency organizations and personnel for certification
Objective 3.2	Improve emergency preparedness in Butler County and its municipalities
Objective 3.3	Improve coordination and communication among disaster response organizations, local, and County governments
Objective 3.4	Evaluate cost-effective ways of augmenting existing broadcast and communication systems to monitor all-hazard warning information continuously and to disseminate appropriate warnings
GOAL 4	REDUCE OR REDIRECT THE IMPACT OF NATURAL DISASTERS (ESPECIALLY FLOODS) AWAY FROM AT-RISK POPULATION AREAS
Objective 4.1	Research possible mitigation projects to reduce flooding, reduce/eliminate sewage leakage and inflow/infiltration problems. Some projects may include reservoirs, levees, floodwalls, diversions, channel modification and storm sewers
GOAL 5	PROTECT EXISTING NATURAL RESOURCES AND OPEN SPACE, INCLUDING PARKS AND WETLANDS, WITHIN THE FLOODPLAIN AND WATERSHED TO IMPROVE THEIR FLOOD CONTROL FUNCTION
Objective 5.1	Protect Butler County’s natural resources through the implementation of cost-effective and technically feasible mitigation projects, recreation planning and storm water management planning
GOAL 6	PROTECT PUBLIC HEALTH, SAFETY, AND WELFARE BY INCREASING THE PUBLIC AWARENESS OF EXISTING HAZARDS AND BY FOSTERING BOTH INDIVIDUAL AND PUBLIC RESPONSIBILITY IN MITIGATING RISKS DUE TO THOSE HAZARDS
Objective 6.1	Develop and distribute public awareness materials about natural hazard risks, preparedness, and mitigation
Objective 6.2	Target owners of properties within identified hazard areas for additional outreach regarding mitigation and disaster preparedness
GOAL 7	IMPLEMENT STRUCTURAL PROJECTS TO REDUCE THE IMPACTS OF HAZARDS
Objective 7.1	Address the risks posed by the potential failure of High Hazard Potential Dams within the County

6.3. Identification and Analysis of Mitigation Techniques

The mitigation strategy in the updated Hazard Vulnerability Assessment and Mitigation Plan Update should include analysis of a comprehensive range of specific techniques or actions.

FEMA, through the March 2013 Local Mitigation Handbook, and PEMA, through the October 2013 Standard Operating Guide (SOG), identify four categories of hazard mitigation techniques that Butler County considered in developing its mitigation action plan. Those categories include:

- **Local plans and regulations:** Government authorities, policies, or codes that influence the way land and buildings are developed and built. Examples include, but are not limited to, comprehensive plans, subdivision regulations, building codes and enforcement, and NFIP and CRS.
- **Structure and infrastructure:** Modifying existing structures and infrastructure or constructing new structures to reduce hazard vulnerability. Examples include, but are not limited to, acquisition and elevation of structures in flood prone areas, utility undergrounding, structural retrofits, floodwalls and retaining walls, detention and retention structures, and culverts.
- **Natural systems protection:** Actions that minimize damage and losses and preserve or restore the functions of natural systems. Examples include, but are not limited to, sediment and erosion control, stream corridor restoration, forest management, conservation easements, and wetland restoration and preservation.
- **Education and awareness:** Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate the hazards and may also include participation in national programs. Examples include, but are not limited to, radio or television spots, websites with maps and information, provide information and training, NFIP outreach, StormReady, and Firewise Communities.

The HMPT reviewed the four types of mitigation techniques and examples of actions at the Risk Assessment and Mitigation Solutions Workshop. Table 6.3-1 provides a matrix identifying the mitigation techniques used for the moderate and high-risk hazards in the County to ensure that there was sufficient breadth and creativity in the mitigation actions considered. These techniques were then used to help guide the development of the Mitigation Action Plan. The specific actions associated with these techniques are included in Table 6.4-1.

Table 6.3-1 Mitigation Techniques Used for Hazards in Butler County

HAZARD	MITIGATION TECHNIQUE			
	LOCAL PLANS AND REGULATIONS	EDUCATION AND AWARENESS PROGRAMS	NATURAL SYSTEMS PROTECTION	STRUCTURAL AND INFRASTRUCTURE PROJECTS
Civil Disturbance	✓	✓		
Dam Failure	✓	✓		✓
Drought	✓	✓		
Earthquakes	✓	✓		
Environmental Hazards: Coal Mining Incidents	✓	✓		✓
Environmental Hazards: Conventional Oil and Gas Well Incidents	✓	✓		✓
Environmental Hazards: Hazardous Materials Release	✓	✓		✓
Environmental Hazards: Unconventional Oil and Gas Well Incidents	✓	✓		✓
Flooding	✓	✓	✓	
Landslides	✓	✓	✓	
Nuclear Incidents	✓	✓		
Pandemic	✓	✓		
Radon	✓	✓		
Subsidence, Sinkhole	✓	✓	✓	
Terrorism	✓	✓		
Tornado, Wind Storm	✓	✓		
Transportation Incidents	✓	✓		✓
Urban Fire and Explosion	✓	✓		✓
Utility Interruptions	✓	✓		✓
Wildfire	✓	✓		
Winter Storms	✓	✓		

6.4. Mitigation Action Plan

A kick-off meeting for the 2021 Butler County Hazard Mitigation Plan Update was held on March 23, 2021 to develop a framework for the plan. The goals and objectives were presented during this meeting. During the Risk Assessment and Mitigation Solutions Workshop on June 24, 2021, Mitigation Techniques were discussed. The specific activities completed by the meeting participants for the Mitigation Strategy can be found in **Section 3.3**.

At least one mitigation action was established for each hazard in Butler County. More than one action is identified for several hazards. Every participating jurisdiction has at least one mitigation action.

The final list of 51 mitigation actions is contained in Table 6.4-1, many of which will require substantial time commitments from staff at the County and local municipalities. This table provides an overview of the strategy that will be utilized in order to implement each of the proposed mitigation actions. For each action listed in Table 6.4-1, the associated strategy identifies the community or organization the action pertains to, the category of the action, the hazard the action addresses, the lead agency or job title that will be responsible for initiating the work, the timeframe for when the action will be implemented, potential sources of funding for the work, and the priority the mitigation action received during the mitigation action prioritization process.

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
Goal 1 - Attempt to reduce the current and future risk of flood damage in Butler County							
Objective 1.1: Reduce damage by directing new development away from high hazard areas by reviewing existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas							
<p><i>1.1.1 Review regulations to make sure that adequate zoning regulations are in place to reduce future development (including new buildings and infrastructure) in high hazard areas in their jurisdiction.</i></p>	<p>Butler County, Adams Township, Buffalo Township, Butler Township, Clay Township, Connoquenessing Borough, Connoquenessing Township, Evans City Borough, Forward Township, Harmony Borough, Jackson Township, Mars Borough, Mercer Township, Parker Township, Saxonburg Borough, Seven Fields Borough, Slippery Rock Township, Venango Township, West Sunbury Borough, Zelienople Borough</p>	<p>Local plans and regulations</p>	<p>Dam Failure, Earthquake, Flood, Landslide, Mining Subsidence, Wildfire</p>	<p>Butler County Planning Commission, Municipalities</p>	<p>Ongoing</p>	<p>Staff Time</p>	<p>High</p>

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
<i>1.1.2 Revise the expected maximum precipitation values for engineering designs in County and Municipal land use regulations to reduce flood damages from inadequate design standards.</i>	Butler County, All Municipalities	Local plans and regulations	Flood	Butler County Planning Commission, Municipalities	Ongoing		High
<u>Objective 1.2: Municipalities to review all comprehensive plans to ensure that designated growth areas are not in hazard areas</u>							
<i>1.2.1 Review County and municipal comprehensive plans to ensure that designated growth areas are not in high hazard areas identified in this plan, or regulations are in place to identify hazard areas in large growth areas and development is restricted in these areas.</i>	Butler County, Buffalo Township, Butler Township, Harmony Borough, Harrisville Borough, Jackson Township, Mercer Township, Middlesex Township, Muddy Creek Township, Zelenople Borough	Local plans and regulations	Dam Failure, Earthquake, Flood, Landslide, Mining Subsidence, Wildfire	Butler County Planning Commission, Municipalities	Ongoing	Staff Time	High

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
<u>Objective 1.3: Continued enforcement of statewide Uniform Construction Code (UCC)</u>							
<i>1.3.1 Continue to review implementation of Uniform Construction Code to ensure safe enforcement.</i>	Butler County, Adams Township, Bruin Borough, Butler Township, Cherry Township, Cherry Valley Borough, Chicora Borough, Donegal Township, Eau Clair Borough, Evans City Borough, Fairview Borough, Fairview Township, Marion Township, Middlesex Township, Slippery Rock Borough	Local plans and regulations	Dam Failure, Earthquakes, Flooding, Landslides, Mine Subsidence, Tornado, Wind Storm, Urban Fire and Explosion, Wildfire, Winter Storms	Municipal Officials	Ongoing	Staff Time	High
<i>1.3.2 Widen Wick Road from 14' to 21'</i>	Mercer Township	Structure and infrastructure	Transportation Incidents	Municipal Officials	0-1 years	Highway Aid Funds, General Funds	Medium
<u>Objective 1.4: Review any capital improvement plans to ensure that infrastructure improvements are not directed towards hazardous areas without adhering to all applicable state, federal, and local regulations.</u>							
<i>1.4.1 Review capital improvement plans to ensure that programmed infrastructure improvements are</i>	Butler County, Butler Township, Jackson Township, Middlesex Township	Local plans and regulations	Dam Failure, Earthquakes, Flooding, Landslide, Mining	Butler OES & Butler Planning Commission, Municipal Officials	Ongoing	Staff Time	High

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
<i>not in high hazard areas.</i>			Subsidence, Wildfire				
<u>Objective 1.5: Evaluate and update existing floodplain ordinances to meet or exceed the NFIP standards</u>							
<i>1.5.1 Review and update floodplain ordinances to be sure that they are in full compliance with the NFIP.</i>	Adams Township, Allegheny Township, Brady Township, Bruin Borough, Buffalo Township, Butler Township, Cherry Township, Cherry Valley Borough, Chicora Borough, City of Butler, Clay Township, Clinton Township, Concord Township, Connoquenessing Borough, Connoquenessing Township, Cranberry Township, Donegal Township, East Butler Borough, Eau Clair Borough, Evans City Borough, Fairview Borough, Fairview Township, Forward	Local plans and regulations	Flooding	All municipalities	Ongoing	Staff Time	Medium

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY	
	Township, Franklin Township, Harmony Borough, Harrisville Borough, Jackson Township, Jefferson Township, Karns City Borough, Lancaster Township, Marion Township, Mars Borough, Mercer Township, Middlesex Township, Muddy Creek Township, Oakland Township, Parker Township, Petrolia Borough, Portersville Borough, Prospect Borough, Saxonburg Borough, Seven Fields Borough, Slippery Rock Borough, Slippery Rock Township, Summit Township, Valencia Borough, Venango Township, Washington Township, West Liberty Borough, West Sunbury Borough, Winfield Township, Worth							

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
	Township, Zelenople Borough						
<i>1.5.2 Encourage municipalities not participating in the NFIP to join in the NFIP</i>	Butler County, Cherry Valley Borough, Fairview Borough, Portersville Borough, Seven Fields Borough, West Sunbury Borough	Local plans and regulations	Flooding	Butler County, DCED, PEMA, and FEMA	3-5 years	Staff Time	Medium
<u>Objective 1.6: Improve the enforcement of existing floodplain regulations</u>							
<i>1.6.1 Butler County OES to arrange with PEMA/FEMA/DCED to hold training for Insurance Companies on the NFIP.</i>	Butler County	Local plans and regulations	Flooding	Butler Department of Emergency Services	3-5 years	Staff Time	Medium
<i>1.6.2 Butler County OES to arrange with PEMA/FEMA/DCED to conduct training on the Community Rating System (CRS) with municipalities.</i>	Butler County	Local plans and regulations	Flood	Butler Department of Emergency Services	3-5 years	Staff Time	Medium
<i>1.6.3 Explore the possibility, feasibility and funding sources</i>	Butler County	Local plans and regulations	Flood	Butler County Planning Commission	Ongoing	Staff Time	High

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
<i>for a new conservation easement program to purchase easements on open space areas along flood prone areas to help divert floodwaters.</i>							
<u>Objective 1.7: Protect Butler County's population through improving shelter planning in vulnerable communities.</u>							
<i>1.7.1 Evaluate existing evacuation shelters to determine adequacy for current and future populations and compliance with the Butler County Emergency Operations Plan</i>	Butler Township, Summit Township, Venango Township	Local plans and regulations	All	Butler Department of Emergency Services	Ongoing	Staff Time	High
<u>Objective 1.8: Investigate the possibility of implementing structural projects to reduce the risk of flooding.</u>							
<i>1.8.1 Implement a brush clearing, bank stabilization and debris control program for all flood-prone waterways.</i>	Butler Township, Callery Borough, East Butler Borough, Jefferson Township	Local plans and regulations	Flood, Landslide	Municipal offices	3-5 years	Staff time, BRIC funding	Medium

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
<i>1.8.2 Breach the dam for the three Raw Water Reservoirs in Zelenople Borough.</i>	Butler County, Zelenople Borough	Structure and infrastructure	Dam Failure, Flood	Zelenople Borough	3-5 years	FEMA HMA grants, private grants, private or public loans, local match	Medium
<i>1.8.3 Install and fix catch basins throughout Slippery Rock Borough</i>	Slippery Rock Borough	Structure and infrastructure	Flooding	Slippery Rock Borough Municipal Authority	Ongoing yearly	Liquid fuel taxes, FEMA FMA grant	High
<i>1.8.4 Replacement of all drainage pipe and catch basins and repave the roads in West Wood III</i>	Center Township	Structure and infrastructure	Flooding	Center Township EMC	4-5 years	Township Funds, FEMA HMA grants	High
<i>1.8.5 Add curbing to the existing roadway, add catch basins, and drainage piping where flooding is occurring in the Windward Heights Housing Development</i>	Center Township	Structure and infrastructure	Flooding	Center Township EMC	4-5 years	Township Funds, FEMA HMA grants	Medium
<i>1.8.6 Add curbs, piping, and catch</i>	Center Township	Structure and infrastructure	Flooding	Center Township EMC	4-5 years	Township Funds,	Low

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
<i>basins in the Shanor Manor development</i>						FEMA HMA grants	
<i>1.8.7 Add curbing, catch basins and piping as necessary in the Shanor Heights development</i>	Center Township	Structure and infrastructure	Flooding	Center Township EMC	4-5 years	Township Funds, FEMA HMA grants	Low
<i>1.8.8 Add curbing, catch basins, and piping as necessary in the C. W. & Al Johnston development</i>	Center Township	Structure and infrastructure	Flooding	Center Township EMC	4-5 years	Township Funds, FEMA HMA grants	Low
<i>1.8.9 Replace the concrete drainage pipe, add curbing, piping, and catch basins where necessary in the Timberly Heights development</i>	Center Township	Structure and infrastructure	Flooding	Center Township EMC	4-5 years	Township Funds, FEMA HMA grants	Medium
<i>1.8.10 Add curbing, catch basins, and piping where necessary in the Northview Housing development to help</i>	Center Township	Structure and infrastructure	Flooding	Center Township EMC	4-5 years	Township Funds, FEMA HMA grants	Medium

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
<i>with stormwater runoff.</i>							
Goal 2 - Reduce the potential impact of natural and man-made disasters on public and private property							
<u>Objective 2.1: Encourage participation in the National Flood Insurance Program</u>							
<i>2.1.1 County OES and PEMA to conduct outreach efforts to educate municipalities about the NFIP and its requirements, including on standards involving substantially damaged properties.</i>	Butler County	Local plans and regulations	Flooding	Butler Department of Emergency Services	Ongoing	Staff Time	Medium
<u>Objective 2.2: Protect Butler County's most vulnerable populations, buildings and critical facilities through the implementation of cost-effective and technically feasible projects</u>							
<i>2.2.1 Identify and conduct cost-benefit analysis, and apply for grants for acquisition, elevation, relocation, wet and dry flooding, and other protection</i>	Butler County, Adams Township, Allegheny Township, Brady Township, Bruin Borough, Buffalo Township, Butler Township, Callery Borough, Center	Structure and infrastructure	Flooding	Butler Department of Emergency Services, all municipalities	3-5 years	FEMA HMA grants	High

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
<i>measures as appropriate for residential, critical facilities and other non-residential buildings with high vulnerabilities.</i>	Township, Cherry Township, Cherry Valley Borough, Chicora Borough, City of Butler, Clay Township, Clinton Township, Concord Township, Connoquenessing Borough, Connoquenessing Township, Cranberry Township, Donegal Township, East Butler Borough, Eau Clair Borough, Evans City Borough, Fairview Borough, Fairview Township, Forward Township, Franklin Township, Harmony Borough, Harrisville Borough, Jackson Township, Jefferson Township, Karns City Borough, Lancaster Township, Marion Township, Mars Borough, Mercer Township, Middlesex						

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
	Township, Muddy Creek Township, Oakland Township, Parker Township, Petrolia Borough, Portersville Borough, Prospect Borough, Saxonburg Borough, Seven Fields Borough, Slippery Rock Borough, Slippery Rock Township, Summit Township, Valencia Borough, Venango Township, Washington Township, West Liberty Borough, West Sunbury Borough, Winfield Township, Worth Township, Zelienople Borough						
2.2.2 <i>When funds become available for hazard mitigation projects, the County will work with municipalities with RL/SRL properties to hold targeted meetings and/or</i>	Butler County, Allegheny Township, Buffalo Township, Butler City, Butler Township, Center Township, Chicora Borough, Evans City Borough, Forward Township, Harmony Borough, Jackson	Local plans and regulations	Flooding	Butler County Municipal Offices	Ongoing	Staff Time	High

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
<i>phone calls with the owners of RL/SRL properties. These meetings to determine potential participation in future acquisition, elevation relocation, and other mitigation projects.</i>	Township, Lancaster City, Marion Township, Mercer Township, Middlesex Township, Prospect Borough, Slippery Rock Township, Winfield Township, Worth Township, Zelienople Borough						
2.2.3 Pursue funding for installing de-icing systems on vulnerable bridges.	Butler Township	Local plans and regulations	Winter Storm	Butler Department of Emergency Services	1-2 years	FEMA BRIC funding	Medium
2.2.4 Review snow removal procedures to prioritize removal to address vulnerable populations first.	Brady Township, Butler Township, Cranberry Township, Evans City Borough, Fairview Borough, Marion Township	Local plans and regulations	Winter Storm	Municipal Offices	Ongoing	Staff Time	Medium
2.2.6 Address gas well fires by properly using, cleaning, and maintaining the wells regularly	Allegheny Township	Structure and infrastructure	Environmental Hazards, Urban Fire and Explosion	Allegheny Township Chairman	Ongoing yearly	Local budget, Staff Time	Medium
2.2.7 Ensure tree limbs are cut back from utility lines around roads	Clearfield Township	Structure and infrastructure	Utility Interruption	Clearfield Township Roadmaster and Township Supervisors	4-5 years	General Township Fund	High

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
<u>Objective 2.3: Make natural gas well locations available to public</u>							
2.3.1 Document and map natural gas wells and lines	Butler Township, Jackson Township, Petrolia Borough, Worth Township	Local plans and regulations	Environmental Hazards	Butler County, Municipality EMCs, Gas Companies	1-2 years, ongoing	Staff Time	Medium
Goal 3 - Improve upon the protection of the citizens of Butler County from all natural and man-made hazards							
<u>Objective 3.1: Provide adequate training and resources for emergency organizations and personnel for certification</u>							
3.1.1 Butler County CERT Trainers to teach Community Emergency Response Team (CERT) classes to interested citizens in Butler County to assist first responders at specified emergencies throughout the County. Additional trainers need to attend future Train-the-Trainer courses.	Butler County, Butler Township	Education and awareness	All	Butler Department of Emergency Services	Ongoing	Staff Time	Medium
3.1.2 OES to work with the Butler Fire Association, Butler Hospital, EMS and	Butler County, Butler Township, Cherry Township, Harrisville Borough, Marion	Education and awareness	All	Butler Department of Emergency Services	Ongoing	Staff Time	High

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
<i>the Butler County Police Chiefs Association to increase the number of trained citizen emergency responders by meeting with groups of potential volunteers. All areas of Butler County will benefit.</i>	Township, Mercer Township						
<i>3.1.3 OES to provide information about local, regional, state, and federal training opportunities to fire departments, EMS, ambulance services, and other emergency responders. Develop a list of training opportunities that are available and distribute the list to all local emergency responders. Will benefit all areas of Butler County.</i>	Butler County, Butler Township, Harrisville Borough, Mercer Township, Oakland Township, Slippery Rock Borough	Education and awareness	All	Butler Department of Emergency Services	Ongoing	Staff Time	Medium

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
3.1.4 Continue to conduct National Weather Service Storm Spotter classes by partnering with the National Weather Service to provide training to people throughout Butler County on Storm Spotting in the areas of Flooding, High Winds, Basic I and II.	Butler County, Butler Township, Concord Township, Muddy Creek Township, Portersville Borough, Washington Township	Education and awareness	Flooding, Tornado, Wind Storm, Winter Storm	Butler Department of Emergency Services, NWS	Ongoing	Staff Time	Medium
3.1.5 Increase training and equipment for police to respond to civil disturbance	Slippery Rock Borough, Slippery Rock University	Education and awareness	Civil Disturbance	Slippery Rock Borough Manager	Ongoing	Local Budget, Police Grants	High
<u>Objective 3.2: Improve emergency preparedness in Butler County and its municipalities</u>							
3.2.1 Review the existing Butler County Emergency Operations Plan (EOP) and update when necessary based on the recommendations of the Butler County	Butler County, Butler Township, Clinton Township	Education and awareness	All	Butler Department of Emergency Services, Municipal Offices	Ongoing	Staff Time	Medium

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
<i>Hazard Mitigation Plan. Include participation from all municipalities in the update process by ensuring that their EOPs are reviewed and updated annually.</i>							
<u>Objective 3.3: Improve coordination and communication among disaster response organizations, local, and County governments</u>							
<i>3.3.1 Plan and host annual HMP review meetings with interdisciplinary team (planners, EMCs, FPAs, other stakeholders).</i>	Butler County Municipalities	Education and awareness	All	Butler OES	Ongoing	Staff Time	High
<i>3.3.2 Update the information the Borough keeps on the neighboring chemical plant</i>	Callery Borough	Local plans and regulations	Environmental Hazards	Callery Borough EMC	0-1 years	Staff Time	Medium
<u>Objective 3.4: Evaluate cost-effective ways of augmenting existing broadcast and communication systems to monitor all-hazard warning information continuously and to disseminate appropriate warnings</u>							
<i>3.4.1 Maintain and improve use of AlertPA and other tools to reach all</i>	Butler County, Butler Township, Callery Borough, Clearfield Township,	Education and awareness	All	Butler Department of Emergency	Ongoing	Staff Time	Medium

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
<i>populated areas throughout the County.</i>	Connoquenessing Borough, Harmony Borough, Harrisville Borough, Mercer Township, ,Summit Township Zelenople Borough			Services, Municipal offices			
3.4.2 Continue to distribute NOAA Weather Radios to Butler County municipalities, schools, nursing homes, day care centers, and SARA facilities for high-risk events.	Butler County, Allegheny Township, Butler Township, Oakland Township, Summit Township, Winfield Township	Education and awareness	All	Butler Department of Emergency Services	Ongoing	FEMA BRIC funding	High
Goal 4: Reduce or redirect the impact of natural disasters (especially floods) away from at-risk population areas							
<u>Objective 4.1: Research possible mitigation projects to reduce flooding, reduce/eliminate sewage leakage and inflow/infiltration problems. Some projects may include reservoirs, levees, floodwalls, diversions, channel modification and storm sewers</u>							
4.1.1 Continue to review Hazard Mitigation Questionnaires and post-disaster reviews submitted by the municipalities.	Butler County, Butler Township, Franklin Township, Prospect Borough	Local plans and regulations	All	Butler Department of Emergency Services	Ongoing	Staff Time	High

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
Goal 5: Protect existing natural resources and open space, including parks and wetlands, within the floodplain and watershed to improve their flood control function.							
Objective 5.1 Protect Butler County's natural resources through the implementation of cost-effective and technically feasible mitigation projects, recreation planning and storm water management planning							
5.1.1 Planning Department to continue the development of the Countywide Stormwater Management Plan within the next 5 years.	Butler County, Butler Township, City of Butler, Cranberry Township, Petrolia Borough, Slippery Rock Borough	Natural systems protection	Flooding, Landslides, Mine Subsidence	Butler Planning Commission	3-5 years	PDEP Grants	Medium
5.1.2 County to work with DEP, conservation agencies, and others, to research avenues for restoring degraded natural resources and open space to improve their flood control functions.	Butler County, Butler Township	Natural systems protection	Flooding	Butler Planning Commission	Ongoing	Staff Time	Medium

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
Goal 6 - Protect public health, safety, and welfare by increasing the public awareness of existing hazards and by fostering both individual and public responsibility in mitigating risks due to those hazards							
Objective 6.1: Develop and distribute public awareness materials about natural hazard risks, preparedness, and mitigation							
6.1.1 Create a "How To" Mitigation display for use at public events to distribute FEMA's publications, such as: Retrofitting for Homeowners Guide, Elevating Your Flood Prone Home, Elevating Residential Structures, and Information on the NFIP.	Butler County, Butler Township, West Liberty Borough, West Sunbury Borough	Education and awareness	Flooding	Butler Department of Emergency Services	1-2 years	FEMA BRIC Funds, Staff Time	Low
6.1.2 Butler OES to work with the Butler Cooperative Extension to develop Animals in Disasters Displays that will be used at 4-H Clubs, Agricultural Fair, in Veterinarians Offices and other places that animal owners may gather. The display	Butler County, Allegheny Township, Butler Township, Fairview Township	Education and awareness	All	Butler Department of Emergency Services	1-2 years	FEMA BRIC Funding, Staff Time	Medium

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
<i>will have information about preparing animals for disasters by making a disaster plan and a disaster supply kit for each animal. The display will encourage animal owners to decide ahead of time where animals will be sheltered and to familiarize them with the County's Animals in Disaster Annex of the Emergency Operations Plan.</i>							
<i>6.1.3 County to develop a Business Continuity Planning Display. The display will be designed to raise awareness level of WHY it is important to have a Business Continuity Plan, how to develop a plan, and will encourage businesses to make</i>	Butler County, Butler Township	Education and awareness	All	Butler OES	1-2 years	FEMA BRIC Funds, Staff Time	Medium

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
<i>sure that their plan fits in with the County's plan. This display will be appropriate for use at local Chamber of Commerce meetings and activities, civic group gatherings such as the Rotary Club, and other business-related gatherings.</i>							
6.1.4 Continue to use Sparky Fire Safety Program displays for children's programs that teach safety.	Butler County, Butler Township, Center Township, City of Butler, Connoquenessing Borough, Fairview Township, Petrolia Borough	Education and awareness	All, Urban Fire and Explosion	Butler Department of Emergency Services, Municipal Fire Departments	Ongoing	Staff Time	Low
6.1.5 Compile a list with links on the state/county website to medical information, relief packages, and other resources in the event of a pandemic.	Butler County	Education and Awareness	Pandemic	Butler Department of Emergency Services	Ongoing	Staff Time	Low

Table 6.4-1 2021 Mitigation Action Plan

ACTION DESCRIPTION	COMMUNITY/ ORGANIZATION	CATEGORY	HAZARD	LEAD AGENCY/ DEPARTMENT	IMPLEMENTATION SCHEDULE	FUNDING SOURCE	PRIORITY
<u>Objective 6.2: Target owners of properties within identified hazard areas for additional outreach regarding mitigation and disaster preparedness</u>							
<i>6.2.1 Develop an outreach program to encourage homeowners in high-risk hazard areas to mitigate and prepare for potential impacts from disasters.</i>	Butler County	Education and Awareness	All Hazards	Butler Department of Emergency Services	Ongoing	Staff Time	Medium
Goal 7 - Implement structural projects to reduce the impacts of hazards.							
<u>Objective 7.1: Address the risks posed by the potential failure of High Hazard Potential Dams within the County</u>							
<i>7.1.1 Identify and make any and all repairs to existing class A-1 and B-1 dams in the County</i>	Butler County, Butler Township, Cherry Township, Clinton Township, Fairview Township, Middlesex Township, Muddy Creek Township, Oakland Township	Structure and infrastructure	Dam Failure	Butler Department Emergency Services, Municipality EMCs	Within 5 years	FEMA HHPD Grant Program	High
<i>7.1.2 Coordinate with local dam owners and PADEP to obtain and digitize dam inundation data.</i>	All municipalities	Education and Awareness	Dam Failure	Butler County Municipalities	Ongoing	FEMA HHPD Grant Program	Low

While all these activities will be pursued over the next five years, the reality of limited time and resources requires the identification of the feasibility and priority level of mitigation actions. Prioritization allows the individuals and organizations involved to focus their energies and ensure progress on mitigation activities.

Evaluating mitigation actions involves judging each action against certain criteria to determine its feasibility and potential impact. Actions evaluated and prioritized by applying the Multi-Objective Mitigation Action Prioritization criteria. For each action, scores were assigned to each criterion using the following weighted, multi-objective mitigation action prioritization criteria.

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

Scores of 1, 2, or 3 were assigned for each multi-objective mitigation action prioritization criterion where 1 is a low score and 3 is a high score. The Efficiency criterion, which considers the cost and effort of each action versus its overall vulnerability reduction benefit, is the most highly weighted criterion as part of the total prioritization score. Actions were prioritized using the cumulative score assigned to each. Each mitigation action was then given a priority ranking (Low, Medium, and High) based on the following:

- Low Priority: 1.0 - 1.8
- Medium Priority: 1.9 - 2.4
- High Priority: 2.5 - 3.0

Table 6.4-2 presents the cumulative results of the prioritization of mitigation actions.

Table 6.4-2 2021 Mitigation Action Prioritization

MITIGATION ACTIONS NAME	MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					PRIORITY
	EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES CRITICAL COMMUNICATIONS/ INFRASTRUCTURE	
1.1.1 Review regulations to make sure that adequate zoning regulations are in place to reduce future development (including new buildings and infrastructure) in high hazard areas in their jurisdiction.	3	3	2	3	1	2.5
1.1.2 Revise the expected maximum precipitation values for engineering designs in County and Municipal land use regulations to reduce flood damages from inadequate design standards.	3	3	2	3	2	2.6
1.2.1 Review County and municipal comprehensive plans to ensure that designated growth areas are not in high hazard areas identified in this plan, or regulations are in place to identify hazard areas in large growth areas and development is restricted in these areas.	3	3	3	3	3	3
1.3.1 Continue to review implementation of Uniform Construction Code to ensure safe enforcement.	3	3	2	3	3	2.8
1.3.2 Widen Wick Road from 14' to 21'	2	2	1	3	2	1.95
1.4.1 Review capital improvement plans to ensure that programmed infrastructure improvements are not in high hazard areas.	3	3	3	3	3	3
1.5.1 Review and update floodplain ordinances to be sure that they are in full compliance with the NFIP.	3	2	1	3	2	2.15
1.5.2 Encourage municipalities not participating in the NFIP to join in the process of the DFIRM going effective in 2016.	3	3	1	2	2	2.3
1.6.1 Butler County OES to arrange with PEMA/FEMA/DCED to hold training for Insurance Companies on the NFIP.	2	2	1	3	2	1.95
1.6.2 Butler County OES to arrange with PEMA/FEMA/DCED to conduct training on the Community Rating System (CRS) with municipalities.	3	2	1	3	3	2.3

Table 6.4-2 2021 Mitigation Action Prioritization

MITIGATION ACTIONS NAME	MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					PRIORITY
	EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES CRITICAL COMMUNICATIONS/ INFRASTRUCTURE	
1.6.3 Explore the possibility, feasibility and funding sources for a new conservation easement program to purchase easements on open space areas along flood prone areas to help divert floodwaters.	3	3	2	3	1	2.5
1.7.1 Evaluate existing evacuation shelters to determine adequacy for current and future populations and compliance with the Butler County Emergency Operations Plan	2	2	3	3	3	2.5
1.8.1 Implement a brush clearing, bank stabilization and debris control program for all flood-prone waterways.	2	2	2	3	2	2.15
1.8.2 Breach the dam for the three Raw Water Reservoirs in Zelenople Borough.	3	2	2	3	2	2.35
1.8.3 Install and fix catch basins throughout Slippery Rock Borough	3	2	2	3	3	2.5
1.8.4 Replacement of all drainage pipe and catch basins and repave the roads in West Wood III	3	2	2	3	3	2.5
1.8.5 Add curbing to the existing roadway, add catch basins, and drainage piping where flooding is occurring in the Windward Heights Housing Development	2	2	2	3	2	2.15
1.8.6 Add curbs, piping, and catch basins in the Shanor Manor development	2	2	1	3	1	1.8
1.8.7 Add curbing, catch basins and piping as necessary in the Shanor Heights development	2	2	1	3	1	1.8
1.8.8 Add curbing, catch basins, and piping as necessary in the C. W. & Al Johnston development.	2	2	1	3	1	1.8
1.8.9 Replace the concrete drainage pipe, add curbing, piping, and catch basins where necessary in the Timberly Heights development	2	2	2	3	2	2.15
1.8.10 Add curbing, catch basins, and piping where necessary in the Northview Housing development to help with stormwater runoff.	2	2	2	3	2	2.15

Table 6.4-2 2021 Mitigation Action Prioritization

MITIGATION ACTIONS NAME	MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					PRIORITY
	EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES CRITICAL COMMUNICATIONS/ INFRASTRUCTURE	
2.1.1 County OES and PEMA to conduct outreach efforts to educate municipalities about the NFIP and its requirements, including on standards involving substantially damaged properties.	2	2	1	3	2	1.95
2.2.1 Identify and conduct cost-benefit analysis, and apply for grants for acquisition, elevation, relocation, wet and dry flooding, and other protection measures as appropriate for residential and non-residential with high vulnerabilities.	3	3	2	3	3	2.8
2.2.2 When funds become available for hazard mitigation projects, the County will work with municipalities with RL/SRL properties to hold targeted meetings and/or phone calls with the owners of RL/SRL properties. These meetings to determine potential participation in future acquisition, elevation relocation, and other mitigation projects.	3	3	2	3	1	2.5
2.2.3 Pursue funding for installing de-icing systems on vulnerable bridges.	2	2	2	3	2	2.15
2.2.4 Review snow removal procedures to prioritize removal to address vulnerable populations first.	2	3	1	3	2	2.25
2.2.6 Address gas well fires by properly using, cleaning, and maintaining the wells regularly	3	2	2	3	2	2.35
2.2.7 Ensure tree limbs are cut back from utility lines around roads	3	2	3	2	3	2.55
2.3.1 Document and map natural gas wells and lines	3	2	2	3	2	2.35
3.1.1 Butler County CERT Trainers to teach Community Emergency Response Team (CERT) classes to interested citizens in Butler County to assist first responders at specified emergencies throughout the County. Additional trainers need to attend future Train-the-Trainer courses.	2	2	3	3	2	2.35

Table 6.4-2 2021 Mitigation Action Prioritization

MITIGATION ACTIONS NAME	MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					PRIORITY
	EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES CRITICAL COMMUNICATIONS/ INFRASTRUCTURE	
3.1.2 OES to work with the Butler Fire Association, Butler Hospital, EMS and the Butler County Police Chiefs Association to increase the number of trained citizen emergency responders by meeting with groups of potential volunteers. All areas of Butler County will benefit.	2	2	3	3	3	2.5
3.1.3 OES to provide information about local, regional, state, and federal training opportunities to fire departments, EMS, ambulance services, and other emergency responders. Develop a list of training opportunities that are available and distribute the list to all local emergency responders. Will benefit all areas of Butler County.	2	2	3	3	1	2.2
3.1.4 Continue to conduct National Weather Service Storm Spotter classes by partnering with the National Weather Service to provide training to people throughout Butler County on Storm Spotting in the areas of Flooding, High Winds, Basic I and II.	2	2	3	3	1	2.2
3.1.5 Increase training and equipment for police to respond to civil disturbance	3	3	1	3	3	2.6
3.2.1 Review the existing Butler County Emergency Operations Plan (EOP) and update when necessary based on the recommendations of the Butler County Hazard Mitigation Plan. Include participation from all municipalities in the update process by ensuring that their EOPs are reviewed and updated annually.	2	2	3	3	1	2.2
3.3.1 Plan and host annual HMP review meetings with interdisciplinary team (planners, EMCs, FPAs, other stakeholders).	3	3	3	3	1	2.7
3.3.2 Update the information the Borough keeps on the neighboring chemical plant	1	3	2	2	3	2.25

Table 6.4-2 2021 Mitigation Action Prioritization

MITIGATION ACTIONS NAME	MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					PRIORITY
	EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES CRITICAL COMMUNICATIONS/ INFRASTRUCTURE	
3.4.1 Maintain and improve use of AlertPA and other tools to reach all populated areas throughout the County.	2	2	3	3	2	2.35
3.4.2 Continue to distribute NOAA Weather Radios to Butler County municipalities, schools, nursing homes, day care centers, and SARA facilities for high-risk events.	2	2	3	3	3	2.5
4.1.1 Continue to review Hazard Mitigation Questionnaires and post-disaster reviews submitted by the municipalities.	2	3	2	3	2	2.45
5.1.1 Planning Department to continue the development of the Countywide Stormwater Management Plan within the next 5 years.	2	2	3	3	1	2.2
5.1.2 County to work with DEP, conservation agencies, and others, to research avenues for restoring degraded natural resources and open space to improve their flood control functions.	2	2	2	3	1	2
6.1.1 Create a "How To" Mitigation display for use at public events to distribute FEMA's publications, such as: Retrofitting for Homeowners Guide, Elevating Your Flood Prone Home, Elevating Residential Structures, and Information on the NFIP.	1	1	1	3	1	1.3
6.1.2 Butler OES to work with the Butler Cooperative Extension to develop Animals in Disasters Displays that will be used at 4-H Clubs, Agricultural Fair, in Veterinarians Offices and other places that animal owners may gather. The display will have information about preparing animals for disasters by making a disaster plan and a disaster supply kit for each animal. The display will encourage animal owners to decide ahead of time where animals will be sheltered and to familiarize them with the County's Animals in Disaster Annex of the Emergency Operations Plan.	2	2	3	3	1	2.2

Table 6.4-2 2021 Mitigation Action Prioritization

MITIGATION ACTIONS NAME	MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					PRIORITY
	EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES CRITICAL COMMUNICATIONS/ INFRASTRUCTURE	
6.1.3 County to develop a Business Continuity Planning Display. The display will be designed to raise awareness level of WHY it is important to have a Business Continuity Plan, how to develop a plan, and will encourage businesses to make sure that their plan fits in with the County's plan. This display will be appropriate for use at local Chamber of Commerce meetings and activities, civic group gatherings such as the Rotary Club, and other business-related gatherings.	2	2	3	2	2	2.2
6.1.4 Continue to use Sparky Fire Safety Program displays for children's programs that teach safety.	2	2	2	1	1	1.7
6.1.5 Compile a list with links on the state/county website to medical information, relief packages, and other resources in the event of a pandemic.	2	2	1	2	2	1.5
6.2.1 Develop an outreach program to encourage homeowners in high-risk hazard areas to mitigate and prepare for potential impacts from disasters.	2	2	3	2	2	2.2
7.1.1 Identify and make any and all repairs to existing class A-1 and B-1 dams in the County	3	3	2	3	3	2.8
7.1.2 Coordinate with local dam owners and PADEP to obtain and digitize dam inundation data.	1	1	1	2	2	1.3

7. Plan Maintenance

7.1. Update Process Summary

Once this Plan has received approval from PEMA and ultimately FEMA, the Plan will be adopted by the Butler County and all participating jurisdictions. This HMP Update is intended to be a 'living document'. Plan adoption, though important, is not considered the final step in the planning process but rather as a first step to 'realization'. The plan monitoring and maintenance schedule is a cycle of events that involve periodic review, adjustments, and improvement. This Chapter establishes a method to monitor how the Plan will be evaluated and maintained in the future.

Monitoring, evaluating, and updating this plan is critical to maintaining its value and success in Butler 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. While the methodology and schedule are similar to what is outlined in the 2015 HMP, slight revisions were made based on the County's experience with maintenance updates between 2010 and 2015.

7.2. Monitoring, Evaluating, and Updating the Plan

Hazard mitigation planning in Butler County is the responsibility of all levels of government (i.e., County and local), as well as the citizens of the County. As listed in FEMA 386-4, the planning team (the Butler County Hazard Mitigation Steering Committee) must continuously monitor and document the progress of the Plan's recommended actions. The Butler County Hazard Mitigation Steering Committee (listed in **Section 3.2**), under the direction of the Butler County Emergency Services Department, will be responsible for maintaining this Multi-Jurisdictional HMP. The Steering Committee will meet annually during the Local Coordinator Quarterly Trainings to discuss specific coordination efforts that may be needed with other stakeholders. In addition, it will also serve in an advisory capacity to the Butler County Board of Commissioners and the Planning Commission. The Steering Committee will also meet following each emergency declaration, with the purpose of reviewing the Plan. The Steering Committee will lead annual reviews of the HMP, but the input needed for effective periodic evaluations will come from community representatives, local emergency management coordinators and planners, engineering staff, assessment department staff, conservation district, the general public, and other important partner agencies. Each year, the County will solicit new projects from the municipalities by sending out Project Opportunity Forms and informing the municipalities of the opportunity to update their mitigation measures. Each municipality will designate a community representative to monitor mitigation activities and

hazard events within their respective communities. The local emergency management coordinator would be suitable for this role.

Each review process will ensure that the Hazard Vulnerability Analysis and Risk Assessment reflect current conditions in the County and the municipalities, the Capability Assessment accurately reflects local circumstances, and the hazard mitigation strategies are updated based on the County's damage assessment reports and local mitigation project priorities. The Steering Committee will complete a Progress Report to evaluate the status and accuracy of the HMP and record the Steering Committee's findings. The Butler County Emergency Services Department will maintain a copy of these records. Efforts will be made to expand participation in the annual reviews to build and diversify participation for the 2026 HMP update.

As directed by FEMA 386-4, the Progress Report will include the following information: the hazard mitigation action's objectives; who the lead and supporting agencies responsible for implementation are; how long the project should take, including a delineation of the various stages of work along with timelines (milestones should be included); whether the resources needed for implementation, funding, staff time, and technical assistance are available, or if other arrangements must be made to obtain them; the types of permits or approvals necessary to implement the action; details on the ways the actions will be accomplished within the organization, and whether the duties will be assigned to agency staff or contracted out; and the current status of the project, identifying any issues that may hinder implementation. Issues that arise during monitoring and evaluation which require changes to the risk assessment, mitigation strategy, and other components of the plan will be incorporated during future updates.

The HMP must be updated on a five-year cycle as required by the Disaster Mitigation Act of 2000. This HMP will be updated and resubmitted to FEMA for approval within the five-year period. The monitoring, evaluating, and updating of the Plan every five years will rely heavily on the outcomes of the annual Steering Committee meetings.

Future plan updates will account for any new hazard vulnerabilities, special circumstances, or new information that becomes available. During the five-year review process, the following questions will be considered as criteria for assessing the effectiveness of the Butler County Hazard Mitigation Plan:

- Has the nature or magnitude of hazards affecting the County changed?
- Are there new hazards that have the potential to impact the County?
- Do the identified goals and actions address current and expected conditions?
- Have mitigation actions been implemented or completed?
- Has the implementation of identified mitigation actions resulted in expected outcomes?

- Are current resources adequate to implement the Plan?
- Should additional local resources be committed to address identified hazards?

In addition, when the plan is next updated, every effort will be made to include a diverse array of county partner agencies, including the engineering/public works staff; tax assessment office; conservation district; universities; and other not-for-profit organizations.

7.3. Continued Public Involvement

The Butler County Emergency Services Department will ensure that the HMP is posted and maintained on the County website and will continue to encourage public review and comment on the plan through information posted to the website and public notices in the local newspaper. The HMP project website developed for the plan update will remain active through 2022.

The citizens of Butler County are encouraged to submit their comments to elected officials and/or members of the Hazard Mitigation Steering Committee. To promote public participation, Butler County welcomed comments on the HMP for a 30-day period. This offered the public the opportunity to share their comments and observations. As was done during the development of the 2021 HMP, the Steering Committee will involve the public during the evaluation and update of the HMP through various workshops and meetings. The public will have access to the current HMP through their local municipal office, the Butler County Department of Emergency Services office, or through the Butler County website. Information on upcoming events related to the HMP or solicitation for comments will be announced via newsletters, newspapers, mailings, and the County website.

Butler County will continue to reach out to municipalities via telephone, mail, and email. All comments received will be maintained and considered by the Hazard Mitigation Steering Committee when updating the HMP. mail regarding mitigation projects, especially those municipalities that did not submit projects for inclusion in this HMP. Any additional Hazard Mitigation Project Opportunity Forms received during the life of this five-year HMP will be incorporated into the Plan as an interim, updated and included in the next five-year Plan update.

8. Plan Adoption

The Plan was submitted to the Pennsylvania State Hazard Mitigation Planner on Month Day, 2021.

This section of the plan includes copies of the local adoption resolutions passed by Butler County and its municipal governments. Adoption resolution templates are also provided to assist the County and municipal governments with recommended language for future adoption of the HMP. A completed Local Mitigation Plan Review Crosswalk can be found in **Appendix B**.

After the Plan was approved by PEMA, it was forwarded to the Federal Emergency Management Agency (FEMA) for final review and approval. FEMA granted approval-pending-adoption on **Month Day, Year**. Full approval from FEMA was received on **Month Day, Year**. A copy of the adoption resolutions executed by Butler County and the participating municipalities are included in this section.

Butler County Hazard Mitigation Plan
County Adoption Resolution

Resolution No. _____
Butler County, Pennsylvania

WHEREAS, the municipalities of Butler County, Pennsylvania, are most vulnerable to natural and human-made hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, Butler County acknowledges the requirement of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Butler County Hazard Mitigation Plan has been developed by the Butler County Emergency Services Department, in cooperation with other County departments, local municipal officials, and the citizens of Butler County, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Butler County Hazard Mitigation Plan, and

WHEREAS, the Butler County Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural and human-made hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for the County of Butler that:

- The Butler County Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the County, and
- The respective officials and agencies identified in the implementation strategy of the Butler County Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2021

ATTEST:

BUTLER COUNTY COMMISSIONERS

_____ By _____

By _____

By _____

Butler County Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. _____

<Borough/Township of Municipality Name>, Butler County, Pennsylvania

WHEREAS, the <Borough/Township of Municipality Name>, Butler County, Pennsylvania, is most vulnerable to natural and human-made hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, the <Borough/Township of Municipality Name> acknowledges the requirement of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Butler County Hazard Mitigation Plan has been developed by the Butler County Emergency Services Department in cooperation with other County departments, and officials and citizens of <Borough/Township of Municipality Name>, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Butler County Hazard Mitigation Plan, and

WHEREAS, the Butler County Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural and human-made hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for the <Borough/Township of Municipality Name>:

- The Butler County Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the <Borough/Township>, and
- The respective officials and agencies identified in the implementation strategy of the Butler County Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2021

ATTEST:

<BOROUGH/TOWNSHIP OF MUNICIPALITY NAME>

By _____

By _____

By _____