Adams County 2015 Hazard Mitigation Plan Update

Prepared for:
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with support from PEMA

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Date: February 5, 2015

Michael Baker
INTERNATIONAL

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Adams County Hazard Mitigation Plan Update

Certification of Annual Review Meetings

The Adams County Hazard Mitigation Steering Committee has reviewed this Hazard Mitigation Plan Update. See Section 7 of the Adams County 2015 Hazard Mitigation Plan Update for further details regarding this form. The director of the Hazard Mitigation Steering Committee hereby certifies the review.

YEAR	DATE OF MEETING	PUBLIC OUTREACH ADDRESSED?*	SIGNATURE
2010	N/A	N/A	To the best knowledge of the HMPSC, no HMP progress reports were submitted from municipalities for the period from 2010-2014. The public had continual access to the HMP through the County's website and some mitigation actions were accomplished in this period. Progress on actions is discussed in detail in Section 6.1 of this plan.
2011	N/A	N/A	
2012	N/A	N/A	
2013	N/A	N/A	
2014	N/A	N/A	
2015			
2016			
2017			
2018			

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

Adams County Hazard Mitigation Plan Update

Record of Changes

DATE	DESCRIPTION OF CHANGE MADE, MITIGATION ACTION COMPLETED, OR PUBLIC OUTREACH PERFORMED	CHANGE MADE BY (PRINT NAME)	CHANGE MADE BY (SIGNATURE)
2010-2014	To the best knowledge of the HMPSC, no HMP progress reports were submitted from municipalities for the period from 2010-2014. The public had continual access to the HMP through the County's website and some mitigation actions were accomplished in this period. Progress on actions is discussed in detail in Section 6.1 of this plan.	N/A	N/A

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

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1. Introduction

1.1. Background

Across the United States, natural and man-made disasters have led to increasing levels of deaths, injuries, property damage, and interruption of business and government services. The time, money, and effort needed to recover from these disasters exhausts resources, diverting attention from important public programs and private agendas. Since 1955 there have been 53 Presidential Disaster Declarations and nine Presidential Emergency Declarations in Pennsylvania, 12 and five of which have included Adams County. The emergency management community, citizens, elected officials and other stakeholders in Adams County, Pennsylvania recognize the impact of disasters on their community and support proactive efforts needed to reduce the impact of natural and human-made hazards.

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

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

Accordingly, the Adams County Hazard Mitigation Plan Steering Committee (HMPSC), composed of government leaders from Adams County, in cooperation with the elected officials of the County and its municipalities have prepared this Hazard Mitigation Plan (HMP) update. 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.

1.2. Purpose

This Hazard Mitigation Plan Update was developed for the purpose of:

- To protect life, safety, and property by reducing the potential for future damages and economic losses that result from natural hazards';
- To qualify for additional grant funding, in both the pre-disaster and the post-disaster environment;
- To qualify for additional credit under the Community Ratings System (CRS);
- To speed recovery and redevelopment following future disaster events;
- To demonstrate a firm local commitment to hazard mitigation principles; and
- To comply with both state and federal legislative requirements for local hazard mitigation plans.

- Improving community resiliency following a disaster event.

1.3. Scope

The Adams County 2015 Hazard Mitigation Plan update has been prepared to meet requirements set forth by the Federal Emergency Management Agency (FEMA) and Pennsylvania Emergency Management Agency (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 address both natural and human-made hazards determined to be of significant risk to the County and/or its local municipalities. Updates will take place at a minimum every five years, but they will also take place following significant disaster events.

1.4. Authority and References

Authority for this plan originates from the following federal sources:

- Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C., Section 322, as amended;
- Code of Federal Regulations (CFR), Title 44, Parts 201 and 206;
- Disaster Mitigation Act of 2000, Public Law 106-390, as amended; 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 1, 2011.
- FEMA *National Fire Incident Reporting System 5.0: Complete Reference Guide*. January, 2008.
- FEMA Hazard Mitigation Assistance Unified Guidance. September 11, 2013.

- FEMA. Integrating Hazard Mitigation Into Local Planning: Case Studies and Tools for Community Officials. March 1, 2013
- FEMA. Mitigation Ideas. A Resource for Reducing Risk to Natural Hazards. January 2013.

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

- PEMA Hazard *Mitigation Planning Made Easy!*
- PEMA Mitigation Ideas: *Potential Mitigation Measures by Hazard Type; A Mitigation Planning Tool for Communities*. March 6, 2009.
- PEMA Pennsylvania's *Hazard Mitigation Planning Standard Operating Guide*. October, 2013.

The following additional guidance document produced by the National Fire Protection Association (NFPA) was used to update this plan:

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

2. Community Profile

2.1. Geography and Environment

Adams County is 526 square miles in size, ranking 44th out of Pennsylvania's 67 counties. The County is located in south central Pennsylvania and is bordered by Cumberland County to the north, York County to the north and east, Franklin County to the west, and by the Maryland counties of Carroll and Frederick to the south.

Adams County is located on the eastern side of the Appalachian Mountains. The broad physical features of the County include a portion of the Blue Ridge Mountains along the western boundary, the County's fruit belt along the foothills of the mountains, a broad central valley that includes the Borough of Gettysburg (Gettysburg) and the Gettysburg National Military Park, and an area of rolling hills bordering York County to the east. Major portions of South Mountain on the west and the Pigeon Hills on the east are covered with forests.

The County is divided almost equally between two major watersheds. Roughly one-half of the County drains northeast into the Susquehanna River by the Conewago Creek and its tributaries, and the other half drains south and west into the Potomac River by the Monocacy River and its tributaries (Adams County Comprehensive Plan 1991).

A base map showing the County's major transportation infrastructure, municipalities, and parks and forests is included as Figure 2.1-1, and a map of watersheds is included as Figure 2.1-2.

Figure 2.1-1 Base Map of Adams County.

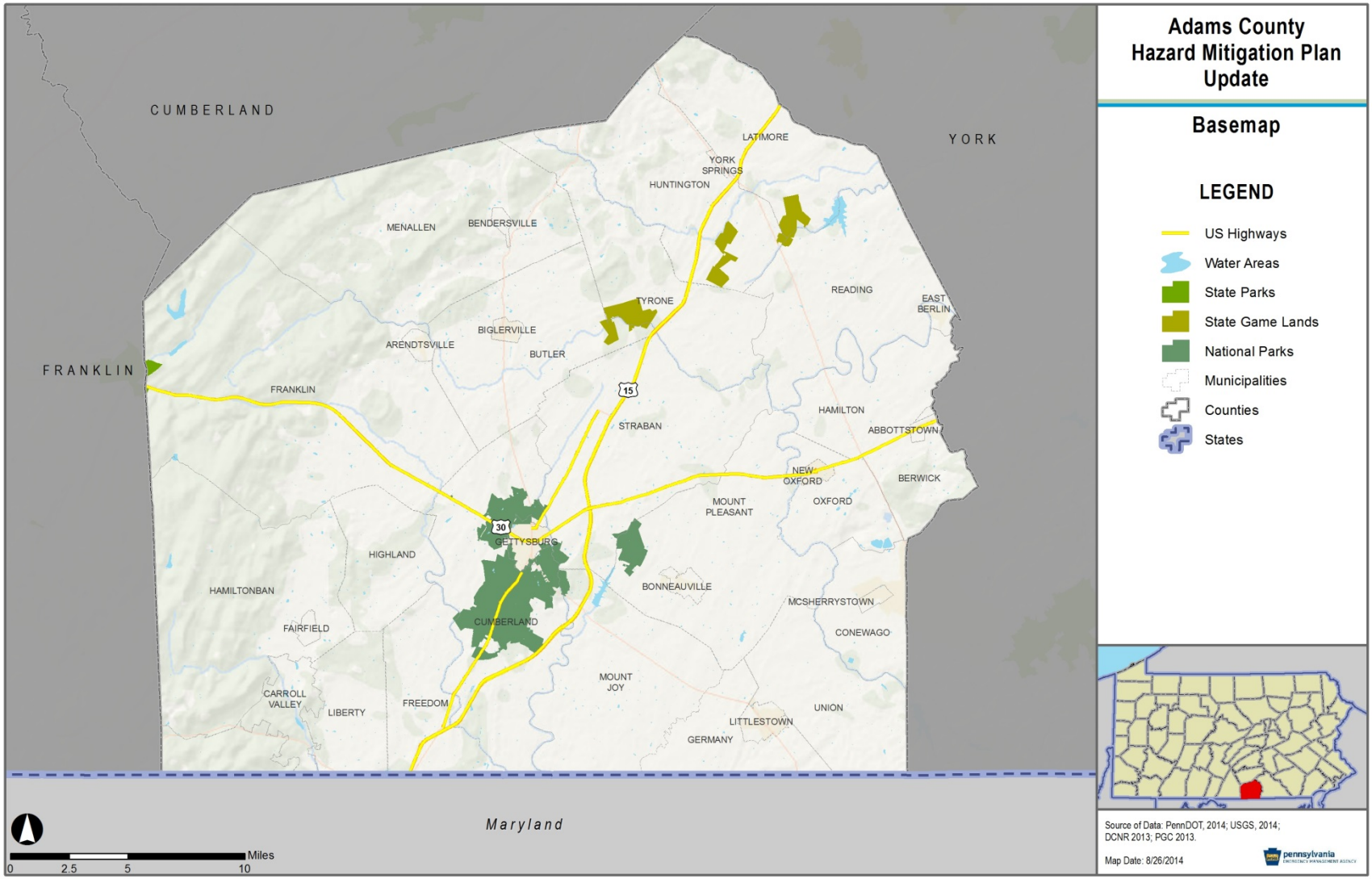
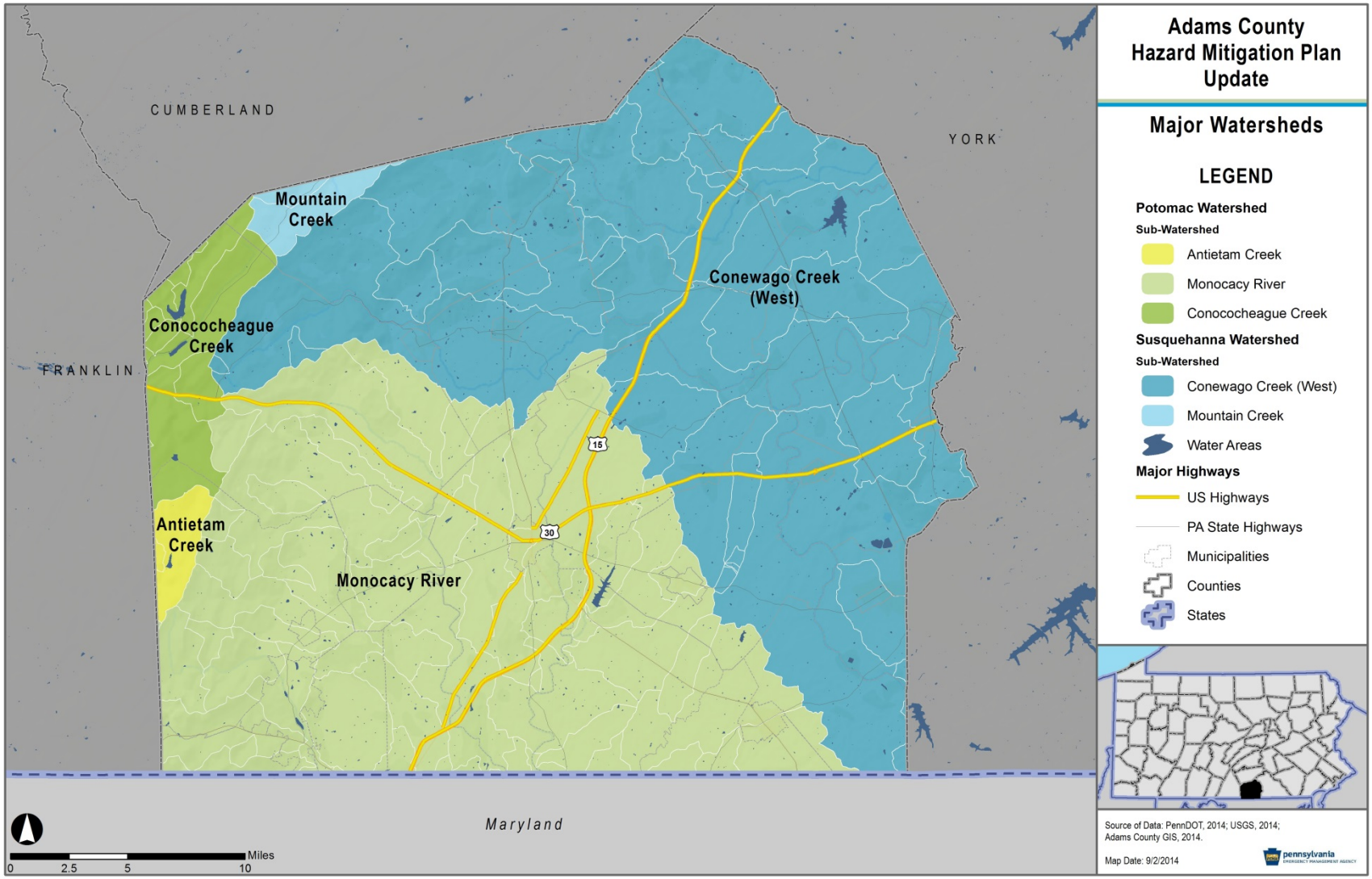


Figure 2.1-2 Adams County Watersheds.



2.2. Community Facts

Adams County is situated along the Mason-Dixon line. The state capital of Harrisburg is located 36 miles north of Gettysburg, the county seat. The outer suburbs of Washington, DC and Baltimore, Maryland are within an hour's drive from most of the County.

Adams County includes 21 townships and 13 boroughs. The County's largest municipality, in terms of population, is Gettysburg Borough, followed closely by Conewago Township. According to a County profile prepared by the Adams County Office of Planning and Development (ACOPD), the County was settled in a "spokes and wheel" pattern around Gettysburg, which is still evident today. Refer to Figure 2.1-1. Most of the County's mid-19th century roadway pattern remains intact. Thirteen historic roadways converge at or near Gettysburg Borough with two circular rings of towns surrounding Gettysburg (ACOPD, Adams County Profile, 2011).

Today, the County's main transportation thoroughfares include U.S. Route 15 running north-south and U.S. Route 30 running east-west Other important roadways include PA Route 97 running southeast from Gettysburg into Maryland, PA Route 94 starting north in Mount Holly Springs in neighboring Cumberland County and traversing the County southeast into Hanover Borough in York County, PA Route 234 running east from its intersection with US Route 30 in Franklin Township to East Berlin Borough, and PA Route 116 running generally east from its intersection with PA Route 16 in Carroll Valley Borough to Hanover Borough in York County.

While Adams County is traditionally associated with agricultural production, according to the Pennsylvania Department of Labor & Industry (L & I) only about 5% of the workforce is employed in the Agriculture sector. Nonetheless, two of the County's 10 largest employers are in the Agriculture sector and the number of Agriculture workers and establishments increased steadily between 2006 and 2010. In addition, according to Dun & Bradstreet, Fruit & Vegetable Canning was the 3rd largest employing industry subsector in Adams County in 2007. The fruit industry has been an important component of Adams County's history since the mid-nineteenth century with Adams County currently the top apple producing County in Pennsylvania and 5th in the nation. Thirty-three percent (33%) of all orchard land in Pennsylvania is within Adams County.

Manufacturing employs the largest percentage, close to 20%, of the workforce in Adams County with Health Care and Social Assistance the second largest industry employer. Refer to the following table showing recent industry statistics from L & I.

Table 2.2-1 Adams County Industry Sectors by Establishments and Employees (2013)

INDUSTRY SECTOR	ESTABLISHMENTS	EMPLOYEES
Manufacturing	121	6,517
Health Care and Social Assistance	2,248	4,566
Accommodation and Food Services	207	3,959
Retail Trade	322	3,357
Agriculture, Forestry, Fishing & Hunting	92	1,452

Table 2.2-1 Adams County Industry Sectors by Establishments and Employees (2013)		
INDUSTRY SECTOR	**ESTABLISHMENTS**	**EMPLOYEES**
Transportation and Warehousing	79	1,446
Construction	186	1,434
Public Administration	52	1,412
Other Services (except Public Admin.)	189	993
Education Services	Confidential	Confidential
Source: PA Department of Labor & Industry, Labor Market Statistics, Quarterly Census of Employment and Wages Program, 1st quarter, 2013.		

Based on 2005 real property tax, the total value of real property in Adams County is $1,875,816,618 (L & I, 2005).

Adams County is an area of national historic significance known for the Battle of Gettysburg in 1863 and for President Lincoln's Gettysburg address on November 19, 1863. The Gettysburg National Military Park includes 6,000 acres surrounding Gettysburg, attracting 1.3 million visitors in 2013. As the military park is a national and international tourism venue, knowing the number of visitors travelling to the facility on an annual basis is helpful for planning purposes.

2.3. Population and Demographics

Population and demographic data provides baseline information for assessing the potential magnitude of hazards and can be used to identify trends in high-risk populations. This section includes baseline demographic trends for Adams County.

Adams County's population has been steadily increasing since the 1950s with 2010 population at 101,407 citizens, shown in Table 2.3-1.

Table 2.3-1 Adams County Population Trends	
YEAR	**POPULATION**
1950	44,197
1960	51,906
1970	56,937
1980	68,292
1990	78,274
2000	91,292
2010	101,407
Source: U.S. Census.	

Recent demographic trends in Adams County are summarized in the following table. While population is increasing, the increase is not as significant as the population increase between 1990 and 2000.

Table 2.3-2 Adams County Demographic Summary

DEMOGRAPHIC DATA POINT	2000	2010
Total Population	91,292	101,407
Male/Female	44,787/46,505	49,865/51,542
Median Age (years)	37	41
Under 5 years	5,405	5,594
5 – 19 years	20,227	20,115
20 – 64 years	53,004	59,744
65 years and older	12,656	15,954

Source: U.S. Census.

Median age has been increasing and is consistent with Pennsylvania's median age of 40. The number of citizens over age 65 has been increasing and is nearly 16% of total population which signals the need to address hazard mitigation actions that take the increasing number of senior citizens into account. As senior citizens may not be able to drive, special evaluation plans may be required. Further, hearing or vision impairments could make receiving emergency instructions difficult.

Consideration should also be given to address hazard mitigation actions for citizens with disabilities. According to the U.S. Census, American Community Survey 2012 Estimates, 13% of Adams County citizens have a disability, which includes 7% of citizens age 18 and younger and 34% of citizens over age 65 (U.S. Census, American Community Survey 2012 Estimates).

Adams County has slightly increased in terms of population density. Based on Census 2010 data the County has a population density of 195.5 people per square mile, making Adams County the 27th most densely population county in the state; up from 31st in 2000. This trend should be taken into consideration when developing mitigation actions as the magnitude of a hazard increases proportionate to density.

Adams County experienced an 11% increase in population between 2000 and 2010, as shown in Table 2.3-3. Several municipalities experienced increases greater than 20% including: York Springs Borough, Berwick Township, Bonneauville Borough, Conewago Township, and Hamilton Township.

Table 2.3-3 Municipal Population in Adams County (US Census).

MUNICIPALITY	US CENSUS POPULATION		
	1990	2000	2010
Abbottstown Borough	539	905	1,011
Arendtsville Borough	693	848	952
Bendersville Borough	560	576	641
Biglerville Borough	993	1,101	1,200
Bonneauville Borough	1,282	1,378	1,800
Carroll Valley Borough	1,457	3,291	3,876
East Berlin Borough	1,175	1,365	1,521
Fairfield Borough	524	486	507
Gettysburg Borough	7,025	7,490	7,620
Littlestown Borough	2,974	3,947	4,434
McSherrystown Borough	2,769	2,691	3,038
New Oxford Borough	1,617	1,696	1,783
York Springs Borough	547	574	833
TOTAL: Boroughs	*22,155*	*26,348*	*29,216*
Berwick Township	1,831	1,818	2,389
Butler Township	2,514	2,678	2,567
Conewago Township	4,532	5,709	7,085
Cumberland Township	5,431	5,718	6,162
Franklin Township	4,126	4,590	4,877
Freedom Township	692	844	831
Germany Township	1,949	2,269	2,700
Hamilton Township	1,760	2,044	2,530
Hamiltonban Township	1,872	2,216	2,372
Highland Township	815	825	943
Huntington Township	1,989	2,233	2,369
Latimore Township	2,209	2,528	2,580
Liberty Township	938	1,063	1,237
Menallen Township	2,700	2,974	3,515
Mount Joy Township	2,848	3,232	3,670
Mount Pleasant Township	4,076	4,420	4,693
Oxford Township	3,437	4,876	5,517
Reading Township	3,828	5,106	5,780
Straban Township	4,565	4,539	4,928
Tyrone Township	1,829	2,273	2,298
Union Township	2,178	2,989	3,148
TOTAL: Townships	*56,119*	*64,944*	*72,191*
Adams County	**78,274**	**91,292**	**101,407**

From a race and ethnicity perspective, Adams County citizens are predominantly white. The number of Hispanic or Latino citizens increased from 3,323 to 6, 115 between 2000 and 2010. Refer to Table 2.3-4. Consistent with this trend, the number of citizens speaking a language other than English increased 35% with 54% of these citizens speaking Spanish or Creole. Additional languages spoken other than English include: Other Indo-European (15%), Asian and Pacific Island (6%), and Other languages (1%). It may be important to consider hazard mitigation strategies to address language barriers to ensure all residents receive emergency instructions.

Table 2.3-4 Race and Ethnicity Profile

DEMOGRAPHIC INDICATOR	2000	2010
One Race	90,405	100,063
White	87,088	94,979
Black or African American	1,105	1,561
American Indian and Alaska Native	184	213
Asian	448	746
Pacific Islander	21	20
Some Other Race	1,559	2,544
Two or More Races	887	1,344
Hispanic or Latino	3,323	6,115
Speak a language other than English	4,683	8,106[1]

Source: U.S. Census.

[1] Number was obtained from the U.S. Census American Community Survey, 2012 Estimates as this question was not asked as part of Census 2010.

Median household income and median family income in Adams County, $58,465 and $68,583 respectively, have been increasing and are larger than state income levels. Per capita income has also been increasing with the state per capita income level slightly higher. Average wage rates in Adams County are slightly lower than state averages as reflected in Table 2.3-5.

Table 2.3-5 Income Levels & Wage Statistics

INCOME	ADAMS COUNTY		PENNSYLVANIA	
	2000	2012 ESTIMATES(1)	2000	2012 ESTIMATES [1]
Median Household Income	42,704	$58,465	40,106	$52,267
Median Family Income	48,810	$68,583	49,184	$65,980
Per Capita Income	18,577	$26,986	20,880	$28,190
WAGES (1ST QUARTER 2013)	**ADAMS COUNTY**		**PENNSYLVANIA**	
Average Hourly Wage	$17.35		$24.18	

Average Weekly Wage	$694	$967
Average Annual Wage	$36,088	$50,284

Source: U.S. Census, American Community Survey, 2012 Estimates: Estimated count of population between 2008-2012. PA Department of Labor & Industry, Labor Market Statistics, Quarterly Census of Employment and Wages Program.

(1) Questions pertaining to income were not included in Census 2010; therefore, American Community Survey data was used to provide comparison to Census 2000 income levels.

According to L & I as of May 2014, Adams County had a civilian labor force of 54,700 with 52,000 employed and 2,500 unemployed. This translates to an unemployment rate of 4.5%; slightly lower than Pennsylvania's unemployment rate of 5.6%.

U.S. Census data shows an increase in the number of housing units in Adams County between 2000 and 2010. Refer to Table 2.3-6. The numbers of vacant housing units and renter-occupied housing units have increased. Vacant buildings are particularly vulnerable to arson and criminal activity. Since vacant properties are often not been maintained, many may be structurally deficient. Citizens renting homes are typically more transient than homeowners; therefore, communicating with citizens who are renters may be more difficult than communicating with homeowners. Communication strategies should be developed to make certain that citizens who rent housing units are given proper notification relative to hazard mitigation actions.

Table 2.3-6 Housing Characteristics

HOUSING CHARACTERISTIC	2000	2010
Total Housing Units	35,831	40,820
Occupied Housing Units	33,652	38,013
Vacant Housing Units	2,179	2,807
Owner-Occupied Housing Units	25,861	29,368
Renter-Occupied Housing Units	7,791	8,645
Median Home Value	$109,500	$204,000(1)

Source: U.S. Census, American Community Survey, 2012 Estimates: Estimated count of population between 2008-2012.

(1) Questions pertaining to home value were not included in Census 2010; therefore, American Community Survey 2012 estimates were used to provide comparison to Census 2000 home values.

ACOPD prepares an annual Subdivision/Land Development & Building Permit Activity report which documents the County's development trends. The following paragraphs document residential and non-residential development patterns back to the 1990s.

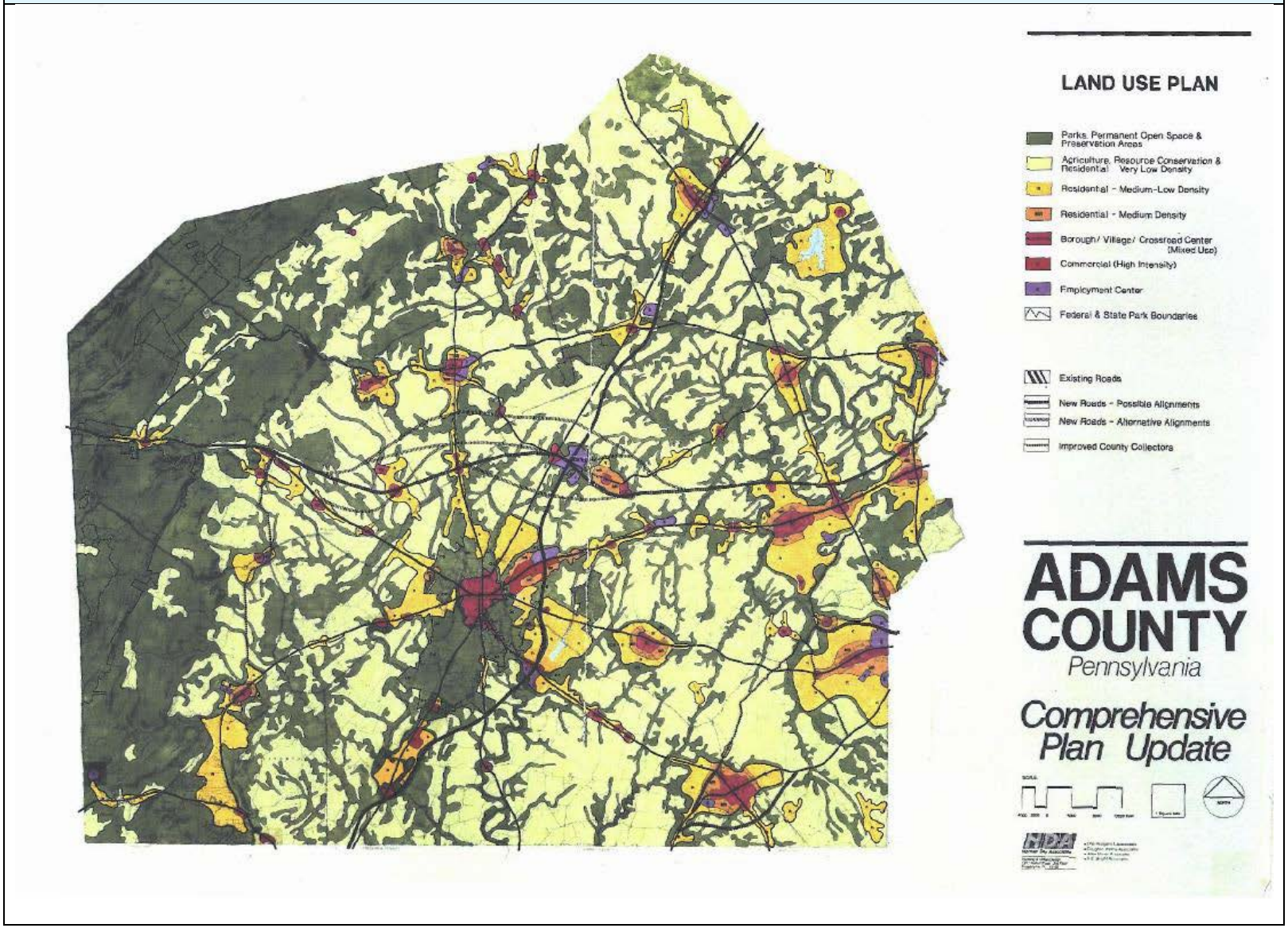
The rate of housing development in Adams County closely mirrors the steady population increase that Adams County has experienced since the 1950s. It is noted that the rate of permit issuance for new residential units was quite strong during the early to mid-2000s, but this rate sharply declined during and following the Great Recession and has yet to recover. The Adams County Comprehensive Plan notes that the second-home developments of the 1960s and 1970s (Lake Heritage, Lake Meade, and Charnita) made a significant impact on Adams County's land use. These second-home developments evolved into relatively dense housing developments now mostly occupied as year-round permanent residences. During the 1980s large, 100 units or more residential developments were constructed throughout Adams County, particularly in eastern Adams County, bordering McSherrystown and New Oxford.

2.4. Land Use and Development

Even with population increases experienced since the 1950s to the present, Adams County remains a rural county and is designated as such according to The Center for Rural Pennsylvania. Approximately 94% of the County's total land area is undeveloped with a majority of this total devoted to agricultural and forest uses (DCED, 2005 Land Use and Growth Management Plan, Adams County Profile).

Land development in Adams County is concentrated around existing communities located on transportation corridors. While development patterns had been fairly consistent with the "spokes and wheel" pattern from Gettysburg outward, development patterns over the past several decades have been influenced by growth in the eastern and southern portions of the County. Municipalities located in the eastern portion of the County such as Berwick Township, Conewago Township, Hamilton Township, and Reading Township experienced population increases over 20% between 2000 and 2010. Similar population increases have been experienced in municipalities in the southern portion of the County located adjacent to Maryland such as Germany Township, Carroll Valley Borough, and Liberty Township. Figure 2.4-1 includes the Land Use Plan from the County comprehensive plan which identified current and anticipated land use trends in Adams County. Multi-municipal plans adopted since the County comprehensive plan included adopted growth areas which are consistent with the County comprehensive plan.

Figure 2.4-1 Adams County Land Use (Adams County Comprehensive plan, 1990).



Much of the residential development constructed in the southern portion of the County during the 1990s and 2000s is attributable to commuters travelling to the Baltimore-Washington metropolitan area for work. According to a regional land use, transportation, and economic development study prepared for the South Central Caucus of County Commissioners, approximately 25,000 south central Pennsylvania residents regularly commute south for work. The south central Pennsylvania region experiences a worker flow deficit with neighboring counties to the south. Among the south central Pennsylvania region's four southernmost counties, including Adams County, 5,870 workers commuted north from Maryland, compared to the more than 25,000 workers commuting south into Maryland. Residents find greater employment opportunities and wages in the Baltimore-Washington metropolitan area while enjoying a less urban and more affordable lifestyle and quality of life opportunities.

While the County experienced a sizeable submission of residential development approvals, many of the developments included in the applications did not come to fruition. Therefore, the potential residential construction boom anticipated in the early 2000s did not occur. The number of proposed residential units annually peaked in 2005 at nearly 7,000, while the number of permitted residential units did not exceed 800 in any year between 1993 and 2013.

Between 2009 and 2013, the number of permitted residential units did not exceed 200. A total of 191 residential units were permitted in 2013. A majority of the permitted units are being constructed in developments proposed in the last decade. According to an annual subdivision/land development and building activity report prepared by ACOPD, 60% of the permitted units in 2013 were located within developments of 10 or more units. The high percentage reflects the continued build-out of existing developments. A majority of the new homes currently being constructed are located in developments proposed between 2003 and 2007 (ACOPD, 2013).

The largest amount of conversion to developed land occurred in 2005 with more than 7,000 acres of land developed. If approved and built, ACOPD estimates that new residential lots/units could occupy 270 acres of land. During 2013, a total of 22,848 acres were included in proposed subdivision or land development plans. Creation of new parcels or land development activity would involve 1,475 acres. Of the acreage included in the plans, approximately 3,354 acres (or 15%) are devoted to active agriculture. If the proposed plans are approved and construction proceeds, approximately 76 acres of agricultural land will be converted to new development or new land parcels. This represents 0.43% of Adams County's total acreage or about 0.02% of the County's active farmland. This is a slight increase from an historic low in 2012, but consistent with the downward trend experienced since the peak of land development proposals in 2005.

In an effort to maintain the County's rural nature and preserve the County's valuable farmland, the County's comprehensive plan includes a Growth Management Plan with designated growth areas. Growth areas in the east are focused on the Boroughs of Littlestown, McSherrystown, New Oxford, Abbottstown, Bonneauville, and East Berlin, and include portions of Conewago, Mount Pleasant, Oxford, Union, Germany, Berwick, Hamilton, and Reading Townships. Other

smaller growth areas were designated in the Hampton area, at Routes 94 and 394; in the Green Springs area, east of Route 94 near the County line at Hanover; and at Lake Meade.

Growth in the central part of the County is planned primarily within the Gettysburg area, with additional development associated with York Springs and several of the interchanges along U.S. Route 15. Development near Gettysburg includes the U.S. Route 15-U.S. Route 30 interchange and Lake Heritage areas, with smaller growth centers at the Fairplay area at U.S. Route 15 and Business Route 15 south of Gettysburg; at the Black Horse area, west of the borough and north of Route 116; near Mummasburg, northwest of Gettysburg; and in the Hunterstown area, at the Route 394 interchange with U.S. Route 15. Projected growth areas near Gettysburg include portions of Cumberland, Straban, Mount Pleasant, Mount Joy, Franklin, Highland, and Freedom Townships. The York Springs and Route 234 interchange-vicinity growth areas include parts of Latimore, Huntington, and Tyrone Townships.

Growth in the western part of the County is planned to occur in association with several boroughs, primarily with Carroll Valley, with less growth in the Biglerville, Arendtsville, Bendersville, and Fairfield areas. A small growth area is also indicated for Hamiltonban, Liberty, and Highland Townships. These projected centers include portions of Franklin, Butler, Menallen, Hamiltonban, Liberty, and Highland Townships.

The County's four multi-municipal plans include tools to complement the County's growth areas. Descriptions of techniques used or planned to direct growth patterns in each of the multi-municipal plans are included in Table 2.4-1. Two additional multi-municipal planning efforts are underway which will include growth areas: the Southwest Adams Joint Comprehensive Plan and the Central Adams Joint Comprehensive Plan.

Table 2.4-1 Multi-Municipal Comprehensive Plans and Growth Area Tools

MUNICIPALITY	YEAR ADOPTED	GROWTH AREA TOOLS
Bonneauville-Mt. Pleasant Joint Comprehensive Plan	2003	• Transfer of Development Rights program proposed to incentivize private developers to preserve farmland. • Land Use Plan categories to direct development: Public Recreation and Battlefield Preservation, Conservation Corridors, Agricultural Preservation, Land Conservation • Consider development timing – monitor private sector growth trends to determine if growth areas should be expanded.
Eastern Adams Joint Comprehensive Plan	2012	• Designated Growth Areas established and included in Map 23 of the Joint Comprehensive Plan.

Table 2.4-1 Multi-Municipal Comprehensive Plans and Growth Area Tools

MUNICIPALITY	YEAR ADOPTED	GROWTH AREA TOOLS
Northwest Adams Joint Comprehensive Plan	2010	• Designated Growth Areas and Potential Future Growth Areas established and intended to accommodate most of the region's residential growth in the next 10-20 years and shown on the Future Land Use Map (Map 9-5). • Growth areas contain 3,681 acres for potential development. • Transfer of Development Rights program proposed to incentivize private developers to preserve farmland.
Southeast Adams Joint Comprehensive Plan	2008	• Designated Growth Areas and Potential Future Growth Areas established and shown on the Future Land Use Plan. • Most growth within the Region will occur within the Designated Growth Area and upon build-out; growth would then be accommodated in the Potential Future Growth Area.

The following figures include growth area mapping from the following multi-municipal comprehensive plans: Eastern Adams Joint Comprehensive Plan, Northwest Adams Joint Comprehensive Plan, and Southeast Adams Joint Comprehensive Plan. This mapping demonstrates where future development is expected to be concentrated in an effort to preserve Adams County's rural quality of life. For more information on how future development patterns impact vulnerability to hazards, please see Section 4.4.4.

Figure 2.4-2 Designated Growth Areas: Eastern Adams Joint Comprehensive Plan

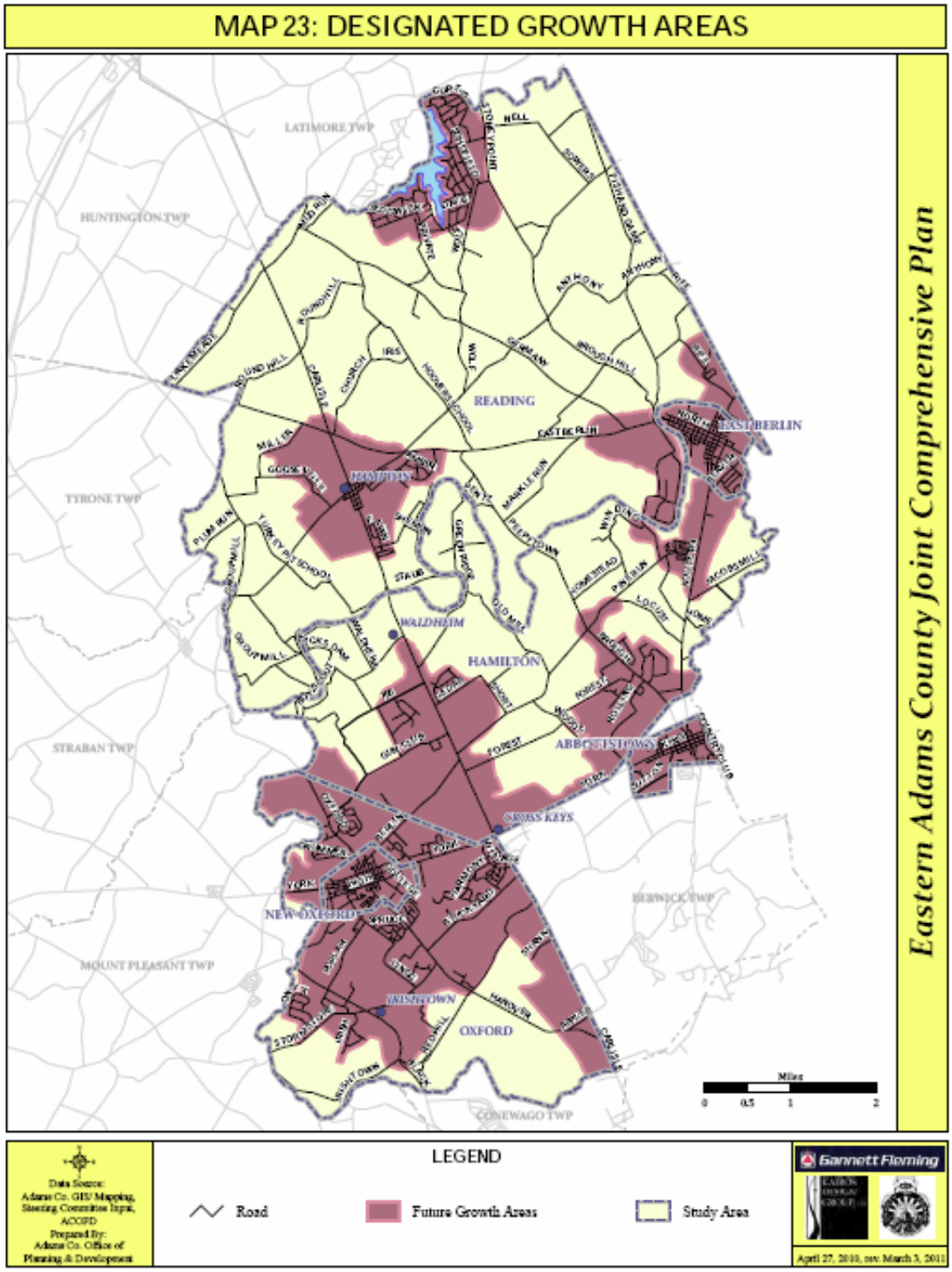


Figure 2.4-3 Future Land Use: Northwest Adams Joint Comprehensive Plan

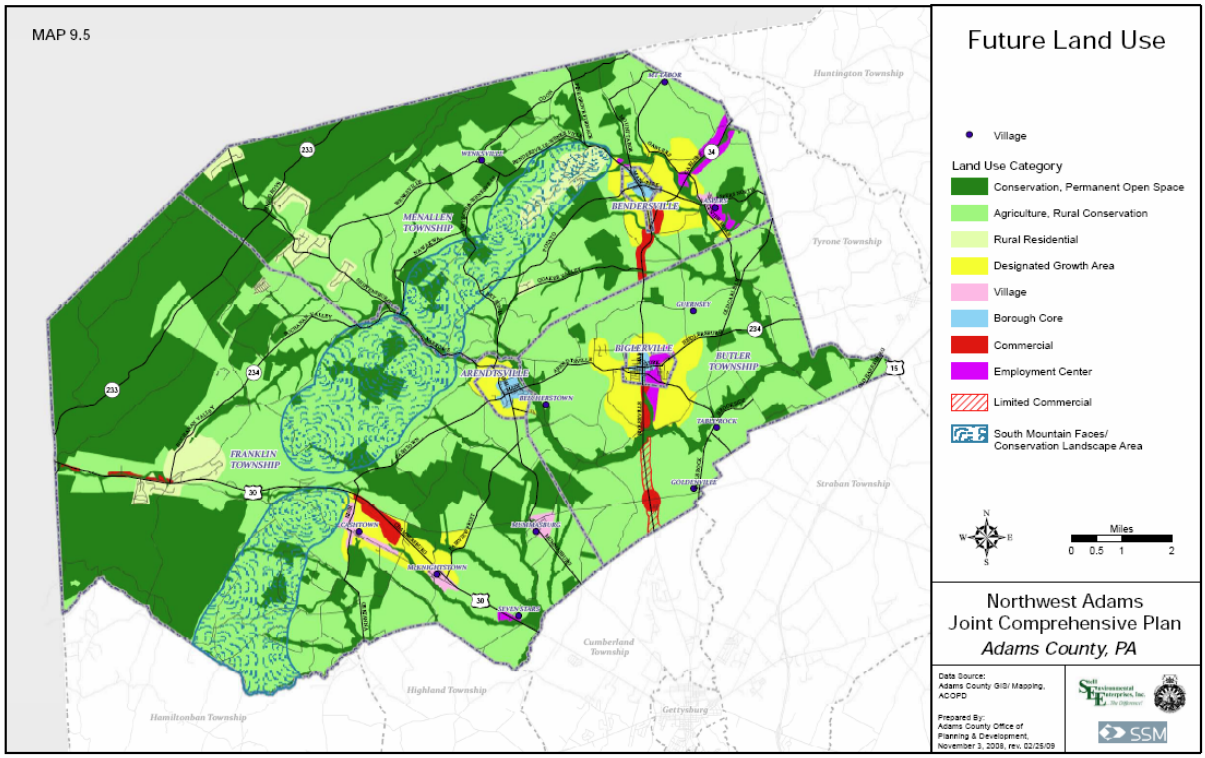
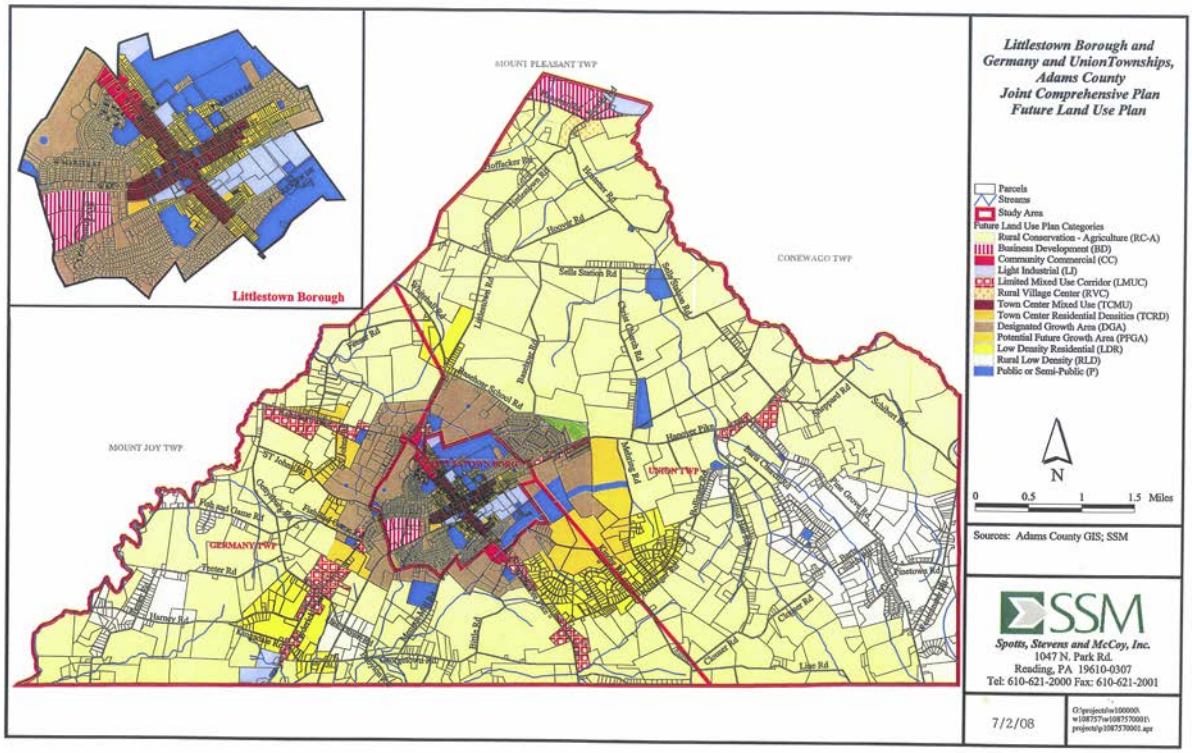


Figure 2.4-4 Future Land Use Plan: Southeast Adams Joint Comprehensive Plan



2.5. Data Sources and Limitations

The Adams County address points and parcel databases were used as an inventory of properties throughout the County. The address points included some entries with land use and property codes indicating the property was vacant. These structures were removed from the database prior to conducting the vulnerability assessment so as to capture structures rather than all addresses in the county. Both parcels and address points had a land use code and a property type field. These two fields were used to assign a generalized land use code of civic/institutional, commercial, industrial, residential, transportation/utilities, and unknown. According to the Adams County GIS Department, while these fields exist, the information contained therein is not always accurate or consistent. As a result, the structure types used throughout this HMP should be considered estimates. The actual structure and land use may differ than information contained in the database. The feature type of each address was used to extract numbers of mobile homes and other trailers.

The list of critical facilities provided in Appendix E was developed based on information provided by the Adams County GIS Department, PEMA, FEMA, and the US Environmental Protection Agency; selection of categories was led by the Adams County HMPSC leadership.

Flood hazard data used in this plan is Adams County's effective DFIRM database from 2009, which is a digital representation of features of Flood Insurance Rate Maps (FIRMs). Adams County GIS provided other GIS datasets including transportation infrastructure, boundaries, community facilities, and natural features like karst features and wooded areas. Additional data for the base map was provided by the Pennsylvania Department of Transportation, National Parks Service, Pennsylvania Game Commission, 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 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 Climatic Data Center (NCDC) database was utilized. NCDC is a division of the US Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). Information on hazard events is compiled by NCDC from data gathered by the National Weather Service (NWS), another division of NOAA. NCDC then presents it on their website in various formats. The data used for this plan came the US Storm Events database, which "documents

the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, and/or disruption to commerce" (NOAA, 2006).

HAZUS-MH is a powerful risk assessment methodology for analyzing potential losses from floods, hurricane winds and earthquakes. In HAZUS-MH, current scientific and engineering knowledge is coupled with the latest GIS technology to produce estimates of hazard-related damage before, or after, a disaster occurs. HAZUS version 2.1 was used to estimate losses for floods in Adams County; this plan incorporates an enhanced analysis, meaning that county-specific data was incorporated into the model to make it more precise. For more information on the enhanced analysis methodology used for this plan's flood model, please see Appendix F.

This HMPU 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 law enforcement, emergency response, medical services, and mobile communications. Table 2.5-1 summarizes the critical facilities in Adams County by type and by municipality. For a complete listing of critical facilities and their vulnerability to individual hazards, please see Appendix E.

Table 2.5-1 Critical facilities by type and municipality (Adams County GIS; EPA, 2014).

MUNICIPALITY	CELL TOWERS	CHILD CARE	CHURCH	EMS STATIONS	FIRE STATIONS	HAZARDOUS MATERIAL SITE	HOSPITALS AND MEDICAL CENTERS	MUNICIPAL BUILDINGS	PARKS AND RECREATION SITES	PERSONAL CARE HOMES	POLICE STATIONS	SCHOOLS	GRAND TOTAL
Abbottstown Borough	0	0	2	0	1	0	0	1	1	0	0	0	5
Arendtsville Borough	0	0	2	0	1	0	0	1	1	0	0	1	6
Bendersville Borough	0	0	2	2	1	1	0	1	0	0	1	1	9
Berwick Township	0	0	3	0	0	0	0	1	0	1	0	0	5
Biglerville Borough	1	1	3	1	1	1	0	1	0	0	1	3	13
Bonneauville Borough	0	0	1	0	1	0	0	1	1	0	1	0	5
Butler Township	0	2	5	0	0	0	0	1	3	0	0	1	12
Carroll Valley Borough	1	2	0	0	0	1	0	1	2	0	1	0	8
Conewago Township	0	3	1	1	1	2	0	1	7	0	1	3	20
Cumberland Township	3	3	8	0	1	2	0	1	1	2	1	5	27
East Berlin Borough	0	1	2	1	1	2	1	1	1	0	1	1	12
Fairfield Borough	1	1	2	1	1	0	0	1	1	0	0	0	8
Franklin Township	7	2	10	0	2	3	0	1	3	1	0	2	31
Freedom Township	0	0	0	0	1	0	0	1	0	0	0	0	2

Table 2.5-1 Critical facilities by type and municipality (Adams County GIS; EPA, 2014).

MUNICIPALITY	CELL TOWERS	CHILD CARE	CHURCH	EMS STATIONS	FIRE STATIONS	HAZARDOUS MATERIAL SITE	HOSPITALS AND MEDICAL CENTERS	MUNICIPAL BUILDINGS	PARKS AND RECREATION SITES	PERSONAL CARE HOMES	POLICE STATIONS	SCHOOLS	GRAND TOTAL
Germany Township	0	3	4	0	0	0	0	1	0	1	0	0	9
Gettysburg Borough	0	3	14	2	1	1	3	1	1	0	1	3	30
Hamilton Township	1	2	2	0	0	0	0	1	0	0	0	0	6
Hamiltonban Township	2	1	7	0	1	0	1	1	1	2	1	4	21
Highland Township	2	0	2	0	0	0	0	1	0	0	0	0	5
Huntington Township	2	1	10	0	0	0	0	1	0	0	0	4	18
Latimore Township	0	0	8	0	0	0	0	1	3	0	1	0	13
Liberty Township	0	1	2	0	0	0	0	1	0	0	1	0	5
Littlestown Borough	0	2	4	2	1	3	1	1	4	1	1	5	25
McSherrystown Borough	0	1	2	0	0	2	0	1	4	0	1	3	14
Menallen Township	2	2	7	0	0	2	1	1	1	0	0	0	16
Mt Joy Township	1	0	5	0	0	0	0	1	1	0	0	1	9
Mt Pleasant Township	2	1	2	0	0	0	0	1	0	0	0	0	6
New Oxford Borough	0	1	4	2	1	2	0	1	1	0	1	6	19

Table 2.5-1 Critical facilities by type and municipality (Adams County GIS; EPA, 2014).

MUNICIPALITY	CELL TOWERS	CHILD CARE	CHURCH	EMS STATIONS	FIRE STATIONS	HAZARDOUS MATERIAL SITE	HOSPITALS AND MEDICAL CENTERS	MUNICIPAL BUILDINGS	PARKS AND RECREATION SITES	PERSONAL CARE HOMES	POLICE STATIONS	SCHOOLS	GRAND TOTAL
Oxford Township	2	8	3	0	1	1	0	1	1	1	0	1	19
Reading Township	3	1	3	1	2	0	0	1	1	0	1	0	13
Straban Township	2	2	11	0	1	3	1	1	1	2	1	2	27
Tyrone Township	2	0	2	0	1	2	0	1	0	0	0	0	8
Union Township	1	1	4	0	0	0	0	1	0	0	0	1	8
York Springs Borough	0	0	2	1	1	0	0	1	0	0	0	0	5
Grand Total	**35**	**45**	**139**	**14**	**22**	**28**	**8**	**34**	**40**	**11**	**16**	**47**	**439**

When applicable, PEIRS incident data spanning 2004-2009 was used in the plan update. Although PEIRS data proved valuable, primarily in the human-made hazards section where few records of past occurrences exist, data limitations exist in that the reporting system is not mandatory. In addition, PEMA no longer uses the PEIRS interface to collect event data, so there are no more recent occurrences of hazards from PEIRS. At the same time, the events from 2004-2009 do provide good context of past occurrences.

Every attempt was made to provide consistency in reported data and in data sources. The baseline population comes from the 2010 US Census. While more recent population estimates are available for Adams County, this data is not available below the Census block group level; because of the relative spread of Adams County's populations, the block groups would be too large to provide a reasonable estimate of populations in hazard areas. As a result, the calculated population at risk to flooding and hazardous material releases is derived from the 2010 Census Block geography.

Estimating potential losses that may occur as a result of hazard events requires a full range of information and accurate data. There are a number of site-specific characteristics that reduce a given structure's vulnerability and consequential losses. Examples include first-floor elevation, the number of stories, construction type, foundation type and the age and condition of the structure. The address and parcel databases include the building and land assessment value for addresses but does not include information on key variables that impact vulnerability, such as specific information on building height, construction type and first floor elevations. As a result, the risk and vulnerability assessments rely on an absence/presence analysis to describe where structures and critical facilities might be vulnerable to a particular hazard.

3. Planning Process

3.1. Update Process and Participation Summary

The Adams County Hazard Mitigation Steering Committee was responsible for preparing the County's 2010 Hazard Mitigation Plan (HMP) which was adopted on February 23, 2011. The 2010 HMP was an update to the County's 2005 Hazard Mitigation Plan. The effort was led by the Adams County Department of Emergency Services (Adams County DES) in conjunction with Adams County Office of Planning and Development (ACOPD) and Adams County municipalities.

The 2015 HMP update was again led by the Adams County DES and the ACOPD. To facilitate the update of the 2015 HMP, the Commonwealth of Pennsylvania Emergency Management Agency (PEMA) contracted with Michael Baker, Jr., Inc. (Baker), a Philadelphia, Pennsylvania firm. Baker subcontracted with Vernon Land Use, LLC (Vernon) of Mechanicsburg, Pennsylvania to assist in updating Adams County's HMP.

The first meeting of the Steering Committee to discuss the 2015 HMP Update was held as a teleconference on July 2, 2014. In addition to an overview of the Hazard Mitigation Planning process, changes to the HMP planning process prompted by FEMA's release of updated planning guidance in March 2013 and PEMA's SOG issued in October 2013, were discussed. The Consultant POC reviewed PEMA priorities for the current plan update which include: focus on the Planning Process including full municipal participation, enhanced Hazus analysis for flooding, the Capability Assessment including new NFIP capability review, and an implementable Mitigation Strategy.

In addition to Adams County local municipalities, the HMPSC identified additional stakeholders to be included in the Hazard Mitigation Planning process. Detailed information pertaining to stakeholders and stakeholder outreach is included in Section 3.4 – Public & Stakeholder Participation.

HMPSC members completed an 'Evaluation of Identified Hazards and Risk' survey as part of the kick-off meeting. This survey, included in Appendix C - Meeting and Other Participation Documentation, listed hazards profiled in the 2010 Hazard Mitigation Plan and prompted HMPSC members to identify if the frequency of occurrence, magnitude of impact, and/or geographic extent of each hazard increased, decreased, or did not change since the 2010 HMP plan preparation. The survey also provided the opportunity to assess hazards not profiled in the HMP plan to determine if those hazards should be included as part of the HMP Update.

HMPSC members identified 17 hazards to profile as part of the HMP Update including 12 natural hazards and 5 human-made hazards. HMPSC member's responses to the hazard survey were used to prepare a risk assessment worksheet used as part of a Hazard Mitigation Planning Workshop conducted with the planning team and stakeholders.

The HMPSC conducted a detailed review of draft goals, objectives, and actions for the 2015 HMP Update and developed the final goals, objectives, and actions. Once developed, the HMPSC evaluated mitigation actions for feasibility and effectiveness using the Mitigation Action

Assessment methodology described in the SOG and prioritized mitigation actions using the multi-objective mitigation action prioritization matrix described in the SOG. A Mitigation Action Plan was developed by the HMPSC with the final Mitigation Action Plan included in Section 6.4 – Mitigation Action Plan.

Adams County's municipalities actively participated as part of the Planning Team. Municipal involvement in developing the 2015 HMP Update is detailed in Section 3.5 – Multi-Jurisdictional Planning. All municipalities met the participation requirements.

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

- Planning process,
- Hazard identification,
- Risk assessment,
- Mitigation strategy: goals, objectives, and actions,
- Formal adoption by the participating jurisdictions, and
- PEMA and FEMA approval.

The report format is structured in accordance with the most current planning guidance from FEMA, Local Mitigation Handbook (2013), and PEMA, Standard Operating Guide (SOG) (October 2013).

While the overall format between the 2015 HMP Update and the 2010 HMP Update has not changed, there are a few content changes.

Hazard Definitions. A standard list of hazard definitions, Risk Assessment Hazard Descriptions, has been developed. Therefore, hazards identified in the 2010 HMP Update are referred to in the 2015 HMP Update using slightly different terminology. For example, 'Flooding' in the 2010 HMP Update is referred to as 'Flood, Flash Flood, Ice Jam' in the 2015 HMP Update. 'Hazardous Materials' in the 2010 HMP Update is referred to as 'Environmental Hazards' in the 2015 HMP Update.

Mitigation Techniques. FEMA's 2013 Local Mitigation Handbook has reduced the number of mitigation techniques from six to four as shown in the following table. The major difference is that emergency services is no longer a mitigation technique category, as emergency services activities are more appropriately located in an emergency response plan.

Table 3.1-1 Mitigation Technique Categories

PRE-2013 LOCAL MITIGATION HANDBOOK	2013 LOCAL MITIGATION HANDBOOK
1. Prevention	1. Plans and Regulations
2. Property Protection	2. Structure and Infrastructure Projects
3. Emergency Services Measures	3. Natural Systems Protection
4. Structural Projects	4. Education and Awareness Programs

Table 3.1-1 Mitigation Technique Categories	
PRE-2013 LOCAL MITIGATION HANDBOOK	**2013 LOCAL MITIGATION HANDBOOK**
5. Natural Resource Protection	
6. Public Education/Awareness Programs	

Planning Data Collection Tools. Standard data collection and documentation tools were developed as part of the SOG and have been used in the 2015 HMP Update including: a revised Capability Assessment Survey, a National Flood Insurance Program (NFIP) worksheet, a Hazard Identification and Risk Evaluation Worksheet, and tools to evaluate and prioritize mitigation actions.

Specific process updates pertaining to each section of the HMP Update are included in Sections 4.1, 5.1, 6.1 and 7.1.

3.2. The Planning Team

The Planning Team assembled for the 2015 HMP Update included representatives from Adams County DES, ACOPD, the Adams County Council of Governments (COG), WellSpan Gettysburg Hospital, and Adams County's local municipalities. A subset of the Planning Team, the Hazard Mitigation Plan Steering Committee (HMPSC), was assembled to guide the overall direction of the HMP Update and make day-to-day decisions pertaining to its completion in conjunction with the Baker Team.

The HMPSC assembled for the 2015 HMP Update included essentially the same organizations as the HMPSC assembled for the 2010 HMP Update with the additions of one additional member of the Adams County DES and one member of the COG. The COG was formed in 2009 during the preparation of the 2010 HMP Update. Representatives from one township and one borough are replaced by one COG representative on the HMPSC. HMPSC members for the 2015 HMP Update are listed in the following table.

Table 3.2-1 Adams County HMP Steering Committee Members	
NAME	**ORGANIZATION**
John Eline	Adams County Department of Emergency Services
Kimberly Frank	Adams County Department of Emergency Services
Tammy Kunkel	Adams County Department of Emergency Services
Robert Thaeler	Adams County Office of Planning & Development
George Steckert	WellSpan-Gettysburg Hospital, Department of Safety & Security
Coleen Reamer	Adams County Council of Governments

Christine Caggiano of Michael Baker Jr., Inc. and Tracey Vernon of Vernon Land Use were Consultant Points of Contact (POCs) and also participated in the HMPSC.

In order to represent the diverse stakeholders in the County, the HMPSC developed a diversified list of potential planning team members, discussed in more detail in Section 3.4. The HMPSC worked throughout the process to plan and hold meetings, collect information, and conduct public outreach.

The stakeholders listed in Table 3.2-2 served on the planning team, demonstrating their commitment to actively participate in the planning process by attending meetings, completing assessments, surveys, and worksheets, and/or submitting comments. The planning team consisted of county and local officials including municipal supervisors and council members, emergency management coordinators, and the other identified stakeholders

Table 3.2-2 Participants in the 2015 Adams County HMP Update.

MUNICIPALITY/ORGANIZATION	PARTICIPANT(S)
Abbottstown Borough	Craig Peterson
Adams County Conservation District	Larry Martick
Adams County Council of Governments	Coleen Reamer
Adams County Department of Emergency Services	John Eline, Kimberly Frank, Tammy Kunkel
Adams County Economic Development Corporation	Robin Fitzpatrick
Adams County Extension Office	Darlene Resh
Adams County Office of Planning and Development	Robert Thaeler
Adams County Water Resource Advisory Committee	Bicky Redman
Arendtsville Borough	Ferd Prehn
Bendersville Borough	Harry Melhorn
Bermudian Springs School District	Duane Hoffman
Berwick Township	Mike Hartman
Biglerville Borough	Kevin Biesecker
Bonneauville Borough	Mike Erikson
Butler Township	Kevin Biesecker
Carroll Valley Borough	A. J. Aldrich
Conewago Township	Keith Whitaker
Cumberland Township	Ben Thomas, Jr.
East Berlin Borough	Andy Raymond
Fairfield Area School District	Caroline Dean
Fairfield Borough	Susan Wagle
Fairfield Regional EMA (Carroll Valley Borough, Fairfield Borough, Highland Township, and Liberty Township)	A.J. Aldrich
Franklin County Department of Emergency Services	Andrew Striker
Franklin Township	Jerry Arrison
Freedom Township	Joyce Shindledecker
Germany Township	Jack Ketterman
Gettysburg Area School District	David Nett, Larry Redding
Gettysburg Borough	David Sanders
Gettysburg College	David Taylor
Gettysburg National Military Park	Ryan Levins
HACC Gettysburg Campus	Ron Cline
Hamilton Township	Jay Livingston, Tim Beard III
Hamiltonban Township	Coleen Reamer, Deborah Feiler
Healthy Adams County	Kathy Gaskin
Highland Township	Craig Rockey

Table 3.2-2 Participants in the 2015 Adams County HMP Update.	
MUNICIPALITY/ORGANIZATION	**PARTICIPANT(S)**
Huntington Township	Gus Fridenvalds
Lake Meade Property Owners Association	Steven Spangler
Latimore Township	Larry Dost, Woody Myers, Daniel Worley
Liberty Township	Bob Jackson
Littlestown Area School District	Jeff Laux
Littlestown Borough	Charles Kellar
Lutheran Theological Seminary at Gettysburg	Don Redman, Elizabeth Meighan
McSherrystown Borough	Scott Cook
Menallen Township	Kenneth C. Wolf
Mount Joy Township	Sheri Moyer
Mount Pleasant Township	Rick Riser
New Oxford Borough	Tania Kepner
Oxford Township	Mario Iocco
Reading Township	Paul Bart
Straban Township	Robin Crushong
Tyrone Township	Russell Raub
Union Township	William Sheely
Upper Adams School District	Todd Fritz
WellSpan-Gettysburg Hospital	George Steckert
York Springs Borough Council	Eloise Swales

3.3. Meetings and Documentation

The following meetings, both in person and teleconference, were held as part of the planning process. Meeting documentation in the form of invitations (letter and e-mail format), agendas, sign-in sheets, handouts, presentations, flyers, and minutes are included in Appendix C - Meeting and Other Participation Documentation.

July 2, 2014: The Steering Committee Kick-Off Meeting was conducted as a conference call on Wednesday, July 2, 2014. A separate conference call was held Friday, June 27, 2014 with HMPSC member Coleen Reamer, who was unable to participate in the kick-off conference call meeting held July 2. The meeting included discussion of the following: review of the updated planning process and project schedule, completion of a hazard review survey (Evaluation of Identified Hazards and Risk survey), identification of stakeholders, methods for stakeholder outreach, and collection of relevant data and documents. HMPSC members identified a total of 17 hazards to profile as part of the HMP update.

July 24, 2014: A Hazard Mitigation Planning Workshop (HMP Workshop) was held with local municipalities and stakeholders identified by the HMPSC during the Steering Committee Kick-Off Meeting. The workshop was held at the Adams County Emergency Services Center from 10:30 AM – 11:30 AM on Thursday, July 24, 2014. The workshop provided an opportunity for participants to review the hazard mitigation process; discuss capabilities; offer risk assessment input on hazards identified by the HMPSC; suggest the inclusion of additional hazards; review and provide input on existing goals, objectives, and actions; and suggest new or revised mitigation actions.

As part of the workshop, municipalities and stakeholders were asked to complete a hazard risk evaluation form (Hazards in Your Community). The form included the 17 hazards to be profiled for the 2015 HMP Update and requested attendees to rank hazards relative spatial extent, probable impact, probability of future events, and overall significance. Results of the hazard risk evaluation form were used to prepare the Risk Factor ranking.

The HMP Workshop provided the opportunity for municipalities to submit and ask questions about Capability Assessment Surveys. Capability Assessment Surveys were sent to municipalities prior to the HMP Workshop via mail and e-mail. Municipalities were asked to bring Capability Assessment Surveys to the HMP Workshop or send via mail, fax, or e-mail to Adams County DES. Responses from Capability Assessment Surveys completed by each municipality for the 2010 HMP Update were pre-populated in the Capability Assessment Survey template and each municipality was asked to review previous responses, update responses, and complete new fields. The NFIP worksheet was incorporated in to the Capability Assessment Survey to reduce the amount of forms each municipality would need to complete. Similar to the Capability Assessment Survey and in an effort to help municipalities complete required forms, the NFIP worksheet was pre-populated with community specific information from FEMA's Community Information System (CIS) database. Fields that were not pre-populated were to be completed by each municipality.

Workshop attendees reviewed goals and objectives from the 2010 HMP using a 5-Year Mitigation Strategy Evaluation Form and provided input on whether the goal or objective should be continued, changed, or deleted; the reason for the recommendation; and the status of work toward the goal or objective. Municipalities provided input on municipal-specific mitigation actions by identifying if an action was completed, canceled, deferred, or is ongoing; what was accomplished for the action during the reporting period; obstacles encountered; and if the action is still relevant or if it should be revised. Municipalities were also asked to identify progress on actions not identified in the 2010 plan, identify new actions to accomplish in the next 5 years, and complete a New Mitigation Action form for new mitigation actions.

Nineteen (19) of Adams County's 34 municipalities were represented at the workshop. Fourteen (14) stakeholder organizations representing K-12 and higher education, neighboring jurisdictions, county environmental organizations, and county government attended the workshop.

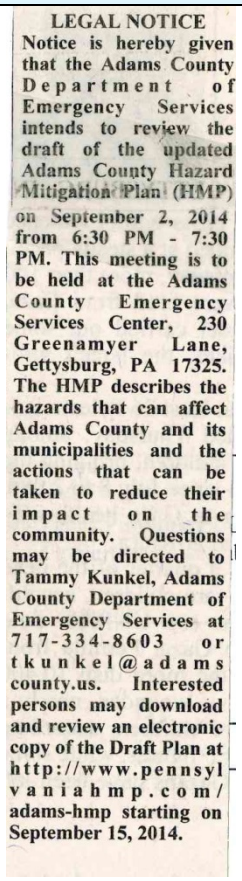
August 2014 Office Hours: To accommodate schedules for those municipalities unable to attend the Hazard Mitigation Planning Workshop, Consultant POC Tracey Vernon met with municipalities during office hours held at Adams County Emergency Services Center.

For municipalities not available to attend the HMP Workshop, the purpose of the office hours was to discuss information presented at the HMP Workshop; complete the hazard risk evaluation form (Hazards in Your Community); review and comment on the goals, objectives, and actions using the 5-Year Mitigation Strategy Evaluation Form; as well as to discuss and develop new mitigation actions. For municipalities who attended the HMP Workshop, the additional time allowed the opportunity to discuss hazards impacting the community, discuss and develop new mitigation actions, and complete a New Mitigation Action form.

Office hours were held on Wednesday, August 6 and Friday, August 8 from 8:00 – 4:00 PM. Municipalities were given the opportunity to schedule a time to meet during one of those two days. A few municipalities were unable to attend during one of those two days; therefore, additional meeting times were made available on August 13, August 18, and August 28. A total of 13 municipalities took advantage of office hours offered during the days noted.

August 18, 2014: A Mitigation Solutions Meeting was held at Adams County Emergency Services Center with the HMPSC on August 18 from 9:00 AM – 11:30 AM. HMPSC members developed goals, objectives, and actions prepared based on input from the HMP Workshop and office hours. After the meeting, the HMPSC was asked to evaluate actions using the Mitigation Action Evaluation form. HMPSC members then prioritized actions using the Mitigation Action Prioritization form. Completed prioritization forms were sent back to the Consultant POC for inclusion in the HMP Update.

Figure 3.3-1 Draft Plan Review Meeting and Comment Period Notice.



LEGAL NOTICE

Notice is hereby given that the Adams County Department of Emergency Services intends to review the draft of the updated Adams County Hazard Mitigation Plan (HMP) on September 2, 2014 from 6:30 PM - 7:30 PM. This meeting is to be held at the Adams County Emergency Services Center, 230 Greenamyer Lane, Gettysburg, PA 17325. The HMP describes the hazards that can affect Adams County and its municipalities and the actions that can be taken to reduce their impact on the community. Questions may be directed to Tammy Kunkel, Adams County Department of Emergency Services at 717-334-8603 or tkunkel@adamscounty.us. Interested persons may download and review an electronic copy of the Draft Plan at http://www.pennsylvaniahmp.com/adams-hmp starting on September 15, 2014.

September 2, 2014: Draft Plan Review Public Meeting to review the draft plan was held at the Adams County Emergency Services Center from 6:30 PM to 7:30 PM on Tuesday, September 2, 2014. In addition to the public, municipalities and other stakeholders were invited to attend. This meeting, along with the public comment period, was advertised via a legal notice in the Gettysburg Times published on 8/22/2014.

The meeting included a review of the HMP process, 2015 hazards and risk assessment, outreach, and the mitigation action plan. Attendees were informed that an electronic copy of the draft HMP update would be available for download and review on the project website starting on September 15, 2014 at http://www.pennsylvaniahmp.com/adams-hmp. Comments and information received from the Draft Plan Review Meeting were incorporated into the Draft HMP Update before posting to the project website. A total of 11 people attended the meeting.

3.4. Public & Stakeholder Participation

The HMPSC identified, at the July 2 Steering Committee Kick-Off Meeting, stakeholders to engage in order to obtain comprehensive input about hazards impacting, or with the potential to impact, Adams County. The following table lists stakeholders identified for the HMP Update. Stakeholders listed in *italics,* a total of 20, either participated in meetings or provided data to assist in the HMP Update.

Table 3.4-1 Adams County Hazard Mitigation Plan Update Stakeholders

Adams County Conservation District	*Adams County Extension Office*	Adams County Historical Society	*Adams County Water Resource Advisory Committee*	*Adams County Economic Development Corporation*
Bermudian Springs School District	*Carroll County Emergency Management*	Conewago Valley School District	*Cumberland County Emergency Management Operations Division*	*Fairfield Area School District*
Franklin County Department of Emergency Services	Frederick County Division of Emergency Management	*Gettysburg Area School District*	*Gettysburg College*	*Gettysburg National Military Park*
Hanover-Adams Chapter of the American Red Cross	*Healthy Adams County*	*Lake Meade Property Owners Association*	*HACC Gettysburg Campus*	*Littlestown Area School District*
Lutheran Theological Seminary at Gettysburg	*PA Department of Conservation and Natural Resources*	*Upper Adams School District*	Watershed Alliance of Adams County	*York County Department of Emergency Services*

The stakeholders represent a diverse mix of K-12 and higher education; adjacent county emergency management agencies; and county, state and federal agencies operating programs in Adams County.

Stakeholders were invited to the HMP Workshop held July 24, 2014 at the Adams County Emergency Services Center. An invitation was sent to each stakeholder dated July 11, 2014 with a follow up e-mail sent July 17, 2014.

As part of the workshop, stakeholders were asked to complete a hazard risk evaluation form (Hazards in Your Community) which listed hazards to be profiled for the 2015 HMP Update. Stakeholders were asked to rank each hazard from the perspective of their organization. For example, school districts would evaluate hazards from the perspective of their buildings and campuses while a county- wide organization would evaluate each hazard from a county level perspective. Hazards were ranked relative to spatial extent, probable impact, probability of future events, and overall significance. Stakeholders were also encouraged to provide additional information pertaining to the listed hazards as well as list additional hazards not identified on the hazard risk evaluation form, but ones which could impact their organization. Results of the hazard risk evaluation form were reviewed as part of the preparation of the 2015 Risk Factor ranking. Stakeholders also reviewed goals and objectives from the 2010 HMP using just the

goals and objectives portion of the 5-Year Mitigation Strategy Evaluation Form and provided input on whether the goal or objective should be continued, changed, or deleted.

After the HMP Workshop, stakeholders who attended the workshop were sent a follow up e-mail on July 30, 2014 thanking them for their attendance. The e-mail noted that a stakeholder may be contacted for input on data or potential mitigation actions and also included a link to the project website. An e-mail dated July 30, 2014 was also sent to stakeholders not available to attend the HMP Workshop. The e-mail welcomed their input and included instructions on completing the hazard risk evaluation form (Hazards in Your Community) and a link to the project website where the form was posted in a fillable format.

A few of the stakeholders were contacted for their knowledge in completing portions of the HMP Update. For example, Gettysburg National Military Park was contacted to obtain information about the annual number of visitors to the park. As the military park is a national and international tourism venue, knowing the number of visitors travelling to the facility on an annual basis is helpful for planning purposes. Adams County Economic Development Corporation was contacted for information pertaining to development of the County's economic development plan.

Stakeholders, along with the general public and planning team were invited to attend the Draft Plan Review meeting for the HMP Update held on September 2, 2014 from 6:30 PM – 7:30 PM at the Adams County Emergency Services Center. An e-mail invitation was sent to municipalities and stakeholders on August 20, 2014. The invitation encouraged municipalities and stakeholders to post a flyer announcing the meeting at their offices in an effort to increase public attendance. A legal notice was published in The Gettysburg Times on August 22, 2014. A total of 11 people attended the meeting and provided input. Proof of legal notice publication, a copy of the e-mail invitation sent to municipalities and stakeholders, minutes, a sign-in sheet, and completed comment forms are included in Appendix C - Meeting and Other Participation Documentation.

As noted above, all stakeholders were e-mailed a link to the project website: http://www.pennsylvaniahmp.com/adams-hmp. The website included general resources pertaining to hazard mitigation planning and posting of upcoming events and project announcements. In addition, HMP Workshop materials were posted on the website including: the agenda, minutes, PowerPoint presentation, a fillable PDF of the Hazard Risk Evaluation form, and a fillable PDF of the New Mitigation Action Form. The Draft HMP Update was also posted to the project website. As of October 3, 2014, the project website had 119 hits, 55 of which were visits to the posted draft plan.

Figure 3.4-2 Adams County HMP Project Website, www.pennsylvaniahmp.com/adams-hmp.

The hazard risk evaluation form (Hazards in Your Community) was completed by 13 stakeholder organizations. The goal and objectives portion of the 5-Year Hazard Mitigation Strategy Evaluation Form was completed by 7 stakeholder organizations.

Stakeholder outreach documentation including meeting invitations, e-mails, sign-in sheets, and completed surveys and forms are included in Appendix C - Meeting and Other Participation Documentation.

3.5. Multi-Jurisdictional Planning

Adams County had full municipal participation in the 2015 HMP Update with 34 of 34 communities participating in the planning process. A detailed accounting of municipal participation can be found in Table 3.5-1.

Each municipality was part of the Planning Team developed for the 2015 HMP Update and invited to participate in several meetings held at the Adams County Emergency Services Center.

The HMP Workshop was held on July 24, 2014 with a total of 19 municipalities represented at the meeting. Meeting invitations were mailed to municipalities on July 14, 2014 and included a municipal Capability Assessment Survey/NFIP Worksheet. A follow up e-mail was sent to each municipality on July 17, 2014. The follow up e-mail provided a reminder of the HMP Workshop and each municipality's Capability Assessment Survey/NFIP Worksheet was attached. In an effort to help municipalities complete required forms, Capability Assessment Surveys were pre-

populated with data each municipality completed as part of the Capability Assessment Survey administered for the 2010 HMP. Similar to the Capability Assessment Survey, the NFIP Worksheet was pre-populated with community-specific information from FEMA's Community Information System (CIS) database. Fields that were not pre-populated were to be completed by each municipality. Municipalities were asked to bring their updated Capability Assessment Survey/NFIP Worksheet to the HMP Workshop.

In addition to discussing the Capability Assessment Survey and NFIP worksheet, the HMP Workshop provided the opportunity for municipalities to comment on hazards identified by the HMPSC. This was accomplished through a risk assessment exercise in which municipalities were asked to complete a hazard risk evaluation form (Hazards in Your Community). The form listed hazards to be profiled for the 2015 HMP Update and prompted municipalities to rank hazards relative to spatial extent, probable impact, probability of future events, and overall significance. Results of the hazard risk evaluation form were used to prepare the 2015 Risk Factor ranking. The form also afforded municipalities the opportunity to provide input on specific instances of a listed hazard in their community and on additional hazards that may impact their community.

The HMP Workshop provided the opportunity to review and comment on goals and objectives from the 2010 HMP. Through use of the 5-Year Mitigation Strategy Evaluation Form, municipalities provided input on whether each goal or objective should be continued, changed, or deleted; the reason for the recommendation; and the status of work toward the goal or objective. Municipalities also provided input on mitigation actions by identifying if an action was completed, canceled, deferred, or is ongoing; what was accomplished for the action during the reporting period; obstacles encountered; and if the action is still relevant or if it should be revised. Municipalities were asked to identify progress on actions not identified in the 2010 plan, identify new actions to accomplish in the next 5 years, and complete a mitigation action form for new mitigation actions.

Follow up e-mails were sent to all Adams County municipalities on July 30, 2014. An e-mail was sent to municipalities who attended the workshop thanking them for their attendance, providing a link to the project website, and inviting them to meet during office hours on August 6 or August 8 at the Adams County Emergency Services Center. The e-mail noted that the purpose of an additional meeting would be for those municipalities requiring additional assistance in developing mitigation actions that reflect community needs or to answer any questions pertaining to the hazard mitigation planning process.

A separate e-mail was sent to municipalities not available to attend the HMP Workshop and reminding them of FEMA's planning process requirements to attend at least one meeting, complete one input form, and have at least one mitigation action. An offer was extended to each municipality to meet during office hours on August 6 or August 8 at the Adams County Emergency Services Center to discuss information presented at the workshop; complete the hazard risk evaluation form; review and comment on the goals, objectives, and actions worksheet; as well as to discuss and develop new mitigation actions. In addition, a link to the project website was provided and an explanation that project related materials would be

available through the website. To accommodate schedules, additional office hours were held August 13, August 18, and August 28. A total of 13 municipalities participated in office hours conducted in August.

A final opportunity to attend a meeting associated with the HMP Update was held on Tuesday, September 2, 2014 at the Draft Plan Review meeting. A total of five municipalities attended the meeting.

Municipal participation in the 2015 HMP Update planning process is summarized in Table 3.5-1. All of Adams County's 34 municipalities met planning requirements. Due to staff scheduling, Bendersville Borough and Mount Pleasant Township were not able to attend an in-person meeting. The Consultant POC conducted a phone meeting with Mount Pleasant Township on September 2, 2014 and Bendersville Borough on September 11, 2014. Documentation of these phone meetings is and all other participation in meetings and completion of surveys is included in Appendix C - Meeting and Other Participation Documentation.

Table 3.5-1 Adams County 2015 HMP Update Community Participation

MUNICIPALITY	MEETINGS			SURVEYS/FORMS		
	HMP Workshop (7/24/14)	HMP Office Hours (August 2014) or Individual Teleconference	Draft Plan Review Meeting (9/2/14)*	Capability Assessment Survey / NFIP Worksheet	Risk Assessment Worksheet	5-Year Mitigation Strategy Evaluation
Abbottstown Borough	X				X	
Arendtsville Borough		X		X		X
Bendersville Borough		X		X		X
Berwick Township	X	X		X	X	X
Biglerville Borough		X		X	X	X
Bonneauville Borough		X		X	X	X
Butler Township		X		X	X	X
Carroll Valley Borough	X			X	X	X
Conewago Township	X			X	X	X
Cumberland Township	X			X	X	X
East Berlin Borough	X		X	X	X	
Fairfield Borough	X			X	X	X
Franklin Township	X			X	X	X
Freedom Township		X		X		X
Germany Township	X	X		X	X	X
Gettysburg Borough		X		X	X	X
Hamilton Township	X		X	X	X	X
Hamiltonban Township	X		X	X	X	X
Highland Township	X			X	X	X
Huntington Township	X			X	X	X
Latimore Township		X		X	X	X
Liberty Township	X			X	X	X
Littlestown Borough	X				X	X
McSherrystown Borough	X			X	X	X
Menallen Township		X		X		X
Mount Joy Township		X		X		X
Mount Pleasant Township		X		X		X
New Oxford Borough		X		X	X	X
Oxford Township		X		X		X

Table 3.5-1 Adams County 2015 HMP Update Community Participation

MUNICIPALITY	MEETINGS			SURVEYS/FORMS		
	HMP Workshop (7/24/14)	HMP Office Hours (August 2014) or Individual Teleconference	Draft Plan Review Meeting (9/2/14)*	Capability Assessment Survey / NFIP Worksheet	Risk Assessment Worksheet	5-Year Mitigation Strategy Evaluation
Reading Township	X			X	X	X
Straban Township	X			X	X	X
Tyrone Township	X			X	X	X
Union Township			X	X		X
York Springs Borough			X	X		

**While a total of 11 people attended the draft plan review meeting, only two were municipal representatives. Most participants at the meeting were stakeholders.*

4. Risk Assessment

4.1. Update Process Summary

The risk assessment provides a factual basis for activities proposed by the County in their mitigation strategy. Hazards that may affect Adams County are identified and defined in terms of their location and extent, magnitude of impacts, previous events, and probability of future events. The Risk Assessment section of the Adams County HMP update utilizes existing data and analysis from the previous Federal Emergency Management Agency (FEMA)-approved HMP as well as more recent data and analysis on hazards occurring during the last five years.

As Adams County grows and changes, so too do its hazards and vulnerabilities. In 2005, Adams County profiled the following hazards:

- Flooding,
- Tornadoes and Windstorms,
- Other Severe Weather,
- Fires,
- Hazardous Material Releases,
- Nuclear Incidents, and
- Terrorism.

In the 2010 HMP update, the names of most hazards in Adams County's HMP and the organization of the hazard profiles were changed to match the Commonwealth of Pennsylvania Standard Operating Guidance. In addition, the following hazards were added to the plan based on updated hazard and risk research: drought, dam failure, earthquakes, subsidence, and hailstorms.

In the 2015 HMP, hazard names were again refined to best match the Standard Operating Guidance. In addition, the HMPSC evaluated the development, population, and growth trends in the County vis-à-vis the Pennsylvania Standard List of Hazards and the 2013 Pennsylvania SSAHMP. The HMPSC assessed the change in risk for all hazards identified in the 2010 plan and voted on which hazards not previously identified but included in the Pennsylvania Standard State List of Hazards had the potential to impact Adams County using the Evaluation of Identified Hazard and Risk Form (found in Appendix C). After this hazard identification and evaluation, the HMPSC agreed to add five new hazards to the 2015 HMP, as shown in Table 4.1-1.

Table 4.1-1 New Hazards added to the 2015 Adams County HMP

HAZARD NAME	REASON FOR INCLUSION
Extreme Temperatures	• Recognition of changing regional climatic trends • Potential for severe economic loss to agricultural sector related to event
Invasive Species	• Potential for severe economic loss to agricultural sector related to event

Table 4.1-1 New Hazards added to the 2015 Adams County HMP	
HAZARD NAME	**REASON FOR INCLUSION**
Hurricane, Tropical Storm, Nor'easter	• Recognition of impact of recent severe coastal storms, especially Hurricane Sandy
Pandemic and Infectious Disease	• Recognition of importance and potential future severity of infectious disease, especially pandemic influenza
Transportation Accidents	• Recognition of potential for property damage, injury, and death due to road, rail, and aviation incidents, especially with US Routes 30 and 15 running through Adams County • Recognition of strong connection between transportation accidents and hazardous material releases

Hazard profiles were then developed in order to define the characteristics of each hazard as they apply to Adams County. Each municipality and the other stakeholders participating in the planning process then evaluated the impact of hazard profiled in their jurisdiction or organization using the Hazards in Your Community Worksheet (see Appendix C). This evaluation, together with the research and analysis of each hazard, allowed for an assessment of jurisdictional risk, discussed in Section 4.4.2.

Following hazard identification and profiling, a vulnerability assessment was conducted for each hazard to identify the impact of both natural and human-made hazard events on people, buildings, infrastructure, and the community, as appropriate. Each hazard is discussed in terms of its potential impact on individual communities, including the types of structures that may be at risk. This assessment allows the County and its municipalities to focus on and prioritize local mitigation efforts on areas that are most likely to be damaged or require early response to a hazard event. A vulnerability analysis was performed which identifies structures, critical facilities, and/or populations that may be impacted during hazard events and describes what events can do to physical, social, and economic assets.

4.2. Hazard Identification

Pennsylvania's disaster history helps provide direction on the identification of hazards and their significance both at the state and local level. PEMA maintains a historical log of all disasters that have occurred in the Commonwealth dating back to 1955. An analysis of the past occurrences of each hazard is the first step toward predicting the future susceptibility to that hazard. By noting the hazards of the past, Adams County and its municipalities will be able to better understand and prepare for future natural and human-made disasters.

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 the 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 the jurisdiction (as recorded in the decennial Census) times a set per capita indicator. As of federal fiscal year 2013-14, these thresholds are $3.50 per capita for counties and $1.37 per capita for the state. With a population of over 101,000, the Adams county threshold is approximately $354,000. State and county thresholds must be simultaneously attained for a Presidential Disaster Declaration to be issued.

Table 4.2-1 displays the Presidential Disaster and Emergency Declarations that have affected Adams County from 1955-2014 from most recent to oldest event.

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

DATE	DECLARATION AND EVENT TYPE	DECLARATION NUMBER	AFFECTED AREAS
October 2012	Emergency Declaration – Hurricane Sandy	3356	All counties
September 2011	Emergency Declaration – Remnants of Tropical Storm Lee	3340	Adams, Bedford, Berks, Blair, Bradford, Bucks, Cambria, Carbon, Centre, Chester, Clinton, Clinton, Columbia, Cumberland, Dauphin, Delaware, Franklin, Fulton, Huntingdon, Juniata, Lackawanna, Lancaster, Lebanon, Lehigh, Luzerne, Lycoming, Mifflin, Monroe, Montgomery, Montour, Northumberland, Northampton, Perry, Philadelphia, Schuylkill, Snyder, Somerset, Sullivan, Susquehanna, Tioga, Union, Wyoming, York
September 2011	Presidential Disaster Declaration - Remnants of Tropical Storm Lee	4030	Adams, Bedford, Berks, Bradford, Bucks, Chester, Columbia, Dauphin, Huntingdon, Juniata, Lackawanna, Lancaster, Lebanon, Luzerne, Lycoming, Mifflin, Montgomery, Montour, Northampton, Northumberland, Perry, Schuylkill, Snyder, Sullivan, Susquehanna, Tioga, Union, Wayne, Wyoming, and York

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

DATE	DECLARATION AND EVENT TYPE	DECLARATION NUMBER	AFFECTED AREAS
April, 2010 (Emergency Declaration)	Presidential Disaster Declaration - Severe Winter Storm	1898	Adams, Allegheny, Armstrong, Beaver, Bedford, Blair, Butler, Cambria, Chester, Cumberland, Dauphin, Delaware, Fayette, Franklin, Fulton, Greene, Huntingdon, Indiana, Juniata, Lancaster, Lebanon, Perry, Philadelphia, Somerset, Westmoreland, and York Counties
September, 2005 (Emergency Declaration)	Emergency Declaration – Hurricane Katrina		All counties: Proclamation of Emergency to Render Mutual Aid and to Receive and House Evacuees
February, 2003	Emergency Declaration – Severe Winter Storm	3180	Adams, Bedford, Berks, Blair, Cambria, Carbon, Chester, Clinton, Columbia, Cumberland, Dauphin, Delaware, Fayette, Franklin, Fulton, Greene, Huntingdon, Juniata, Lancaster, Lebanon, Lehigh, Lycoming, Mifflin, Montour, Montgomery, Northampton, Northumberland, Perry, Philadelphia, Schuylkill, Snyder, Somerset, Union, Washington, Westmoreland, and York Counties
September, 2003	Presidential Disaster Declaration - Hurricane Isabel/Henri	1497	All counties
September, 1999	Presidential Disaster Declaration - Hurricane Floyd	1294	All counties

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

DATE	DECLARATION AND EVENT TYPE	DECLARATION NUMBER	AFFECTED AREAS
January, 1996	Presidential Disaster Declaration - Severe Winter Storms	1085	Adams, Allegheny, Armstrong, Beaver, Bedford, Berks, Blair, Bradford, Bucks, Cambria, Cameron, Carbon, Centre, Chester, Clearfield, Clinton, Columbia, Cumberland, Dauphin, Delaware, Elk, Fayette, Franklin, Fulton, Greene, Huntingdon, Indiana, Jefferson, Juniata, Lackawanna, Lancaster, Lebanon, Lehigh, Lycoming, Luzerne, McKean, Mifflin, Monroe, Montgomery, Montour, Northampton, Northumberland, Perry, Philadelphia, Pike, Potter, Schuylkill, Snyder, Somerset, Sullivan, Susquehanna, Tioga, Union, Wayne, Westmoreland, Wyoming and York Counties - Public Assistance; All 67 counties declared for Individual Assistance
January, 1996	Presidential Disaster Declaration - Flooding	1093	All counties
June, 1996	Presidential Disaster Declaration - Flooding	1120	Adams, Beaver, Bedford, Bucks, Cambria, Crawford, Franklin and Huntingdon Counties
January and February, 1994	Presidential Disaster Declaration - Severe Winter Storms	1015	All counties
March, 1993	Emergency Declaration – Blizzard	3105	All counties
October, 1976	Presidential Disaster Declaration - Flood	523	Adams, Bradford, Columbia, Cumberland, Dauphin, Franklin, Juniata, Lackawanna, Lancaster, Lebanon, Luzerne, Mifflin, Northumberland, Perry, Schuylkill, Snyder, Sullivan, Susquehanna, Wayne, Wyoming and York Counties
September, 1975	Presidential Disaster Declaration - Flood (Eloise)	485	Adams, Berks, Bradford, Centre, Clinton, Columbia, Cumberland, Dauphin, Franklin, Juniata, Lackawanna, Lancaster, Lebanon, Luzerne, Lycoming, Mifflin, Montour, Northampton, Perry, Potter, Schuylkill, Snyder, Sullivan, Susquehanna, Tioga, Union, Wayne, Wyoming and York Counties

Table 4.2-1 Presidential Disaster and Emergency Declarations affecting Adams County.			
DATE	**DECLARATION AND EVENT TYPE**	**DECLARATION NUMBER**	**AFFECTED AREAS**
June, 1972	Presidential Disaster Declaration - Flood (Agnes)	340	All counties
August, 1965	Presidential Disaster Declaration - Water Shortage	206	Numerous counties statewide (no list available)

4.2.2. Summary of Hazards

As described in Section 4.1, at the initiation of the plan update process, the HMPSC reviewed the Pennsylvania Standard List of Hazards to evaluate new and changing hazards in Adams County. Following a review of the hazards considered in the 2010 HMP, the 2013 Standard State All-Hazard Mitigation Plan, and the Standard List of Hazards, the HMPSC decided that the 2015 plan update should identify, profile, and analyze 17 hazards. The hazards include all hazards profiled in the 2010 plan and the addition of Extreme Temperature; Hurricane, Tropical Storm, and Nor'easter; Invasive Species; Pandemic and Infectious Disease; and Transportation Accidents as hazards of concern. Table 4.2-2 contains a complete list of the 17 hazards identified for hazard profiling in the 2015 HMP update. Hazard profiles are included in Section 4.3 for each of these hazards.

Table 4.2-2 Definition of hazards profiled in the 2015 Adams County HMP Update.	
PROFILED HAZARDS	**DESCRIPTION**
NATURAL	
Drought	Drought is a natural climatic condition which occurs in virtually all climates, the consequence of a natural reduction in the amount of precipitation experienced over a long period of time, usually a season or more in length. High temperatures, prolonged winds, and 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 impact these sectors of the local economy, as well as residents who depend on wells for drinking water and other personal uses. (National Drought Mitigation Center, 2006).
Earthquake	An earthquake is the motion or trembling of the ground produced by sudden displacement of rock usually within the upper 10-20 miles of the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of underground caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in loss of life and injury to hundreds of thousands of persons, and disrupt the social and economic functioning of the affected area. 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).

Table 4.2-2 Definition of hazards profiled in the 2015 Adams County HMP Update.

PROFILED HAZARDS	DESCRIPTION
Extreme Temperature	Extreme cold temperatures drop well below what is considered normal for an area during the winter months and often accompany winter storm events. Combined with increases in wind speed, such temperatures in Pennsylvania can be life threatening to those exposed for extended periods of time. Extreme heat can be described as temperatures that hover 10°F or more above the average high temperature for a region during the summer months. Extreme heat is responsible for more deaths in Pennsylvania than all other natural disasters combined (Lawrence County, PA HMP, 2004).
Flood, Flash Flood, Ice Jam	Flooding is the temporary condition of partial or complete inundation on normally dry land and it is the most frequent and costly of all hazards in Pennsylvania. Flooding events are generally the result of excessive precipitation. General flooding is typically experienced when precipitation occurs over a given river basin for an extended period of time. Flash flooding is usually a result of heavy localized precipitation falling in a short time period over a given location, often along mountain streams and in urban areas where much of the ground is covered by impervious surfaces. The severity of a flood event is dependent upon a combination of stream and river basin topography and physiography, hydrology, precipitation and weather patterns, present soil moisture conditions, the degree of vegetative clearing as well as the presence of impervious surfaces in and around flood-prone areas. (NOAA, 2009). Winter flooding can include ice jams which occur when warm temperatures and heavy rain cause snow to melt rapidly. Snow melt combined with heavy rains can cause frozen rivers to swell, which breaks the ice layer on top of a river. The ice layer often breaks into large chunks, which float downstream, piling up in narrow passages and near other obstructions such as bridges and dams. All forms of flooding can damage infrastructure (USACE, 2007).
Hailstorm	In addition to flooding and severe winds, hail is another potential damaging product of severe thunderstorms. Hailstorms occur when ice crystals form within a low pressure front due to the rapid rise of warm air into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until, having developed sufficient weight, they fall as precipitation in the form of balls or irregularly shaped masses of ice greater than 0.75 inches in diameter (FEMA, 1997). The size of hailstones is a direct function of the size and severity of the storm. High velocity updraft winds are required to keep hail in suspension in thunderclouds. The strength of the updraft is a function of the intensity of heating at the Earth's surface. Damage to crops and vehicles are typically the most significant impacts of hailstorms. Areas in eastern and central Pennsylvania typically experience less than 2 hailstorms per year while areas in western Pennsylvania experience 2-3 annually.

Table 4.2-2 Definition of hazards profiled in the 2015 Adams County HMP Update.

PROFILED HAZARDS	DESCRIPTION
Hurricane, Tropical Storm, Nor'easter	Hurricanes, tropical storms, and nor'easters are classified as cyclones and are any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise (in the Northern Hemisphere) and whose diameter averages 10-30 miles across. While most of Pennsylvania is not directly affected by the devastating impacts cyclonic systems can have on coastal regions, many areas in the state are subject to the primary damaging forces associated with these storms including high-level sustained winds, heavy precipitation, and tornadoes. Areas in southeastern Pennsylvania could be susceptible to storm surge and tidal flooding. The majority of hurricanes and tropical storms form in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico during the official Atlantic hurricane season (June through November). (FEMA, 1997).
Invasive Species	An invasive species is a species that is not indigenous to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. These species can be any type of organism: plant, fish, invertebrate, mammal, bird, disease, or pathogen. Infestations may not necessarily impact human health, but can create a nuisance or agricultural hardships by destroying crops, defoliating populations of native plant and tree species, or interfering with ecological systems (Governor's Invasive Species Council of Pennsylvania, 2009).
Pandemic and Infectious Disease	A pandemic occurs when infection from of a new strain of a certain disease, to which most humans have no immunity, substantially exceeds the number of expected cases over a given period of time. Such a disease may or may not be transferable between humans and animals. (Martin & Martin-Granel, 2006).
Subsidence, Sinkhole	Subsidence is a natural geologic process that commonly occurs in areas with underlying limestone bedrock and other rock types that are soluble in water. Water passing through naturally occurring fractures dissolves these materials leaving underground voids. Eventually, overburden on top of the voids causes a collapse which can damage structures with low strain tolerances. This collapse can take place slowly over time or quickly in a single event, but in either case. Karst topography describes a landscape that contains characteristic structures such as sinkholes, linear depressions, and caves. In addition to natural processes, human activity such as water, natural gas, and oil extraction can cause subsidence and sinkhole formations. (FEMA, 1997).

Table 4.2-2 Definition of hazards profiled in the 2015 Adams County HMP Update.

PROFILED HAZARDS	DESCRIPTION
Tornado, Wind Storm	A wind storm 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). 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. They 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, and duration of the storm. 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, an average of over 800 tornadoes is reported nationwide, resulting in an average of 80 deaths and 1,500 injuries (NOAA, 2002). Based on NOAA Storm Prediction Center Statistics, the number of recorded F3, F4, & F5 tornadoes between 1950-1998 ranges from <1 to 15 per 3,700 square mile area across Pennsylvania (FEMA, 2009). A water spout is a tornado over a body of water (American Meteorological Society, 2009).
Wildfire	A wildfire is a raging, uncontrolled fire that spreads rapidly through vegetative fuels, exposing and possibly consuming structures. Wildfires often begin unnoticed and can spread quickly, creating dense smoke that can be seen for miles. Wildfires can occur at any time of the year, but mostly occur during long, dry hot spells. Any small fire in a wooded area, if not quickly detected and suppressed, can get out of control. Most wildfires are caused by human carelessness, negligence, and ignorance. However, some are precipitated by lightning strikes and in rare instances, spontaneous combustion. Wildfires in Pennsylvania can occur in fields, grass, brush, and forests. 98% of wildfires in Pennsylvania are a direct result of people, often caused by debris burns (PA DCNR, 1999).
Winter Storm	Winter storms may include snow, sleet, freezing rain, or a mix of these wintry forms of precipitation. A winter storm can range from a moderate snowfall or ice event over a period of a few hours to blizzard conditions with wind-driven snow that lasts for several days. Many winter storms are accompanied by low temperatures and heavy and/or blowing snow, which can severely impair visibility and disrupt transportation. The Commonwealth of Pennsylvania has a long history of severe winter weather. (NOAA, 2009).

Table 4.2-2 Definition of hazards profiled in the 2015 Adams County HMP Update.	
PROFILED HAZARDS	**DESCRIPTION**
HUMAN-MADE	
Dam Failure	A dam is a barrier across flowing water that obstructs, directs, or slows down water flow. Dams provide benefits such as flood protection, power generation, drinking water, irrigation, and recreation. Failure of these structures results in an uncontrolled release of impounded water. Failures are relatively rare, but immense damage and loss of life is possible in downstream communities when such events occur. Aging infrastructure, hydrologic, hydraulic and geologic characteristics, population growth, and design and maintenance practices should be considered when assessing dam failure hazards. The failure of the South Fork Dam, located in Johnstown, PA, was the deadliest dam failure ever experienced in the United States. It took place in 1889 and resulted in the Johnstown Flood which claimed 2,209 lives (FEMA, 1997). Today there are approximately 3,200 dams and reservoirs throughout Pennsylvania (Pennsylvania Department of Environmental Protection, 2009).
Environmental Hazards	Environmental hazards are hazards that pose threats to the natural environment, the built environment, and public safety through the diffusion of harmful substances, materials, or products. For the purposes of the Adams County HMP, environmental hazards focuses on Hazardous material releases at fixed facilities or in transit; including toxic chemicals, infectious substances, biohazardous waste, and any materials that are explosive, corrosive, flammable, or radioactive (PL 1990-165, § 207(e)).
Nuclear Incident	Nuclear incidents generally refer to events involving the release of significant levels of radioactivity or exposure of workers or the general public to radiation (FEMA, 1997). Nuclear accidents/incidents can be placed into three categories: 1) Criticality accidents which involve loss of control of nuclear assemblies or power reactors, 2) Loss-of-coolant accidents which result 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, and 3) Loss-of-containment accidents which involve the release of radioactivity. The primary concern following such an incident or accident 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. (FEMA, 1997).
Terrorism	Terrorism is use of force or violence against persons or property with the intent to intimidate or coerce. Acts of terrorism include threats of terrorism; assassinations; kidnappings; hijackings; bomb scares and bombings; cyber-attacks (computer-based); and the use of chemical, biological, nuclear and radiological weapons (FEMA, 2009). Increasingly, cyber-attacks have become a more pressing concern for governments across America.

Table 4.2-2 Definition of hazards profiled in the 2015 Adams County HMP Update.	
PROFILED HAZARDS	**DESCRIPTION**
Transportation Accident	Transportation accidents can result from any form of air, rail, water, or road travel. It is unlikely that small accidents would significantly impact the larger community. However, certain accidents could have secondary regional impacts such as a hazardous materials release or disruption in critical supply/access routes, especially if vital transportation corridors or junctions are present. Traffic congestion in certain circumstances can also be hazardous. Traffic congestion is a condition that occurs when traffic demand approaches or exceeds the available capacity of the road network. This hazard should be carefully evaluated during emergency planning since it is a key factor in timely disaster or hazard response, especially in areas with high population density. (Federal Highway Administration, 2009).

4.3. Hazard Profiles and Vulnerability Analysis

Disaster frequency and its effects or severity are an important basis for planning emergency response and mitigation. Natural hazards tend to reoccur on a predictable seasonal basis, whereas human-caused or technological events tend to change over time with advancements in technology and methods of operation.

As defined in the Pennsylvania Standard Operating Guide, five criteria were used to assure a systematic and comprehensive approach to hazard analysis:

- **Location and Extent**: The location and extent of the County's vulnerability to a certain hazard can vary throughout the County. The maximum threat or worst-case disaster should be considered for each hazard. However, secondary effects of many hazards can be just as devastating. These secondary effects cause many hazards to become regional hazards affecting many areas with differing impacts.
- **Range of Magnitude**: Each individual hazard poses certain threats to the County and its municipalities. It is important to identify which hazards pose the greatest threat and focus mitigation actions toward those hazards.
- **Past Occurrences**: A record of past events is particularly helpful to evaluate hazards. Past records of the County's hazards also offer valuable information when tempered with the knowledge of preventative efforts, changes in preventative efforts, and advancements in technology that may reduce the frequency or severity of such events.
- **Future Occurrences**: The probability of an occurrence in the future is another important factor to consider when preparing for an all-hazards response. An event that occurs annually with relatively minor impact may deserve more emphasis than a major event that occurs once every 50 to 100 years.
- **Vulnerability Assessment**: The susceptibility of a community to destruction, injury, or death resulting from a hazard event defines the degree of vulnerability. The degree of vulnerability may be related to geographic location, as with floodplains, the type of facilities or structures, or the socioeconomics of a given area. Additionally, certain population groups may be more vulnerable to some hazards because of immobility or

their inability to take protective action. Where possible, the vulnerability assessment section of each hazard profile lists the properties and critical infrastructure within the respective hazard areas.

NATURAL HAZARDS

4.3.1. Drought

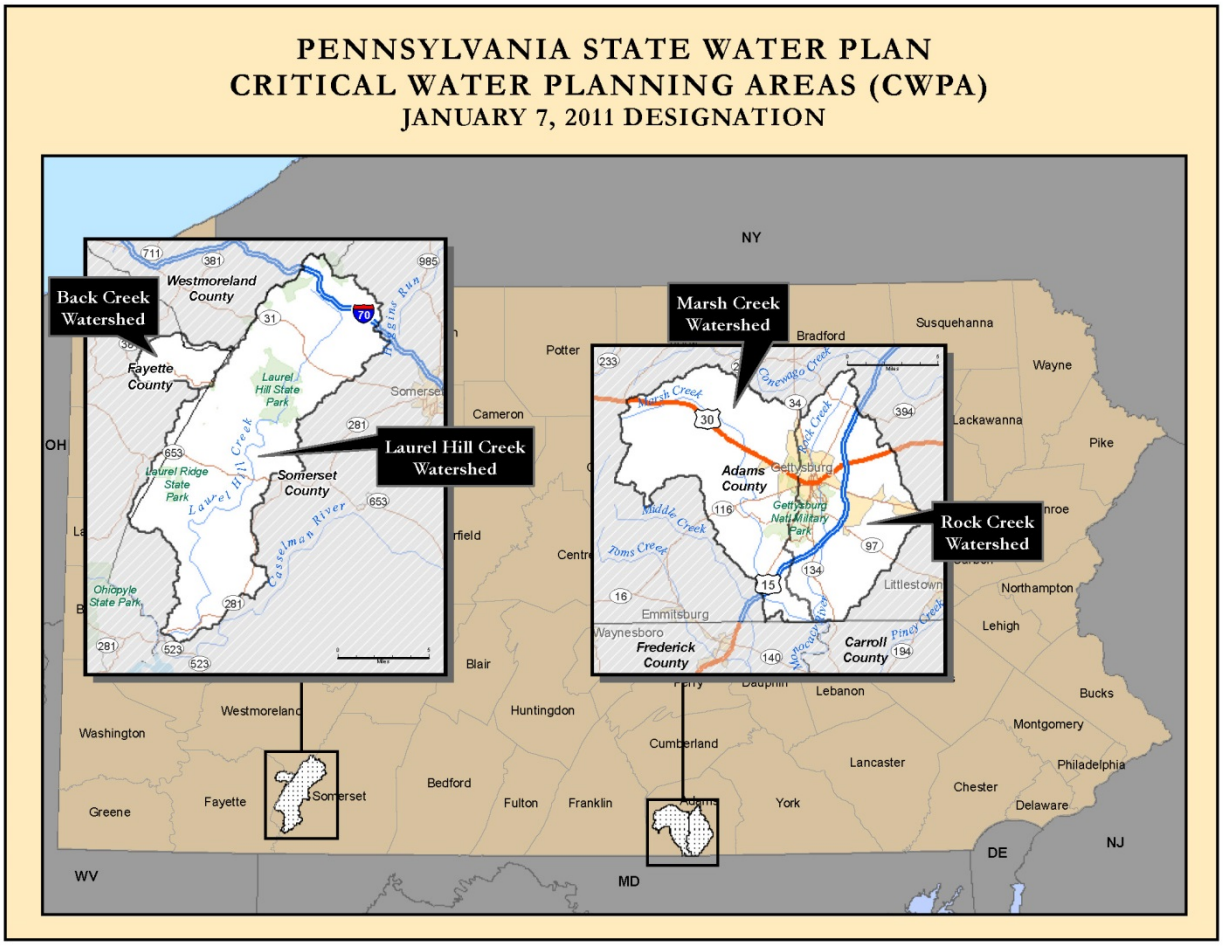
4.3.1.1. Location and Extent

Drought is a normal part of 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.

Drought is defined as the consequence of a natural reduction in the amount of precipitation expected over an extended period of time, usually a season or more in length. Droughts are regional climatic events, so they typically impact all communities in a relatively uniform fashion with only minor localized variations in rainfall events. Droughts often occur across county boundaries, affecting large areas of Pennsylvania at the same time. The spatial extent for areas of impact can range from localized areas in Pennsylvania to the entire Mid-Atlantic region. Areas with extensive agriculture uses are particularly vulnerable to drought; over half of all land in Adams County is farmland, and agriculture is one of two top industries (Adams County, 2014).

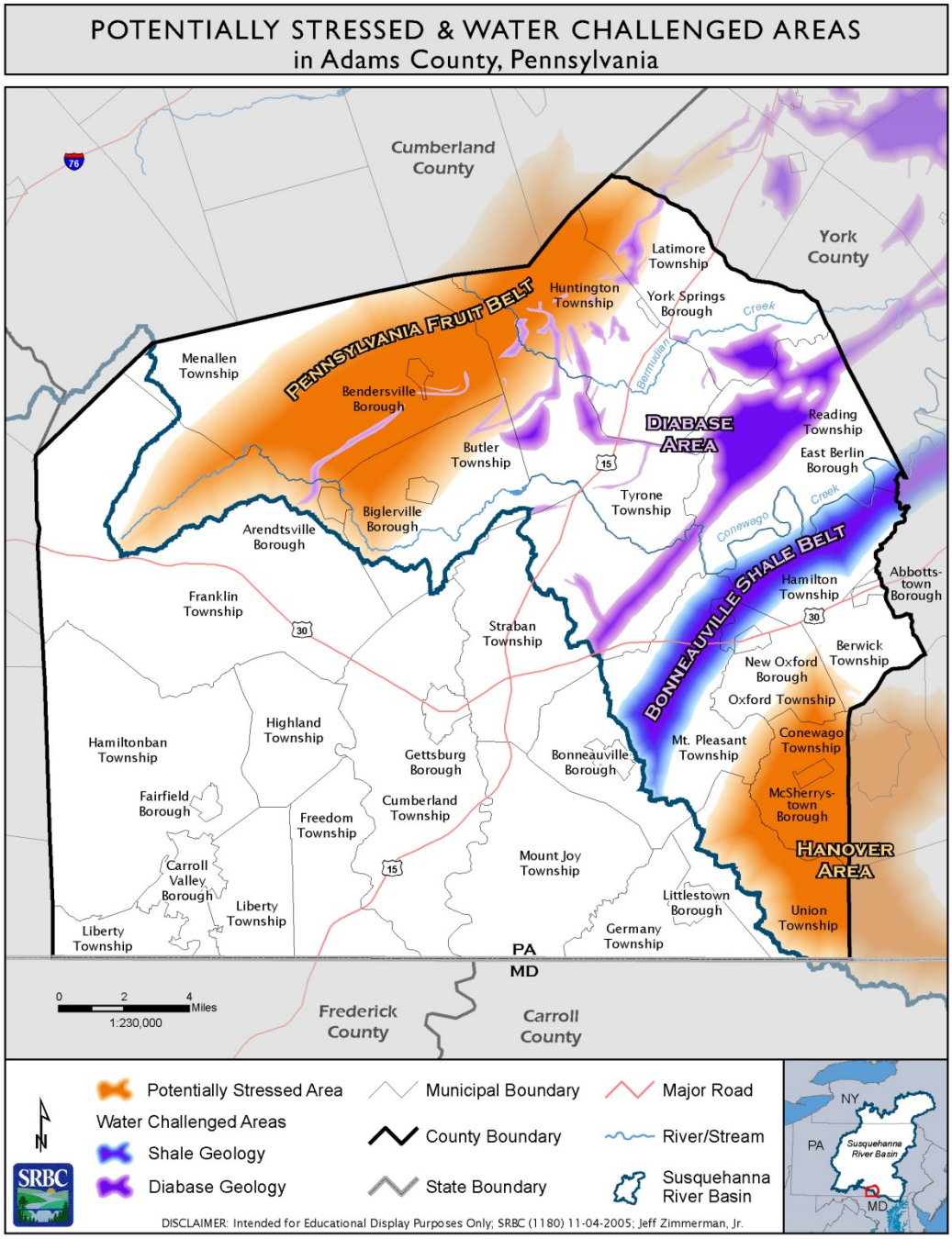
Beyond the potential for countywide, regional droughts, the Marsh and Rock Creek Watersheds were designated Critical Water Planning Areas (CWPA) under the Pennsylvania State Water Plan in 2011 in part because of an assessment that found that water demand exceeds supply in the CWPA during times of low water flow. The geology in the area enables short-term water storage but groundwater availability will not be sufficient protection against a drought. Figure 4.3.1-1 shows the area covered by this designation (PA DEP, 2012).

Figure 4.3.1-1 Critical Water Planning Areas, including Adams County Watersheds (PA DEP, 2012).



In addition, the Susquehanna River Basin Commission (SRBC) has identified potentially stressed and water challenged Areas in Adams County. Similar to the Marsh and Rock Creek CWPA, the water challenged areas lack sufficient natural water resources while the potentially stressed areas are water-challenged areas with significant additional demands on water use from industry, development, or agriculture (SRBC, 2005). As shown in Figure 4.3.1-2, the Pennsylvania Fruit Belt and Hanover area are potentially stressed because; the Fruit Belt is stressed because of intensive agricultural uses moving toward year-round production. The Hanover area is potentially stressed due to mining operations that depress water levels.

Figure 4.3.1-2 Potentially Stressed and Water-Challenged Areas in Adams County (SRBC, 2005).



While these challenged and stressed areas are not more likely to experience a drought than the rest of the county, they may experience worse drought impacts due to pre-existing supply and demand challenges.

4.3.1.2. Range of Magnitude

Droughts can have varying effects, depending upon what month they occur, severity, duration and location. Some droughts may 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.

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

The Commonwealth uses five parameters to assess drought conditions:

1) Stream flows (compared to benchmark records)
2) Precipitation (measured as the departure from normal, 30 year average precipitation)
3) Reservoir storage levels in a variety of locations (especially three New York City reservoirs in upper Delaware River Basin)
4) Groundwater elevations in a number of counties (comparing to past month, past year and historic record)
5) The Palmer Drought Severity Index – a soil moisture algorithm calibrated for relatively homogeneous regions which measures dryness based on recent precipitation and temperature (see Table 4.3.1-1).

Table 4.3.1-1 Palmer Drought Severity Index (PSDI) classifications (NDMC, 2006).

SEVERITY CATEGORY	PSDI VALUE
Extremely wet	4.0 or more
Very wet	3.0 to 3.99
Moderately wet	2.0 to 2.99
Slightly wet	1.0 to 1.99
Incipient wet spell	0.5 to 0.99
Near normal	0.49 to -0.49
Incipient dry spell	-0.5 to -0.99
Mild drought	-1.0 to -1.99
Moderate drought	-2.0 to -2.99
Severe drought	-3.0 to -3.99
Extreme drought	-4.0 or less

In Pennsylvania, PEMA has primary responsibility for managing droughts with direct support from the Department of Environmental Protection (DEP). According to *Drought Management in*

Pennsylvania (2102), PEMA and DEP use the following three stages to describe and manage droughts. They are listed in order of increasing severity:

- **Drought Watch:** A period to alert government agencies, public water suppliers, water users and the public regarding the potential for future drought-related problems, Drought Watches are invoked when three or more drought indicators are present for a county or group of counties. The focus is on increased monitoring, awareness and preparation for response if conditions worsen. A request for voluntary water conservation is made. The objective of voluntary water conservation measures during a drought watch is to reduce water uses by 5 percent in the affected areas. Due to varying conditions, individual water suppliers or municipalities may be asking for more stringent conservation actions.

- **Drought Warning:** This phase involves a coordinated response to imminent drought conditions and potential water supply shortages through concerted voluntary conservation measures to avoid or reduce shortages, relieve stressed sources, develop new sources, and if possible, forestall the need to impose mandatory water use restrictions. The objective of voluntary water conservation measures during a drought warning is to reduce overall water uses by 10-15 percent in the affected areas. Due to varying conditions, individual water suppliers or municipalities may be asking for more stringent conservation actions. At

- **Drought Emergency:** This stage is a phase of concerted management operations to marshal all available resources to respond to actual emergency conditions, to avoid depletion of water sources, to assure at least minimum water supplies to protect public health and safety, to support essential and high priority water uses and to avoid unnecessary economic dislocations. It is possible during this phase to impose mandatory restrictions on non-essential water uses that are provided in the Pennsylvania Code (Chapter 119), if deemed necessary and if ordered by the Governor of Pennsylvania. The objective of water use restrictions (mandatory or voluntary) and other conservation measures during this phase is to reduce consumptive water use in the affected area by fifteen percent, and to reduce total use to the extent necessary to preserve public water system supplies, to avoid or mitigate local or area shortages and to assure equitable sharing of limited supplies.

In addition, local water rationing is an option for communities:

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

The worst historical drought event in Pennsylvania occurred in 1963, when precipitation statewide averaged below normal for ten of twelve months. Drought emergency status led to

widespread water use restrictions, and reservoirs dipped to record low levels. Corn, hay, and other agricultural products shriveled in parched field, causing economic losses. Governor William Scranton sought drought aid for Pennsylvania in the face of mounting agricultural losses, and the event became a presidentially declared disaster in September 1963 (Gelber, 2002).

Central Pennsylvania has averaged 3.4 dry periods (10 or more consecutive days having less than 0.01 inch of precipitation) per year from 1950 through 1992. While severe drought may not be an annual occurrence in Adams County, the effects drought can have on the County can be dramatic due to the County's agricultural industry. In fact, the Pennsylvania Crop Insurance Education and Participation Program (a partnership of the US Department of Agriculture, the Pennsylvania Department of Agriculture, and Penn State University) estimated that drought was the top reason for crop failure in Pennsylvania from 1981-2009; roughly 59% of all crop failures were due to drought.

Environmental impacts of drought include:

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

4.3.1.3. Past Occurrence

Between 1930 and 1994, the Commonwealth of Pennsylvania experienced five significant droughts: 1930-1934, 1939-1942, 1953-1955, 1961-1967, and 1991-1992. From 1999 through early 2003, the County experienced a severe drought, per the DEP. The Adams County drought history data is shown in Table 30. The DEP maintains the most comprehensive data on drought occurrences across Pennsylvania. Declared drought status for Adams County from 1980 to 2010 is shown in Table 4.3.1-2. Descriptions for drought status categories (i.e. *watch*, *warning*, and *emergency*) are included in Section 4.3.1.2.

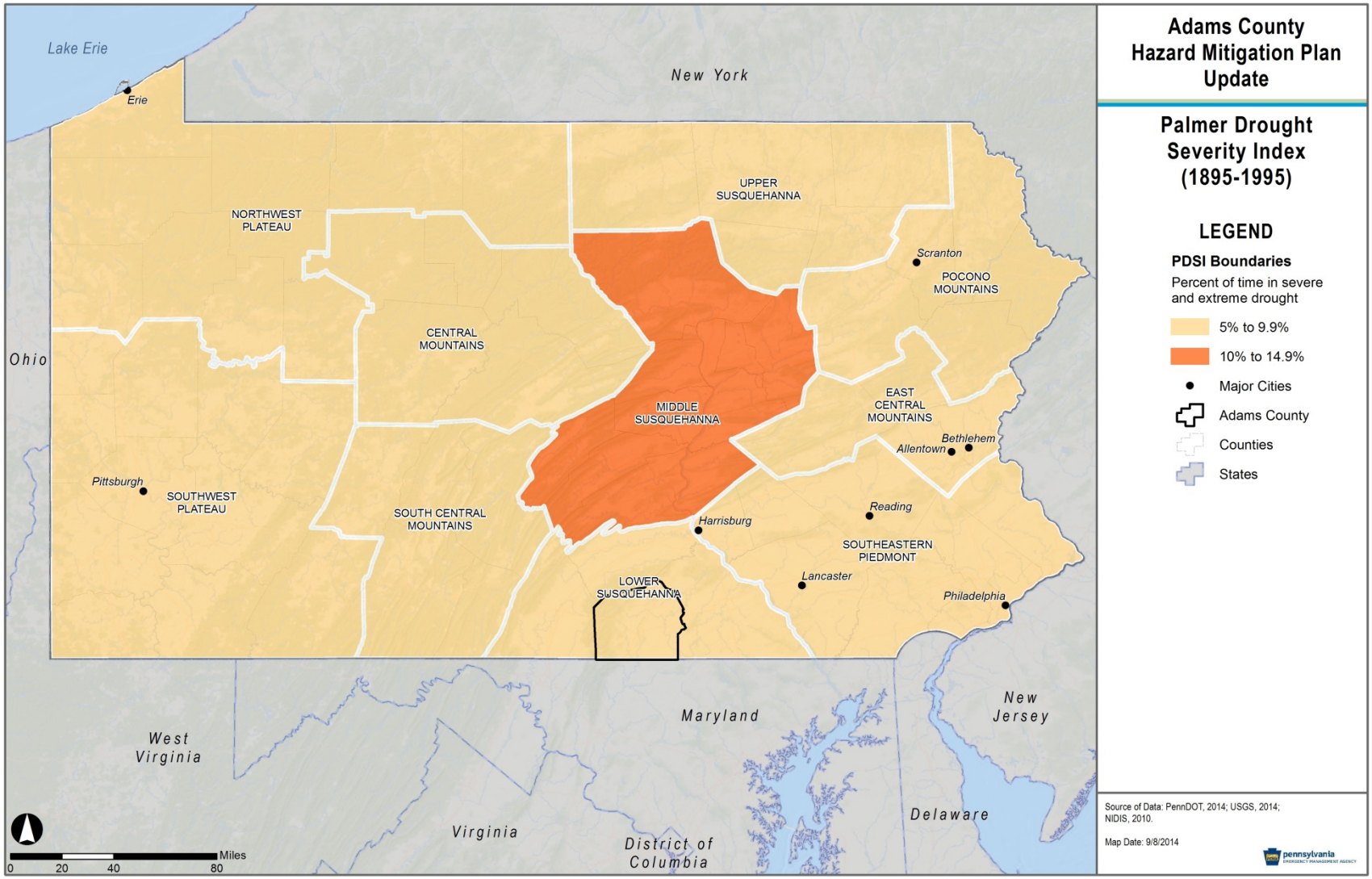
Table 4.3.1-2 Past drought events in Adams County (PA DEP 2014).

DATE	DROUGHT STATUS	DATE	DROUGHT STATUS
Nov 18, 1980 - Apr 20, 1982	Emergency	Dec 14, 1998 - Dec 16, 1998	Warning
Apr 26, 1985 - Jul 29, 1985	Watch	Dec 16, 1999 - Feb 25, 2000	Watch
Jul 29, 1985 - Oct 22, 1985	Watch	Feb 25, 2000 - May 5, 2000	Watch
Oct 22, 1985 - Oct 29, 1985	Watch	Aug 8, 2001 - Aug 24, 2001	Watch
Oct 29, 1985 - Dec 19, 1985	Watch	Aug 24, 2001 - Nov 6, 2001	Watch
Jul 7, 1988 - Aug 24, 1988	Watch	Nov 6, 2001 - Dec 5, 2001	Warning
Aug 24, 1988 - Dec 12, 1988	Watch	Dec 5, 2001 - Feb 12, 2002	Warning
Jun 28, 1991 - Jul 24, 1991	Emergency	Feb 12, 2002 - May 13, 2002	Emergency
Aug 16, 1991 - Sep 13, 1991	Emergency	May 13, 2002 - June 14, 2002	Emergency
Sep 13, 1991 - Oct 21, 1991	Emergency	June 14, 2002 - Aug 9, 2002	Emergency
Oct 21, 1991 - Jan 16, 1992	Warning	Aug 9, 2002 - Sept 5, 2002	Emergency
Jan 17, 1992 - Apr 20, 1992	Warning	Sept 5, 2002 - Nov 7, 2002	Emergency
Sep 1, 1995 - Sep 20, 1995	Warning	Nov 7, 2002 - Dec 19, 2002	Emergency
Sep 20, 1995 - Nov 8, 1995	Emergency	April 11, 2006 - June 30, 2006	Watch
Nov 8, 1995 - Dec 18, 1995	Warning	Aug 8, 2007 - Sept 5, 2007	Watch
Jul 17, 1997 - Oct 27, 1997	Watch	Sept 5, 2007 - Oct 5, 2007	Watch
Oct 17, 1997 - Nov 13, 1997	Watch	Oct 5, 2007 - Jan 11, 2008	Watch
Dec 3, 1998 - Dec 8, 1998	Watch	Jan 11, 2008 - Feb 15, 2008	Watch
Dec 8, 1998 - Dec 14, 1998	Warning	Sept 16, 2010 - Nov 10, 2010	Watch

4.3.1.4. Future Occurrence

It is difficult to forecast the severity and frequency of future drought events. Based on data from 1895 to 1995, Pennsylvania can be divided into ten PDSI areas (see Figure 4.3.1-3). Each of these areas have been assigned a percent of time PDSI values are less than or equal to three – a value equivalent to a drought warning or drought emergency in Pennsylvania. Historically, Adams County is under a drought warning or emergency 5-9.9% of the time. Therefore, the probability of future droughts is considered *possible* as defined by the Risk Factor Methodology probability criteria (see Table 4.4.1-1).

Figure 4.3.1-3 Percent of time areas of the United States have PSDI values <= -3 (NDMC, 2009).



4.3.1.5. Vulnerability Assessment

The most significant losses resulting from drought events are typically found in the agriculture sector of the County's economy. For example, drought conditions in 1999 resulted in a Gubernatorial Proclamation of Emergency in part because of significant crop damage. Preliminary damage estimates by the US Department of Agriculture indicated possible crop losses across Pennsylvania in excess of $500 million. This figure did not include a 20 percent decrease in dairy milk production statewide, which also resulted in million dollar losses (NCDC, 2011).

While these were statewide impacts, they illustrate the potential for droughts to severely impair the local economy for an agricultural county like Adams. Adams County ranks 7th of the 67 counties in Pennsylvania in terms of the market value of agricultural products sold; in 2012, the market value of agricultural production topped $201 million. The county ranks first in fruits, tree nuts, and berries in Pennsylvania by sales value (USDA, 2012). Other important crops include poultry and eggs and milk from cows.

Water supplies are also vulnerable to the effects of drought. All streams in the County originate here and flow out of the County; groundwater is the main source of water. Table 4.3.1-3 lists the water suppliers in Adams County along with the source of water supplies, most of which are groundwater supplies. In addition, the table indicated if the supplier has a contingency plan and/or rationing plan which may help reduce vulnerability in a drought.

Table 4.3.1-3 Water Suppliers in Adams County. "NP" denotes data points not provided by the supplier.

SUPPLIER	HOUSEHOLDS SERVED	SURFACE WATER SUPPLIES	GROUND WATER SUPPLIES	CONTINGENCY PLAN/ RATIONING PLAN
Arendtsville Borough Municipal Authority	347	0	4	Yes/Yes
Bendersville Borough Municipal Authority	275	3	3	Yes/Yes
Biglerville Borough Water & Sewer Authority	520	0	3	Yes/Yes
Bonneauville Borough Municipal Water Authority	817	0	6	No/No
Calvary Heights Mobile Home Park	45	0	2	Yes/Yes
Castle Hill Mobile Home Park	49	0	2	Yes/Yes
Chesapeake Estates Mobile Home Park	131	0	5	Yes/No
East Berlin Area Joint Authority	729	0	4	Yes/Yes
Fairfield Borough Municipal Authority	333	0	4 permanent, 2 add'l	Yes/Yes
Franklin Township Municipal Authority	130	0	2	Yes/Yes
Gettysburg Municipal Authority	4,200 (approx.)	1	5 active, 2 add'l	Yes/Yes

Table 4.3.1-3 Water Suppliers in Adams County. "NP" denotes data points not provided by the supplier.

SUPPLIER	HOUSEHOLDS SERVED	SURFACE WATER SUPPLIES	GROUND WATER SUPPLIES	CONTINGENCY PLAN/ RATIONING PLAN
Hanover Borough Municipal Water Company	15,271	3	0	Yes/Yes
Hillside Rest Home	1	NP	NP	NP
Hoffman Homes, Inc.	10	0	2	Yes/No
Lake Meade Municipal Authority	1,073	0	3	Yes/No
Lincoln Estates Mobile Home Park	185	0	2	No/No
Meadow's Property Owners Assoc.	79	0	2	Yes/No
Mountain View Mobile Park	63	0	2	Yes/Yes
New Oxford Mobile Home Village	107	0	2	Yes/No
New Oxford Municipal Authority	1,335	1	0	Yes/Yes
Oak Village	78	NP	NP	NP
Panorama Mobile Home Park	33	0	2	No/No
PA American Water Company	820	0	2	Yes/Yes
Possum Valley Municipal Authority	118	10	2	Yes/Yes
Raven Rock Mountain Complex Site R	Classified	0	3	Yes/Yes
Section A Water Company	120	0	2	No/No
Stockhams Village	83	0	4	Yes/No
Stonemille Property Management	89	0	2	No/No
Village of Laurel Run	10	NP	1	NP
Walnut Grove Mobile Home Park	170	0	1	No/No
York Springs Water Authority	400	0	3	Yes/Yes
York Water Company	328	2	0	Yes/Yes

The County Comprehensive Plan indicates that the 34 public water systems in the County obtain water supplies primarily from wells. The smaller systems typically have undersized storage facilities that are incapable of providing adequate operating, emergency, and fire reserves. Given the significant growth in the County over the past 25 years and the major role of agriculture in the local economy, water supply will likely continue to be a key issue. The Adams County Water Supply and Wellhead Protection Plan indicates that six of the community water systems in Adams County are inadequate and would not have enough water during a drought (Adams County Office of Planning and Development, 2001).

Adams County residents that use private domestic wells are more vulnerable to droughts. Table 4.3.1-4 shows the number of domestic wells per municipality. It is important to note that

the well data was obtained from the Pennsylvania Groundwater Information System (PaGWIS). **PaGWIS relies on voluntary submissions of well record data by well drillers; as a result, it is not a complete database of all domestic wells in the County.** This is the most complete dataset of domestic wells available.

Table 4.3.1-4 PaGWIS Data for Adams County.

MUNICIPALITY	NUMBER OF REPORTED DOMESTIC WELLS	MUNICIPALITY	NUMBER OF REPORTED DOMESTIC WELLS
Abbottstown Borough	2	Highland Township	65
Arendtsville Borough	0	Huntington Township	145
Bendersville Borough	0	Latimore Township	129
Berwick Township	117	Liberty Township	102
Biglerville Borough	1	Littlestown Borough	0
Bonneauville Borough	0	McSherrystown Borough	0
Butler Township	135	Menallen Township	195
Carroll Valley Borough	54	Mt Joy Township	100
Conewago Township	64	Mt Pleasant Township	193
Cumberland Township	205	New Oxford Borough	1
East Berlin Borough	6	Oxford Township	130
Fairfield Borough	0	Reading Township	162
Franklin Township	191	Straban Township	149
Freedom Township	38	Tyrone Township	118
Germany Township	185	Union Township	142
Gettysburg Borough	3	York Springs Borough	1
Hamilton Township	173	Unknown	67
Hamiltonban Township	106	**TOTAL**	**2,979**

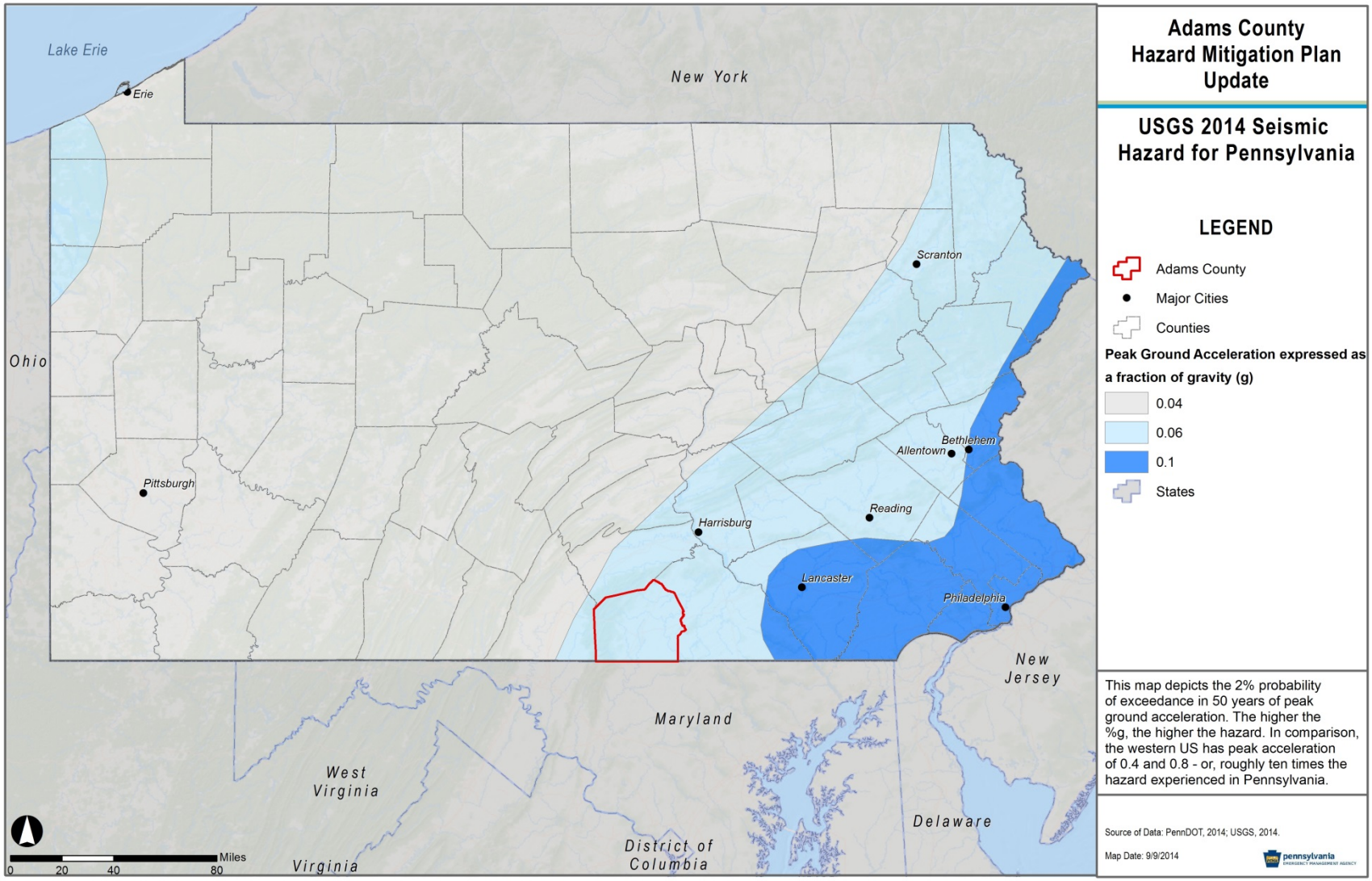
Water supply planning efforts like the Marsh and Rock Creek Watershed Critical Area Resource Plan, the SRBC's water planning efforts, and Adams County's Water Supply and Wellhead Protection Plan indicate the importance of drought mitigation in Adams County. These planning efforts and their associated implementation strategies should lessen the impacts of droughts in the future.

4.3.2. Earthquake

4.3.2.1. Location and Extent

Earthquake events in Pennsylvania typically do not impact areas greater than 100 km from the epicenter, and earthquake epicenters in Adams County are rare. The area is generally not known for seismicity, and USGS downgraded the probabilistic seismic hazard for much of Pennsylvania in 2014. Figure 4.3.2-1 shows the 2014 earthquake hazard in Pennsylvania and Adams County, expressed as the two-percent probability of exceedance in 50 years of peak ground acceleration (g). This map was digitized from the 2014 National Seismic Hazard report. Adams County lies in the 0.06 zone, indicating that the hazard is slight. 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 (see Section 4.3.2.3).

Figure 4.3.2-1 Approximate USGS Seismic Hazard for Pennsylvania (Petersen et al, 2014).



4.3.2.2. Range of Magnitude

Earthquake magnitude is often measured using the Richter Scale, an open-ended logarithmic scale that describes the energy release of an earthquake. Table 4.3.2-1 summarizes Richter Scale magnitudes as they relate to the spatial extent of impacted areas. A historical survey of earthquakes occurring within 100 km of Adams County with known magnitudes indicates that earthquakes have generally had magnitudes of up to 4.3 with most magnitudes between two and 3. Pennsylvania has not experienced any earthquakes with a magnitude greater than 6.0.

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

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

The Richter Scale does not give any indication of the impact or damage of an earthquake, although it can be inferred that higher magnitude events cause more damage. Instead, the impact of an earthquake event is measured in terms of earthquake intensity, usually measured using the Modified Mercalli Intensity Scale, shown in Table 4.3.2-2. Based on historical data of earthquakes with a recorded Intensity, little damage is expected from earthquake events. The one historical epicenter in Adams County did not have an intensity recorded. 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 Adams County or near the border in an adjacent county, causing mild damage in populated areas.

Table 4.3.2-2 Modified Mercalli Intensity Scale with associated impacts.

SCALE	INTENSITY	DESCRIPTION OF EFFECTS	CORRESPONDING RICHTER SCALE MAGNITUDE
I	Instrumental	Usually detected only on seismographs.	<4.2
II	Feeble	Felt only by a few persons at rest, especially on upper floors of buildings.	
III	Slight	Felt quite noticeably indoors, especially on upper floors. Most people don't recognize it as an earthquake (i.e. a truck rumbling).	
IV	Moderate	Can be felt by people walking; dishes, windows, and doors are disturbed.	
V	Slightly Strong	Sleepers are awoken; unstable objects are overturned.	<4.8
VI	Strong	Trees sway; suspended objects swing; objects fall off shelves; damage is slight.	<5.4

Table 4.3.2-2 Modified Mercalli Intensity Scale with associated impacts.

SCALE	INTENSITY	DESCRIPTION OF EFFECTS	CORRESPONDING RICHTER SCALE MAGNITUDE
VII	Very Strong	Damage is negligible in buildings of good design and construction, slight to moderate in well-built ordinary structures, and considerable in poorly built or badly designed structures; some chimneys are broken.	<6.1
VIII	Destructive	Damage is slight in specially designed structures; considerable in ordinary, substantial buildings. Moving cars become uncontrollable; masonry fractures, poorly constructed buildings damaged.	<6.9
IX	Ruinous	Some houses collapse, ground cracks, pipes break open; damage is considerable in specially designed structures; buildings are shifted off foundations.	
X	Disastrous	Some well-built wooden structures are destroyed; most masonry and frame structures are destroyed along with foundations. Ground cracks profusely; liquefaction and landslides widespread.	<7.3
XI	Very Disastrous	Most buildings and bridges collapse, roads, railways, pipes and cables destroyed.	<8.1
XII	Catastrophic	Total destruction; trees fall; lines of sight and level are distorted; ground rises and falls in waves; objects are thrown upward into the air.	>8.1

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 Adams County or near the border in an adjacent county, causing mild damage in populated areas.

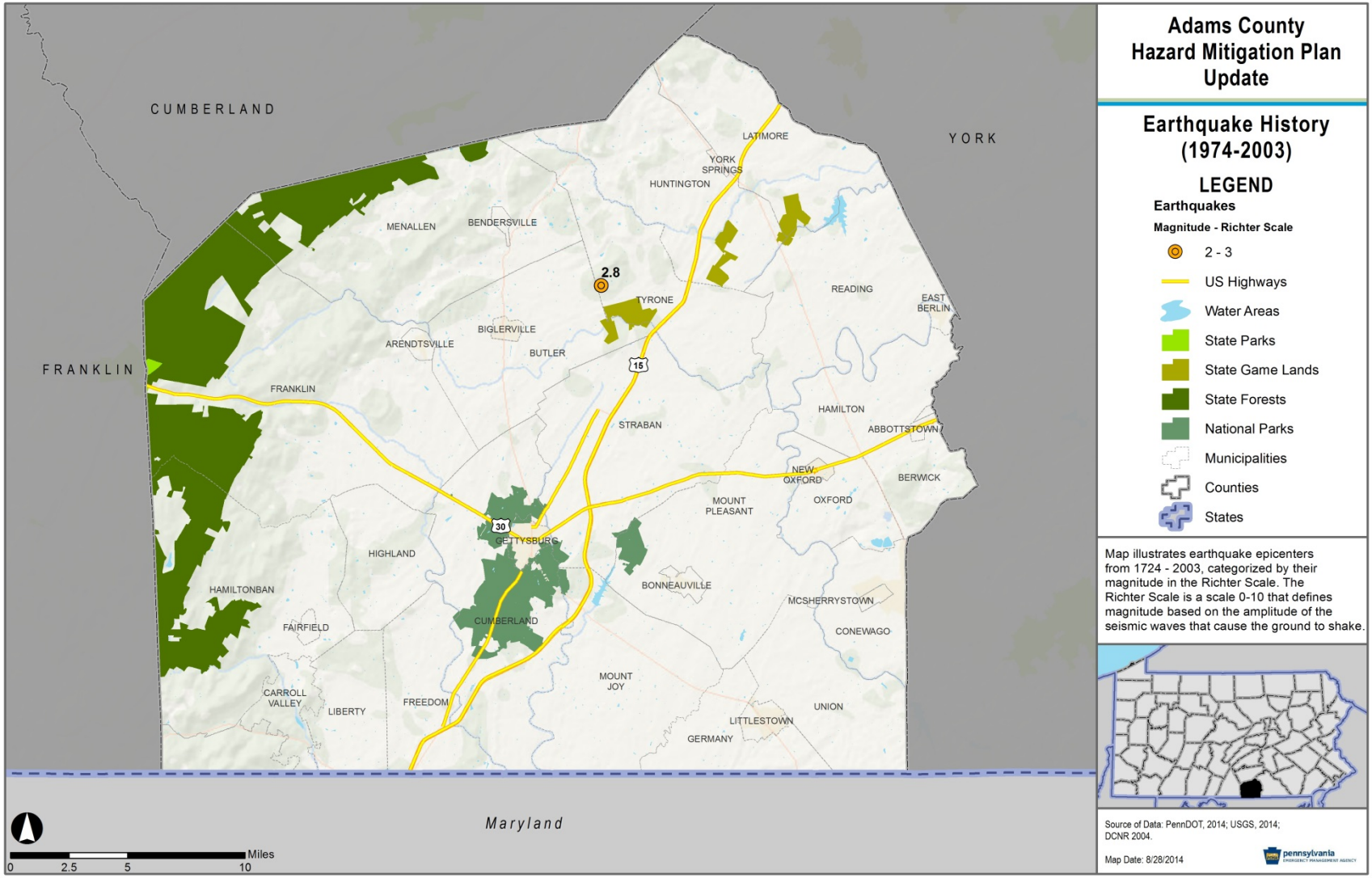
Environmental impacts of earthquakes can be numerous, widespread, and devastating, particularly if indirect impacts like economic impacts are considered. Some examples of these impacts are listed below, but these impacts are unlikely to occur in Adams County:

1. Induced tsunamis and flooding or landslides and avalanches;
2. Poor water quality;
3. Damage to vegetation; and
4. Breakage in sewage or toxic material containments.

4.3.2.3. Past Occurrence

There has been only one earthquake epicenter recorded in Adams County from 1724-2003, a minor magnitude 2.8 event with a depth of 11 km in 1994 (DCNR, 2004). More recently, a magnitude 5.8 earthquake with an epicenter in rural Louisa County, VA was felt throughout Pennsylvania, triggering evacuations, emergency bridge and tunnel inspections, and minor damage to buildings. This shallow earthquake occurring along the Spotsylvania Fault was felt as far north as Ontario, Canada and as far south as Alabama. Additionally, there is a historical cluster of earthquakes between Lancaster and Reading, approximately 65 miles from Gettysburg.

Figure 4.3.2-2 Map of earthquake epicenters in Adams County (DCNR, 2004).



DCNR's earthquake records end in 2003, but a number of minor earthquakes have occurred in Pennsylvania and have been documented by USGS's Seismic Hazard Program. Two such events occurred near Adams County in 2008 near York. Neither of these events had a magnitude of more than two, indicating that they were likely recorded but not felt (USGS, 2014).

4.3.2.4. Future Occurrence

One way to express an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. Peak ground acceleration (PGA) measures the strength of ground movements in this manner. PGA represents the rate in change of motion of the earth's surface during an earthquake as a ratio of the established rate of acceleration due to gravity. As shown in Figure 4.3.2-1, Adams County has a very low PGA ratio of 0.06. Historical records indicate that the future liklihood of an earthquake is *unlikely* as defined by the Risk Factor Methodology probability criteria (see Table 4.4.1-1).

4.3.2.5. Vulnerability Assessment

Earthquakes of the magnitude seen in Pennsylvania are small and shallow. Based on the past history of earthquake events in and near Adams County, the County's vulnerability to this hazard is expected to be low. In the event of an earthquake, unanchored objects may be upset, but few damages are expected.

4.3.3. Extreme Temperature

4.3.3.1. Location and Extent

Adams County is subject to extreme temperatures in the summer and winter seasons. Temperature extremes are a concern in Adams County because of the effect they can have on agricultural products as well as the human health issues they can cause. Demographics are a consideration for this hazard, as large populations of elderly or poor represent those most vulnerable to extreme temperatures.

Figure 4.3.3-1 and Figure 4.3.3-2 show annual mean maximum and minimum temperatures throughout Pennsylvania and highlight Adams County. These maps present the year-round average minimum temperature (40-43°F) and average maximum temperature (60-63°F). Elevation and topography account for local differences seen on the maps. However, during July, the warmest month, the average high temperature is 86 ^{o}F and the average low is 63 ^{o}F in Adams County. In January, the coldest month, the average high in Adams County is 39 ^{o}F and the average low is 21 ^{o}F (The Weather Channel, 2014).

Figure 4.3.3-1 Map showing average minimum temperature in Adams County based on temperature data collected between 1981 and 2010.

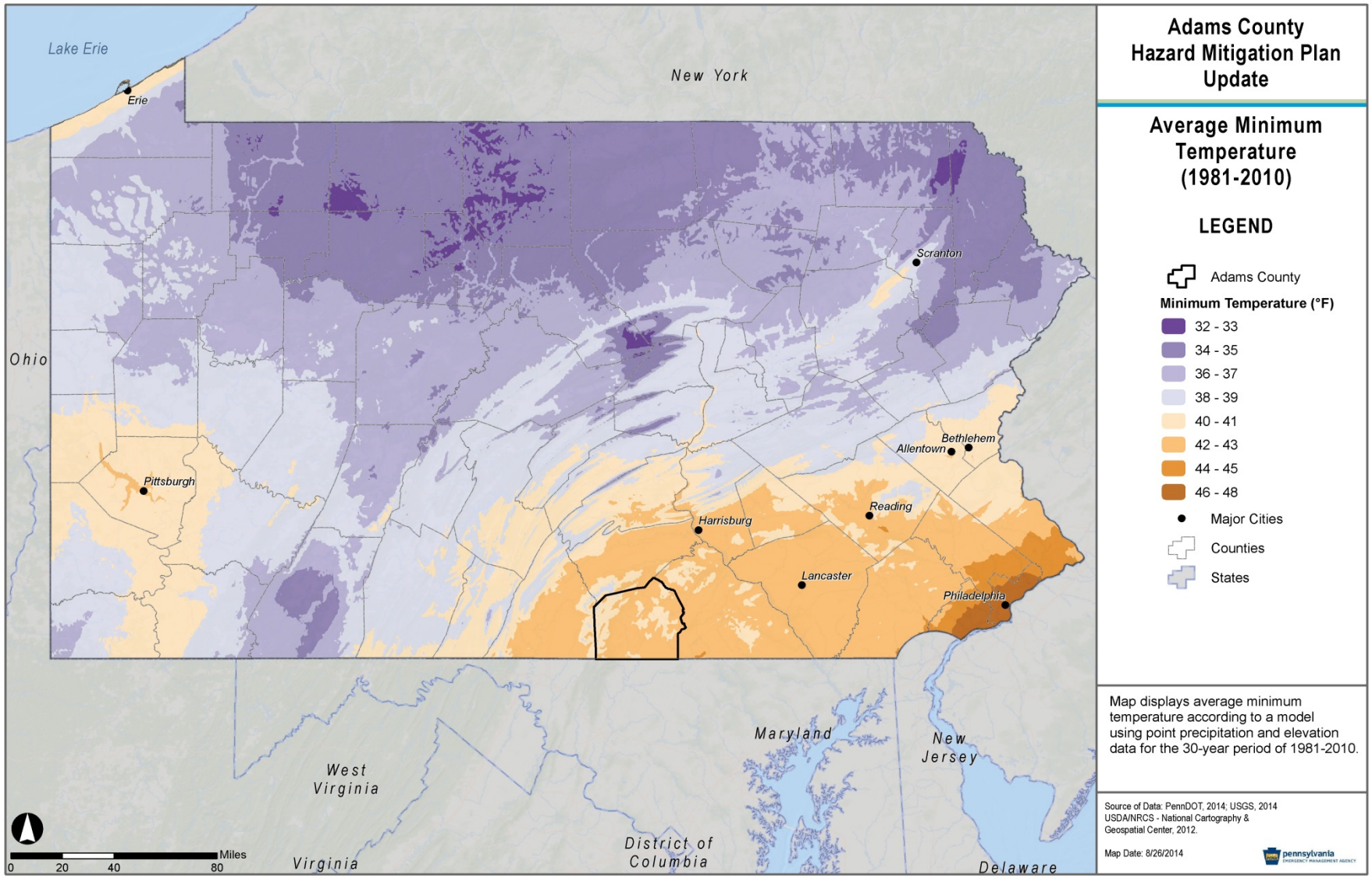
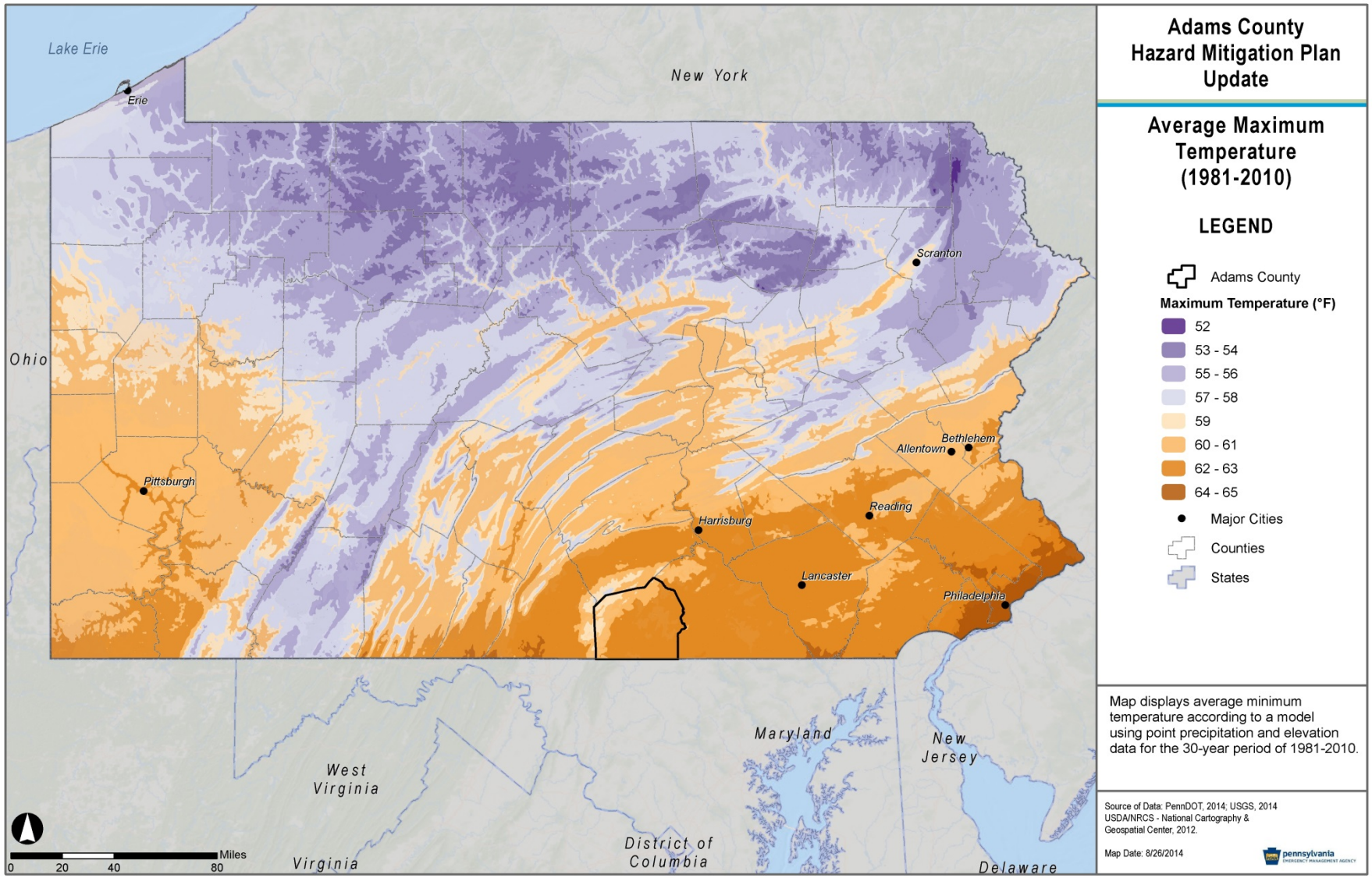


Figure 4.3.3-2 Map showing average maximum temperature Adams County based on temperature data collected between 1981 and 2010.



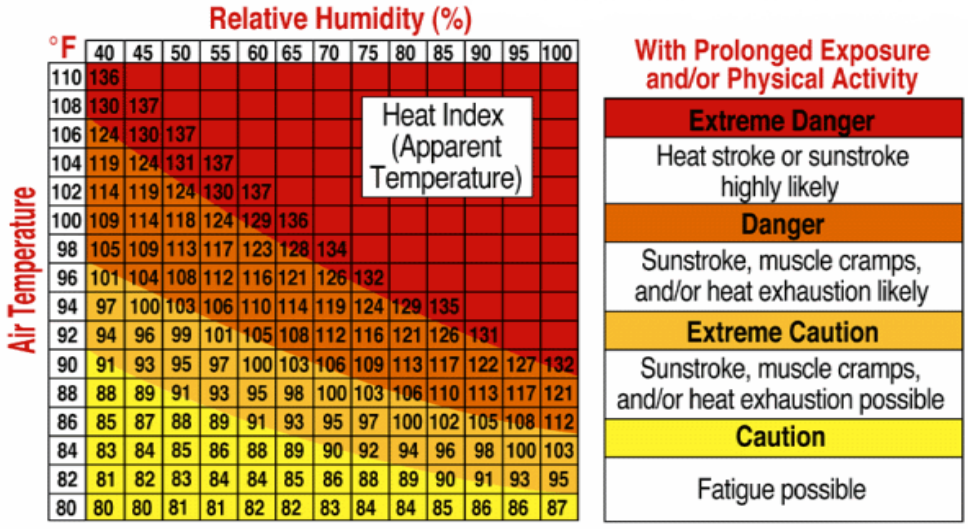
4.3.3.2. Range of Magnitude

Extreme temperatures can cause a range of impacts to communities, including:

- **Health Impacts** – The health impacts of extreme cold are greater in terms of mortality in humans, but often after more prolonged exposure versus a cold snap. Extreme heat waves, however, can prove more deadly over a shorter duration. At greatest risk of death in heat waves are the urban-dwelling elderly without access to an air-conditioned environment for at least part of the day.
- **Transportation** – Cold weather can impact automotive engines, possibly stranding motorists, and stress metal bridge structures. Highways and railroad tracks can become distorted in high heat. Disruptions to the transportation network and accidents due to extreme temperatures represent an additional risk.
- **Agriculture** – Absolute temperature and duration of extreme cold can have devastating effects on trees and winter crops. Livestock is especially vulnerable to heat, and crop yields can be impacted by heat waves that occur during key development stages.
- **Energy** – Energy consumption rises significantly during extreme cold weather. Residents are placed in extreme danger when any fuel shortages or utility failures prevent the heating of a dwelling. Extreme heat also can result in utility interruptions, and sagging transmission lines due to the heat can lead to shorting out.

In terms of human health concerns, extremely high temperatures cause heat stress which can be divided into four categories. Each category is defined by apparent temperature which is associated with a heat index value that captures the combined effects of dry air temperature and relative humidity on humans and animals. Major human risks for these temperatures include heat cramps, heat syncope, heat exhaustion, heatstroke, and death. Note that while the temperatures in Figure 4.3.3-3 serves as a guide for various danger categories, the impacts of high temperatures will vary from person to person based on individual age, health, and other factors. The very old and the very young are most vulnerable to health-related impacts of extreme temperatures.

Figure 4.3.3-3 Four categories of heat stress (NOAA NWS, 2014).



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

Temperature advisories, watches and warnings are issued by the National Weather Service relating the above impacts to the range of temperatures typically experienced in Pennsylvania. Exact thresholds vary across the Commonwealth, but in general *Heat Advisories* are issued when the heat index will be equal to or greater than 100°F, but less than 105°F, *Excessive Heat Warning*s are issued when heat indices will attain or exceed 105°F, and *Excessive Heat Watches*, are issued when there is a possibility that excessive heat warning criteria may be experienced within twelve to forty-eight hours (NOAA NWS, 2014). The record high temperature in Gettysburg, PA was 104°F in 1988.

Cold temperatures can be extremely dangerous to humans and animals exposed to the elements. Without heat and shelter, cold temperatures can cause hypothermia, frost bite, and death. Wind chill temperatures are often used in place of raw temperature values due to the effect of wind can have in drawing heat from the body under cold temperatures. These values represent what temperatures actually feel like to humans and animals under cold, windy conditions. Similarly to high temperatures, the effect of cold temperatures will vary by individual. The record low temperature in Gettysburg, PA was -25°F in 1994.

A potential worst-case extreme temperature scenario would be a prolonged heat wave in Adams County during the height of the fruit harvest (July through September). In addition to the significant economic losses faced from ruined agricultural products, there would likely be human health implications. In addition, that time of year is high tourist season at the Gettysburg National Memorial Park, meaning that there would be an elevated number of people exposed to high temperatures for prolonged periods of time.

4.3.3.3. Past Occurrence

Data from the National Climatic Data Center reports that there have been five heat and excessive heat events and two extreme cold/wind chill in Adams County from 1996-2014. There were no deaths, injuries, property damage, or crop damage reported as a part of these events. However, NCDC records indicate that the 2011 heat wave was particularly dangerous, with overnight readings of 80°F in some areas. This event put significant stress on the electric power systems in Pennsylvania and contributed to poorer-than-usual air quality conditions in the Lower Susquehanna Valley.

Table 4.3.3-1 Extreme Temperature Events reported to NCDC.

EVENT DATE	EVENT TYPE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
4/9/1997	Cold/Wind Chill	0	0	$0.00	$0.00
7/5/1999	Heat	0	0	$0.00	$0.00
7/17/2006	Heat	0	0	$0.00	$0.00
7/18/2006	Heat	0	0	$0.00	$0.00
7/31/2006	Heat	0	0	$0.00	$0.00
8/1/2006	Heat	0	0	$0.00	$0.00
2/5/2007	Extreme Cold/Wind Chill	0	0	$0.00	$0.00

Table 4.3.3-1 Extreme Temperature Events reported to NCDC.					
EVENT DATE	EVENT TYPE	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE
2/5/2007	Extreme Cold/Wind Chill	0	0	$0.00	$0.00
7/21/2011	Excessive Heat	0	0	$0.00	$0.00

4.3.3.4. Future Occurrence

The future occurrence of extreme temperature can be considered *possible* as defined by the Risk Factor methodology probability criteria (see Table 4.4.1-1). The likelihood of a future occurrence is small on an annual basis, but could provide economically dangerous.

It is important to note that frequency estimates may not be an accurate representation of future conditions due to the unknown impacts of climate change. Significant, broad evidence supports human influence to a long-term trend of global warming. It has been difficult to predict how much, how fast, or how long the warming will occur, due to the large number of variables involved. According to the Pennsylvania Climate Impacts Assessment Report (2009), annual and seasonal average temperatures are expected to increase; with one scenario predicting almost a 7 °F increase in annual average temperature by the end of the 21st century. Some areas of the world may experience greater temperature changes than others. Predictions for smaller areas and shorter time periods become more uncertain.

4.3.3.5. Vulnerability Assessment

The potential for extreme temperature events will continue to exist in Adams County in the summer and winter months. All agricultural production is at risk during an extreme temperature event, and with the market value of agricultural production topping $201 million, the economic livelihood of the county is in danger during these events. The Pennsylvania Crop Insurance Education and Participation Program estimated that from 1981-2009, 13% of all crop losses were due to extreme temperature events (2010). The duration of the event also plays a role in the vulnerability; short-term events may be easier to mitigate than longer-term, protracted events, especially heat waves that coincide with droughts.

In terms of human and social vulnerabilities, weather forecasters can normally predict the temperature with excellent accuracy and they, along with local emergency management personnel and social services agencies, are instrumental in reducing extreme temperature vulnerabilities through public education and attention to the issue. Adhering to extreme temperature warnings can significantly reduce the risk of temperature-related deaths. Those hardest hit by both heat and cold waves are adults 75 years of age or older, many of whom are already physically vulnerable. Excessive heat exposure also affects people with certain pre-existing medical conditions, including cardiovascular disease, respiratory illnesses, and obesity.

4.3.4. Flood, Flash Flood, Ice Jam

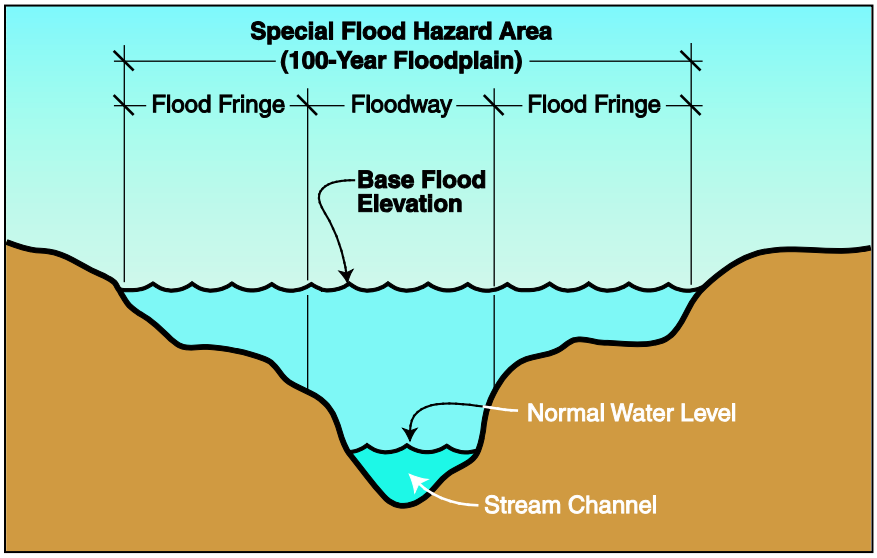
4.3.4.1. Location and Extent

A flood is a natural event for rivers and streams. For inland areas like south-central Pennsylvania, excess water from snowmelt or rainfall accumulates and overflows onto the

stream banks and adjacent floodplains. Floodplains are lowlands adjacent to rivers, streams and creeks that are subject to recurring floods. The size of the floodplain is described by the recurrence interval of a given flood. Flood recurrence intervals are explained in more detail in Section 4.3.4.4. However, in assessing the potential spatial extent of flooding it is important to know that a floodplain associated with a flood that has a 10 percent chance of occurring in a given year is smaller than the floodplain associated with a flood that has a 0.2% annual chance of occurring.

The National Flood Insurance Program (NFIP), for which FIRMs are published, identifies the 1% annual chance flood. This 1% annual chance flood event is used to delineate the special flood hazard area (SFHA) and identify Base Flood Elevations. Figure 4.3.4-1 illustrates these terms. The SFHA serves as the primary regulatory boundary used by FEMA, the Commonwealth of Pennsylvania and Adams County local governments.

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



The Effective Countywide DFIRMs were released for Adams County and all communities on February 18, 2009. All communities within the County are now shown on a single set of countywide FIRMs. Prior to the publication of this digital data, flood hazard information from FEMA was available through paper FIRMs and Q3 data. These final FIRMs for Adams County can be obtained from the FEMA Map Service Center (http://www.msc.fema.gov). These maps can be used to identify the expected spatial extent and elevation of flooding from a 1% and 0.2% annual chance event. All of the municipalities in the County except New Oxford Borough have identified SFHAs. Since it has no delineated floodplains, New Oxford Borough does not participate in the NFIP. Portions of Adams County in the Potomac River Watershed are currently being restudied through the Risk Mapping, Assessment, and Planning (MAP) effort at FEMA.

Adams County is located in the Chesapeake Bay Watershed and has two major tributaries. The northeastern half of the County drains into the Susquehanna River, and the southwestern half drains into the Potomac River. The drainage divide extends from the western tip of Menallen Township generally south and then east across Franklin and southern Butler Township, passing just south of Arendtsville. In Straban Township, the divide turns toward the southeast, crossing Mount Pleasant Township east of Bonneauville and Union Township east of Littlestown.

Conewago Creek, the largest stream in Adams County, drains nearly all of the land area within the Susquehanna River watershed. Two major tributaries are the South Branch of Conewago Creek and Bermudian Creek. Tributaries on the Monocacy River in Maryland drain most of the area within the Potomac River watershed, including Toms Creek, Middle Creek, Marsh Creek, Rock Creek, and several smaller streams.

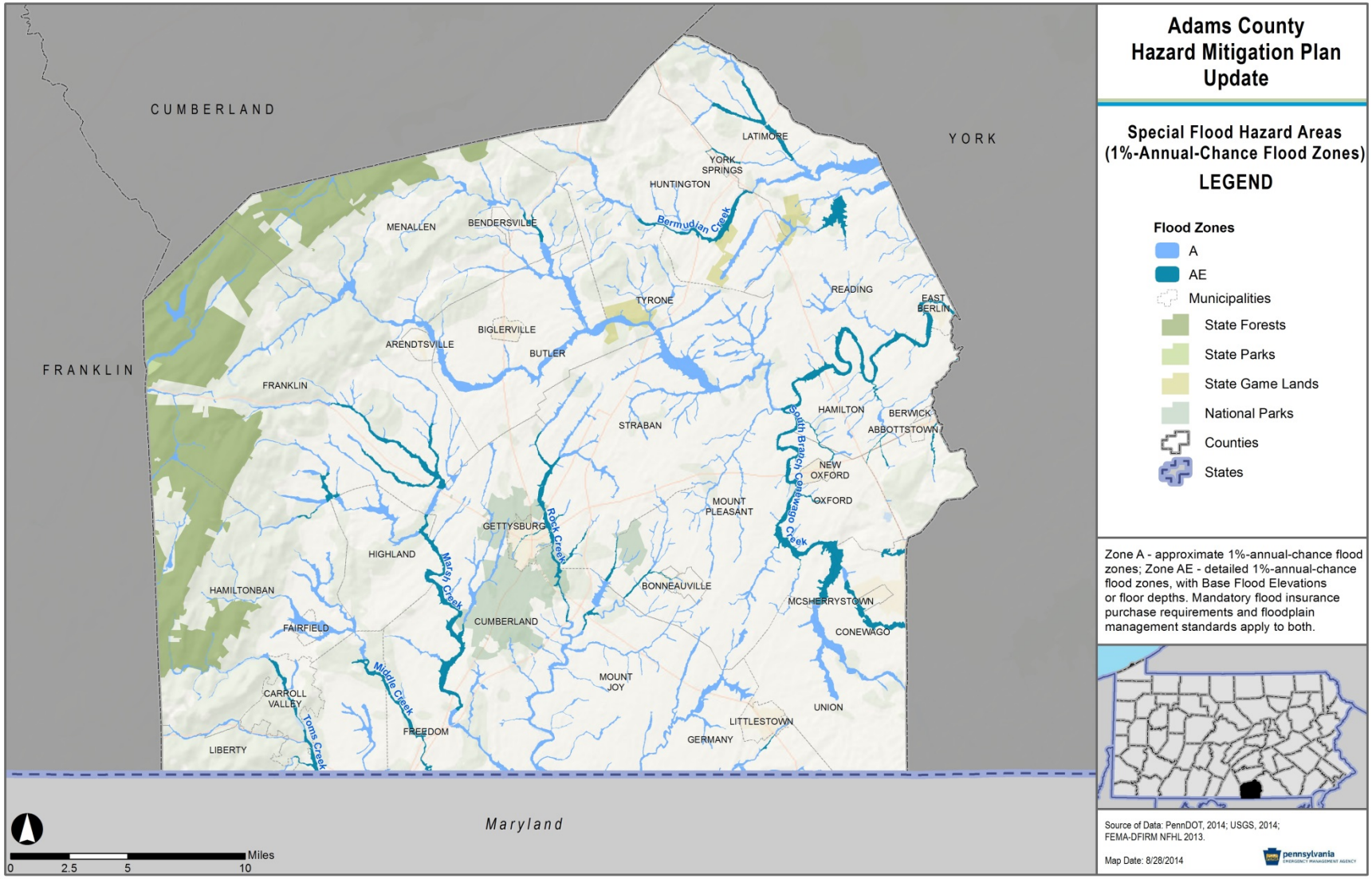
The most severe flooding in Central Pennsylvania has been associated with the Susquehanna River Basin, which is the largest on the Atlantic Seaboard of the United States and drains directly into the Chesapeake Bay. In addition, the tributaries of the Susquehanna River located within Adams County – Conewago Creek and Bermudian Creek – are major sources of flooding within Adams County.

Figure 4.3.4-2 shows the SFHAs and watercourses of Adams County. Detailed SFHAs are delineated for all or a portion of the following streams:

- Bermudian Creek
- South Branch Conewago Creek
- Rock Creek
- Marsh Creek
- Middle Creek
- Toms Creek

Other streams and tributaries have approximate SFHAs (A Zones).

Figure 4.3.4-2 Map showing Special Flood Hazard Areas in Adams County.



4.3.4.2. Range of Magnitude

Floods are considered hazards when people and property are affected. Nationwide, hundreds of floods occur each year, making them one of the most common hazards in all 50 states and U.S. territories. In Pennsylvania, flooding occurs commonly and can happen during any season of the year from a variety of sources. Every two to three years, serious flooding occurs along one or more of Pennsylvania's major rivers or streams, and it is not unusual for this to occur several years in succession. Injuries and deaths can occur when people are swept away by flood currents or bacteria and disease are spread by moving or stagnant floodwaters. 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 Central Pennsylvania, including Adams 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. Ice jams are not uncommon on the main branch of the Susquehanna, but there is no record of an ice jam occurring on one of Adams County’s streams.

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. In addition, the County occasionally experiences intense rainfall from tropical storms in late summer and early fall.

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.

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.

The three worst flooding events experienced in Adams County were Tropical Storm Agnes in 1972, Tropical Storm Eloise in 1975, and Tropical Storm Lee/Irene in 2011. Agnes and Eloise in particular are cited in Adams County's FIS as being the worst floods for many communities in Adams County. Agnes was an early season hurricane that came up from the Gulf of Mexico and brought heavy rain that exceeded the carrying capacity of streams and rivers from southern New York to Virginia from June 22nd to 25th (Gelber, 2002). Hurricane Agnes caused the most damage in central Pennsylvania. The Susquehanna River and its major tributaries flooded across the region. The flooding resulted in evacuations, economic losses, and casualties in many communities and major cities, including Harrisburg, Wilkes-Barre, and York. The flooding from Hurricane Agnes caused $2.8 billion in economic losses and 48 deaths in Pennsylvania. In the case of Eloise, the tropical storm interacted with another weather system, stalling over central Pennsylvania and leading to between seven and ten inches of rain over the seven-day period from September 20-27, 1975. Much like Tropical Storm Eloise, Tropical Storm Lee/Irene stalled over Pennsylvania for a prolonged period, leading to widespread flooding in central Pennsylvania. For more details on Tropical Storm Lee/Irene, please see Section 4.3.6.2.

4.3.4.3. Past Occurrence

There have been 51 floods and flash floods reported in Adams County from 1972-2014. Flash flooding is a common occurrence in the County, with just over half of the reported events being flash floods. Ten of the Presidential Disaster and Emergency Declarations affecting Adams County have been in response to hazard events related to flooding, including flooding induced by named coastal storms (see Section 4.2.1: Table of Presidential Disaster Declarations). Table 4.3.4-1 lists limited flood occurrences prior to 1995, and the complete record of flood events from 1995 to 2010 obtained from the National Climatic Data Center. Estimated property damage was not available for many flooding events; this does not mean that there was no damage, simply that none was reported to the NCDC.

Table 4.3.4-1 Flood and flash flood events reported to the NCDC up to May 2014. Entries marked "NR" indicate "Not Reported" for property damage.

DATE	TYPE	DEATH	INJURY	REPORTED PROPERTY DAMAGE ($)
6/1/1972	Flood (Hurricane)	UNK	UNK	UNK
7/1/1973	Flood (Hurricane)	UNK	UNK	UNK
9/1/1975	Flood (Hurricane)	UNK	UNK	UNK
10/1/1976	Flood	UNK	UNK	UNK
6/1/1995	Flash Flood	NR	NR	NR
7/1/1995	Flash Flood	NR	NR	NR
1/19/1996	Flood	0	0	NR
1/19/1996	Flash Flood	0	0	NR
6/18/1996	Flood (Hurricane)	0	0	10,000
6/20/1996	Flood	0	0	10,000
9/6/1996	Flash Floods	0	0	NR
12/13/1996	Flash Flood	0	0	NR
9/11/1997	Flash Flood	0	0	NR
11/7/1997	Flash Flood	0	0	NR
1/8/1998	Flash Flood	0	0	NR
3/21/1998	Flash Flood	0	0	NR
9/16/1999	Flash Flood	0	0	20,000
9/1/2000	Flash Flood	0	0	20,000
5/16/2003	Flood	0	0	NR
6/21/2003	Flash Flood	0	0	NR
9/23/2003	Flood	0	0	NR
12/11/2003	Flood	0	0	NR
2/6/2004	Flash Flood	0	0	NR
6/14/2004	Flood	0	0	NR
9/17/2004	Flood	0	0	NR
9/28/2004	Flood	0	0	NR
3/28/2005	Flood	0	0	NR
4/2/2005	Flash Flood	0	0	NR
7/7/2005	Flash Flood	0	0	NR
8/7/2005	Flood	0	0	NR
6/25/2006	Flash Flood	1	0	NR

Table 4.3.4-1 Flood and flash flood events reported to the NCDC up to May 2014. Entries marked "NR" indicate "Not Reported" for property damage.

DATE	TYPE	DEATH	INJURY	REPORTED PROPERTY DAMAGE ($)
6/27/2006	Flash Flood	0	0	NR
6/28/2006	Flash Flood	0	0	NR
4/15/2007	Flood	0	0	NR
3/5/2008	Flood	0	0	NR
1/25/2010	Flood	0	0	10,000
8/12/2010	Flash Flood	0	0	10,000
3/10/2011	Flood	0	0	NR
4/16/2011	Flash Flood	0	0	NR
4/28/2011	Flash Flood	0	0	NR
9/11/2011	Flash Flood	0	0	64,000
9/23/2011	Flash Flood	0	0	NR
9/23/2011	Flood	0	0	NR
9/27/2011	Flash Flood	0	0	NR
9/18/2012	Flash Flood	0	0	NR
10/29/2012	Flood	0	0	NR
1/31/2013	Flood	0	0	NR
10/10/2013	Flood	0	0	NR
3/30/2014	Flood	0	0	NR
4/30/2014	Flood	0	0	NR
5/16/2014	Flood	0	0	NR

The following photos, provided by a member of the HMPSC, illustrate flooding in the Narrows above Ahrendtsville. As is evidenced in the photos, log jamming at bridges and narrow points is an ongoing flood concern in Adams County.

Figure 4.3.4-3 Flood debris and impacts near the Narrrows, flood of September 1996 (Photo courtesy of Bicky Redman).

Figure 4.3.4-4 Log jamming in the Narrows, August 2014 (Photo courtesy of Bicky Redman).

The following definition of RL and SRL properties from the Hazard Mitigation Assistance (HMA) Unified Guidance from July 2013 reflects changes made in the Biggert-Waters Flood Insurance Reform Act of 2012. A **Repetitive Loss** property is a structure covered by a contract for flood insurance made available under the NFIP that:

(a) 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

(b) At the time of the second incidence of flood-related damage, the contract for flood insurance contains increased cost of compliance coverage. (Please note: Homes are eligible for ICC coverage after first loss, however cost for ICC is part of all policies.)

A **Severe Repetitive Loss** property is a structure that:

(a) Is covered under a contract for flood insurance made available under the NFIP; and

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

According to the 2013 Pennsylvania State Hazard Mitigation Plan, there were 33 repetitive loss properties in Adams County, two of which have been mitigated (PEMA, 2013). Both mitigated properties were single-family homes, one each in East Berlin Borough and Reading Township. Reading Township has about two-thirds of these repetitive loss properties, with 18 properties. The other repetitive loss properties in Adams County are in Butler Township, Carroll Valley Borough, Cumberland Township, East Berlin Borough, Franklin Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Oxford Township, and Reading Township. Table 4.3.4-2 shows the number of repetitive loss properties by municipality.

Table 4.3.4-2 Summary of the number and type of Repetitive Loss properties by municipality (PEMA, 2013). Please note that only communities with Repetitive Loss properties are shown.

MUNICIPALITY	TYPE				SUM OF REPETITIVE LOSS PROPERTIES
	NON-RESIDENTIAL	CONDO	2-4 FAMILY	SINGLE FAMILY	
Butler Township	0	0	0	1	1
Carroll Valley Borough	0	0	0	1	1
Cumberland Township	0	0	0	1	2
East Berlin Borough	0	0	0	2	2
Franklin Township	0	0	0	1	1
Gettysburg Borough	0	1	1	1	3

Table 4.3.4-2 Summary of the number and type of Repetitive Loss properties by municipality (PEMA, 2013). Please note that only communities with Repetitive Loss properties are shown.

MUNICIPALITY	TYPE				SUM OF REPETITIVE LOSS PROPERTIES
	NON-RESIDENTIAL	CONDO	2-4 FAMILY	SINGLE FAMILY	
Hamilton Township	0	0	0	3	3
Highland Township	1	0	0	0	1
Oxford Township	0	0	1	0	1
Reading Township	0	0	0	18	18
TOTAL	**1**	**1**	**2**	**28**	**33**

There are also five severe repetitive loss properties in Adams County – four in Reading Township and one in Butler Township. These properties are all single-family residences, and none of them have been mitigated as of 2013.

Floods are the most common and costly natural catastrophe in the United States. 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 flood losses is to purchase flood insurance through the NFIP.

Congress established the NFIP in 1968 to help control the growing cost of federal disaster relief. The NFIP is administered by the 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.

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 (SFIP) under their own names.

Today, nearly 90 WYO insurance companies issue and service the SFIP under their own names. More than 4.4 million federal flood insurance policies are in force. These policies represent $650 billion in flood insurance coverage for homeowners, renters, and business owners throughout the United States and its territories.

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 of the municipalities in Adams County are participating 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 so as to minimize or eliminate flood damage; and
- Anchor foundation or structure to resist floatation, collapse, or lateral movement.

In addition, Regular Program communities are eligible to participate in the NFIP's CRS Program. Under the CRS, policyholders can receive premium discounts of 5 to 45 percent as their cities and towns adopt more comprehensive flood mitigation measures. Currently, no municipalities in Adams County participate in CRS, but this has been identified as a potential mitigation strategy by the Planning Team.

Table 4.3.4-3 lists the Adams County municipalities participating in the NFIP, their initial FIRM identification date, and their current effective map dates. Data on policies-in-force, claims, and substantial damage claims can be found in Section 5.2.1.3.

Table 4.3.4-3 Adams County Municipal Participation in the National Flood Insurance Program (FEMA CIS, 2014).

COMMUNITY	PARTICIPATION STATUS	TOTAL PREMIUM AND COVERAGE	INITIAL FIRM IDENTIFIED	CURRENT EFFECTIVE MAP DATE
Abbottstown Borough	Participating	$1,198,800.00	9/2/1981	2/18/2009
Arendtsville Borough	Participating	$165,000.00	8/19/1985	2/18/2009
Bendersville Borough	Participating	550000	4/20/1979	2/18/2009
Berwick Township	Participating	$1,098,700.00	11/4/1981	2/18/2009
Biglerville Borough	Participating	$50,000.00	9/28/1978	2/18/2009

Table 4.3.4-3 Adams County Municipal Participation in the National Flood Insurance Program (FEMA CIS, 2014).

COMMUNITY	PARTICIPATION STATUS	TOTAL PREMIUM AND COVERAGE	INITIAL FIRM IDENTIFIED	CURRENT EFFECTIVE MAP DATE
Bonneauville Borough	Participating	$3,058,000.00	8/3/1981	2/18/2009
Butler Township	Participating	$1,900,600.00	08/19/1685	2/18/2009
Carroll Valley Borough	Participating	$1,881,400.00	9/2/1988	2/18/2009
Conewago Township	Participating	$4,960,900.00	3/4/1988	2/18/2009
Cumberland Township	Participating	$14,156,600.00	9/30/1981	2/18/2009
East Berlin Borough	Participating	$5,224,600.00	7/16/1981	2/18/2009
Fairfield Borough	Participating	$292,800.00	1/5/1979	2/18/2009
Franklin Township	Participating	$9,082,200.00	8/15/1983	2/18/2009
Freedom Township	Participating	$240,200.00	3/16/1988	2/18/2009
Germany Township	Participating	$1,771,200.00	7/4/1988	2/18/2009
Gettysburg Borough	Participating	$11,875,900.00	8/15/1983	2/18/2009
Hamilton Township	Participating	$5,031,100.00	8/3/1981	2/18/2009
Hamiltonban Township	Participating	$2,734,200.00	7/4/1988	2/18/2009
Highland Township	Participating	$1,196,500.00	7/4/1988	2/18/2009
Huntington Township	Participating	$1,845,000.00	7/15/1988	2/18/2009
Latimore Township	Participating	$2,353,800.00	6/1/1979	2/18/2009
Liberty Township	Participating	$1,431,100.00	7/4/1988	2/18/2009
Littlestown Borough	Participating	$560,000.00	6/25/1976	2/18/2009
McSherrystown Borough	Participating	$5,181,900.00	3/4/1988	2/18/2009
Menallen Township	Participating	$3,080,200.00	7/4/1988	2/18/2009
Mt Joy Township	Participating	$5,955,000.00	7/4/1988	2/18/2009
Mt Pleasant Township	Participating	$1,933,600.00	12/1/1981	2/18/2009
New Oxford Borough	Not Participating (No SFHAs)	$0.00	NA	2/18/2009
Oxford Township	Participating	$4,134,000.00	12/1/1981	2/18/2009
Reading Township	Participating	$14,488,300.00	6/15/1981	2/18/2009
Straban Township	Participating	$2,591,500.00	7/16/1981	2/18/2009
Tyrone Township	Participating	$505,000.00	6/1/1989	2/18/2009
Union Township	Participating	$0.00	12/4/1985	2/18/2009
York Springs Borough	Participating	$576,200.00	6/1/1979	2/18/2009

4.3.4.4. Future Occurrence

In Adams County, flooding occurs commonly and can occur during any season of the year. Within the flood susceptible areas of Adams 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 county streams. The future occurrence of floods in Adams County can be characterized as highly likely as defined by the Risk Factor Methodology probability criteria (see Table 4.4-1).

Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and the related probability of occurrence. The NFIP uses historical records to determine the probability of occurrence for different extents of flooding. The probability of occurrence is expressed in percentages as the chance of a flood of a specific extent occurring in any given year. A specific flood that is used for a number of purposes is called the -base flood, which has a one percent chance of occurring in any particular year. The base flood is often referred to as the “100-year flood” since its probability of occurrence suggests it should reoccur once every 100 years, although this is not the case in practice. Experiencing a 100-year flood does not mean a similar flood cannot happen for the next 99 years; rather it reflects the probability that over a long period of time, a flood of that magnitude has a one percent chance of occurring in any given year. It is therefore referred to in this document as the 1%-chance flood Table 4.3.4-4 shows a range of flood recurrence intervals and associated probabilities of occurrence.

Table 4.3.4-4 Recurrence intervals and associated probabilities of occurrence (FEMA, 2007).

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

The NFIP recognizes the 1%-annual-chance flood as the *base flood*, the standard for identifying properties subject to federal flood insurance purchase requirements. A 1%-annual-chance flood is a flood which has a 1% chance of occurring over a given year. DFIRMs and FIRMs published by FEMA can be used to identify areas subject to the 1%- and 0.2%-annual-chance flooding. Areas subject to 2%- and 10%-annual-chance events are not shown on maps; however, water surface elevations associated with these events are included in the flood source profiles contained in associated Flood Insurance Study Reports. The most recent Flood Insurance Study for each county in Pennsylvania is available from the FEMA Map Service Center (http://www.msc.fema.gov)

4.3.4.5. Vulnerability Assessment

Adams County is vulnerable to flooding that causes loss of lives, property damage, and road closures. All of the municipalities in Adams County are flood prone, except New Oxford

Borough. For purposes of assessing vulnerability, the county focused on populations, structures, and critical facilities that are located in the 1%-annual-chance floodplain. While greater and smaller floods are possible, information about the extent and depths for this floodplain is available for all municipalities countywide, thus providing a consistent basis for analysis. Flood vulnerability maps for each applicable local municipality, showing the 1%-annual-chance flood hazard area and addressable structures, critical facilities and transportation routes within it, are included in Appendix D. These maps were created using Adams County's Effective DFIRM data.

An important component of the vulnerability of Adams County Communities is its participation in the NFIP. Table 4.3.4-5 includes the number of NFIP policies, claims, and substantial damage claims per municipality. Reading Township has the highest number of policies as well as the most claims and substantial damage claims. Union Township has no effective policies and has subsequently had no claims or substantial damage claims.

Table 4.3.4-5 NFIP Policies and Claims according to CIS.

MUNICIPALITY	# POLICIES	# CLAIMS	# SUBSTANTIAL DAMAGE CLAIMS
Abbottstown Borough	8	5	0
Arendtsville Borough	2	1	0
Bendersville Borough	2	0	0
Berwick Township	6	3	1
Biglerville Borough	1	2	1
Bonneauville Borough	11	2	0
Butler Township	11	5	1
Carroll Valley Borough	14	4	1
Conewago Township	20	3	0
Cumberland Township	48	19	0
East Berlin Borough	30	26	1
Fairfield Borough	10	3	0
Franklin Township	39	14	0
Freedom Township	3	3	1
Germany Township	6	0	0
Gettysburg Borough	83	33	1
Hamilton Township	35	19	1
Hamiltonban Township	21	0	0
Highland Township	4	1	0
Huntington Township	7	3	0
Latimore Township	12	0	0

Table 4.3.4-5 NFIP Policies and Claims according to CIS.

MUNICIPALITY	# POLICIES	# CLAIMS	# SUBSTANTIAL DAMAGE CLAIMS
Liberty Township	6	6	0
Littlestown Borough	2	0	0
McSherrystown Borough	19	0	0
Menallen Township	15	5	3
Mount Joy Township	20	2	0
Mount Pleasant Township	8	5	0
Oxford Township	18	13	0
Reading Township	109	142	15
Straban Township	11	2	1
Tyrone Township	4	0	0
Union Township	0	0	0
York Springs Borough	4	1	0

Flood events are also a major cause for road closures in the County and its municipalities. Affected areas of roadway may vary from a few feet for only a few hours (as in the case of flash flooding) to several hundred feet for a few days (as in the case of riverine flooding). Road closures limit accessibility to certain areas of the County, which in turn delays the provision of emergency services to the residents in those areas. In addition, despite posted signs warning drivers to stay out of floodwaters, inevitably there are individuals who must be rescued from their cars that become stranded in floodwaters.

Other concerns during a flood include the safety of mobile homes and trailers, as they are typically lightweight and unanchored, and of hazardous material facilities. For more information on the number of trailers in each Adams County municipality, please see Section 4.3.10.5. There are three EPA TRI hazardous materials facilities in the SFHA:

- Fairfield Shoe Co., Carroll Valley Borough
- Dal-Tile Corp. Bendersville Plant, Bendersville Borough
- Motts LLP, Menallen Township

Table 4.3.4-6 displays the number of structures, critical facilities, and populations intersecting the SFHA. The number of vulnerable structures was calculated by overlaying the structures with the SFHA. Similarly, the estimated population in the SFHA was calculated by overlaying the centroids of the 2010 Census blocks with the SFHA; while clearly an estimate, using the block centroid helps to minimize overestimation of floodprone populations. Table 4.3.4-7 shows the number of structures in the SFHA by generalized land use type. Unsurprisingly, most vulnerable structures are residential properties.

Table 4.3.4-6 Community Flood Vulnerability for Adams County.

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN SFHA	PERCENT OF STRUCTURES IN SFHA	TOTAL CRITICAL FACILITIES IN MUNICIPALITY	TOTAL CRITICAL FACILITIES IN SFHA	PERCENT CRITICAL FACILITIES IN SFHA	TOTAL 2010 POPULATION	2010 POPULATION IN SFHA	PERCENT POPULATION IN SFHA
Abbottstown Borough	378	3	0.8%	5	0	0.0%	1,011	13	1.3%
Arendtsville Borough	342	0	0.0%	6	0	0.0%	952	0	0.0%
Bendersville Borough	243	1	0.4%	9	1	11.1%	641	0	0.0%
Berwick Township	1,032	6	0.6%	5	0	0.0%	2,389	0	0.0%
Biglerville Borough	444	0	0.0%	13	0	0.0%	1,200	0	0.0%
Bonneauville Borough	659	5	0.8%	5	0	0.0%	1,800	66	3.7%
Butler Township	1,141	32	2.8%	12	1	8.3%	2,567	131	5.1%
Carroll Valley Borough	1,535	16	1.0%	8	2	25.0%	3,876	63	1.6%
Conewago Township	3,067	32	1.0%	20	1	5.0%	7,085	116	1.6%
Cumberland Township	3,208	52	1.6%	27	0	0.0%	6,162	197	3.2%
East Berlin Borough	634	25	3.9%	12	0	0.0%	1,521	24	1.6%
Fairfield Borough	287	30	10.5%	8	0	0.0%	507	56	11.0%
Franklin Township	2,394	60	2.5%	31	2	6.5%	4,877	67	1.4%
Freedom Township	399	4	1.0%	2	0	0.0%	831	101	12.2%
Germany Township	1,102	17	1.5%	9	0	0.0%	2,700	83	3.1%
Gettysburg Borough	2,129	22	1.0%	30	0	0.0%	7,620	27	0.4%
Hamilton Township	1,117	57	5.1%	6	0	0.0%	2,530	37	1.5%
Hamiltonban Township	1,059	44	4.2%	21	1	4.8%	2,372	54	2.3%
Highland Township	450	7	1.6%	5	0	0.0%	943	42	4.5%
Huntington Township	977	7	0.7%	18	0	0.0%	2,369	156	6.6%
Latimore Township	1,117	31	2.8%	13	2	15.4%	2,580	54	2.1%
Liberty Township	627	8	1.3%	5	0	0.0%	1,237	11	0.9%
Littlestown Borough	1,869	0	0.0%	25	0	0.0%	4,434	0	0.0%
McSherrystown Borough	1,050	52	5.0%	14	1	7.1%	3,038	134	4.4%
Menallen Township	1,603	37	2.3%	16	1	6.3%	3,515	65	1.8%

Table 4.3.4-6 Community Flood Vulnerability for Adams County.

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN SFHA	PERCENT OF STRUCTURES IN SFHA	TOTAL CRITICAL FACILITIES IN MUNICIPALITY	TOTAL CRITICAL FACILITIES IN SFHA	PERCENT CRITICAL FACILITIES IN SFHA	TOTAL 2010 POPULATION	2010 POPULATION IN SFHA	PERCENT POPULATION IN SFHA
Mt Joy Township	1,683	9	0.5%	9	0	0.0%	3,670	51	1.4%
Mt Pleasant Township	1,968	13	0.7%	6	0	0.0%	4,693	79	1.7%
New Oxford Borough	677	0	0.0%	19	0	0.0%	1,783	0	0.0%
Oxford Township	2,257	39	1.7%	19	0	0.0%	5,517	24	0.4%
Reading Township	2,416	173	7.2%	13	0	0.0%	5,780	286	4.9%
Straban Township	1,998	10	0.5%	27	0	0.0%	4,928	34	0.7%
Tyrone Township	911	6	0.7%	8	0	0.0%	2,298	108	4.7%
Union Township	1,226	1	0.1%	8	0	0.0%	3,148	0	0.0%
York Springs Borough	207	15	7.2%	5	0	0.0%	833	45	5.4%
TOTAL	**42,206**	**814**	**1.9%**	**439**	**12**	**2.7%**	**101,407**	**2,124**	**2.1%**

Table 4.3.4-7 Structures in SFHAs by Generalized Land Use Type.

MUNICIPALITY	TOTAL STRUCTURES	CIVIC/ INSTITUTIONAL	COMMERCIAL	INDUSTRIAL	RESIDENTIAL	TRANSPORTATION/ UTILITIES	UNKNOWN	GRAND TOTAL
Abbottstown Borough	378	0	0	0	3	0	0	3
Arendtsville Borough	342	0	0	0	0	0	0	0
Bendersville Borough	243	0	0	1	0	0	0	1
Berwick Township	1,032	0	1	0	5	0	0	6
Biglerville Borough	444	0	0	0	0	0	0	0
Bonneauville Borough	659	1	0	0	4	0	0	5
Butler Township	1,141	1	2	0	29	0	0	32
Carroll Valley Borough	1,535	0	1	0	15	0	0	16
Conewago Township	3,067	1	2	0	25	0	4	32
Cumberland Township	3,208	1	1	1	48	0	1	52
East Berlin Borough	634	0	0	1	23	0	1	25
Fairfield Borough	287	1	1	1	24	0	3	30
Franklin Township	2,394	1	2	0	54	0	3	60
Freedom Township	399	0	0	0	4	0	0	4
Germany Township	1,102	0	1	0	14	0	2	17
Gettysburg Borough	2,129	0	2	0	20	0	0	22
Hamilton Township	1,117	1	0	0	53	0	3	57
Hamiltonban Township	1,059	1	2	0	39	0	2	44
Highland Township	450	1	0	0	5	0	1	7
Huntington Township	977	0	0	0	7	0	0	7
Latimore Township	1,117	2	0	0	28	0	1	31
Liberty Township	627	0	0	0	6	0	2	8
Littlestown Borough	1,869	0	0	0	0	0	0	0
McSherrystown Borough	1,050	0	0	0	51	0	1	52
Menallen Township	1,603	2	3	1	29	0	2	37
Mt Joy Township	1,683	0	0	0	7	1	1	9

Table 4.3.4-7 Structures in SFHAs by Generalized Land Use Type.

MUNICIPALITY	TOTAL STRUCTURES	CIVIC/ INSTITUTIONAL	COMMERCIAL	INDUSTRIAL	RESIDENTIAL	TRANSPORTATION/ UTILITIES	UNKNOWN	GRAND TOTAL
Mt Pleasant Township	1,968	0	0	1	11	0	1	13
New Oxford Borough	677	0	0	0	0	0	0	0
Oxford Township	2,257	1	18	0	20	0	0	39
Reading Township	2,416	2	1	0	169	0	1	173
Straban Township	1,998	1	1	0	6	1	1	10
Tyrone Township	911	0	0	0	6	0	0	6
Union Township	1,226	0	0	0	1	0	0	1
York Springs Borough	207	0	1	0	13	0	1	15
TOTAL	**42,206**	**17**	**39**	**6**	**719**	**2**	**31**	**814**

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

4.3.5. Hailstorm

4.3.5.1. Location and Extent

Hailstorms are not limited to any particular geographic area of Adams County, and neither the duration of the storm nor the extent of area affected by such an occurrence can be predicted. Hail precipitation is often produced at the front of a severe thunderstorm system or in conjunction with a tornado event. Hailstorms occur when ice crystals form within a low pressure front due to the rapid rise of warm air into the upper atmosphere and the subsequent cooling of the air mass. Frozen droplets gradually accumulate on the ice crystals until, having developed sufficient weight, they fall as precipitation in the form of balls or irregularly shaped masses of ice. Hailstones are formed most commonly in thunderstorms with intense updraft, high liquid water content, large vertical extent, large water droplets, and cloud layers below freezing.

4.3.5.2. Range of Magnitude

Hail is described qualitatively and quantitatively by its size and can range from 0.2 inches to 4.5 inches; the size of hail is dependent on the strength of the updraft, as shown in table 4.3.5-1. Adams County has experienced hail ranging in size from 0.75 to 1.75 inches in diameter.

Table 4.3.5-1 Hailstone size and relationship to updraft speed (NOAA, 2013).

HAILSTONE SIZE	MEASUREMENT (INCHES)	UPDRAFT SPEED (MPH)
BB	< 0.25	< 24
Pea	0.25	24
Marble	0.50	35
Dime	0.70	38
Penny	0.75	40
Nickel	0.88	46
Quarter	1.00	49
Half Dollar	1.25	54
Walnut	1.50	60
Golf Ball	1.75	64
Hen Egg	2.00	69
Tennis Ball	2.50	77
Baseball	2.75	81
Tea Cup	3.00	84
Grapefruit	4.00	98
Softball	4.50	103

Hailstorms can cause significant damage to crops, livestock and property. Damage is dependent on the size, duration, and intensity of hail precipitation. Those who do not seek shelter could face serious injury. Automobiles and aircraft are particularly susceptible to damage. Since hail precipitation usually occurs during thunderstorm events, the impacts of other hazards associated with thunderstorms (i.e. strong winds, intense precipitation, etc…) often occur simultaneously. Damage to trees, shrubbery, and other vegetation may occur during hailstorm events through defoliation. Unless there are compounding stresses, natural

vegetation can typically recover over time following the event. However, crops such as corn and soybeans can be damaged to the point of total loss, particularly if an event occurs later in the growing season.

A potential worst-case scenario of a hailstorm would be if a storm carrying hail of over 2 inches were to occur over a prolonged period in the Pennsylvania Fruit Belt in Adams County. Because hail can cause significant crop damage, a storm of this magnitude would potentially destroy agricultural yields and result in significant lost revenue, as well as anticipated property damage or injuries.

4.3.5.3. Past Occurrence

The NCDC reports 42 hail events in Adams County from 1980-2014 causing $15,000 in property damage. As is typical, all of these events occurred from April to August, and most events occurred in the afternoon/early evening.

Table 4.3.5-2 Adams County Hail Events (NCDC, 2014).

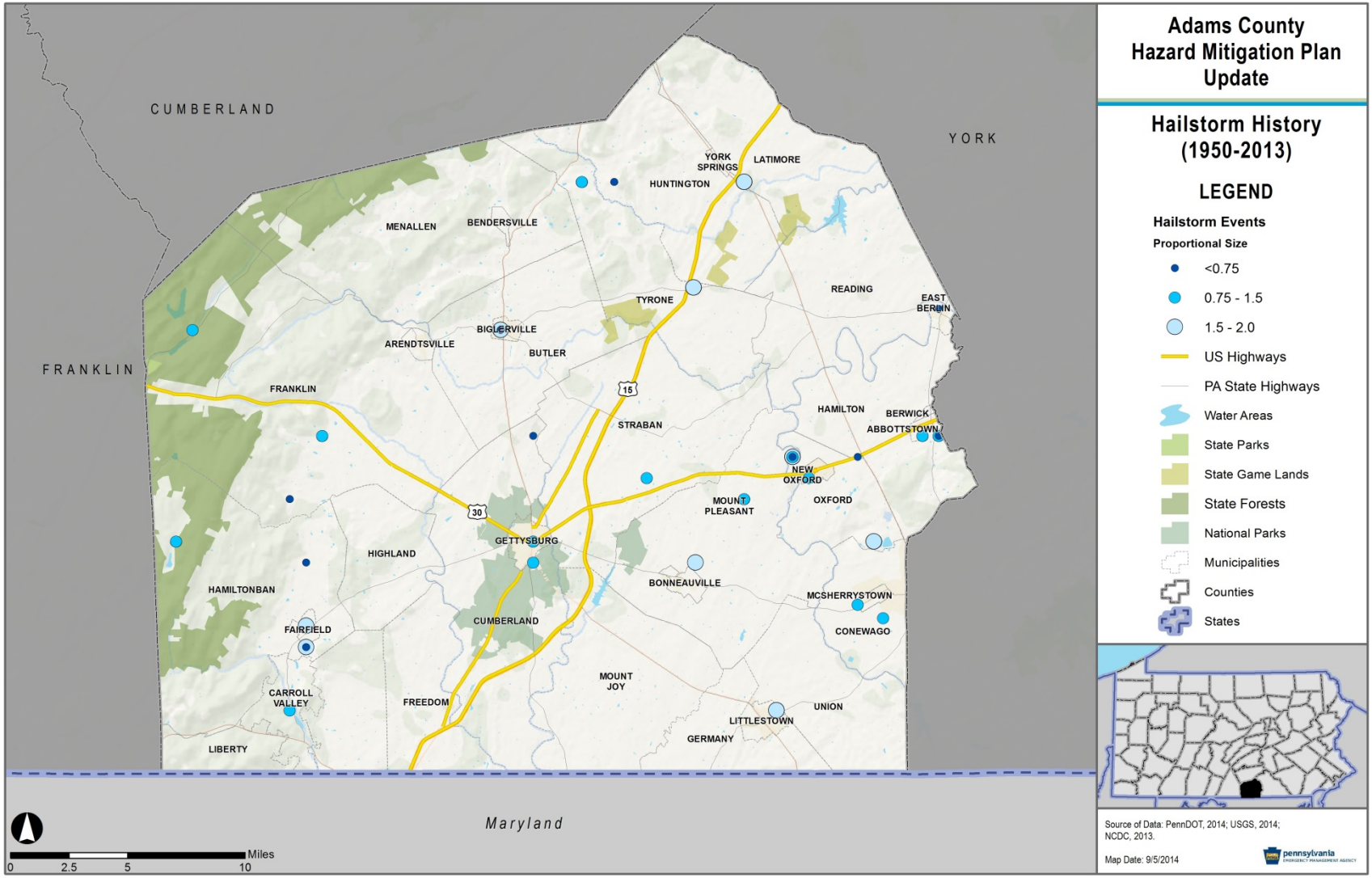
LOCATION	DATE	SIZE (IN)	INJURIES/ FATALITIES	PROPERTY LOSSES	CROP LOSSES
Countywide	4/9/1980	1.75	0	$0.00	$0.00
Countywide	5/12/1980	1.75	0	$0.00	$0.00
Countywide	5/23/1987	1.75	0	$0.00	$0.00
Countywide	5/23/1988	1	0	$0.00	$0.00
Countywide	6/6/1989	1.75	0	$0.00	$0.00
Countywide	5/13/1991	1.75	0	$0.00	$0.00
East Berlin	8/11/1993	0.75	0	$0.00	$0.00
Fairfield	8/11/1993	1.75	0	$0.00	$0.00
Bristol	6/29/1994	0.75	0	$0.00	$0.00
Abbottstown	5/29/1995	0.75	0	$0.00	$0.00
Biglerville	6/4/1996	0.75	0	$0.00	$0.00
Heidlersburg	6/11/1996	0	0	$0.00	$0.00
Heidlersburg	6/11/1996	0	0	$0.00	$0.00
New Oxford	6/14/1996	0.75	0	$0.00	$0.00
Gettysburg	6/24/1996	0	0	$0.00	$0.00
Biglerville	4/8/1998	0.75	0	$0.00	$0.00
Zora	5/10/2000	0.75	0	$0.00	$0.00
Bermudian	5/24/2000	1.75	0	$0.00	$0.00
Littlestown	5/24/2000	1.75	0	$0.00	$0.00
Fairfield	9/14/2000	0.75	0	$0.00	$0.00
Fairfield	5/2/2002	0.75	0	$0.00	$0.00

Table 4.3.5-2 Adams County Hail Events (NCDC, 2014).

LOCATION	DATE	SIZE (IN)	INJURIES/ FATALITIES	PROPERTY LOSSES	CROP LOSSES
New Oxford	5/26/2002	1.25	0	$0.00	$0.00
New Oxford	5/27/2002	1	0	$0.00	$0.00
McSherrystown	6/19/2002	1	0	$0.00	$0.00
Gettysburg	6/1/2004	0.88	0	$0.00	$0.00
Bonneauville	8/19/2004	1.75	0	$0.00	$0.00
New Oxford	8/7/2005	1	0	$0.00	$0.00
Abbottstown	8/7/2005	1	0	$0.00	$0.00
Cashtown	7/4/2006	0.75	0	$0.00	$0.00
Bendersville	7/18/2006	0.75	0	$0.00	$0.00
Fairfield Airport	8/25/2007	0.88	0	$0.00	$0.00
Gettysburg	6/10/2008	1	0	$0.00	$0.00
Fairfield	6/23/2008	1.75	0	$0.00	$0.00
York Springs	7/27/2008	1.75	0	$0.00	$0.00
Heidlersburg	7/27/2008	1.75	0	$0.00	$0.00
East Berlin	8/2/2008	0.75	0	$0.00	$0.00
Cashtown	8/10/2008	1	0	$0.00	$0.00
Gettysburg	6/9/2009	0.88	0	$0.00	$0.00
McSherrystown	6/4/2010	1	0	$10,000.00	$0.00
Guldens Station	8/18/2011	1	0	$0.00	$0.00
Trust	6/29/2012	0.88	0	$5,000.00	$0.00
New Oxford	7/18/2012	1	0	$0.00	$0.00

Figure 4.3.5-1 maps the recorded hailstorm events in Adams County between 1950 and 2013. Hail events appear to be evently distributed across the county.

Figure 4.3.5-1 Number of hailstorm events by county between 1950 and 2013 (NCDC, 2013).



4.3.5.4. Future Occurrence

It is not possible to predict the formation of a hailstorm with more than a few days' lead time. The past occurrences in the County described above, however, indicate that this event is one that can happen several times in any given year, most likely during the late spring and summer months. Based on prior occurrences, the County can expect one to two recordable hailstorms each year. On the whole, though, the probability of future hail events can be considered *possible* according to the Risk Factor Methodology (see Table 4.4. 4-1).

4.3.5.5. Vulnerability Assessment

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

As a hazard, damage to crops and vehicles are typically the most significant impacts of hailstorms. Corn and soybean crops are particularly vulnerable, and the USDA Census of Agriculture reports that in 2012, corn for grain, corn for silage, and soybeans were three of the top crop items by acres (USDA, 2012). The Pennsylvania Crop Insurance Education and Participation Program estimated that from 1981-2009, 6% of all crop losses in Pennsylvania were due to hail events (2010).

4.3.6. Hurricane, Tropical Storm, Nor'easter

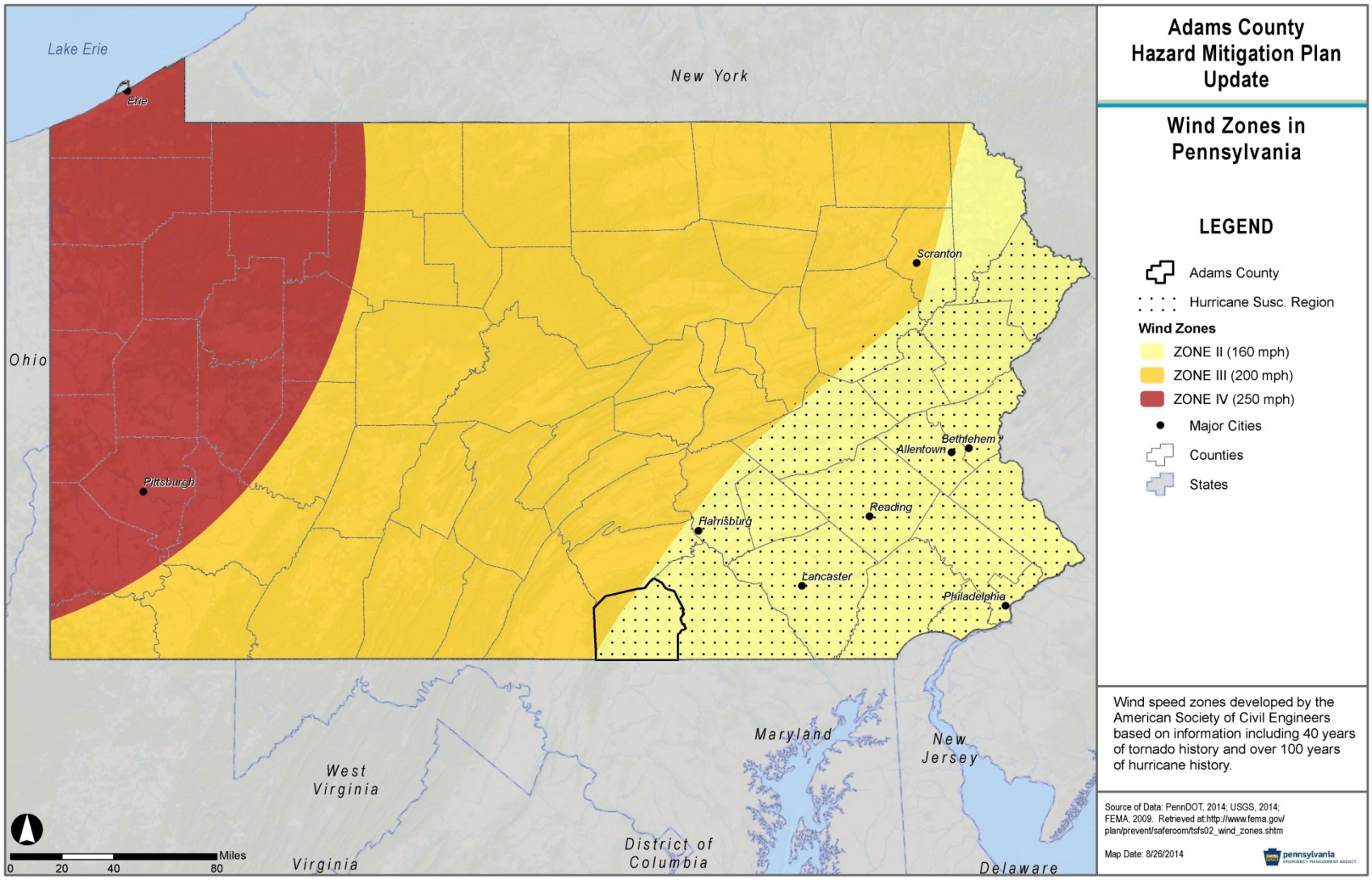
4.3.6.1. Location and Extent

Tropical storms impacting Adams County develop in tropical or sub-tropical waters found in the Atlantic Ocean, Gulf of Mexico, or Caribbean Sea. While Adams County is located over 100 miles from open coastline, tropical storms can track inland causing heavy rainfall and strong winds. These storms are regional events that can impact very large areas hundreds to thousands of miles across over the life the storm. Therefore, all communities within Adams County are equally subject to the impacts of hurricanes, tropical storms, and Nor'easters that track through or near the County. Areas in Adams County which are subject to flooding, wind, and winter storm damage are particularly vulnerable.

Figure 4.3.6-1 shows wind speed zones developed by the American Society of Civil Engineers based on information including 40 years of tornado history and over 100 years of hurricane history. It identifies wind speeds that could occur across the United States to be used as the basis for design and evaluation of the structural integrity of shelters and critical facilities.

Adams County falls mostly within Zone II, meaning design wind speeds for shelters and critical facilities should be able to withstand a 3-second gust of up to 160 mph, regardless of whether the gust is the result of a tornado, hurricane, tropical storm, or windstorm event. A small portion of Adams County falls within Zone III. Adams County also falls mostly within the identified Hurricane Susceptible Region.

Figure 4.3.6-1 Design wind speeds for community shelters across the United States (FEMA 2009).



4.3.6.2. Range of Magnitude

Cyclones with maximum sustained winds of less than 39 miles per hour (mph) are called tropical depressions. A tropical storm is a cyclone with maximum sustained winds between 39-74 mph. These storms sometimes develop into hurricanes with wind speeds in excess of 74 mph. Nor'easters are extra-tropical storms which typically develop from low-pressure centers off the Atlantic Coast north of North Carolina during the winter months. Extra-tropical is a term used to describe a hurricane or tropical storm that's cyclone has lost its 'tropical' characteristics. While an extra-tropical storm donates a change in weather pattern and how the storm is gathering energy, it may still have winds that are tropical storm or hurricane force.

The impacts associated with hurricanes and tropical storms are primarily wind damage and flooding. It is not uncommon for tornadoes to develop during these events. Historical tropical storm and hurricane events have brought intense rainfall, sometimes leading to damaging floods, northeast winds, which, combined with waterlogged soils, caused trees and utility poles to fall.

The impact tropical storm or hurricane events have on an area is typically measured in terms of wind speed. Expected damage from hurricane force winds is measured using the Saffir-Simpson Scale. The Saffir-Simpson Scale categorizes hurricane intensity linearly based upon maximum sustained winds, barometric pressure, and storm surge potential (characteristic of tropical storms and hurricanes, but not a threat to inland locations like Adams County), which are combined to estimate potential damage. Table 4.3.6-1 lists Saffir-Simpson Scale categories with associated wind speeds and expected damages. Categories 3, 4, and 5 are classified as "major" hurricanes. While major hurricanes comprise only 20 of all tropical cyclones making landfall, they account for over 70 percent of the damage in the United States. The likelihood of these damages occurring in Adams County is assessed in Section 4.3.4.4, Future Occurrence.

Table 4.3.6-1 Saffir-Simpson Scale categories with associated wind speeds and damages (NHC, 2013).

STORM CATEGORY	WIND SPEED (mph)	TYPES OF DAMAGE DUE TO HURRICANE WINDS
1	74-95	**Very dangerous winds will produce some damage:** Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110	**Extremely dangerous winds will cause extensive damage:** Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3	111-130	**Devastating damage will occur:** Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.

Table 4.3.6-1 Saffir-Simpson Scale categories with associated wind speeds and damages (NHC, 2013).		
STORM CATEGORY	**WIND SPEED (mph)**	**TYPES OF DAMAGE DUE TO HURRICANE WINDS**
4	131-155	**Catastrophic damage will occur:** Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5	>155	**Catastrophic damage will occur:** A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

It is important to recognize the potential for flooding events during hurricanes and tropical storms; the risk assessment and associated impact for these events is included Section 4.3.4. Wind impacts in Adams County generally include downed trees and utility poles, which can spark widespread utility interruptions. Wind impacts are particularly an issue for mobile homes and other manufactured housing; these structures are often not well-anchored and are highly susceptible to wind damage in a hurricane, tropical storm, or Nor'easter.

The worst-case event for a tropical storm in Adams County was Tropical Storm Lee/Hurricane Irene in 2011. Hurricane Irene made landfall in the US on August 27, 2011 and again on August 28, dumping between 2 and 8 inches of rain in eastern Pennsylvania, with its worst rain occurring in the Delaware River basin. One and a half weeks later, beginning on September 5, Tropical Storm Lee and its associated heavy rainfall moved through Pennsylvania and New York. With large portions of the Susquehanna River Basin already saturated by Hurricane Irene, Lee's rain caused flash flooding and riverine flooding in and east of the Susquehanna River Valley. The heavy rain broke previous precipitation records set by the former worst-case, Tropical Storm Agnes, and caused multiple new floods of record throughout the state. According to the NCDC Storm Events Database, Lee/Irene caused $64,000 in damage to public facilities in Adams County. Several roads were closed throughout the county, and conditions necessitated water rescues near East Berlin. Preliminary accounts indicated a total of 124 structures with major or minor damage. With the event occurring in the active growing season, there was widespread crop damage reported to the Department of Agriculture.

4.3.6.3. Past Occurrence

The National Oceanic and Atmospheric Administration's Coastal Services Center maintains records of all coastal storms occurring in the United States since the 1850s. Table 4.3.4-2 lists all coastal storms having centers of circulation to pass through or within 20 miles of Adams County.

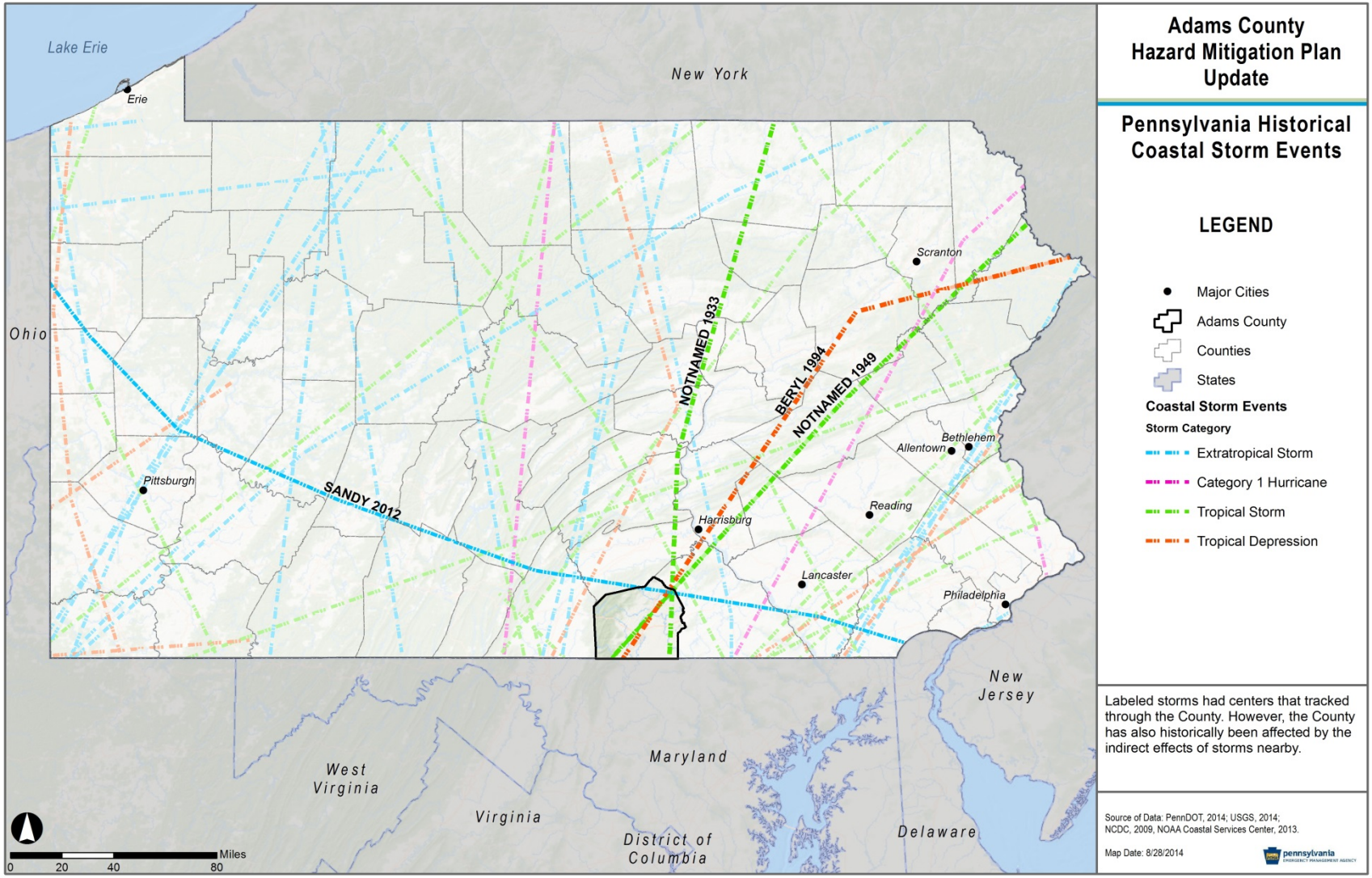
Table 4.3.4-2: Previous coastal storms tracking through or near Adams County.

YEAR	EVENT	STRENGTH IN/NEAR ADAMS COUNTY
1878	Not Named	Category 1
1885	Not Named	Extra-tropical
1893	Not Named	Tropical Storm
1933	Not Named	Tropical Storm
1949	Not Named	Tropical Storm
1954	Hazel	Extra-tropical
1955	Connie	Tropical Storm
1955	Diane	Tropical Storm
1979	David	Tropical Storm
1988	Chris	Tropical Depression
1994	Beryl	Tropical Depression
1999	Dennis	Tropical Depression
2006	Ernesto	Extra-tropical
2012	Sandy	Extra-tropical

Figure 4.3.4-2 shows the historical coastal storms in/near Adams County. It is important to note that a number of hurricane, tropical storm, and nor'easter events have impacted the County without tracking through or near it; these storm events include the Remnants of Tropical Storms Lee and Irene (2011), Hurricane Isabel/Henri (2003), Hurricane Floyd (1999), Hurricane Eloise (1975) and Hurricane Agnes (1972). Each of these storm events resulted in a Presidential Disaster Declaration. Perhaps the best example of this is Hurricane Agnes (1972). While it was the most significant tropical storm event to impact the Commonwealth, the storm track for Agnes remained to the east of Pennsylvania and New Jersey until making landfall near New York City and traveling into upstate New York. After making first landfall as a minimal hurricane near Panama City, FL, Agnes weakened and exited back into the Atlantic off the North Carolina coast. However, the storm skirted along the coast, made a second landfall near New York City as a tropical storm and merged with an extra-tropical low pressure system over northern Pennsylvania. This brought extremely heavy rains to Pennsylvania, with particular concentrations of rain in the Susquehanna River Basin. Maximum rainfall from the storm, falling in the period of June 20-25, 1972, was about 18 inches the middle of the Susquehanna drainage area; however this is an unofficial measurement. The maximum official depth of 15.2

inches was recorded in Harrisburg, PA. Estimated losses in Pennsylvania alone were near $3 billion; total damages for the storm nationwide were estimated at $4 billion.

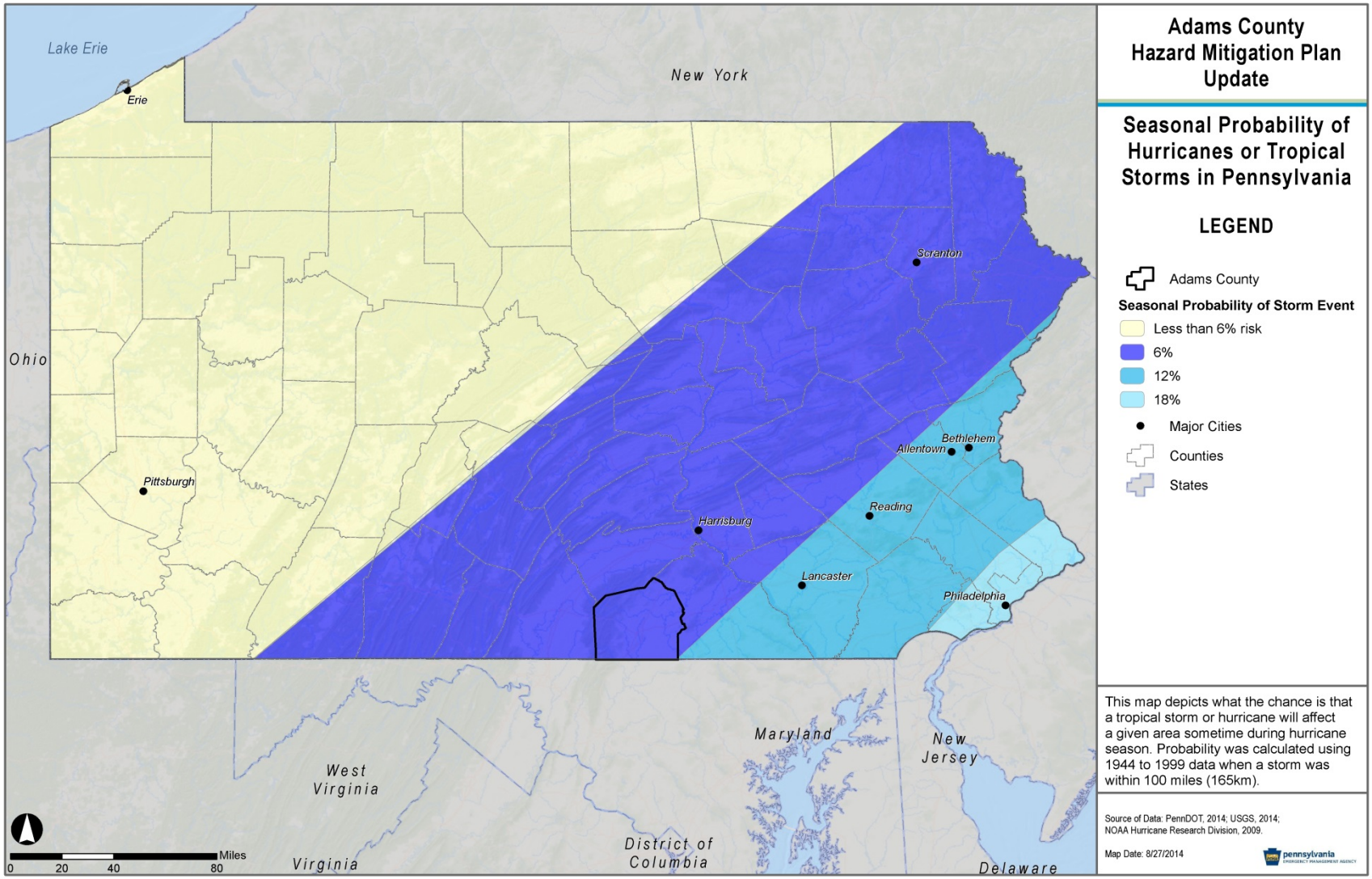
Figure 4.3.6-2 Map showing historical coastal storm events which tracked through Adams County (NOAA CSC, 2014).



4.3.6.4. Future Occurrence

The National Oceanic and Atmospheric Administration Hurricane Research Division published the map included as Figure 4.3.6-3 showing the chance that a tropical storm or hurricane will affect a given area during the entire Atlantic hurricane season spanning from June to November. Note that this figure does not provide information on the probability of various storm intensities. However, based on historical data between 1944 and 1999, this map reveals there is approximately a 6 percent chance of experiencing a tropical storm or hurricane event between June and November of any given year in most of the County, or *possible* as defined by the Risk Factor Methodology probability criteria (see Table 4.4.1-1). Note that these probabilities are the result of only a single study and may differ from other seasonal probability estimates not identified in this report. Outlier storms may also have a large impact on Pennsylvania even though their probability is low

Figure 4.3.6-3 Seasonal probability of Atlantic Basin hurricanes or tropical storms across Pennsylvania.



4.3.6.5. Vulnerability Assessment

A vulnerability assessment for hurricanes and tropical storms focuses on the impacts of flooding and severe wind. Therefore, the assessment for flood-related vulnerability is addressed in Section 4.3.4.5. and vulnerability to wind damage is addressed in Section 4.3.10.5. Adams County is also vulnerable to severe winter weather impacts caused by Nor'easters which are evaluated in 4.3.12.5.

4.3.7. Invasive Species

4.3.7.1. Location and Extent

An invasive species is a species that is not indigenous to a given ecosystem and that, when introduced to a non-native environment, is likely to cause economic or environmental harm, or pose a hazard to human health. The Commonwealth of Pennsylvania plays host to a number of invasive pathogens, insects, plants, invertebrates, fish, and higher mammals. These species have largely been introduced by the actions of humans. Common pathways for invasive species threats include unintentional release of species, the movement of goods and equipment that may unknowingly harbor species, smuggling, ship ballast, hull fouling, and escape from cultivation (PISC, 2010). Invasive species threats are generally divided into two main subsets:

- ***Aquatic Invasive Species*** are nonnative viruses, invertebrates, fish, and aquatic plants that threaten the diversity or abundance of native species, the ecological stability of the infested waters, human health and safety, or commercial, agriculture, aquaculture, or recreational activities dependent on such waters.
- ***Terrestrial Invasive Species*** are nonnative arthropods, vascular plants, higher vertebrates, or pathogens that complete their lifecycle on land instead of in an aquatic environment and whose introduction does or is likely to cause economic or environmental harm or harm to human health.

The Governor's Pennsylvania Invasive Species Council (PISC), the lead organization for invasive species threats, identifies over 100 species threats that are or could potentially become significant in Pennsylvania. Of these threats, County and municipal leaders believe that the most significant are insects and other invertebrates, plant pathogens, and human and animal pathogens.

The location and extent of these invasive threats depends on the preferred habitat of the species as well as the species' ease of movement and establishment. For example, Plum Pox is a serious stone fruit disease that renders that is spread by aphids. Other species' spread has been limited by state agency activity. For example, the Emerald Ash Borer's spread is slower than it would be naturally because of an aggressive quarantine and testing program. However, the Ash Borer is still spreading.

Most new introductions of invasive species occur because of human activity. There are a few key pathways to introduction:

- Contamination of internationally traded products,
- Hull fouling,
- Discarded live fish bait,

- Intentional release,
- Escape from cultivation,
- Movement of soil, compost, wood, vehicles, or other materials and equipment,
- Unregulated sale of organisms,
- Smuggling activities, and
- Hobby trading or specimen trading.

4.3.7.2. Range of Magnitude

The magnitude of invasive species threats ranges from nuisance to widespread killer. Some invasive species like the Brown Marmorated Stink Bugs are not considered an agricultural pest and do not harm humans. Other invasive species can cause significant changes in the composition of Pennsylvania ecosystems or can cause significant economic losses in food-producing communities. Still more invasive species can cause widespread illness or death in humans; one species of particular concern with this magnitude is anthrax, considered by the Centers for Disease Control and Prevention (CDC) to be a Category A agent that may pose a significant, widespread threat to public health.

The magnitude of an invasive species threat is generally amplified when the ecosystem or host species is already stressed, such as in times of drought. The already weakened state of the native ecosystem causes it to more easily succumb to an infestation. In addition, large-scale tree death may also feed additional wildfires due to increased fuel availability.

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

An example of a possible worst-case scenario for invasive species would be a return of the Plum Pox virus to Adams County. This disease attacks many kinds of stone fruits and renders their fruit unmarketable; the market value of fruits, tree nuts, and berries in Adams County is nearly $66 annually (USDA, 2012).

4.3.7.3. Past Occurrence

Invasive species have been entering the Commonwealth since the arrival of early European settlers, but not all occurrences have required government action and there is no comprehensive record of invasive species incidents. However, Adams County was the epicenter of the Plum Pox outbreak in 1999. Trees cannot be cured of Plum Pox; during the event, 1,675 orchard-acres were destroyed. Found on Adams County peach trees, the state and federal

Departments of Agriculture imposed a 300-square mile quarantine and instituted aggressive surveillance. After years of monitoring and testing, the virus was officially considered eradicated in 2013 (Penn State Extension, 2013).

4.3.7.4. Future Occurrence

According to the PISC, the probability of future occurrence for invasive species threats is on the rise worldwide because of the growing volume of transported goods, increasing technology, efficiency and speed of transportation and expanding international trade agreements. Expanded global trade has created opportunities for many organisms to be transported to and establish themselves in new countries and regions. Furthermore, climate change may be contributing to the introduction of new invasive species. As maximum and minimum seasonal temperatures change, pests are able to establish themselves in previously inhospitable climates. This also gives introduced species an earlier start and increases the magnitude of their growth. This may shift the dominance of ecosystems in the favor of nonnative species. Overall, though, the probability of future large-scale invasive species hazards is *unlikely,* as defined by the Risk Factor Methodology (see Table 4.4.1-1).

In order to combat the increase in future occurrences, the Penn State Extension, together with the PA and US Departments of Agriculture, conduct education and awareness campaigns and spearhead identifying and monitoring invasive species. These efforts should decrease the severity of future occurrences.

4.3.7.5. Vulnerability Assessment

Adams County's exact vulnerability will depend on the invasive species in question. In general, though, what is most at risk to invasive species would be the county's agricultural products.

4.3.8. Pandemic and Infectious Disease

4.3.8.1. 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, but are not 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 Adams County and beyond. 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.

Adams County is primarily concerned with pandemic influenza. Pandemic influenza planning began in response to the H5N1 (avian) flu outbreak in Asia, Africa, Europe, the Pacific, and the Near East in the late 1990s and early 2000s. H5N1 did not reach pandemic proportions in the

United States, but Pennsylvania and local departments of health began actively planning for an occurrence of an influenza pandemic. As stated in the Pennsylvania Department of Health (DOH) Influenza Pandemic Response Plan, “an influenza pandemic is inevitable and will probably give little warning” (PA DOH, 2005). 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. Past and future novel strains of avian flu are also of concern in Adams County considering its high concentration of poultry production.

4.3.8.2. Range of Magnitude

The magnitude of a pandemic or infectious disease threat in Adams County will range significantly depending on the aggressiveness of the virus in question and the ease of transmission. Pandemic influenza is fairly easily transmitted from person-to-person, but advances in medical technologies have greatly reduced the number of deaths caused by influenza over time. In terms of lives lost, the impact various pandemic influenza outbreaks have had globally over the last century has declined. The severity of illness from the 2009 H1N1 influenza flu virus varied as expected with any influenza pandemic. The gravest cases occurring mainly among those considered at high risk: children, the elderly, pregnant women, and chronic disease patients with reduced immune system capacity. Most people infected with H1N1 in 2009 recovered without needing medical treatment, and this flu strain is now included in flu shots. According to the CDC, about 70% of those who hospitalized with the 2009 H1N1 flu virus in the United States belonged to a high risk group (CDC, 2009). This pattern is expected to continue with future novel flu strains.

The magnitude of a pandemic may be exacerbated by the fact that an influenza pandemic will cause outbreaks across Pennsylvania, limiting the ability to transfer assistance from one jurisdiction to another. Additionally, effective preventative and therapeutic measures, including vaccines and other medications, will likely be in short supply or will not be available.

There are no true environmental impacts in pandemic disease outbreaks, but there may be significant economic and social costs beyond the possibility of deaths. Widespread illness may increase the likelihood of shortages of personnel to perform essential community services. In addition, high rates of illness and worker absenteeism 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.

The 1918 Spanish flu pandemic remains the worst case pandemic event on record. While mortality figures were probably under-reported, in the first month of the pandemic alone, 8,000 Pennsylvanians died from the flu or its complications (US DHHS, 2010).

4.3.8.3. Past Occurrence

The United States Department of Health and Human Services estimates that influenza pandemics have occurred for at least 300 years at unpredictable intervals. There have been

several pandemic influenza outbreaks over the past 100 years. A list of events worldwide is shown in Table 4.3.8-1.

Table 4.3.8-1 List of previous significant outbreaks of influenza over the past century (PA DOH, 2014).

DATE	PANDEMIC NAME/SUBTYPE	WORLDWIDE DEATHS (APPROXIMATE)
1918-1920	Spanish Flu / H1N1	50 million
1957-1958	Asian Flu / H2N2	1-3 million
1968-1969	Hong Kong Flu / H3N2	1 million
2009 - 2010	Swine Flu / A/H1N1	25,174

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, and there were 350,000 cases 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% of the population of Pennsylvania was affected. The first cases of the Hong Kong Flu in the U.S. were detected in September of 1968 with deaths peaking between December, 1968 and January, 1969 (Global Security, 2009). In the 2009/2010 season, when H1N1 was a primary concern, there were 314 confirmed flu cases, and a child died from the H1N1 flu in Adams County (PA DOH, 2014a).

4.3.8.4. Future Occurrence

Future occurrences of pandemic influenza 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. However, 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).

4.3.8.5. Vulnerability Assessment

In general, jurisdictions that are more densely populated are more vulnerable to disease threats when the disease is directly spread from human to human, but every jurisdiction in Adams County has some vulnerability to pandemic and infectious disease threats. 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. 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 populations identified as being at high risk are concentrated at these facilities or because of a large number of people living in close quarters. The highest concentration of these institutions is found in the Gettysburg area.

4.3.9. Subsidence, Sinkhole

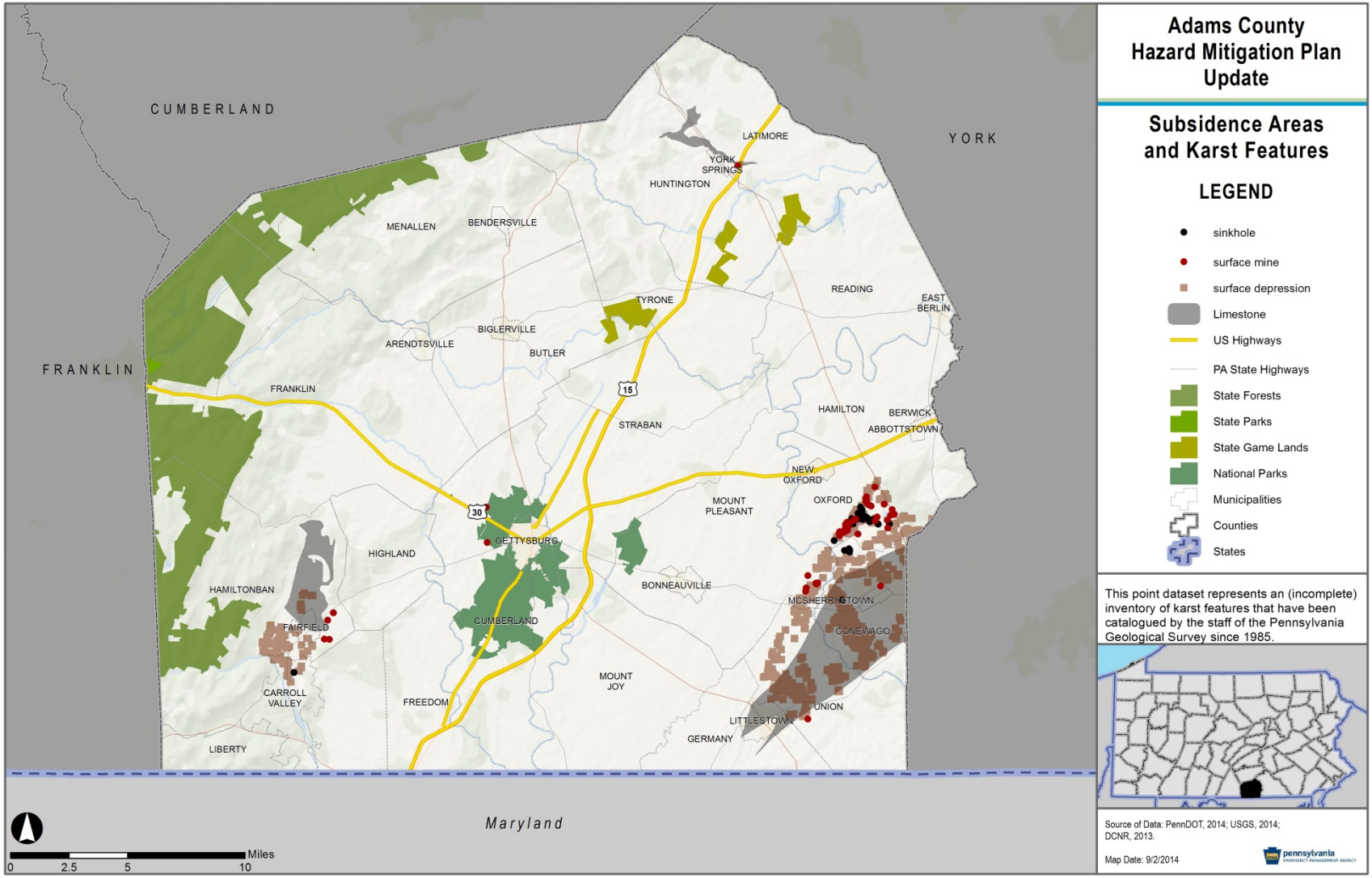
4.3.9.1. Location and Extent

Subsidence potential in Adams County is primarily associated with the solution of carbonate bedrock, such as limestone and dolomite, by water. Water passing through naturally occurring fractures and bedding planes dissolves the bedrock, leaving voids below the surface (DCNR, 2009). Eventually, overburden on top of the voids collapses, leaving surface depressions resulting in karst topography. Characteristic structures associated with karst topography include sinkholes, linear depressions, and caves. Often, sub-surface solution of limestone will not result in the immediate formation of karst features. Collapse sometimes occurs only after a large amount of activity, or when a heavy burden is placed on the overlying material. Abrupt or long-term changes in the ground surface may also occur following sub-surface fluid extraction (e.g. water). Figure 4.3.9-1 shows that a small portion of Adams County lies in an area of Pennsylvania where limestone/dolomite bedrock is present near ground surface, thus making those areas more susceptible to natural sinkhole development. The map also illustrates DCNR's partial inventory of sinkholes and surface depressions. The following municipalities have identified near-surface limestone and are therefore vulnerable to sinkholes:

- Conewago Township
- Fairfield Borough
- Franklin Township
- Germany Township
- Hamiltonban Township
- Huntington Township
- Latimore Township
- Littlestown Borough
- McSherrystown Borough
- Union Township
- York Springs Borough

While not underlain by limestone, Carroll Valley Borough has had a number of surface depressions, indicating it might also be vulnerable to subsidence and sinkholes. Human activity can also 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.

Figure 4.3.9-1 Map showing areas of Adams County subject to natural subsidence due to the presence of limestone bedrock. Inventoried surface depression and sinkhole locations are also shown.



4.3.9.2. Range of Magnitude

No two subsidence areas or sinkholes are exactly alike. Variations in size and shape, time period under which they occur (i.e. gradually or abruptly), and their proximity to development ultimately determines the magnitude of damage incurred. Based on the geologic formations underlying parts of Adams County, subsidence and sinkhole events may occur gradually or abruptly. Events could result in minor elevation changes or deep, gaping holes in the ground surface. Subsidence and sinkhole events can cause severe damage in urban environments, although gradual events can be addressed before significant damage occurs. Primarily, problems related to subsidence include the disruption of utility services and damages to private and public property including buildings, roads, and underground infrastructure. If long-term subsidence or sinkhole formation is not recognized and mitigation measures are not implemented, fractures or complete collapse of building foundations and roadways may result. If mitigation measures are not taken, the cost to fill in and stabilize sinkholes can be significant although sinkholes are limited in extent.

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

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

The worst-case scenario for sinkholes in Adams County would be a series of large sinkholes opening in Conewago Township, where there have been historic sinkholes and potential sinkholes. The township's major roadway, PA-116, and all businesses and residences along that roadway, lie on near-surface limestone, making them vulnerable to sinkholes. This series of sinkholes could close roads, cause power outages, prevent the delivery of emergency services, cause injuries or death to residents, and could cause serious property damage.

4.3.9.3. Past Occurrence

The Pennsylvania Department of Conservation and Natural Resources conducted a partial inventory of karst features categorized as sinkholes, surface depressions, surface mines, or cave entrances that have been cataloged in Pennsylvania by the staff of the Pennsylvania Geological Survey since 1985 (DCNR, 2014). This inventory indicates that Adams County has had 31 sinkholes and 788 surface depressions recorded. Additionally, PA DCNR staff have indicated that small sinkholes occur more frequently across Pennsylvania cause limited damage.

Since the 2010 HMP, there have been a few high-profile sinkhole occurrences in western Adams County, particularly in Conewago Township. A sinkhole on Oak Drive was identified and initially repaired for a cost of $36,317 (Asper, 2011). However, the following February (2010), township officials began monitoring a depression at the same location. After nearly two months,

in April, the sinkhole opened and widely expanded, damaging the township right-of-way, cracking nearby driveways, and encroaching on private property. The sinkhole was colloquially dubbed “the sinkhole to China.” The township engaged engineers and PennDOT to find the root, or “throat,” of the sinkhole for a permanent repair. The scope of repairs the second time around was approximately $100,000; the township evaluated the possibility of simply closing the roadway since it had sinkhole activity consistently since 2004, but ultimately decided to complete the repair in September 2011 (Asper, 2011a). In the end, they needed to excavate 80 feet to complete the repair, and the roadway was closed for months. Figure 4.3.9-2 shows this sinkhole from the Hanover Evening Sun newspaper.

Figure 4.3.9-2 Oak Drive sinkhole (Asper, 2011).

In August 2011, a sinkhole formed on Hanover Street between New Oxford and Hanover. Like the incident in Conewago, this was a repeat sinkhole. It was small enough to be repaired within a week (Stonesifer, 2011). Figure 4.3.9-3 shows this sinkhole.

Figure 4.3.9-3 Hanover Road sinkhole with repair equipment (Stonesifer, 2011).

4.3.9.4. Future Occurrence

Based on geological conditions and current mining activity in Pennsylvania, the annual occurrence of subsidence and sinkhole events in areas of the Commonwealth underlain by carbonate rock or where mining occurs is considered *possible* on a countywide basis as defined by the Risk Factor Methodology (see Table 4.4.1-1). However, sinkholes may be more frequent in localized areas of the county.

4.3.9.5. Vulnerability Assessment

Based on geology, the following municipalities are vulnerable to sinkholes:

- Conewago Township
- Fairfield Borough
- Franklin Township
- Germany Township
- Hamiltonban Township
- Huntington Township
- Latimore Township
- Littlestown Borough
- McSherrystown Borough
- Union Township
- York Springs Borough

While not underlain by limestone, Carroll Valley Borough has had a number of surface depressions, indicating it might also be vulnerable to subsidence and sinkholes. Table 4.3.9-1 presents the vulnerability of structures and critical facilities to subsidence and sinkhole events by community, and Table 4.3.9-2 breaks down the vulnerable structures by generalized structure type.

Table 4.3.9-1 Subsidence Vulnerability for Adams County.

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN SUBSIDENCE-PRONE AREAS	PERCENT OF STRUCTURES IN SUBSIDENCE-PRONE AREAS	TOTAL CRITICAL FACILITIES	TOTAL CRITICAL FACILITIES IN SUBSIDENCE-PRONE AREAS	PERCENT CRITICAL FACILITIES IN SUBSIDENCE-PRONE AREAS
Abbottstown Borough	378	0	0.0%	5	0	0.0%
Arendtsville Borough	342	0	0.0%	6	0	0.0%
Bendersville Borough	243	0	0.0%	9	0	0.0%
Berwick Township	1,032	0	0.0%	5	0	0.0%
Biglerville Borough	444	0	0.0%	13	0	0.0%
Bonneauville Borough	659	0	0.0%	5	0	0.0%
Butler Township	1,141	0	0.0%	12	0	0.0%
Carroll Valley Borough	1,535	0	0.0%	8	0	0.0%
Conewago Township	3,067	2,382	77.7%	20	16	80.0%
Cumberland Township	3,208	0	0.0%	27	0	0.0%
East Berlin Borough	634	0	0.0%	12	0	0.0%
Fairfield Borough	287	69	24.0%	8	1	12.5%
Franklin Township	2,394	0	0.0%	31	0	0.0%
Freedom Township	399	0	0.0%	2	0	0.0%
Germany Township	1,102	6	0.5%	9	1	11.1%
Gettysburg Borough	2,129	0	0.0%	30	0	0.0%
Hamilton Township	1,117	0	0.0%	6	0	0.0%
Hamiltonban Township	1,059	98	9.3%	21	3	14.3%
Highland Township	450	0	0.0%	5	0	0.0%
Huntington Township	977	11	1.1%	18	0	0.0%
Latimore Township	1,117	4	0.4%	13	1	7.7%
Liberty Township	627	0	0.0%	5	0	0.0%
Littlestown Borough	1,869	1,026	54.9%	25	19	76.0%
McSherrystown Borough	1,050	1,050	100.0%	14	14	100.0%
Menallen Township	1,603	0	0.0%	16	0	0.0%
Mt Joy Township	1,683	0	0.0%	9	0	0.0%
Mt Pleasant Township	1,968	0	0.0%	6	0	0.0%
New Oxford Borough	677	0	0.0%	19	0	0.0%
Oxford Township	2,257	0	0.0%	19	0	0.0%
Reading Township	2,416	0	0.0%	13	0	0.0%
Straban Township	1,998	0	0.0%	27	0	0.0%
Tyrone Township	911	0	0.0%	8	0	0.0%
Union Township	1,226	398	32.5%	8	4	50.0%
York Springs Borough	207	5	2.4%	5	0	0.0%
TOTAL	**42,206**	**5,049**	**12.0%**	**439**	**59**	**13.4%**

Table 4.3.9-2 Structures in Subsidence-Prone Areas by Generalized Land Use Type

MUNICIPALITY	TOTAL STRUCTURES	CIVIC/ INSTITUTIONAL	COMMERCIAL	INDUSTRIAL	RESIDENTIAL	TRANSPORTATION/ UTILITIES	UNKNOWN	GRAND TOTAL
Abbottstown Borough	378	0	0	0	0	0	0	0
Arendtsville Borough	342	0	0	0	0	0	0	0
Bendersville Borough	243	0	0	0	0	0	0	0
Berwick Township	1,032	0	0	0	0	0	0	0
Biglerville Borough	444	0	0	0	0	0	0	0
Bonneauville Borough	659	0	0	0	0	0	0	0
Butler Township	1,141	0	0	0	0	0	0	0
Carroll Valley Borough	1,535	0	0	0	0	0	0	0
Conewago Township	3,067	14	84	18	2204	1	61	2382
Cumberland Township	3,208	0	0	0	0	0	0	0
East Berlin Borough	634	0	0	0	0	0	0	0
Fairfield Borough	287	1	4	0	57	1	6	69
Franklin Township	2,394	0	0	0	0	0	0	0
Freedom Township	399	0	0	0	0	0	0	0
Germany Township	1,102	0	1	0	5	0	0	6
Gettysburg Borough	2,129	0	0	0	0	0	0	0
Hamilton Township	1,117	0	0	0	0	0	0	0
Hamiltonban Township	1,059	2	5	0	86	0	5	98
Highland Township	450	0	0	0	0	0	0	0
Huntington Township	977	0	0	0	11	0	0	11
Latimore Township	1,117	0	1	0	0	0	3	4

Table 4.3.9-2 Structures in Subsidence-Prone Areas by Generalized Land Use Type

MUNICIPALITY	TOTAL STRUCTURES	CIVIC/ INSTITUTIONAL	COMMERCIAL	INDUSTRIAL	RESIDENTIAL	TRANSPORTATION/ UTILITIES	UNKNOWN	GRAND TOTAL
Liberty Township	627	0	0	0	0	0	0	0
Littlestown Borough	1,869	20	53	3	940	0	10	1026
McSherrystown Borough	1,050	12	38	1	974	1	24	1050
Menallen Township	1,603	0	0	0	0	0	0	0
Mt Joy Township	1,683	0	0	0	0	0	0	0
Mt Pleasant Township	1,968	0	0	0	0	0	0	0
New Oxford Borough	677	0	0	0	0	0	0	0
Oxford Township	2,257	0	0	0	0	0	0	0
Reading Township	2,416	0	0	0	0	0	0	0
Straban Township	1,998	0	0	0	0	0	0	0
Tyrone Township	911	0	0	0	0	0	0	0
Union Township	1,226	2	8	0	379	1	8	398
York Springs Borough	207	0	0	0	5	0	0	5
TOTAL	**42,206**	**51**	**194**	**22**	**4,661**	**4**	**117**	**5,049**

There are a few measures that can reduce the overall vulnerability to subsidence and sinkholes. Municipal governments may determine guidelines for construction in high-subsidence areas. A community can reduce its vulnerability to subsidence or sinkholes by implementing solutions such as land use controls, insurance programs, subsidence-resistant designs, or in the case of mine-related subsidence, conduct selective support or mine filling. If a sinkhole occurs on private property, it is normally the responsibility of the property owner to initiate repairs. Homeowners' insurance often does not cover damages attributed to sinkholes. Since 1987, sinkhole insurance has been available within Pennsylvania and may serve to eliminate the financial burdens placed on the homeowner.

Careful planning is the least-costly and most effective method for reducing vulnerability to subsidence hazards. Municipalities could minimize the potential for sinkhole development through proper maintenance and updating of water utility lines. Zoning laws can also be enacted to regulate development within highly karst areas.

4.3.10. Tornado, Windstorm

4.3.10.1. Location and Extent

Tornadoes and windstorms can affect any area of the County. Straight-line winds create movement of air from areas of higher pressure to areas of lower pressure – the greater the difference in pressure, the stronger the winds. Windstorms are generally defined as sustained wind speeds of 40 mph or greater lasting for one hour or longer, or winds of 58 mph or greater for any duration.

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

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

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. Tornado movement is characterized in two ways: direction and speed of the spinning winds, and forward movement of the tornado/storm track. Rotational wind speeds of the vortex can range from 100 mph to more than 250 mph. In addition, the speed of forward motion can be zero to 45 or 50 mph. Therefore, some estimates place the maximum velocity (combination of ground speed, wind speed, and upper winds) of tornadoes at about 300 mph.

The forward motion of the tornado path can be a few hundred yards or several hundred miles in length. The width of tornadoes can vary greatly, but generally range in size from less than 100

feet to over a mile in width. Some tornadoes never touch the ground and are short-lived, while others may touch the ground several times.

4.3.10.2. Range of Magnitude

Each year, tornadoes account for $1.1 billion in damages and cause over 80 deaths nationally (NCAR, 2001). 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.

Damages and deaths can be especially significant when tornadoes and windstorms move through populated, developed areas. Windstorms are generally defined as sustained wind speeds of 40 mph or greater lasting for one hour or longer, or winds of 58 mph or greater for any duration. The destruction caused by tornadoes ranges from light to inconceivable depending on the intensity, size and duration of the storm. Typically, tornadoes cause the greatest damages to structures of light construction such as mobile homes. The Enhanced Fujita Scale, also known as the “EF-Scale,” measures tornado strength and associated damages. The EF-Scale is an update to the earlier Fujita Scale, also known as the “F-Scale,” which was published in 1971. The EF-Scale provides engineered wind estimates and better damage descriptions. It classifies United States tornadoes into six intensity categories, as shown in Table 4.3.10-1, based upon the estimated maximum winds occurring within the wind vortex. Since its implementation by the National Weather Service in 2007, the EF-Scale has become the definitive metric for estimating wind speeds within tornadoes based upon damage to buildings and structures. F-Scale categories with corresponding EF-Scale wind speeds are also provided since previous tornado occurrences are described based on the F-Scale.

Table 4.3.10-1 Enhanced Fujita Scale (EF-Scale) categories with associated wind speeds and description of damages.

EF-SCALE NUMBER	WIND SPEED (mph)	F-SCALE NUMBER	TYPE OF DAMAGE POSSIBLE
EF0	65–85	F0-F1	**Minor damage**: Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e., those that remain in open fields) are always rated EF0.
EF1	86-110	F1	**Moderate damage**: Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.

Table 4.3.10-1 Enhanced Fujita Scale (EF-Scale) categories with associated wind speeds and description of damages.

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

The expected damages from the wind speeds most likely to be encountered in Adams County are Light to -Moderate. However, these events can still topple trees, create secondary hazards such as power outages, increase the impact of flooding, and cause severe damage to manufactured homes.

Since tornado and windstorm events are typically localized, environmental impacts of these events are rarely widespread. The impacts of windstorms on the environment typically take place over a larger area. In either case, where these events occur, severe damage to plant species is likely. This includes uprooting or total destruction of trees and an increased threat of wildfire in areas where dead trees are not removed. Hazardous material facilities should meet design requirements for the wind zones identified in the Hurricane, Tropical Storm, and Nor'easter profile (Figure 4.3.6-1) in order to prevent release of hazardous materials into the environment.

The most damage caused by tornadoes in Adams County occurred on June 7, 1980, when a storm system spawned and F-2 and an F-3 (these occurred prior to the switch to the Enhanced Fujita Scale) tornado that caused a reported $2.75 million in damages.

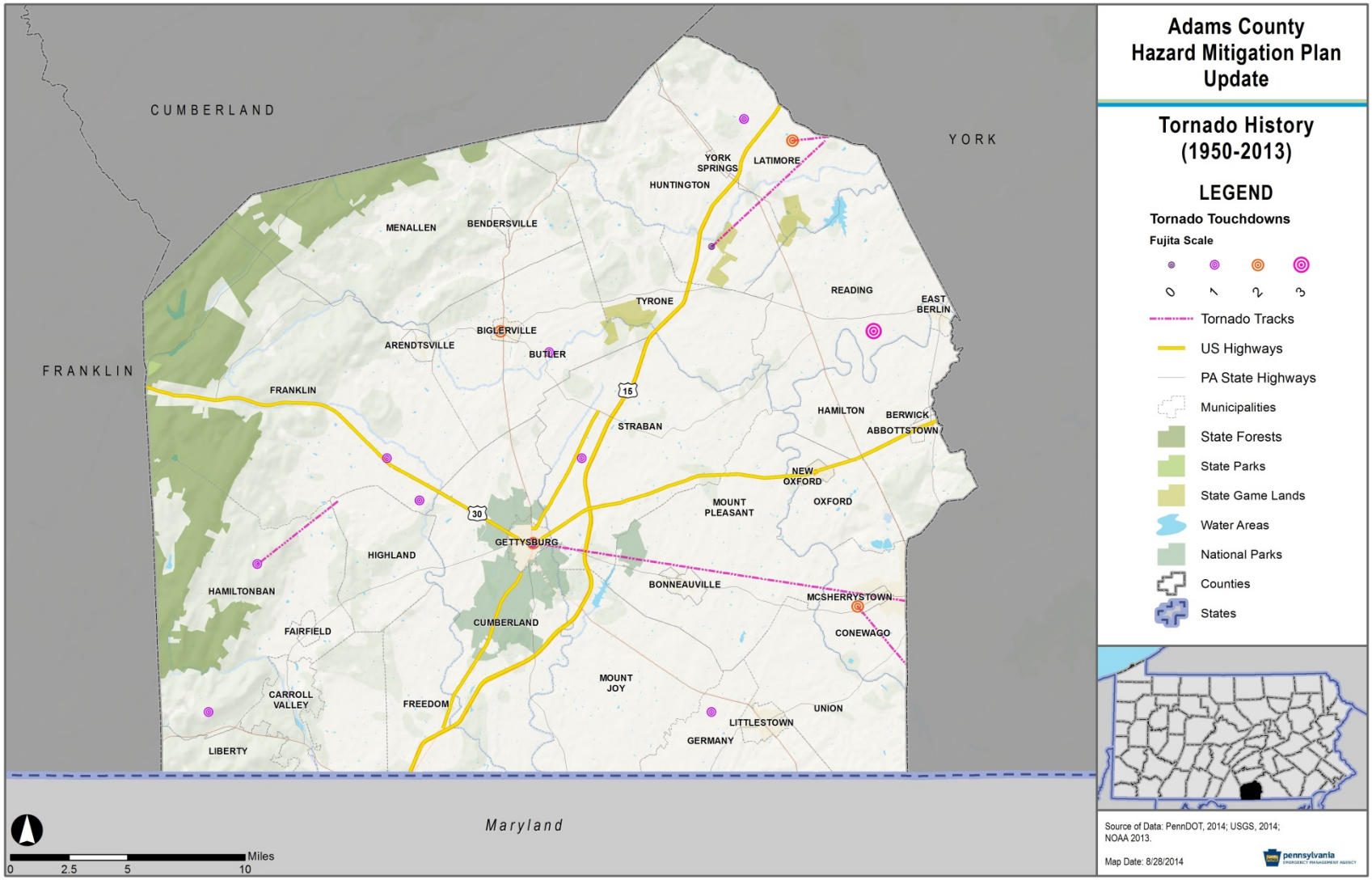
4.3.10.3. Past Occurrence

Tornadoes have occurred throughout Pennsylvania in all seasons and in all parts of the state, but they are most common between noon and 9 PM in May through August. Table 4.3.10-2 lists each tornado reported in Adams County, along with reported losses; Figure 4.3.10-1 shows the spatial location of these events.

Table 4.3.10-2 Previous tornado events between 1950 and 2014 in Adams County (NCDC, 2014).

LOCATION	DATE	MAGNITUDE	DEATHS	INJURIES	ESTIMATED PROPERTY DAMAGE ($)
County-wide	3/30/1951	F1	0	0	2,500
County-wide	4/25/1954	F2	0	0	25,000
County-wide	9/16/1971	F1	0	0	25,000
County-wide	3/21/1976	F2	0	0	25,000
County-wide	8/28/1978	F2	0	0	2,500
County-wide	6/7/1980	F2	0	0	2.5 million
County-wide	6/7/1980	F3	0	0	250,000
McKnightstown	6/24/1996	F1	0	0	None Reported
McKnightstown	7/19/1996	F1	0	0	None Reported
York Springs	9/6/1996	F1	0	0	None Reported
Table Rock	4/1/1998	F1	0	0	None Reported
Heidlersburg	3/3/1999	F0	0	0	25,000
Littlestown	8/20/1999	F1	0	0	None Reported
Fountain Dale	8/30/2005	F1	0	0	None Reported
Gettysburg	8/30/2005	F1	0	0	None Reported
Seven Stars	8/30/2005	F1	0	0	None Reported

Figure 4.3.10-1 Map showing tornado events and tracks in Adams County .



Windstorm events may be the result of thunderstorms, hurricanes, tropical storms, winter storms, or nor'easters. There have been 121 events with wind speeds of greater than 50 knots, as shown in Table 4.3.10-3. These events frequently occurred in conjunction with thunderstorms.

Table 4.3.10-3 Previous windstorms over 50 knots (NCDC, 2014).

LOCATION	DATE	WIND SPEED	DEATHS	INJURIES	PROPERTY DAMAGE ($)	CROP DAMAGE
County-Wide	8/11/1980	56 kts.	0	0	None Reported	None Reported
County-Wide	6/30/1987	87 kts.	1	0	None Reported	None Reported
County-Wide	11/16/1989	54 kts.	0	0	None Reported	None Reported
County-Wide	6/18/1990	63 kts.	0	0	None Reported	None Reported
County-Wide	4/9/1991	61 kts.	0	0	None Reported	None Reported
County-Wide	7/7/1991	50 kts.	0	0	None Reported	None Reported
County-Wide	2/14/1992	76 kts.	0	0	None Reported	None Reported
York Springs	7/30/1996	50 kts.	0	0	None Reported	None Reported
Abbottstown	9/28/1996	50 kts.	0	0	None Reported	None Reported
Gettysburg	10/18/1996	50 kts.	0	0	None Reported	None Reported
Biglerville	6/18/1997	51 kts.	0	0	None Reported	None Reported
York Springs	7/28/1997	51 kts.	0	0	None Reported	None Reported
Fountain Dale	5/29/1998	51 kts.	0	0	None Reported	None Reported
Cashtown	5/31/1998	51 kts.	0	0	None Reported	None Reported
Gettysburg	6/16/1998	51 kts.	0	0	None Reported	None Reported
County-Wide	9/16/1999	60 kts.	0	0	None Reported	None Reported
County-Wide	9/29/1999	60 kts.	0	0	None Reported	None Reported
County-Wide	4/9/2000	58 kts.	0	0	None Reported	None Reported
East Berlin	4/9/2001	50 kts.	0	0	None Reported	None Reported
Biglerville	6/12/2001	50 kts.	0	0	None Reported	None Reported
Gettysburg	6/12/2001	50 kts.	0	0	None Reported	None Reported
Gettysburg	6/20/2001	50 kts.	0	0	None Reported	None Reported
East Berlin	7/1/2001	50 kts.	0	0	None Reported	None Reported
Fountain Dale	7/10/2001	50 kts.	0	0	None Reported	None Reported
Gettysburg	8/13/2001	50 kts.	0	0	None Reported	None Reported
Edgegrove	9/24/2001	50 kts.	0	0	None Reported	None Reported
County-Wide	3/9/2002	50 kts.	0	0	None Reported	None Reported
County-Wide	3/21/2002	50 kts.	0	0	None Reported	None Reported
New Oxford	4/28/2002	50 kts.	0	0	None Reported	None Reported

Table 4.3.10-3 Previous windstorms over 50 knots (NCDC, 2014).

LOCATION	DATE	WIND SPEED	DEATHS	INJURIES	PROPERTY DAMAGE ($)	CROP DAMAGE
Fairfield	5/2/2002	50 kts.	0	0	None Reported	None Reported
Gettysburg	6/27/2002	50 kts.	0	0	None Reported	None Reported
McSherrystown	9/27/2002	50 kts.	0	0	None Reported	None Reported
Gettysburg	7/6/2003	50 kts.	0	0	None Reported	None Reported
East Berlin	7/21/2003	60 kts.	0	0	10,000	None Reported
Gettysburg	7/21/2003	50 kts.	0	0	None Reported	None Reported
York Springs	7/21/2003	50 kts.	0	0	5,000	None Reported
Gettysburg	8/26/2003	50 kts.	0	0	None Reported	None Reported
County-Wide	11/13/2003	60 kts.	0	0	None Reported	None Reported
York Springs	5/7/2004	50 kts.	0	0	None Reported	None Reported
Biglerville	6/14/2004	50 kts.	0	0	5,000	None Reported
Gettysburg	6/17/2004	50 kts.	0	0	None Reported	None Reported
Biglerville	7/14/2004	50 kts.	0	0	None Reported	None Reported
Cashtown	8/19/2004	50 kts.	0	0	None Reported	None Reported
Arendtsville	6/6/2005	50 kts.	0	0	None Reported	None Reported
Biglerville	6/6/2005	50 kts.	0	0	None Reported	None Reported
Biglerville	6/6/2005	50 kts.	0	0	None Reported	None Reported
Fairfield	6/6/2005	50 kts.	0	0	None Reported	None Reported
Gettysburg	6/6/2005	50 kts.	0	0	None Reported	None Reported
Bonneauville	8/7/2005	50 kts.	0	0	None Reported	None Reported
New Oxford	8/7/2005	50 kts.	0	0	None Reported	None Reported
Biglerville	11/29/2005	50 kts.	0	0	5,000	None Reported
Biglerville	7/4/2006	50 kts.	0	0	None Reported	None Reported
Gettysburg	7/4/2006	50 kts.	0	0	None Reported	None Reported
Gettysburg	7/18/2006	50 kts.	0	0	None Reported	None Reported
York Springs	7/18/2006	50 kts.	0	0	None Reported	None Reported
East Berlin	7/27/2006	50 kts.	0	0	None Reported	None Reported
York Springs	7/27/2006	50 kts.	0	0	None Reported	None Reported
McSherrystown	6/8/2007	50 kts.	0	0	None Reported	None Reported
McKnightstown	6/8/2007	50 kts.	0	0	None Reported	None Reported
Greenmount	6/13/2007	50 kts.	0	0	None Reported	None Reported
McKnightstown	6/13/2007	50 kts.	0	0	None Reported	None Reported
McSherrystown	8/3/2007	50 kts.	0	0	None Reported	None Reported

Table 4.3.10-3 Previous windstorms over 50 knots (NCDC, 2014).

LOCATION	DATE	WIND SPEED	DEATHS	INJURIES	PROPERTY DAMAGE ($)	CROP DAMAGE
New Oxford	8/3/2007	50 kts.	0	0	None Reported	None Reported
Fairfield	8/25/2007	50 kts.	0	0	None Reported	None Reported
Arendtsville	6/23/2008	50 kts.	0	0	2.50K	None Reported
Biglerville	6/23/2008	50 kts.	0	0	2.50K	None Reported
East Berlin	7/27/2008	50 kts.	0	0	None Reported	None Reported
East Berlin	8/2/2008	50 kts.	0	0	None Reported	None Reported
Gettysburg	8/7/2008	61 kts.	0	0	None Reported	None Reported
Cashtown	8/10/2008	50 kts.	0	0	1,000	None Reported
County-Wide	12/31/2008	50 kts.	0	0	5,000	None Reported
County-Wide	2/12/2009	50 kts.	0	0	25,000	None Reported
New Oxford	8/11/2009	50 kts.	0	0	10,000	None Reported
Table Rock	8/21/2009	61 kts.	0	0	5,000	200
Biglerville	4/8/2010	50 kts.	0	0	5,000	None Reported
Cashtown	5/14/2010	60 kts.	0	0	None Reported	None Reported
New Oxford	5/27/2010	50 kts.	0	0	5,000	None Reported
McSherrystown	6/4/2010	70 kts.	0	0	75,000	None Reported
McSherrystown	6/4/2010	50 kts.	0	0	50,000	None Reported
Wenksville	6/4/2010	50 kts.	0	0	5,000	None Reported
Gardners	7/25/2010	50 kts.	0	0	5,000	None Reported
Orrtanna	7/25/2010	62 kts.	0	0	5,000	None Reported
Greenmount	8/16/2010	50 kts.	0	0	5,000	None Reported
York Springs	8/16/2010	50 kts.	0	0	5,000	None Reported
New Oxford	9/22/2010	50 kts.	0	0	5,000	None Reported
Two Taverns	9/22/2010	50 kts.	0	0	5,000	None Reported
County-Wide	2/25/2011	58 kts.	0	0	None Reported	None Reported
Abbotstown	4/16/2011	50 kts.	0	0	5,000	None Reported
Bermudian	4/28/2011	50 kts.	0	0	5,000	None Reported
Biglerville	4/28/2011	50 kts.	0	0	5,000	None Reported
Biglerville	4/28/2011	50 kts.	0	0	5,000	None Reported
Fairfield	5/26/2011	50 kts.	0	0	5,000	None Reported
County-Wide	6/9/2011	50 kts.	0	0	5,000	None Reported
Fairfield	9/14/2011	50 kts.	0	0	5,000	None Reported
Gettysburg	9/14/2011	50 kts.	0	0	5,000	None Reported

Table 4.3.10-3 Previous windstorms over 50 knots (NCDC, 2014).

LOCATION	DATE	WIND SPEED	DEATHS	INJURIES	PROPERTY DAMAGE ($)	CROP DAMAGE
Fairfield Arpt	4/26/2012	50 kts.	0	0	3,000	None Reported
Bendersville	5/27/2012	50 kts.	0	0	5,000	None Reported
York Springs	7/5/2012	50 kts.	0	0	5,000	None Reported
Mcknightstown	7/18/2012	50 kts.	0	0	5,000	None Reported
Berlin Junction	8/3/2012	50 kts.	0	0	5,000	None Reported
Hampton	8/3/2012	50 kts.	0	0	5,000	None Reported
Round Top	9/1/2012	50 kts.	0	0	None Reported	None Reported
Sells Station	9/1/2012	50 kts.	0	0	5,000	None Reported
Round Top	9/7/2012	50 kts.	0	0	5,000	None Reported
Bendersville	9/8/2012	50 kts.	0	0	5,000	None Reported
Fairfield Arpt	9/8/2012	50 kts.	0	0	5,000	None Reported
York Spgs	9/8/2012	50 kts.	0	0	5,000	None Reported
County-Wide	10/29/2012	56 kts.	0	0	None Reported	None Reported
Berlin Junction	6/13/2013	50 kts.	0	0	2,000	None Reported
Orrtanna	6/25/2013	50 kts.	0	0	5,000	None Reported
Virginia Mills	6/25/2013	50 kts.	0	0	2,000	None Reported
Biglerville	6/28/2013	50 kts.	0	0	2,000	None Reported
York Springs	6/30/2013	50 kts.	0	0	5,000	None Reported
Gettysburg	7/19/2013	50 kts.	0	0	5,000	None Reported
County-Wide	9/12/2013	50 kts.	0	0	2,000	None Reported
County-Wide	9/12/2013	50 kts.	0	0	2,000	None Reported
Granite Hill	11/1/2013	50 kts.	0	0	None Reported	None Reported
Brush Run	11/18/2013	50 kts.	0	0	None Reported	None Reported
Gettysburg	11/18/2013	50 kts.	0	0	None Reported	None Reported
Virginia Mills	11/18/2013	50 kts.	0	0	None Reported	None Reported
Totals:			**1**	**0**	**364,000**	**200**

Some additional instances of thunderstorms and high winds were reported through the Pennsylvania Emergency Incident Reporting System (PEIRS), shown in Table 4.3.10-4. Since PEMA no longer uses the PEIRS system to report events, incident summaries are only available for a short time frame. However, the comments associated with these events provide an indication or prior events and damages incurred in Adams County.

Table 4.3.10-4 Thunderstorms and high winds reported to PEIRS, 2004-2009.

LOCATION	DATE	TIME	STORM	COMMENTS
County-wide	2/12/2009	1:53:00 PM	High Winds	Part of a residential roof blew off as a result of high winds
Littlestown Boro	2/10/2008	3:30:00 PM	High Winds	Roof blew off due to high winds
McSherrystown, Conewago & Berwick	8/3/2007	6:46:00 PM	Severe Thunderstorm	Massive downburst hit Adams County. Trees and wires down. Power outages; unknown number of customers affected. SR 116 was closed.
County-wide	10/29/2006	7:36:00 AM	High Winds	25 reports of trees and/or wires down, which resulted in several road closures. Several areas lost power
Biglerville	6/14/2004	9:08:00 PM	Severe Thunderstorm	Slow moving thunderstorms with very heavy rainfall.
County-wide	9/28/2004	5:30:00 PM	Severe Thunderstorm	Several roads were closed and or washed out. An embankment was washed out.

4.3.10.4. Future Occurrence

The probability of a tornado or windstorm directly affecting Adams County is relatively high. However, those that have occurred were relatively weak and caused little destruction (with the exception of the 1980 tornadoes). 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 the County in the past, and will strike the County once every four years. The probability of the County and its municipalities experiencing severe winds is difficult to quantify, but is considered relatively high. The degree of damage and impact to the county will vary as it has in years past.

Overall, the probably of future tornado and windstorms should be considered *likely* according to the Risk Factor Methodology (see Table 4.4.1-1).

4.3.10.5. Vulnerability Assessment

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.

A growing concern for Adams County is the increasing number of people residing in manufactured homes or campers on an almost year-round basis. According to a survey completed by the Center for Rural Pennsylvania in 2009, Adams County had the highest

percentage (36 percent) of mobile homes in the rural counties included in the report. The report also noted that manufactured homes in Adams County are not limited to one particular area of the County, but rather spread throughout. Adding to this concern, a great number of laborers for the fruit-growing industry in Adams County have historically resided in campers and manufactured homes during the growing season, and more often, permanently. These populations are hard to track and are vulnerable to hazards such as severe thunderstorms, high-wind events, and tornadoes. Mobile homes and commercial trailers may be at higher risk during tornadoes and windstorms because of their lightweight, unanchored design. Table 4.3.10-5 shows the number of mobile homes and commercial trailers per municipality in Adams County. Tyrone, Mount Pleasant, and Berwick Townships have the highest proportion of mobile homes and commercial trailers with over 20% of all structures

Table 4.3.10-5 Mobile homes and commercial trailers per jurisdiction (Adams County GIS, 2014).

MUNICIPALITY	TOTAL STRUCTURES	NUMBER OF MOBILE HOMES AND COMMERCIAL TRAILERS	PERCENT MOBILE HOMES AND COMMERCIAL TRAILERS
Abbottstown Borough	378	55	14.6%
Arendtsville Borough	342	5	1.5%
Bendersville Borough	243	12	4.9%
Berwick Township	1,032	315	30.5%
Biglerville Borough	444	1	0.2%
Bonneauville Borough	659	3	0.5%
Butler Township	1,141	196	17.2%
Carroll Valley Borough	1,535	5	0.3%
Conewago Township	3,067	31	1.0%
Cumberland Township	3,208	298	9.3%
East Berlin Borough	634	12	1.9%
Fairfield Borough	287	7	2.4%
Franklin Township	2,394	294	12.3%
Freedom Township	399	18	4.5%
Germany Township	1,102	37	3.4%
Gettysburg Borough	2,129	3	0.1%
Hamilton Township	1,117	111	9.9%
Hamiltonban Township	1,059	78	7.4%
Highland Township	450	19	4.2%
Huntington Township	977	108	11.1%
Latimore Township	1,117	91	8.1%
Liberty Township	627	30	4.8%
Littlestown Borough	1,869	0	0.0%

Table 4.3.10-5 Mobile homes and commercial trailers per jurisdiction (Adams County GIS, 2014).

MUNICIPALITY	TOTAL STRUCTURES	NUMBER OF MOBILE HOMES AND COMMERCIAL TRAILERS	PERCENT MOBILE HOMES AND COMMERCIAL TRAILERS
McSherrystown Borough	1,050	7	0.7%
Menallen Township	1,603	158	9.9%
Mt Joy Township	1,683	72	4.3%
Mt Pleasant Township	1,968	415	21.1%
New Oxford Borough	677	3	0.4%
Oxford Township	2,257	113	5.0%
Reading Township	2,416	319	13.2%
Straban Township	1,998	234	11.7%
Tyrone Township	911	247	27.1%
Union Township	1,226	36	2.9%
York Springs Borough	207	1	0.5%
TOTAL	**42,206**	**3,334**	**7.9%**

4.3.11. Wildfire

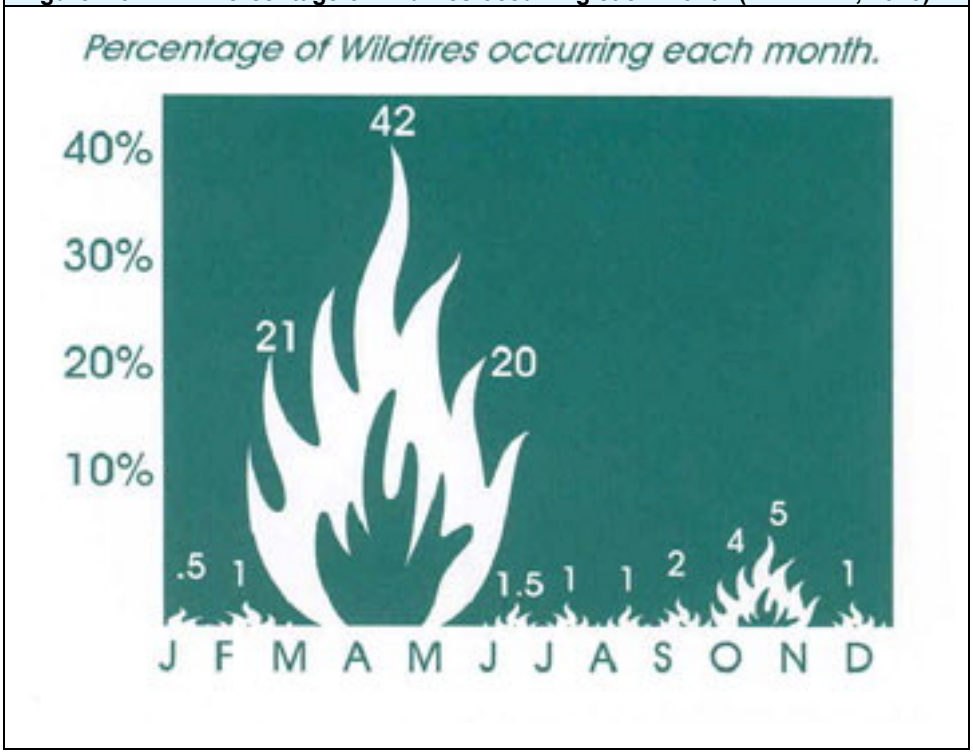
4.3.11.1. Location and Extent

Adams County experiences a number of fires every year, most of which are small and affect one or more residential structures. The risk of urban structure fires is essentially the same throughout the County (assuming building codes are in place and are enforced). However, a significant portion of County land consists of forests or farms, which are more prone to wildfires. As a result, this HMP focuses on wildfires.

Wildfires occur throughout wooded and open vegetation areas of Pennsylvania. They can occur any time of the year, but mostly occur during long, dry hot spells. Any small fire, if not quickly detected and suppressed, can get out of control. Wildfires can be started by human negligence, lightning strikes, and rare instances of spontaneous combustion. There have been major fires in the state and in the state forest that covers the western portion (e.g., Franklin, Hamiltonban, and Menallen Townships) of the County.

The greatest potential for wildfires is in the spring months of March, April and May, and, to a lesser extent, the autumn months of October and November. In the spring, bare trees allow sunlight to reach the forest floor, drying fallen leaves and other ground debris. In the fall, dried leaves are also fuel for fires. The percentage of wildfires occurring each month in Pennsylvania is shown in Figure 4.3.11-1. This pattern is consistent with wildfires in Adams County.

Figure 4.3.11-1 Percentage of wildfires occurring each month (PA DCNR, 2013).



4.3.11.2. Range of Magnitude

As stated in Section 4.3.11.1, wildfires can occur at any time of the year, but mostly occur during long, dry, hot spells. Any small fire in a wooded area, if not quickly detected and suppressed, can get out of control. Most wildfires are caused by human carelessness, negligence, and ignorance. However, some are precipitated by lightning strikes and in rare instances, spontaneous combustion.

Wildfires in the Commonwealth of Pennsylvania can occur in fields, grass, and brush as well as in the forest itself. In Adams County, much of the northwestern portion of the County consists of forested areas. Under dry conditions or droughts, wildfires have the potential to burn forests as well as croplands. In the fall, dried leaves are also fuel for fires. Ninety-eight percent of wildfires in Pennsylvania are caused by people, often by debris burns. Several fires have started in a private backyard and traveled through dead grasses and weeds into bordering woodlands.

An uncontrolled fire (wildfire) is one of the most destructive fires caused by nature or man. It kills people, livestock, and wildlife. It destroys property, valuable timber, forage, and inestimable scenic and recreational value. Potential aftermath of wildfires includes severe erosion, silting of stream beds and reservoirs, and flooding due to a loss of ground cover.

Vegetation loss is often an environmental concern with wildfires, but it typically is not a serious impact since natural re-growth occurs with time. The most significant environmental impact is the potential for severe erosion, silting of stream beds and reservoirs, and flooding due to ground-cover loss following a fire event.

Wildfires also have a positive environmental impact in that they burn dead trees, leaves, and grasses to allow more open spaces for new and different types of vegetation to grow and receive sunlight. Another positive effect of a wildfire is that it stimulates the growth of new shoots on trees and shrubs and its heat can open pine cones and other seed pods.

The worst wildfire in Adams County burned 18 acres in Franklin Township in 2007. The specific cause of this fire is unknown. No property damage, injuries, or deaths were reported.

4.3.11.3. Past Occurrence

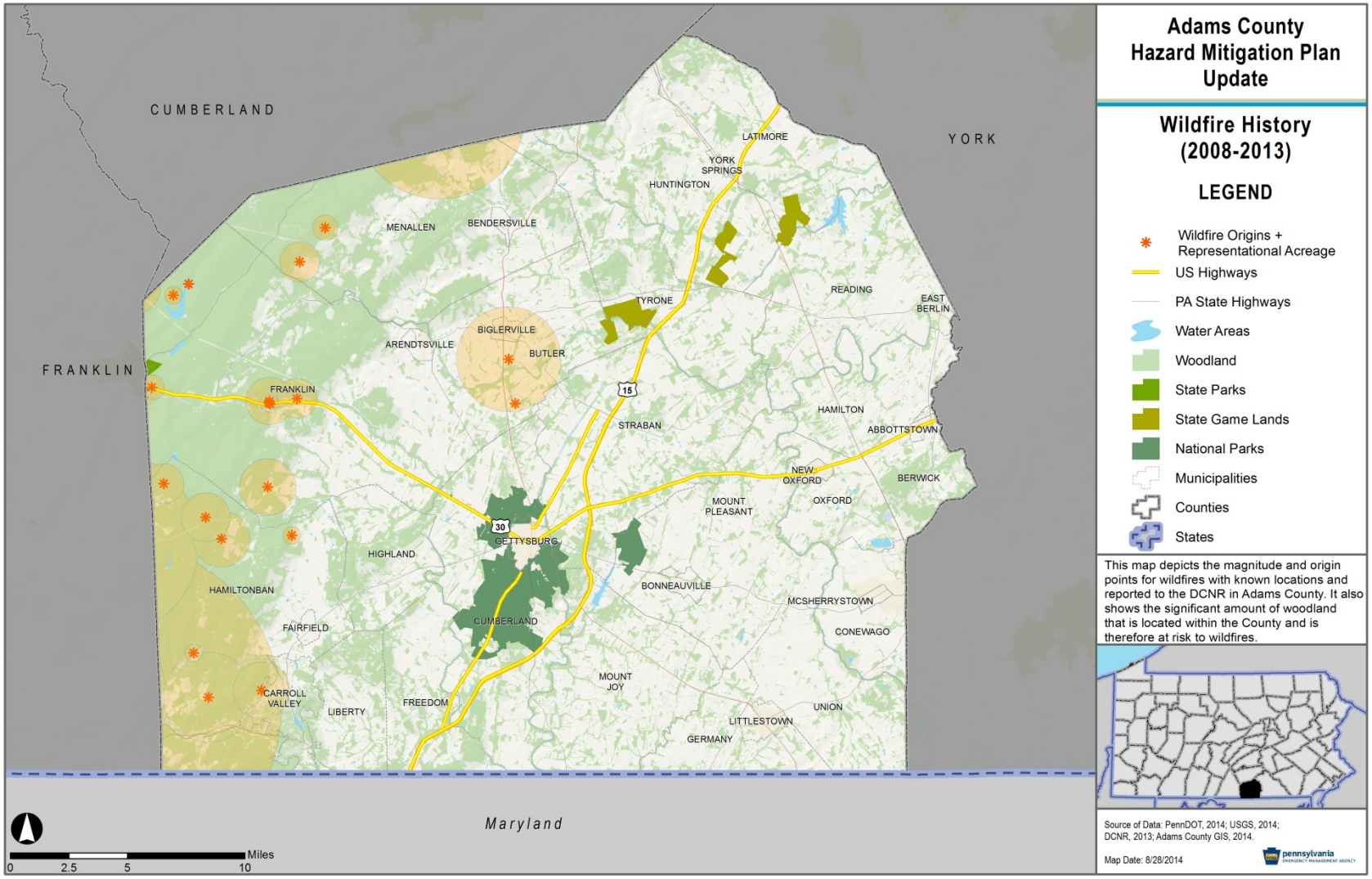
Since 1977, there have been more than 230 major wildfires in the Commonwealth, resulting in more than 100,000 acres of forest being destroyed. According to DCNR, in Adams County, over 52 acres have burned since 2002, the worst burning 18 acres in Franklin Township in 2007. The specific cause of this fire is unknown. No property damage, injuries, or deaths were reported. Table 4.3.11-1 lists all wildfire events in Adams County reported to DCNR since 2002. Note that specific dates were not available for events after 2008.

Table 4.3.11-1 Wildfire events reported to DCNR.

DATE	LOCATION	ACRES BURNED	DATE	LOCATION	ACRES BURNED
2/8/2002	Menallen Township	0.1	10/8/2007	Franklin Township	18.0
8/4/2002	Hamiltonban Township	1.0	11/25/2007	Menallen Township	1.5
8/11/2002	Hamiltonban Township	2.5	3/26/2008	Franklin Township	0.2
8/13/2002	Franklin Township	0.000220	4/10/2008	Menallen Township	0.5
12/18/2004	Franklin Township	0.4	6/24/2008	Franklin Township	0.1
4/6/2005	Menallen Township	0.7	10/20/2008	Hamiltonban Township	0.1
4/9/2005	Franklin Township	1.0	2009	Hamiltonban Township	0.10
4/11/2005	Franklin Township	0.3	2009	Butler Township	0.10
4/19/2005	Menallen Township	4.0	2009	Butler Township	3.40
5/13/2005	Franklin Township	1.5	2010	Hamiltonban Township	2.50
2/26/2006	Hamiltonban Township	2.5	2010	Hamiltonban Township	0.75
3/1/2006	Franklin Township	0.4	2010	Franklin Township	0.10
3/1/2006	Franklin Township	0.4	2010	Franklin Township	0.10
3/1/2006	Liberty Township	2.0	2010	Franklin Township	0.70
3/8/2006	Hamiltonban Township	0.6	2010	Franklin Township	0.50
3/15/2006	Menallen Township	0.6	2011	Franklin Township	0.01
3/19/2006	Hamiltonban Township	0.5	2011	Menallen Township	0.20
3/22/2006	Hamiltonban Township	0.2	2012	Hamiltonban Township	1.00
4/30/2007	Hamiltonban Township	1.0	2012	Franklin Township	1.00
5/14/2007	Franklin Township	1.0	2012	Hamiltonban Township	0.50

Location information was available for wildfires from 2008-2013 from DCNR. As shown in Figure 4.3.11-2, wildfires have been concentrated in western Adams County. The map also displays wooded lands countywide; these areas are potentially vulnerable to future wildfires.

Figure 4.3.11-2 Map showing location of wildfire events with known locations reported to DCNR in Adams County from 2008-2013 (PADCNR-BOF, 2013).



A major concern with respect to wildfires is the Michaux State Forest, located in Adams, Cumberland, and Franklin Counties. The Michaux State Forest totals more than 85,000 acres and is utilized for not only recreational purposes, but also wood products and timber resources. Numerous local communities in the three-county area also depend on the forest for its pure water supplies. Therefore, fires within the forest can have severe impacts on the well-being of residents and the local economy.

According to the PA DCNR, Forestry Bureau, there have been a total of 836 acres burned as a result of forest fires in the Michaux State Forest between 1995 and 2007. Since 2004, 264.6 acres have been burned. The worst fire occurred in 2001, burning nearly 400 acres of the forest. These forest fires are the result of numerous causes, including campfires, debris, lightning, and smoking. Data on wildfires in the Michaux State Forest is not available after 2007.

4.3.11.4. Future Occurrence

Weather conditions like drought can increase the likelihood of fires burning out of control and becoming a wildfire. Any fire, without the quick response or attention of firefighters, forestry personnel, or visitors to the forest, has the potential to become a wildfire. The probability of future wildfires should be considered *likely* according to the Risk Factor Methodology (see Table 4.4.1-1). However, the likelihood of one of those fires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Weather conditions, particularly drought events, increase the likelihood of wildfires occurring.

It is important to note that most wildfires in Pennsylvania are human-caused. As a result, the occurrence of future wildfire events will strongly depend on patterns of human activity. Events are more likely to occur in wildfire-prone areas experiencing new or additional development. Wildfires may also be more likely after invasive species infestations or high wind events; these events would add additional potential fuel load to fire-prone locations.

4.3.11.5. Vulnerability Assessment

The Pennsylvania Bureau of Forestry has conducted an independent wildfire hazard risk assessment for the various municipalities across Adams County. Results of that assessment are shown in Figure 4.3.7-2. *Wildfire hazard* is defined based on conditions that affect wildfire ignition and/or behavior such as fuel, topography and local weather. Based on this assessment, three jurisdictions in western Adams County have a *high* wildfire rating: Franklin Township, Hamiltonban Township, and Menallen Township. Table 4.3.11-2 shows the total addressable structures and critical facilities in the high wildfire hazard areas, and Table 4.3.11-3 shows the number of structures by generalized land use type.

Five municipalities have a *medium* wildfire hazard potential: Liberty, Tyrone, Huntington, Berwick, and Liberty Townships. The remaining communities have a *low* wildfire hazard. The individual vulnerability of communities will differ based on the design of the urban/wildland interface, the number of ingress and egress points into a community, and the availability of water to fight fires.

Table 4.3.11-2 Structures and critical facilities located in wildfire high hazard areas of Adams County.

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN WILDFIRE HIGH HAZARD AREAS	PERCENT OF STRUCTURES IN WILDFIRE HIGH HAZARD AREAS	TOTAL CRITICAL FACILITIES	TOTAL CRITICAL FACILITIES IN WILDFIRE HIGH HAZARD AREAS	PERCENT CRITICAL FACILITIES IN WILDFIRE HIGH HAZARD AREAS
Abbottstown Borough	378	0	0.0%	5	0	0.0%
Arendtsville Borough	342	0	0.0%	6	0	0.0%
Bendersville Borough	243	0	0.0%	9	0	0.0%
Berwick Township	1,032	0	0.0%	5	0	0.0%
Biglerville Borough	444	0	0.0%	13	0	0.0%
Bonneauville Borough	659	0	0.0%	5	0	0.0%
Butler Township	1,141	0	0.0%	12	0	0.0%
Carroll Valley Borough	1,535	0	0.0%	8	0	0.0%
Conewago Township	3,067	0	0.0%	20	0	0.0%
Cumberland Township	3,208	0	0.0%	27	0	0.0%
East Berlin Borough	634	0	0.0%	12	0	0.0%
Fairfield Borough	287	0	0.0%	8	0	0.0%
Franklin Township	2,394	2,394	100.0%	31	31	100.0%
Freedom Township	399	0	0.0%	2	0	0.0%
Germany Township	1,102	0	0.0%	9	0	0.0%
Gettysburg Borough	2,129	0	0.0%	30	0	0.0%
Hamilton Township	1,117	0	0.0%	6	0	0.0%
Hamiltonban Township	1,059	1,059	100.0%	21	21	100.0%
Highland Township	450	0	0.0%	5	0	0.0%
Huntington Township	977	0	0.0%	18	0	0.0%
Latimore Township	1,117	0	0.0%	13	0	0.0%
Liberty Township	627	0	0.0%	5	0	0.0%
Littlestown Borough	1,869	0	0.0%	25	0	0.0%
McSherrystown Borough	1,050	0	0.0%	14	0	0.0%
Menallen Township	1,603	1,603	100.0%	16	16	100.0%
Mt Joy Township	1,683	0	0.0%	9	0	0.0%
Mt Pleasant Township	1,968	0	0.0%	6	0	0.0%
New Oxford Borough	677	0	0.0%	19	0	0.0%
Oxford Township	2,257	0	0.0%	19	0	0.0%
Reading Township	2,416	0	0.0%	13	0	0.0%
Straban Township	1,998	0	0.0%	27	0	0.0%
Tyrone Township	911	0	0.0%	8	0	0.0%
Union Township	1,226	0	0.0%	8	0	0.0%
York Springs Borough	207	0	0.0%	5	0	0.0%
TOTAL	**42,206**	**5,056**	**12.0%**	**439**	**68**	**15.5%**

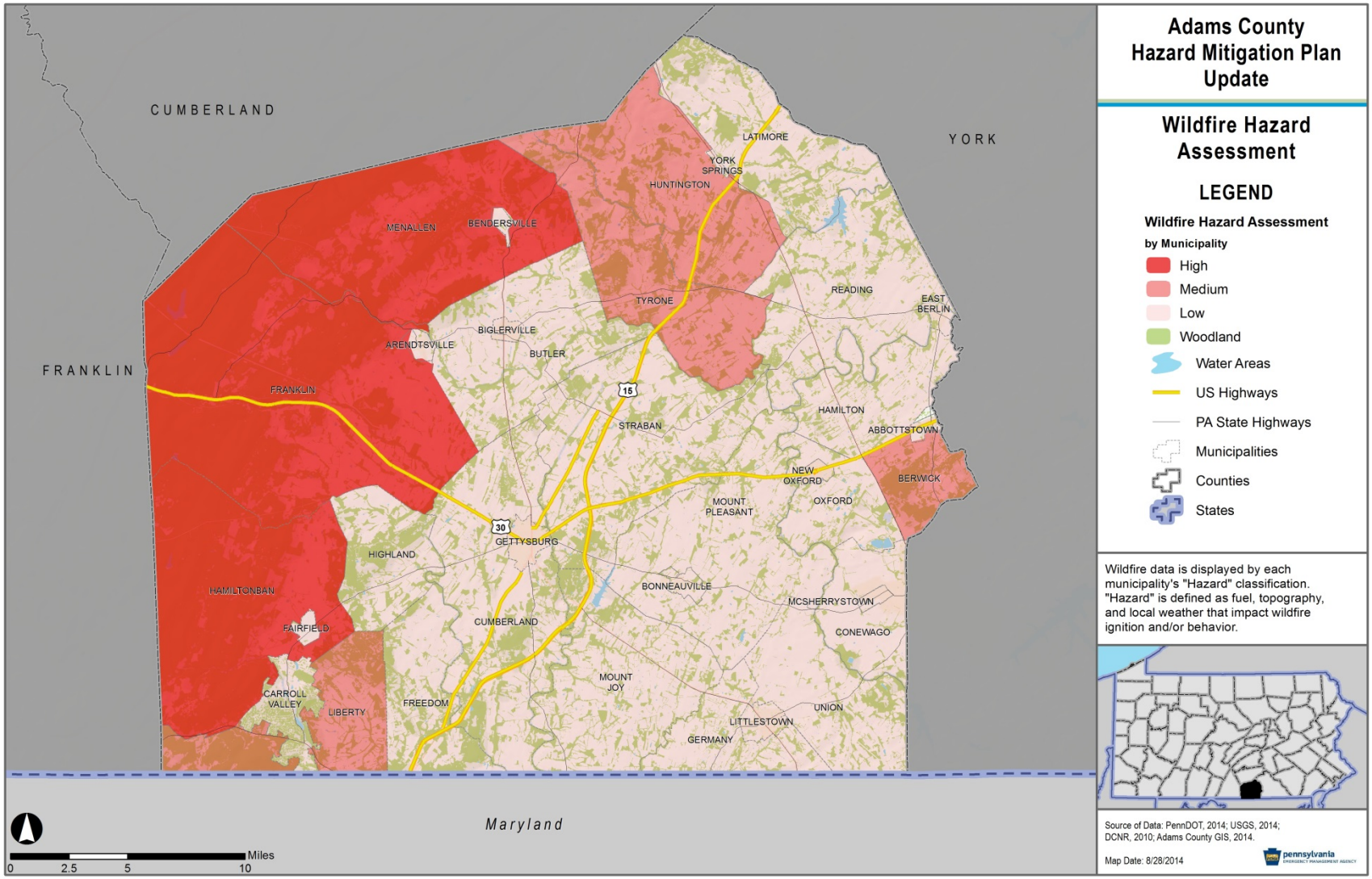
Table 4.3.11-3 Structures in Wildfire High Hazard Areas by Generalized Land Use Type

MUNICIPALITY	TOTAL STRUCTURES	CIVIC/ INSTITUTIONAL	COMMERCIAL	INDUSTRIAL	RESIDENTIAL	TRANSPORTATION/ UTILITIES	UNKNOWN	GRAND TOTAL
Abbottstown Borough	378	0	0	0	0	0	0	0
Arendtsville Borough	342	0	0	0	0	0	0	0
Bendersville Borough	243	0	0	0	0	0	0	0
Berwick Township	1,032	0	0	0	0	0	0	0
Biglerville Borough	444	0	0	0	0	0	0	0
Bonneauville Borough	659	0	0	0	0	0	0	0
Butler Township	1,141	0	0	0	0	0	0	0
Carroll Valley Borough	1,535	0	0	0	0	0	0	0
Conewago Township	3,067	0	0	0	0	0	0	0
Cumberland Township	3,208	0	0	0	0	0	0	0
East Berlin Borough	634	0	0	0	0	0	0	0
Fairfield Borough	287	0	0	0	0	0	0	0
Franklin Township	2,394	26	74	1	2169	11	113	2394
Freedom Township	399	0	0	0	0	0	0	0
Germany Township	1,102	0	0	0	0	0	0	0
Gettysburg Borough	2,129	0	0	0	0	0	0	0
Hamilton Township	1,117	0	0	0	0	0	0	0
Hamiltonban Township	1,059	17	13	3	975	5	46	1059
Highland Township	450	0	0	0	0	0	0	0
Huntington Township	977	0	0	0	0	0	0	0
Latimore Township	1,117	0	0	0	0	0	0	0
Liberty Township	627	0	0	0	0	0	0	0
Littlestown Borough	1,869	0	0	0	0	0	0	0
McSherrystown Borough	1,050	0	0	0	0	0	0	0
Menallen Township	1,603	17	19	8	1441	6	112	1603
Mt Joy Township	1,683	0	0	0	0	0	0	0

Table 4.3.11-3 Structures in Wildfire High Hazard Areas by Generalized Land Use Type

MUNICIPALITY	TOTAL STRUCTURES	CIVIC/ INSTITUTIONAL	COMMERCIAL	INDUSTRIAL	RESIDENTIAL	TRANSPORTATION/ UTILITIES	UNKNOWN	GRAND TOTAL
Mt Pleasant Township	1,968	0	0	0	0	0	0	0
New Oxford Borough	677	0	0	0	0	0	0	0
Oxford Township	2,257	0	0	0	0	0	0	0
Reading Township	2,416	0	0	0	0	0	0	0
Straban Township	1,998	0	0	0	0	0	0	0
Tyrone Township	911	0	0	0	0	0	0	0
Union Township	1,226	0	0	0	0	0	0	0
York Springs Borough	207	0	0	0	0	0	0	0
TOTAL	**42,206**	**60**	**106**	**12**	**4,585**	**22**	**271**	**5,056**

Figure 4.3.11-3 Map showing wildfire *hazard* by jurisdiction across Adams County.



Another component of jurisdictional vulnerability involves examining the number of structures and critical facilities located in wooded areas, as any wooded area in the county is vulnerable to a wildfire. Table 4.3.11-4 shows the number of structures and critical facilities in wooded areas of Adams County, and Table 4.3.11-5 shows the number of structures by generalized land use type.

Table 4.3.11-4 Structures and critical facilities located in wooded areas of Adams County.

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN WOODED AREAS	PERCENT OF STRUCTURES IN WOODED AREAS	TOTAL CRITICAL FACILITIES	TOTAL CRITICAL FACILITIES IN WOODED AREAS	PERCENT CRITICAL FACILITIES IN WOODED AREAS
Abbottstown Borough	378	0	0.0%	5	0	0.0%
Arendtsville Borough	342	0	0.0%	6	0	0.0%
Bendersville Borough	243	0	0.0%	9	0	0.0%
Berwick Township	1,032	67	6.5%	5	0	0.0%
Biglerville Borough	444	0	0.0%	13	0	0.0%
Bonneauville Borough	659	2	0.3%	5	0	0.0%
Butler Township	1,141	35	3.1%	12	1	8.3%
Carroll Valley Borough	1,535	47	3.1%	8	0	0.0%
Conewago Township	3,067	1	0.0%	20	0	0.0%
Cumberland Township	3,208	73	2.3%	27	0	0.0%
East Berlin Borough	634	1	0.2%	12	0	0.0%
Fairfield Borough	287	0	0.0%	8	0	0.0%
Franklin Township	2,394	527	22.0%	31	2	6.5%
Freedom Township	399	41	10.3%	2	0	0.0%
Germany Township	1,102	19	1.7%	9	0	0.0%
Gettysburg Borough	2,129	0	0.0%	30	0	0.0%
Hamilton Township	1,117	33	3.0%	6	0	0.0%
Hamiltonban Township	1,059	146	13.8%	21	1	4.8%
Highland Township	450	21	4.7%	5	0	0.0%
Huntington Township	977	37	3.8%	18	1	5.6%
Latimore Township	1,117	33	3.0%	13	0	0.0%
Liberty Township	627	77	12.3%	5	0	0.0%
Littlestown Borough	1,869	9	0.5%	25	0	0.0%
McSherrystown Borough	1,050	1	0.1%	14	0	0.0%
Menallen Township	1,603	158	9.9%	16	1	6.3%
Mt Joy Township	1,683	54	3.2%	9	0	0.0%
Mt Pleasant Township	1,968	34	1.7%	6	0	0.0%
New Oxford Borough	677	4	0.6%	19	0	0.0%
Oxford Township	2,257	46	2.0%	19	0	0.0%

Table 4.3.11-4 Structures and critical facilities located in wooded areas of Adams County.

MUNICIPALITY	TOTAL STRUCTURES	STRUCTURES IN WOODED AREAS	PERCENT OF STRUCTURES IN WOODED AREAS	TOTAL CRITICAL FACILITIES	TOTAL CRITICAL FACILITIES IN WOODED AREAS	PERCENT CRITICAL FACILITIES IN WOODED AREAS
Reading Township	2,416	75	3.1%	13	0	0.0%
Straban Township	1,998	90	4.5%	27	1	3.7%
Tyrone Township	911	116	12.7%	8	0	0.0%
Union Township	1,226	9	0.7%	8	0	0.0%
York Springs Borough	207	0	0.0%	5	0	0.0%
TOTAL	**42,206**	**1,756**	**4.2%**	**439**	**7**	**1.6%**

Table 4.3.11-5 Structures in Wooded Areas by Generalized Land Use Type

MUNICIPALITY	TOTAL STRUCTURES	CIVIC/ INSTITUTIONAL	COMMERCIAL	INDUSTRIAL	RESIDENTIAL	TRANSPORTATION/ UTILITIES	UNKNOWN	GRAND TOTAL
Abbottstown Borough	378	0	0	0	0	0	0	0
Arendtsville Borough	342	0	0	0	0	0	0	0
Bendersville Borough	243	0	0	0	0	0	0	0
Berwick Township	1,032	0	0	0	65	0	2	67
Biglerville Borough	444	0	0	0	0	0	0	0
Bonneauville Borough	659	0	1	0	1	0	0	2
Butler Township	1,141	0	1	0	32	1	1	35
Carroll Valley Borough	1,535	0	0	0	47	0	0	47
Conewago Township	3,067	0	0	0	0	0	1	1
Cumberland Township	3,208	1	2	1	49	0	20	73
East Berlin Borough	634	0	1	0	0	0	0	1
Fairfield Borough	287	0	0	0	0	0	0	0
Franklin Township	2,394	2	2	0	477	0	46	527
Freedom Township	399	0	0	0	39	0	2	41
Germany Township	1,102	0	0	0	14	0	5	19
Gettysburg Borough	2,129	0	0	0	0	0	0	0
Hamilton Township	1,117	0	1	0	30	0	2	33
Hamiltonban Township	1,059	1	0	0	131	0	14	146
Highland Township	450	0	0	0	17	0	4	21
Huntington Township	977	1	0	0	29	0	7	37
Latimore Township	1,117	0	0	0	33	0	0	33
Liberty Township	627	0	0	0	36	0	41	77
Littlestown Borough	1,869	0	0	0	0	0	9	9

Table 4.3.11-5 Structures in Wooded Areas by Generalized Land Use Type

MUNICIPALITY	TOTAL STRUCTURES	CIVIC/ INSTITUTIONAL	COMMERCIAL	INDUSTRIAL	RESIDENTIAL	TRANSPORTATION/ UTILITIES	UNKNOWN	GRAND TOTAL
McSherrystown Borough	1,050	0	0	0	0	0	1	1
Menallen Township	1,603	1	1	0	147	0	9	158
Mt Joy Township	1,683	0	0	0	47	0	7	54
Mt Pleasant Township	1,968	0	0	0	33	0	1	34
New Oxford Borough	677	0	1	0	1	0	2	4
Oxford Township	2,257	1	2	0	43	0	0	46
Reading Township	2,416	0	0	0	71	0	4	75
Straban Township	1,998	1	2	0	81	1	5	90
Tyrone Township	911	0	0	0	110	0	6	116
Union Township	1,226	0	0	0	8	0	1	9
York Springs Borough	207	0	0	0	0	0	0	0
TOTAL	**42,206**	**8**	**14**	**1**	**1,541**	**2**	**190**	**1,756**

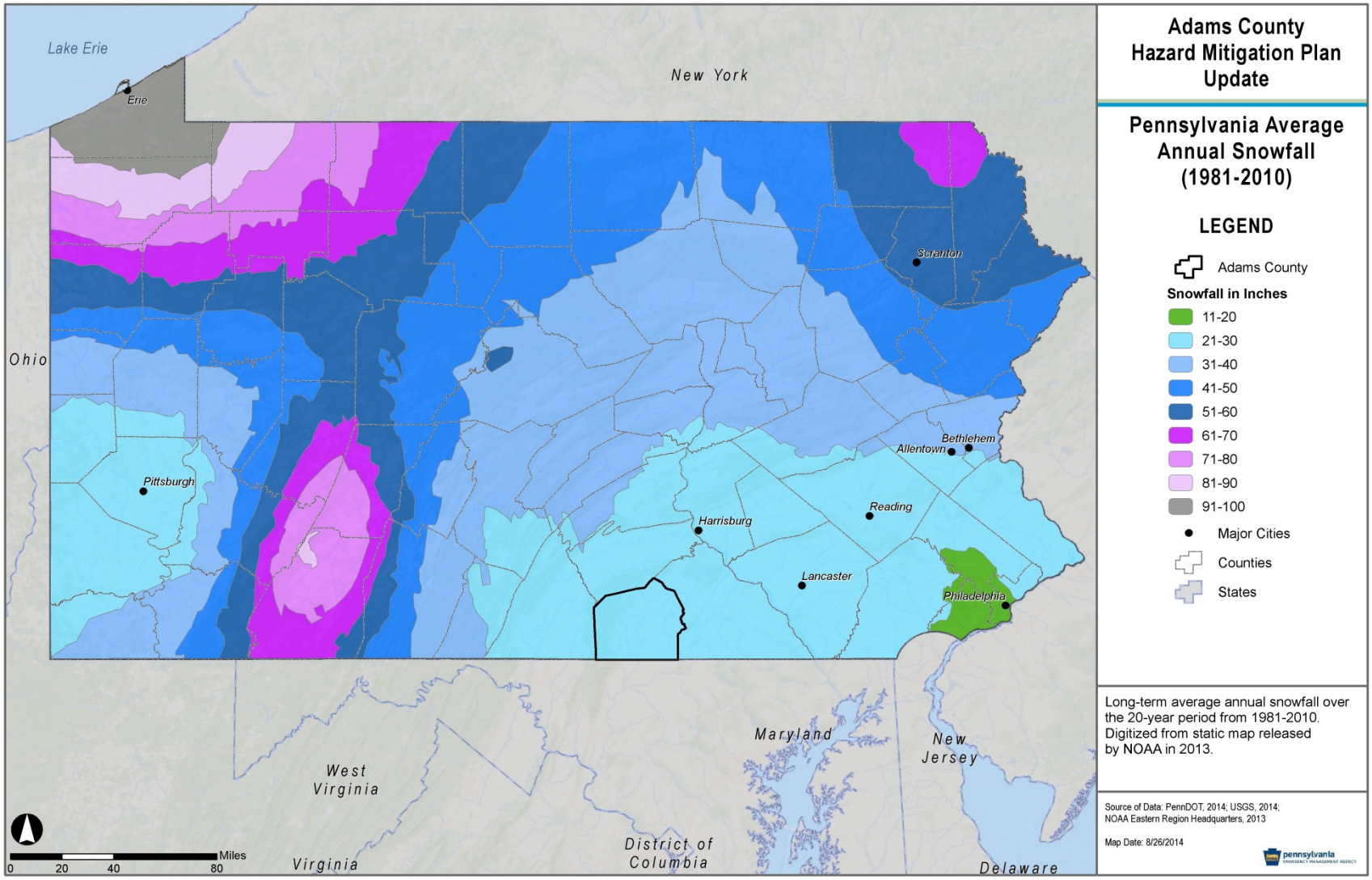
4.3.12. Winter Storm

4.3.12.1. Location and Extent

Winter storms are regional events that affect most of the Commonwealth on an annual basis. In many cases, surrounding states and even the larger northeastern U.S. region are affected. Winter storms for Adams County include blizzards and/or heavy snowfall, hail, heavy precipitation or ice storms, and temperature extremes. Snowstorms occur approximately five times per year. These storms are more prevalent in the northern and western regions of Pennsylvania and include ice and high wind.

Winter storms begin as low-pressure systems that move through Pennsylvania either following the jet stream or developing as extra-tropical cyclonic weather systems over the Atlantic Ocean called -Nor'easters. The effects of these storms can sometimes last for weeks, bringing several inches or even feet of snow and ice and cold temperatures. From 1981-2010, annual snowfall in Adams County averaged between 21 and 30 inches, shown in Figure 4.3.12-1. This is a reduction in average annual snowfall from the previous twenty-year average annual snowfall observation of between 30 and 40 inches.

Figure 4.3.12-1 Pennsylvania mean annual snowfall (NOAA NWS, 2012).



4.3.12.2. Range of Magnitude

Winter storms consist of cold temperatures, heavy snow or ice and sometimes strong winds. They begin as low-pressure systems that move through Pennsylvania usually following the jet stream. Due to their regular occurrence, these storms are considered hazards only when they result in damage to specific structures or cause disruption to traffic, communications, electric power, or other utilities.

A winter storm can adversely affect roadways, utilities, business activities, and can cause loss of life, frostbite and freezing conditions. They can result in the closing of secondary roads, particularly in rural locations, loss of utility services and depletion of oil heating supplies. These storms typically fall into one of the following categories:

- **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:** Significant accumulations of solid pellets which form from the freezing of raindrops or partially melted snowflakes causing slippery surfaces posing hazards to pedestrians and motorists.
- **Ice Storm:** Significant accumulations of rain or drizzle freezing on objects (trees, power lines, roadways, etc.) as it strikes them, causing slippery surfaces and damage from the sheer weight of ice accumulation.
- **Blizzard:** Wind velocity of 35 miles per hour or more, temperatures below freezing, considerable blowing snow with visibility frequently below one-quarter mile prevailing over an extended period of time.
- **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.

Average annual snowfall across Pennsylvania ranges from 11 inches in the southeast to over 100 inches in the northwest (see Figure 4.3.12-1**Error! Reference source not found.**). 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 (note particularly higher average snowfall in Somerset County in the Allegheny Mountains). 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.

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. About 30 percent of the County's population lives in such areas. Furthermore, winter storms may be more severe at higher altitudes, such as in the western parts of Franklin, Hamiltonban, and Menallen Townships. The worst winter storm to affect Adams County occurred in January 1994. This storm, as described in Section 4.3.12.3, caused approximately $998,000 in damages in Adams County, and caused serious power outages throughout the state.

Environmental impacts 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 excellent groundwater recharge. However, abrupt high temperatures following a heavy snowfall can cause rapid surface water runoff and severe flooding.

4.3.12.3. 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.

The first of these devastating winter storms occurred in early January, with record snowfall depths (in excess of 33 inches in the southwest and south-central portions of the Commonwealth), strong winds, and sleet/freezing rain. Numerous storm-related power outages were reported, and as many as 600,000 residents were without electricity, in some cases for several days at a time. A ravaging ice storm followed, affecting the southeastern portion of the Commonwealth, which closed major arterial roads and downed trees and power lines. Utility crews from a five-state area were called to assist in power restoration repairs. Officials from PP&L stated that this was the worst winter storm in the history of the company, and related damage-repair costs exceeded $5,000,000.

Serious power supply shortages continued through mid-January because of record cold temperatures at many places, causing sporadic power generation outages across the Commonwealth. The entire Pennsylvania-New Jersey-Maryland grid and its partners in the District of Columbia, New York, and Virginia experienced 15- to 30-minute rolling blackouts, threatening the lives of people and the safety of the facilities in which they resided. Power and fuel shortages affecting Pennsylvania and the East Coast power grid system required the governor to recommend power conservation measures be taken by all commercial, residential, and industrial power consumers.

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

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.

In January 1996, another series of severe winter storms with 27- and 24-inch accumulated snow depths was followed by 50 to 60 degree temperatures, resulting in rapid melting and flooding (as described in the preceding section on flood hazard vulnerability assessment).

Table 4.3.12-1 presents a history of the winter storms that have affected Adams County. Since 2004, Adams County has witnessed 13 heavy snow events, 12 winter storms, and four ice storms. All of these events occurred across Adams County, with the most significant occurring in February 2007. This storm produced very heavy snow across north-central Pennsylvania, and a snow and sleet mix for the central and southern counties. Significant amounts of freezing rain also occurred in the southeastern part of the County. A total of six inches of snow and sleet fell for the entire storm in Adams County.

Table 4.3.12-1 Previous winter storms in Adams County from 1966-2014 (NCDC, 2014).

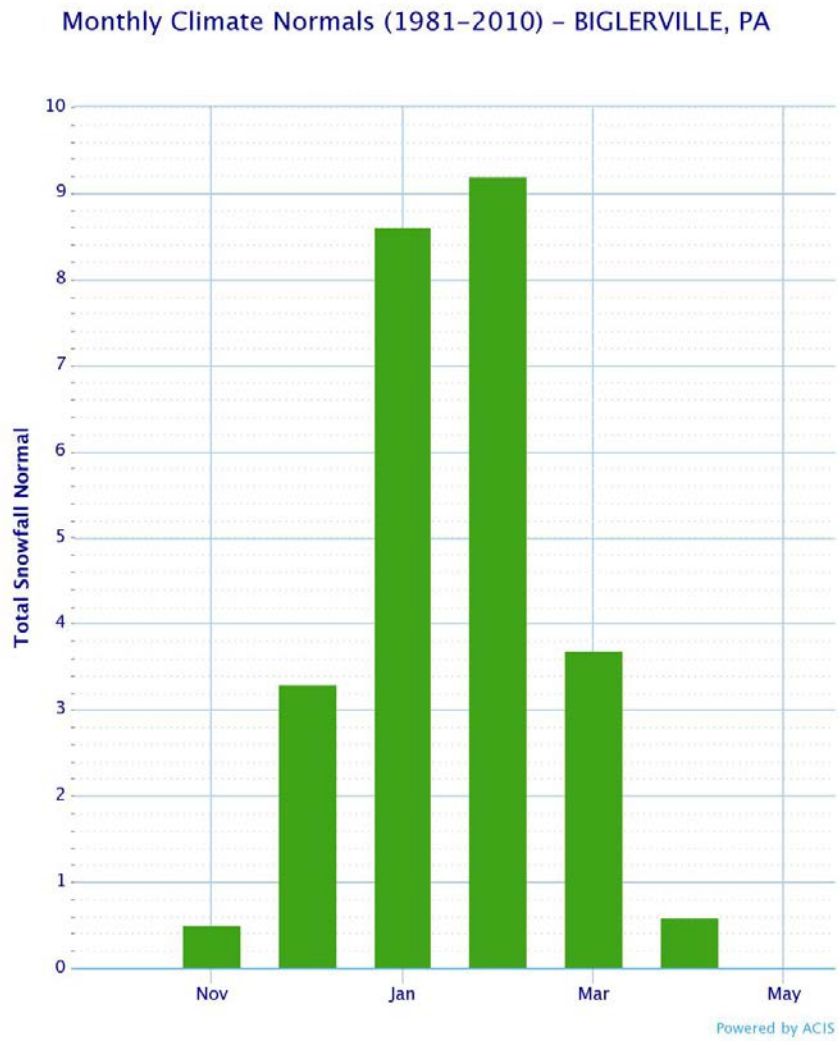
LOCATION	DATE	TYPE	DEATH	INJURY	PROPERTY DAMAGE ($)
Statewide	1/1/1966	Winter Storm	UNK	UNK	None Reported
Statewide	2/1/1972	Winter Storm	UNK	UNK	None Reported
Statewide	1/1/1973	Winter Storm	UNK	UNK	None Reported
Statewide	1/1/1978	Winter Storm	UNK	UNK	None Reported
Statewide	2/1/1978	Winter Storm	UNK	UNK	None Reported
County-wide	2/1/1983	Winter Storm	UNK	UNK	None Reported
Statewide	3/1/1993	Blizzard	UNK	UNK	None Reported
County-wide	12/14/1993	Freezing Drizzle	0	0	None Reported
Several counties	1/6/1994	Record Snowfall	0	0	988,000
County-wide	1/6/1995	Ice Storm	0	0	None Reported
County-wide	2/3/1995	Heavy Snow	0	0	None Reported
County-wide	2/15/1995	Freezing Rain	0	0	None Reported
County-wide	2/26/1995	Light Snow	0	0	None Reported
County-wide	2/26/1995	Freezing Rain, Sleet	0	0	None Reported
County-wide	2/27/1995	Freezing Rain	0	0	None Reported
County-wide	3/8/1995	Snow	0	0	None Reported
County-wide	6/1/1995	Snow Drought	0	0	None Reported
Statewide	1/7/1996	Blizzard	0	0	635,000
County-wide	1/12/1996	Heavy Snow	0	0	None Reported
County-wide	11/28/1996	Heavy Snow	0	0	None Reported
County-wide	2/13/1997	Winter Storm	0	0	None Reported
County-wide	1/15/1998	Ice Storms	0	0	None Reported
County-wide	1/2/1999	Winter Storm	0	0	None Reported
County-wide	1/8/1999	Winter Storm	0	0	None Reported
County-wide	1/14/1999	Winter Storm	0	0	None Reported
County-wide	3/14/1999	Heavy Snow	0	0	None Reported
County-wide	1/25/2000	Heavy Snow	0	0	None Reported
County-wide	1/30/2000	Heavy Snow	0	0	None Reported

Table 4.3.12-1 Previous winter storms in Adams County from 1966-2014 (NCDC, 2014).

LOCATION	DATE	TYPE	DEATH	INJURY	PROPERTY DAMAGE ($)
County-wide	2/13/2000	Ice Storm	0	0	None Reported
County-wide	2/18/2000	Winter Storm	0	0	None Reported
County-wide	12/13/2000	Winter Storm	0	0	None Reported
County-wide	1/20/2001	Heavy Snow	0	0	None Reported
Several counties	3/4/2001	Heavy Snow	0	0	150,000
County-wide	1/6/2002	Heavy Snow	0	0	None Reported
County-wide	12/5/2002	Heavy Snow	0	0	None Reported
County-wide	12/10/2002	Ice Storm	0	0	None Reported
County-wide	12/25/2002	Heavy Snow	0	0	None Reported
County-wide	1/2/2003	Ice Storm	0	0	None Reported
County-wide	2/6/2003	Heavy Snow	0	0	None Reported
Statewide	2/16/2003	Heavy Snow	0	2	263,000
County-wide	12/5/2003	Heavy Snow	0	0	None Reported
County-wide	1/25/2004	Heavy Snow	0	0	None Reported
County-wide	2/6/2004	Heavy Snow	0	0	None Reported
County-wide	2/24/2005	Heavy Snow	0	0	None Reported
County-wide	3/1/2005	Heavy Snow	0	0	None Reported
County-wide	12/9/2005	Heavy Snow	0	0	None Reported
County-wide	12/16/2005	Winter Storm	0	0	None Reported
County-wide	2/12/2006	Heavy Snow	0	0	None Reported
County-wide	2/13/2007	Winter Storm	1	0	None Reported
County-wide	12/13/2007	Winter Storm	0	0	None Reported
County-wide	1/6/2009	Ice Storm	0	0	2,000
County-wide	1/27/2009	Winter Storm	0	0	None Reported
County-wide	12/19/2009	Winter Storm	0	0	None Reported
County-wide	2/5/2010	Winter Storm	0	0	None Reported
County-wide	2/9/2010	Winter Storm	0	0	None Reported
County-wide	1/26/2011	Heavy Snow	0	0	None Reported
County-wide	2/1/2011	Winter Storm	0	0	None Reported
County-wide	2/21/2011	Heavy Snow	0	0	None Reported
County-wide	10/29/2011	Heavy Snow	0	0	None Reported

Figure 4.3.12-2 shows the monthly snowfall normal at Adams County's climate station at Biglerville. These snowfall normals are derived from observed data from 1981-2010 (NOAA-NWS, 2014).

Figure 4.3.12-2 Snowfall normals at Biglerville Station.



4.3.12.4. Future Occurrence

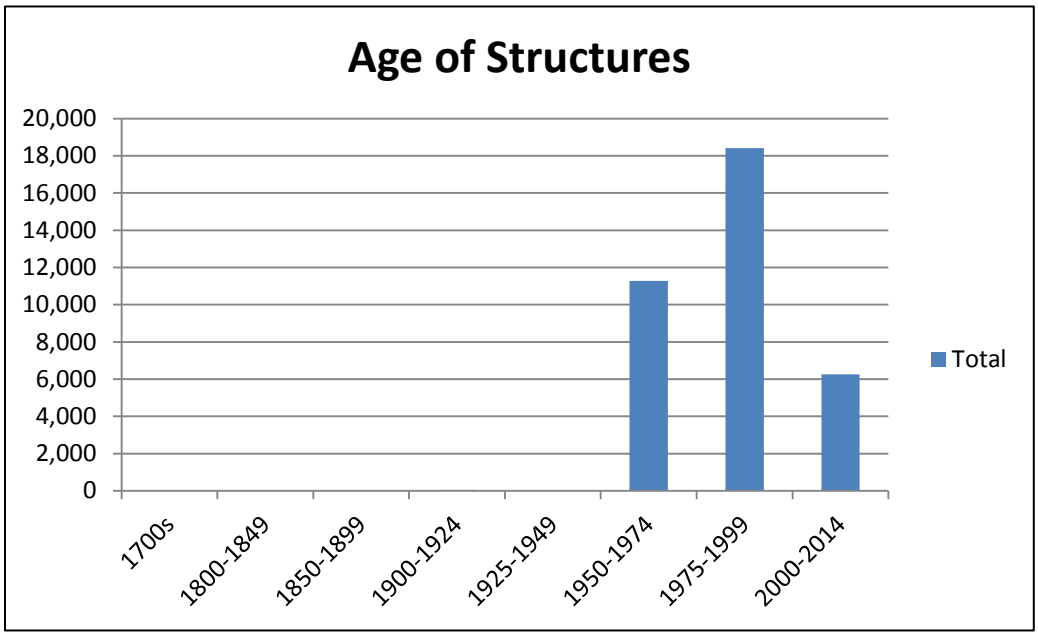
Winter storms occur on the average of 35 times a year in Pennsylvania. The NCDC estimates that Adams County has a 5 percent chance of equaling or exceeding annual accumulated snow depths of 20 to 30 inches. According to the Weather Channel, Adams County witnesses an average of more than 3 inches of precipitation during the winter months of November through February. The probability of future winter storms can be considered *highly likely* according to the Risk Factor Methodology (see Table 4.4.1-1).

4.3.12.5. Vulnerability Assessment

In Adams County, wintertime snow accumulations are expected and normal. The most common but potentially serious effect of very heavy snowstorms with accumulations exceeding six or more inches in a 12-hour period are traffic accidents, interruptions in power supply and communications, and the failure of inadequately designed and/or maintained roofing systems. All critical facilities within Adams County are vulnerable to the effects of severe winter storms. Vulnerability to the effects of winter storms on buildings is dependent on the 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 the structure has been maintained). Figure 4.3.12-3 shows the age of Adams County structures. 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.

Figure 4.3.12-3 Age of structures for buildings with known ages (Adams County GIS, 2014).



Pennsylvania and Adams County experience several winter storms every year that can create power loss, among other obvious adverse effects. The series of storms in early 1994 and 1996 were presidentially declared disasters. Heavy snowstorm, sleet storm, ice storm, blizzard, and severe blizzard are the types of winter storms possible in Adams County. Due to the frequency of past events and a relatively high annual probability for high snow depths, winter storms are very likely to continue affecting normal activity in the County in the coming years.

HUMAN-MADE HAZARDS

4.3.13. Dam Failure

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

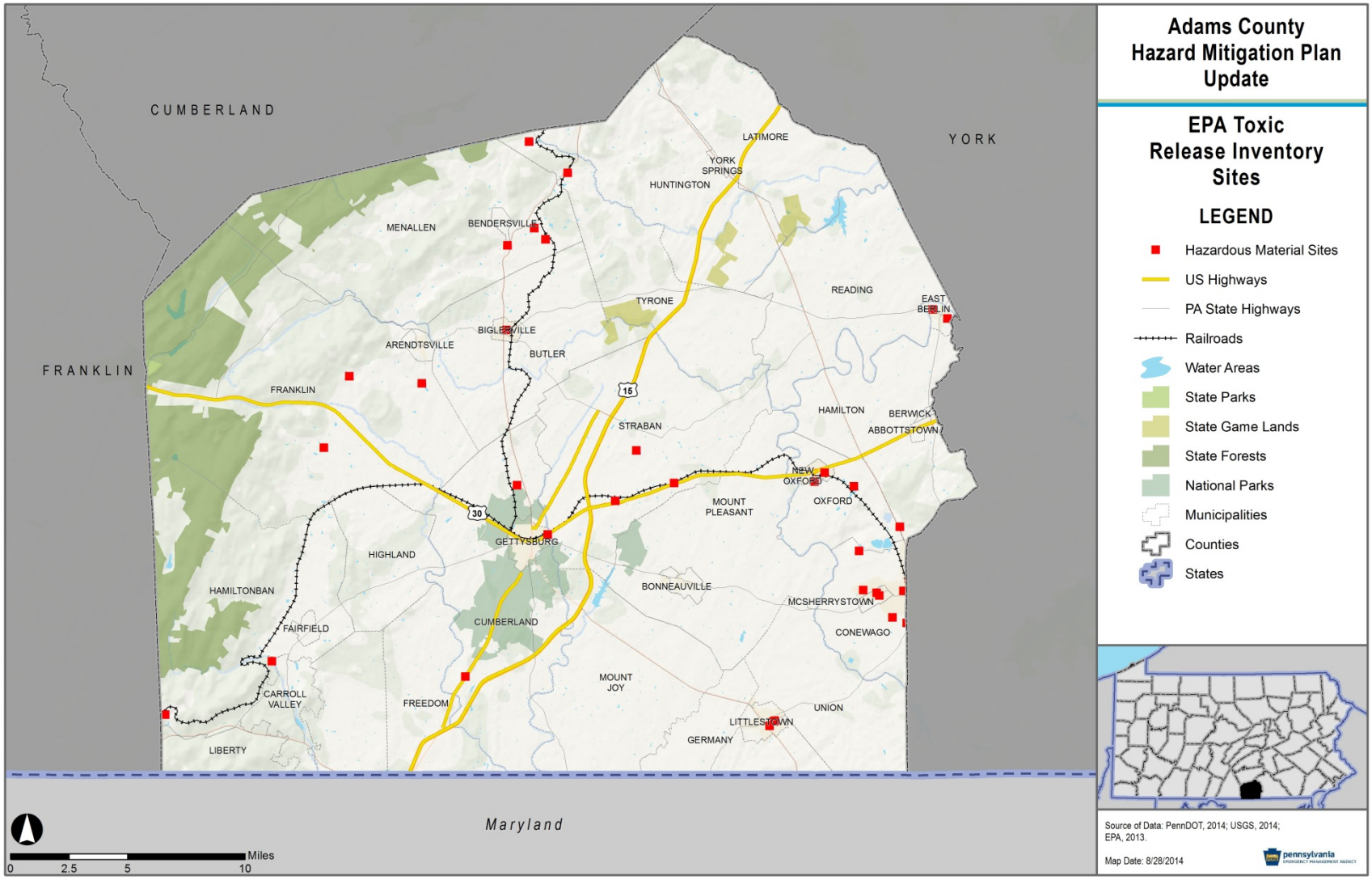
4.3.14. Environmental Hazards: Hazardous Material Releases

4.3.14.1. Location and Extent

One of the greatest threats to those who reside in the Commonwealth is the constant production, storage, use, and transportation of hazardous materials. The release of these materials from a facility is less dangerous than the release of them while being transported. Hazardous materials include flammable liquids, solids, and gases, combustible liquids, explosives, blasting agents, radioactive materials, oxidizing materials, corrosive materials, poisons, refrigerated liquids, hazardous waste/substances, and other regulated material.

Any facility in Pennsylvania that uses, manufactures, or stores hazardous materials must comply with Title III of the Superfund Amendments and Reauthorization Act (SARA). This is also known as the Emergency Planning and Community Right-to-Know Act (EPCRA). They must also comply with the reporting requirements, as amended, in Pennsylvania's Hazardous Materials Emergency Planning and Response Act (1990-165). There are 100 SARA facilities in Adams County. Information about the chemicals that are being manufactured or processed in facilities can be found in the U.S. Environmental Protection Agency's (USEPA) Toxic Release Inventory (TRI) database. Facilities which employ ten or more full-time employees and which manufacture or process 25,000 pounds or more, or otherwise use 10,000 pounds or more, of any SARA Section 313-listed toxic chemical in the course of a calendar year are required to report TRI information to the EPA, the federal enforcement agency for SARA Title III, and PEMA. This plan focuses on the hazard posed by Adams County's 28 EPA TRI facilities since TRI-reporting facilities handle potentially dangerous chemicals in potentially high quantities. The location of these hazardous materials is shown in Figure 4.3.14-1.

Figure 4.3.14-1 EPA TRI facilities in Adams County.



Hazardous material releases can occur at facilities (fixed sites) or along transportation routes. Hazardous material releases can create direct injuries and death and contaminate air, water, and soils. They can occur as a result of human carelessness, intentional acts, or natural hazards. When caused by natural hazards, these incidents are known as secondary hazards. Hazardous materials can include toxic chemicals, radioactive materials, infectious substances, and hazardous wastes. An accidental hazardous material release can occur wherever hazardous materials are manufactured, used, stored, or transported. Such releases can affect the nearby population and contaminate critical or sensitive environmental areas.

U.S. Route 15 and U.S. Route 30 are major transportation corridors in Adams County and therefore susceptible to hazardous material releases. Transportation of hazardous materials on highways involves tanker trucks or trailers which are responsible for the greatest number of hazard material release incidents. These roads also cross rivers and streams at many points and have the potential to pollute watersheds that serve as domestic water supplies. Potential also exists for hazardous material releases to occur along rail lines as collisions and derailments of train cars can result in large spills.

4.3.14.2. 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. Exacerbating conditions, characteristics that can enhance or magnify the effects of a hazardous material release include:

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

The severity of the incident is dependent not only on the circumstances described above, but also with the type of material released and the distance and related response time for emergency response teams. The areas within closest proximity to the releases are generally at greatest risk, yet depending on the agent, a release can travel great distances or remain

present in the environment for a long period of time (e.g. centuries to millennia for radioactive materials), resulting in extensive impacts on people and the environment.

The environmental impacts of hazardous material releases include:

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

The worst possible hazardous materials incident would be the release of a large quantity of chlorine gas or anhydrous ammonia from a fixed facility near Gettysburg Borough. While little physical property damage is likely from this type of event, the potential to cause injury and death to residents and visitors is significant. In addition, an event such as this would likely close the Gettysburg National Military Park, causing a major disruption to the local economy.

4.3.14.3. Past Occurrence

In 2001, Pennsylvania reported to the U.S. Department of Transportation (US DOT) a total of 971 highway incidents, resulting in a cost of over $1 million (US DOT, July 2002). Transportation carriers must have response plans in place to address accidents; otherwise, the local emergency response team will step in to secure and restore the area. For example, in May 1998, a truck carrying hazardous waste spilled its load, prompting the Pennsylvania North-Central Region Emergency Response Team of the PA DEP to respond. The cyanide-containing waste was quickly cleaned up with no injuries, property damage, or environmental damage reported.

Table 4.3.14-1 lists the hazardous material incidents that have been reported through PEIRS for Adams County. As stated previously, PEIRS is no longer used to report incidents, so records from PIERS stop at 2009. However Adams County Department of Public Safety provided the most recent five years of incidents to provide a complete, up-to-date list of incidents that occurred in Adams County through January of 2014. A majority of the hazardous material release incidents that have occurred in the past have been due to accidents involving tractor trailers and ruptured saddle tanks; these had little to no effect on people, property, or the environment beyond a travel delay. There were 29 occurrences of scheduled ground spraying for mosquitoes, ground flies, and other insects. Chemical releases reported to PEMA ranged from a broken thermometer in a school to a 600- gallon spill of MCPA AMINE pesticide. Thirty-one natural gas releases have occurred since 2004. Releases at facilities had little effect beyond the facilities' walls.

Table 4.3.14-1 Hazardous Material Releases reported through PEIRS (2004-2009) and by Adams County Department of Emergency Services (2009-2014).

LOCATION	DATE	EVENT
New Oxford	1/13/2004	Chemical spill
Carroll Valley	1/13/2004	Propane release
Union Township	1/29/2004	Heating oil spill
Mt. Joy	2/2/2004	Flammable liquid & solids
Conewago	2/6/2004	Diesel fuel spill
Conewago Twp	2/10/2004	Natural gas release
Freedom	2/26/2004	Explosion
Gettysburg	3/6/2004	Odor investigation
Hamilton	3/16/2004	Diesel fuel spill
Conewago Twp	4/1/2004	Chemical spill
Mt. Joy	4/7/2004	Flammable liquid & solids
Franklin	4/19/2004	Heating oil spill
Mt. Pleasant	5/8/2004	Chemical spill
Oxford	5/25/2004	Natural gas release
Conewago	6/9/2004	Odor investigation
Mt. Joy	7/20/2004	Drum found
Carroll Valley	9/7/2004	Natural gas release
Straban	9/10/2004	Natural gas release
Straban	9/22/2004	Natural gas release
Straban	11/5/2004	Oil spill
Gettysburg	1/31/2005	Natural gas release
Gettysburg	5/17/2005	Pesticide spill
Straban	5/17/2005	Road closure
Biglerville	5/21/2005	Natural gas release
Cumberland	6/9/2005	Natural gas release
McSherrystown	7/6/2005	Road closure
Gettysburg	7/20/2005	Natural gas release
Reading	7/20/2005	Natural gas release
County-wide	7/25/2005	Ground spraying
County-wide	7/27/2005	Ground spraying
Oxford	8/22/2005	Ground spraying
East Berlin	10/8/2005	Kerosene spill
Latimore	11/14/2005	Road closure
Oxford	12/7/2005	Natural gas release
Gettysburg	4/7/2006	Heating oil spill
Gettysburg	5/28/2006	Petroleum products
Butler, Cumberland, Hamilton Townships	6/29/2006	Ground spraying
East Berlin	7/18/2006	Natural gas release
County-wide	7/26/2006	Ground spraying
Franklin Township	8/1/2006	Ground spraying
Carroll Valley	8/7/2006	Diesel fuel spill
New Oxford	8/14/2006	Natural gas release
Mt. Joy	9/5/2006	Natural gas release
Tyrone Twp., Straban Twp., and Hamilton Township	9/5/2006	Ground spraying
Butler, Cumberland, Hamilton, Reading, and Tyrone Townships	9/6/2006	Ground spraying
Franklin	9/18/2006	Natural gas release
Huntington	9/21/2006	Chemical release

Table 4.3.14-1 Hazardous Material Releases reported through PEIRS (2004-2009) and by Adams County Department of Emergency Services (2009-2014).

LOCATION	DATE	EVENT
Biglerville	11/28/2006	Explosion
Mount Pleasant	12/17/2006	Petroleum products
Biglerville	1/18/2007	Chemical spill
Hamilton	1/19/2007	Diesel fuel spill
Conewago	2/11/2007	Sewage spill
Straban	2/26/2007	Toxic/infectious substance
Gettysburg	3/27/2007	Chemical spill
Conewago Twp	5/2/2007	Mine discharge
Oxford	6/20/2007	Chemical release
Franklin Township	6/24/2007	Ground spraying
County-wide	6/27/2007	Ground spraying
County-wide	7/2/2007	Ground spraying
Latimore Twp	7/6/2007	Asphalt spill
Conewago	7/19/2007	Natural gas release
Littlestown	7/30/2007	Natural gas release
Tyrone Twp	7/30/2007	Diesel fuel spill
Reading	7/31/2007	Hydraulic oil spill
County-wide	8/1/2007	Ground spraying
Littlestown	8/2/2007	Natural gas release
County-wide	8/28/2007	Ground spraying
County-wide	9/12/2007	Ground spraying
Littlestown	9/20/2007	Ground spraying
Cumberland	9/21/2007	Natural gas release
Straban	10/8/2007	Petroleum products
Gettysburg	3/11/2008	Natural gas release
Franklin	3/27/2008	Natural gas release
Straban	4/12/2008	Petroleum products
Reading Twp	5/21/2008	Milk spill
Straban	5/22/2008	Diesel fuel spill
Reading	5/28/2008	Natural gas release
Gettysburg	6/5/2008	Chemical spill
County-wide	6/17/2008	Ground spraying
Reading	6/18/2008	Natural gas release
County-wide	6/26/2008	Ground spraying
County-wide	7/10/2008	Ground spraying
Oxford	7/18/2008	Petroleum products
County-wide	7/22/2008	Ground spraying
County-wide	7/22/2008	Ground spraying
County-wide	7/23/2008	Ground spraying
Tyrone Twp	7/28/2008	Chemical spill
Gettysburg	7/28/2008	Petroleum products
County-wide	7/30/2008	Ground spraying
County-wide	8/5/2008	Ground spraying
County-wide	8/13/2008	Ground spraying
County-wide	8/20/2008	Ground spraying
County-wide	8/21/2008	Ground spraying
Carroll Valley	8/27/2008	Natural gas release
County-wide	9/4/2008	Ground spraying
Franklin	10/1/2008	Natural gas release
Gettysburg	10/8/2008	Natural gas release

Table 4.3.14-1 Hazardous Material Releases reported through PEIRS (2004-2009) and by Adams County Department of Emergency Services (2009-2014).

LOCATION	DATE	EVENT
Carroll Valley	11/11/2008	Natural gas release
Franklin	1/13/2009	Hydrocarbon - Transportation
Tyrone	1/16/2009	Haz Mat- Fixed Facility- Ammonia Alarm
Tyrone	1/16/2009	Haz Mat- Fixed Facility- Ammonia Alarm
Straban	1/30/2009	Fuel Oil Spill
Straban	1/31/2009	Heating oil spill
Carroll Valley	2/11/2009	Chemical release
Carroll Valley	2/11/2009	Haz Mat- Restaurant
Hamilton	2/15/2009	Fire-Structure Fire
Tyrone	3/4/2009	Haz Mat- Fixed Facility-Ammonia system maint.
Biglerville	4/28/2009	Haz Mat -Transportation
Berwick Township	5/18/2009	Ground spraying
New Oxford	5/22/2009	Chemical spill
Arendtsville	5/22/2009	Suspisious package
Franklin	5/26/2009	Haz Mat- Fixed FacilityNatural Gas Release
Franklin	5/30/2009	Hydrocarbon- transportation
Straban	6/9/2009	Fire- Miscellaneous
Berwick	6/18/2009	Natural gas release
County-wide	6/18/2009	Ground spraying
Berwick	6/18/2009	Haz Mat- Natural Gas Release
Gettysburg	6/24/2009	Haz Mat- Fixed Facility- Formalin spill
Gettysburg	6/24/2009	Chemical spill
Straban	6/29/2009	Diesel fuel spill
Straban	6/29/2009	Haz Mat- transportation- Diesel Fuel Spill
Cumberland	7/7/2009	Haz Mat- Fixed Facility- Chlorine Leak
Tyrone	8/27/2009	Haz Mat- Fixed Facility- Ammonia leak
York Springs	9/17/2009	Haz Mat- Fuel leak
Franklin	10/2/2009	Hydrocarbon- transportation
Franklin	10/6/2009	Haz Mat- Fixed Facility- Ammonia leak??
York Springs	10/28/2009	Haz Mat- Fuel leak
Franklin	11/9/2009	Hyrdocarbon- transportation
Tyrone	11/24/2009	Haz Mat- Natural Gas leak
Huntington	12/14/2009	Hydrocarbon- transportation
McSherrystown	1/10/2010	Hazardous Material/Petroleum
Conewago	2/22/2010	Hazardous Material/Petroleum
Mount Joy	3/1/2010	Hazardous Material/Heating oil
Carroll Valley	4/21/2010	Hydrocarbon spill
Tyrone	6/2/2010	Ammonia leak
Butler	6/2/2010	Hydraulic fluid spill
Hamiltonban	6/13/2010	Ammonia leak
Hamiltonban	6/27/2010	Blue Bayou chemical
Biglerville	7/28/2010	Roof vent popped
Biglerville	7/30/2010	liquid sugar
Tyrone, Straban	8/4/2010	Haz Mat- diesel fuel leak
Biglerville	8/6/2010	Ammonia leak
Cumberland	8/12/2010	Waste water leak
Huntington	8/12/2010	Routine maintenance
Gettysburg	9/7/2010	Maintenance O2 tanks
Straban	10/30/2010	Plural component activator
Franklin	11/9/2010	Gas leak

Table 4.3.14-1 Hazardous Material Releases reported through PEIRS (2004-2009) and by Adams County Department of Emergency Services (2009-2014).

LOCATION	DATE	EVENT
Tyrone	12/11/2010	Commercial building fire with haz mat
Freedom	12/18/2010	MVA tractor trailer overturned
Carroll Valley	1/31/2011	MVA tractor trailer overturned
Menallen	3/1/2011	diesel leaking from fuel tank
Straban	3/1/2011	white powder incident
Liberty	3/7/2011	MVA truck overturned
Cumberland	3/9/2011	fuel tank leak
Franklin	3/29/2011	MVA
Conewago	3/29/2011	fuel spill
Highland	4/8/2011	MVA
Highland	4/16/2011	propane tank overturned
Cumberland	5/9/2011	MVA with fuel spill
New Oxford	5/10/2011	diesel fuel leak from tank
Arendtsville	5/10/2011	natuarl gas line struck
Biglerville	5/31/2011	ammonia leak
Biglerville	7/8/2011	MVA- fuel spill
Hamiltonban	8/29/2011	Ammonia leak
Reading	8/30/2011	bio diesel fuel leak
Hamiltonban	9/22/2011	Ammonia leak
Berwick	10/6/2011	diesel fuel leak
Reading	12/21/2011	MVA with fuel leak
Latimore	1/3/2012	home heating oil tank rupture
Mount Joy	3/1/2012	MVA with fuel leak
Franklin	3/8/2012	gas leak
Franklin	3/23/2012	gas leak
Bonneauville	3/28/2012	oil leak
Mount Pleasant	3/28/2012	antifreeze leak
Huntington	3/29/2012	milk spill
Menallen	4/20/2012	building fire
Franklin	4/20/2012	MVA with fuel leak
Franklin	4/27/2012	gas leak
Franklin	5/9/2012	oil spill
Straban	9/12/2012	odor of ammonia
Straban	9/27/2012	MVA with fuel spill
Straban	9/27/2012	toluene spill
Latimore	12/19/2012	tractor trailer fire
Gettysburg	12/31/2012	decomposing body
Conewago	3/7/2013	fuel spill
Huntington	3/12/2013	fuel spill
Franklin	3/15/2013	vehicle into lake
Menallen	3/22/2013	tire fire
Union	4/26/2013	trash pile burning
Straban	5/8/2013	diesel fuel on roadway
Tyrone	6/5/2013	driveway sealer dumped
Tyrone	6/10/2013	fuel in ditch
Straban	6/25/2013	tractor trailer overturned
Mount Joy	7/29/2013	dreding material running into tributary
Mount Joy	8/28/2013	transformer leak
Cumberland	9/23/2013	farm vehicle spilled liquid manure
Straban	10/22/2013	tractor trailer accident

Table 4.3.14-1 Hazardous Material Releases reported through PEIRS (2004-2009) and by Adams County Department of Emergency Services (2009-2014).

LOCATION	DATE	EVENT
Mount Pleasant	11/21/2013	tractor trailer accident
Hungtinton	11/22/2013	tractor trailer accident
Mount Joy	11/25/2013	Building Fire
Gettysburg	12/3/2013	transformer oil leak
Hamiltonban	1/21/2014	Trailer fire

In addition to the PEIRS reports, PEMA collects annual incidences of hazardous material releases in its annual Hazardous Material Emergency Planning and Response Act Annual Reports. The reports from 2006 through 2011, available publicly through PEMA's website, indicate an average of ten annual hazardous material releases in Adams County, as shown in table 4.3.14-2.

Table 4.3.14-2 Number of Hazardous Material Release Incidents in Pennsylvania Counties 2006 -2011 (PEMA Pennsylvania Hazardous Material Emergency Planning and Response Act Annual Reports)

YEAR	NUMBER OF INCIDENTS
2006	7
2007	13
2008	11
2009	10
2010	13
2011	7

4.3.14.4. Future Occurrence

There are 28 EPA TRI facilities in Adams County, many near population centers. Though they follow applicable safety and health regulations and best practices, accidents resulting in the release of hazardous substances may occur at these facilities at any time.

The most common release of hazardous materials in the County is through ground spraying of chemicals on the County's numerous farms. Based on weather conditions, these chemicals can affect areas outside of the farms. Hazardous materials are also transported along US Routes 15 and 30. Transportation of hazardous materials on highways involves tanker trucks or trailers; trucks are responsible for a number of hazmat incidents. Hazmat releases from rail transport are also of concern due to collisions and derailments that can result in large spills. There are several points where these transportation routes cross streams within the watersheds that are part of the County's domestic water supply.

While hazardous material release incidents in Adams County have occurred in the past, they are generally considered difficult to predict. Smaller incidents, such as fuel spills, will affect the County many times each year, most likely along US 30 or US 15, or during the refilling of home heating oil tanks. The County anticipates one significant hazmat release every two years. An

occurrence is largely dependent upon the accidental or intentional actions of a person or group. Intentional acts are addressed under Section 4.3.16: Terrorism.

4.3.14.5. Vulnerability Assessment

Human-caused hazards are difficult to predict. Technological accidents can occur at hazardous material facilities, nuclear power plants, or along transportation routes. Terrorists can target any of these facilities, critical facilities, or agricultural lands. Trucks transport hazardous materials along highways that traverse the County, crossing streams within the watershed that are part of the County's domestic water supply at many points.

Vulnerability to environmental hazards focuses on the people in the hazard area, as opposed to other hazards which focus on the property damage. Table 4.3.14-3 presents a breakdown of the population within the 1.5 miles of an EPA TRI fixed hazardous materials facility, within 0.25 miles of a major highway, or within 0.25 miles of a railroad on which hazardous materials are transported. All communities have populations within 0.25 miles of major roads, but only 16 have populations within 0.25 miles of a rail line.

Table 4.3.14-3 Populations Vulnerable to Hazardous Material Releases at Fixed Facilities and in Transit.

MUNICIPALITY	TOTAL POPULATION (2010 CENSUS)	POPULATION WITHIN 1.5 MILE OF EPA TRI FACILITY	POPULATION WITHIN 0.25 MI OF MAJOR ROADS	POPULATION WITHIN 0.25 MI OF RAIL LINES
Abbottstown Borough	1,011	0	992	0
Arendtsville Borough	952	810	817	0
Bendersville Borough	641	641	23	0
Berwick Township	2,389	207	636	0
Biglerville Borough	1,200	1,200	1,200	605
Bonneauville Borough	1,800	0	1,246	0
Butler Township	2,567	1,078	718	459
Carroll Valley Borough	3,876	1,599	1,146	138
Conewago Township	7,085	6,077	2,510	291
Cumberland Township	6,162	2,855	3,319	1,180
East Berlin Borough	1,521	1,521	1,273	0
Fairfield Borough	507	327	439	0
Franklin Township	4,877	1,804	1,251	163
Freedom Township	831	198	118	0
Germany Township	2,700	1,158	658	0
Gettysburg Borough	7,620	7,620	6,403	4,489
Hamilton Township	2,530	284	317	0
Hamiltonban Township	2,372	365	248	594
Highland Township	943	0	160	41
Huntington Township	2,369	363	614	56
Latimore Township	2,580	0	239	0

Table 4.3.14-3 Populations Vulnerable to Hazardous Material Releases at Fixed Facilities and in Transit.

MUNICIPALITY	TOTAL POPULATION (2010 CENSUS)	POPULATION WITHIN 1.5 MILE OF EPA TRI FACILITY	POPULATION WITHIN 0.25 MI OF MAJOR ROADS	POPULATION WITHIN 0.25 MI OF RAIL LINES
Liberty Township	1,237	0	161	0
Littlestown Borough	4,434	4,434	3,656	0
McSherrystown Borough	3,038	3,038	3,038	0
Menallen Township	3,515	1,199	402	411
Mt Joy Township	3,670	38	1,072	0
Mt Pleasant Township	4,693	442	840	321
New Oxford Borough	1,783	1,860	1,575	1,611
Oxford Township	5,517	4,999	1,169	622
Reading Township	5,780	836	1,225	0
Straban Township	4,928	3,140	2,371	669
Tyrone Township	2,298	322	314	167
Union Township	3,148	1,033	584	0
York Springs Borough	833	0	820	0
TOTAL	**101,407**	**49,448**	**41,554**	**11,817**

Critical infrastructure within each hazard area is listed in Table 4.3.14-4; these facilities may be required to evacuate due to a hazardous material release, thereby disrupting vital services.

Table 4.3.14-4 Critical Facilities Vulnerable to Hazardous Material Releases in by Municipality in Adams County.

MUNICIPALITY	TOTAL CRITICAL FACILITIES IN MUNICIPALITY	TOTAL CRITICAL FACILITIES WITHIN 1.5 MI OF EPA TRI FACILITIES	PERCENT CRITICAL FACILITIES WITHIN 1.5 MI OF EPA TRI FACILITIES	CRITICAL FACILITIES WITHIN 0.25 MI OF MAJOR ROADS	CRITICAL FACILITIES WITHIN 0.25 MI OF MAJOR ROADS	TOTAL CRITICAL FACILITIES WITHIN 0.25 MI OF RAIL LINES	PERCENT CRITICAL FACILITIES WITHIN 0.25 MI OF RAIL LINES
Abbottstown Borough	5	0	0.0%	5	100.0%	0	0.0%
Arendtsville Borough	6	6	100.0%	6	100.0%	0	0.0%
Bendersville Borough	9	9	100.0%	1	11.1%	0	0.0%
Berwick Township	5	2	40.0%	5	100.0%	0	0.0%
Biglerville Borough	13	13	100.0%	13	100.0%	8	61.5%
Bonneauville Borough	5	0	0.0%	5	100.0%	0	0.0%
Butler Township	12	7	58.3%	9	75.0%	3	25.0%
Carroll Valley Borough	8	4	50.0%	4	50.0%	0	0.0%
Conewago Township	20	18	90.0%	8	40.0%	3	15.0%
Cumberland Township	27	18	66.7%	26	96.3%	4	14.8%
East Berlin Borough	12	12	100.0%	12	100.0%	0	0.0%
Fairfield Borough	8	6	75.0%	8	100.0%	0	0.0%
Franklin Township	31	17	54.8%	11	35.5%	0	0.0%
Freedom Township	2	1	50.0%	1	50.0%	0	0.0%
Germany Township	9	5	55.6%	7	77.8%	0	0.0%
Gettysburg Borough	30	30	100.0%	28	93.3%	16	53.3%
Hamilton Township	6	1	16.7%	2	33.3%	0	0.0%
Hamiltonban Township	21	8	38.1%	10	47.6%	5	23.8%
Highland Township	5	0	0.0%	2	40.0%	0	0.0%
Huntington Township	18	2	11.1%	9	50.0%	0	0.0%
Latimore Township	13	0	0.0%	5	38.5%	0	0.0%
Liberty Township	5	0	0.0%	0	0.0%	0	0.0%
Littlestown Borough	25	25	100.0%	18	72.0%	0	0.0%
McSherrystown Borough	14	14	100.0%	14	100.0%	0	0.0%

Table 4.3.14-4 Critical Facilities Vulnerable to Hazardous Material Releases in by Municipality in Adams County.

MUNICIPALITY	TOTAL CRITICAL FACILITIES IN MUNICIPALITY	TOTAL CRITICAL FACILITIES WITHIN 1.5 MI OF EPA TRI FACILITIES	PERCENT CRITICAL FACILITIES WITHIN 1.5 MI OF EPA TRI FACILITIES	CRITICAL FACILITIES WITHIN 0.25 MI OF MAJOR ROADS	CRITICAL FACILITIES WITHIN 0.25 MI OF MAJOR ROADS	TOTAL CRITICAL FACILITIES WITHIN 0.25 MI OF RAIL LINES	PERCENT CRITICAL FACILITIES WITHIN 0.25 MI OF RAIL LINES
Menallen Township	16	11	68.8%	6	37.5%	5	31.3%
Mt Joy Township	9	0	0.0%	6	66.7%	0	0.0%
Mt Pleasant Township	6	1	16.7%	1	16.7%	1	16.7%
New Oxford Borough	19	19	100.0%	15	78.9%	12	63.2%
Oxford Township	19	18	94.7%	4	21.1%	2	10.5%
Reading Township	13	1	7.7%	6	46.2%	0	0.0%
Straban Township	27	23	85.2%	18	66.7%	8	29.6%
Tyrone Township	8	3	37.5%	5	62.5%	2	25.0%
Union Township	8	0	0.0%	0	0.0%	0	0.0%
York Springs Borough	5	0	0.0%	5	100.0%	0	0.0%
TOTAL	**439**	**274**	**62.4%**	**275**	**62.6%**	**69**	**15.7%**

4.3.15. Nuclear Incident

4.3.15.1. Location and Extent

Through a Memorandum of Understanding (MOU), the Nuclear Regulatory Commission (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.

Portions of Adams County are within the Ingestion Exposure Pathway Emergency Planning zone (EPZ) (within 50 miles) of the TMI facility in Dauphin County and Peach Bottom in York County. The other three nuclear plants in Pennsylvania are more than 50 miles away from Adams County; this distance exceeds the Plume-Exposure and Ingestion Exposure Pathway EPZs for nuclear emergencies, so these other facilities are considered a minimal threat to the County. Figure 4.3.15-1 illustrates the location of the nuclear facilities in the Commonwealth and their associated ingestion areas.

The NRC encourages the use of Probabilistic Risk Assessments (PRAs) to estimate quantitatively the potential risk to public health and safety when considering the design, operations, and maintenance practices at nuclear power plants. PRAs 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 (RERPs) to prepare for nuclear/radiological emergencies at the five nuclear power-generating facilities in the Commonwealth of Pennsylvania. These plans include the following:

- A Plume Exposure Pathway EPZ within a radius of 10 miles from each power plant
- An Ingestion Exposure Pathway EPZ within a radius of 50 miles from each plant

Plume Exposure Pathway refers to whole-body external exposure to gamma radiation from the 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 days. The

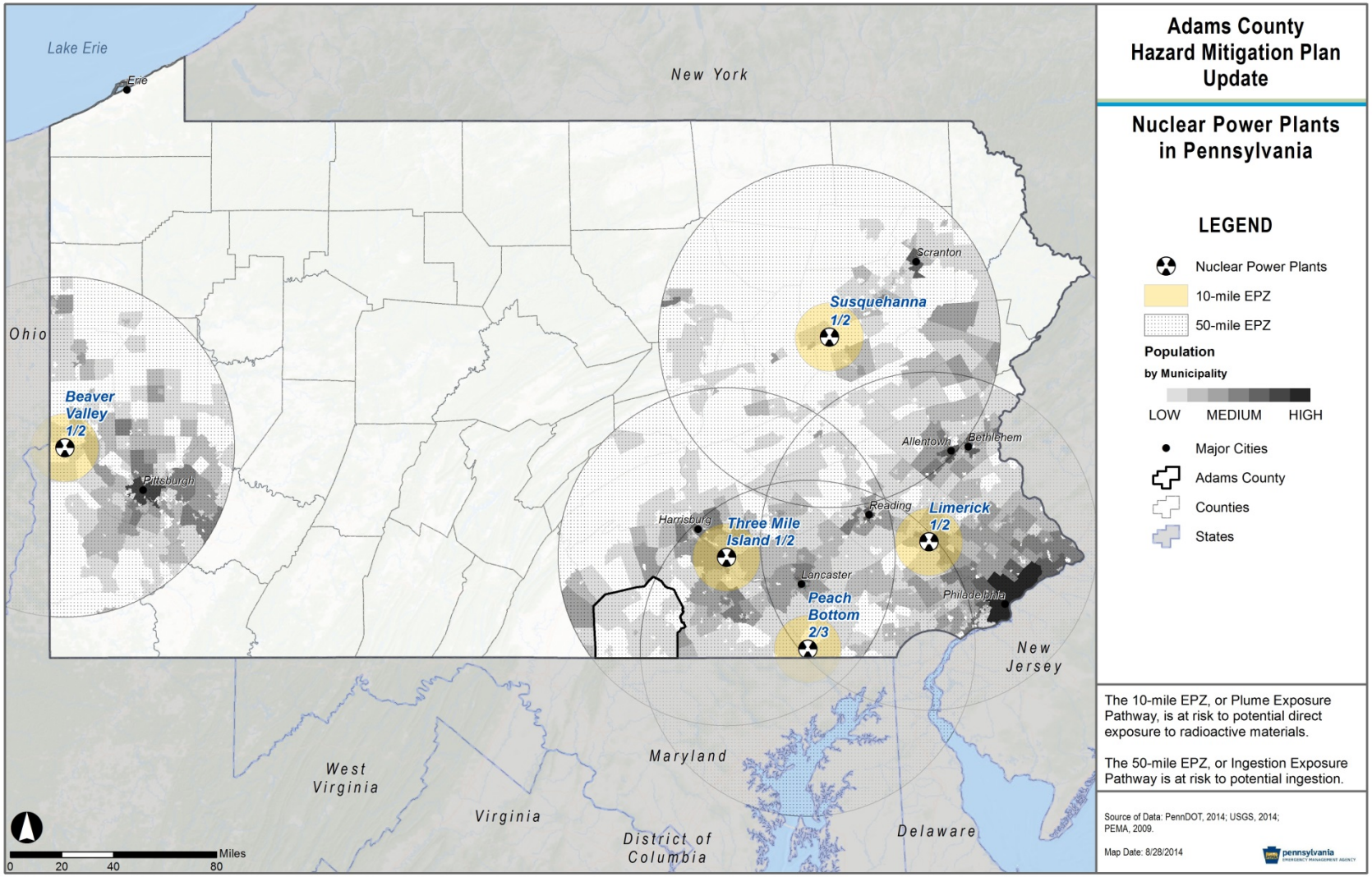
Ingestion Exposure Pathway refers to exposure primarily from ingestion of water or foods such as milk and fresh vegetables that have been contaminated with radiation.

The County RERPs, which are part of the County Emergency Operations Plan, also include the following:

- Preventive and emergency protective actions
- Response levels and associated protective action guides (PAGs) for food
- Recommended PAGs within an Ingestion Exposure Pathway EPZ
- Information for farmers to assist in protection of their livestock and crops from radioactive contamination

Nuclear facilities must notify the appropriate authorities in the event of an accident. The federally recognized classification levels are Unusual Event, Alert, Site Area Emergency, and General Emergency. After a nuclear/radiological incident, the main concern is the effect on the health of the population near the incident. External radiation, inhalation, and ingestion of radioactive isotopes can cause acute health effects (death, severe health impairment), chronic health effects (cancers), and psychological effects that can affect health. Additional considerations include the long-term effects to the environment and agriculture.

Figure 4.3.15-1 Location of Adams County in relation to Pennsylvania nuclear power stations, their Emergency Planning Zones (EPZs), and the population density of affected municipalities (PEMA, 2009 and Census, 2014).



4.3.15.2. Range of Magnitude

TMI is the closest nuclear power plant, approximately 20 miles from Adams County; Peach Bottom is about 37 miles away. Portions of the County lie within the Ingestion Exposure Pathway EPZ designated for nuclear/radiological emergencies. 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 days. 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.

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.

Nuclear facilities must notify the appropriate authorities in the event of an accident. The Nuclear Regulatory Commission uses four classification levels for nuclear incidents (Nuclear Regulatory Commission, 2008):

- **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.

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 the Commonwealth and the nation. During this incident, equipment malfunctions, design-related problems, and worker errors led to a partial meltdown of the TMI Unit 2 reactor core at TMI.

The worst-case radiological release event would be a major release of radioactive material from the Three Mile Island Nuclear Generating Station. This event would cause a great deal of fear for residents of south central Pennsylvania. In addition, as a support county, Adams County would be impacted by large numbers of evacuees clogging the county's transportation networks. Finally, there is the potential for radioactive contamination to reach Adams County, possibly necessitating the evacuation of portions of the county. Specific impacts depend on the extent of the spread of the contamination

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 (Nuclear Regulatory Commission, 2008). 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.

4.3.15.3. Past Occurrence

Nuclear incidents rarely occur, but the incident at Three Mile Island is the worst fixed-nuclear facility accident in U.S. history. The resulting contamination and state of the reactor core led to the development of a fourteen-year cleanup and scientific effort. Additionally, the *President's 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."

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 (National Energy Institute, 2010).

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 one of the Commonwealth's nuclear facilities, be it real or perceived, are significant. The mitigation efforts put in place immediately following the 1979 continue until 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.

There have been no significant nuclear incidents at Three Mile Island or Peach Bottom since the last plan update. The Pennsylvania Emergency Incident Reporting System, which is no longer used or maintained by the Commonwealth, did note two radiological incidents in Adams County. In 2005, a truck carrying radio-isotopes overturned on Route 30, and in 2009, there was a radiation leak inside the Unit 1 containment building at Three Mile Island. Both of these events were considered minor.

4.3.15.4. 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 (Nuclear Energy Agency 2005). Nuclear incident occurrences may also occur as a result of intentional actions; these acts are addressed under Section 4.3.16: Terrorism.

The probability of future nuclear incidents is *unlikely*, as defined by the Risk Factor probability criteria (see Table 4.4-1). However, if an event were to occur, Adams County would likely host displaced persons and the agricultural yield could be compromised because the county is wholly in the 50-mile EPZ.

4.3.15.5. Vulnerability Assessment

The effects and impacts of a nuclear/radiological threat depend on the type of radiation released, the duration of the release, the volume of the release, and the existing weather

conditions, such as wind speed and direction. Adams County is located within the 50-mile ingestion zone for the TMI facility. Additionally, the eastern portion of Adams County is located within the 50-mile ingestion zone for the Peach Bottom facility.

The County's primary vulnerability to nuclear incidents comes in the form of food, soil, and water contamination. In terms of vulnerable land, the 171,305 acres of farmland held in Adams County's 1,188 farms is vulnerable to radiological contamination in a nuclear incident (USDA, 2012). In 2012, the market value of all agricultural products of these farms exceeded $201 million. While unlikely that all agricultural products would be lost in the event of a nuclear incident, the County could expect some portion of that $201 million to be lost. Time of year also impacts the vulnerability and losses estimated for a nuclear incident; an incident that occurs during the prime growing and harvesting season will have a larger impact on the County. For example, the incident at Three Mile Island occurred in the off-season; as a result, the Pennsylvania Department of Agriculture estimated that agricultural losses for the entire Commonwealth were not more than $1 million.

Water contamination is also a concern in nuclear incidents. The 34 community water supplies and the County's 2,979 estimated domestic drinking water wells are all vulnerable to the effects of a nuclear incident.

4.3.16. Terrorism

4.3.16.1. Location and Extent

The Federal Bureau of Investigation (FBI) characterizes terrorism as either domestic or international, depending on the origin, base, and objectives of the terrorist organization. However, the origin of the terrorist or person causing the hazard is far less relevant to mitigation planning than the hazard itself and its consequences.

Terrorism 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 material releases; and cyberterrorism. Within these general categories, however, there are many variations - particularly in the area of biological and chemical weapons.

Terrorism can take many forms:

- Agriterrorism,
- Arson/incendiary attack,
- Armed attack,
- Biological agent,
- Chemical agent,
- Cyberterrorism,
- Conventional bomb,
- Intentional hazardous materials or radiological releases, or
- Nuclear bombs.

Two types of terrorist activity could have potential relevance to Adams County: agriterrorism and intentional hazardous material releases. Agriterrorism is direct, intentional, generally covert contamination of food supplies or introduction of pests and/or disease agents to crops and livestock. Adams County is semirural, with much of its land area dedicated to agriculture.

The County also has a number of SARA Title III and EPA Toxic Release facilities and major transportation routes that traverse the County, making intentional hazardous material release a potential threat to citizens and the environment.

Gettysburg Borough, the Adams County seat, is also home to the Gettysburg National Military Park, which includes the historic battlefield and the Soldier's National Cemetery which attracts close to 2 million visitors annually. The significance of this historic location and the vast number of visitors makes the Gettysburg area susceptible to terrorism.

The probability of terrorism cannot be quantified with as great a level of accuracy as that of many natural hazards. Furthermore, these incidents generally occur at a specific location, such as a government building, rather than encompassing an area such as a floodplain. Thus, planning should be asset-specific, identifying potentially at-risk critical facilities and systems in the community. Once a comprehensive list of critical assets has been developed, it should be prioritized so that efforts can be directed to protect the most important assets first. Then, beginning with the highest-priority assets, the vulnerabilities of each facility or system to each type of hazard should be assessed.

4.3.16.2. Range of Magnitude

The severity of terrorist incidents depends upon the type of method used, the proximity of the device to people, animals, or other assets, and the duration of exposure to the incident or device. For example, chemical agents are poisonous gases, liquids, or solids that have toxic effects on people, animals, or plants. Many chemical agents can cause serious injuries or death. Severity of injuries depends on the type and amount of the chemical agent used and the duration of exposure.

Biological agents are organisms or toxins that have illness-producing effects on people, livestock, and crops. Because some biological agents cannot be easily detected and may take time to develop, it is difficult to know that a biological attack has occurred until victims display symptoms. In other cases the effects are immediate. Those affected by a biological agent require the immediate attention of professional medical personnel. Some agents are contagious, and victims may need to be quarantined.

A worst-case scenario for a terrorist attack in Adams County would be an attack at the Gettysburg National Military Park. Thousands of people visit the park each day, especially during battlefield re-enactment events. A planned attack using a hazardous material or high-yield explosive device would cause enormous numbers of casualties, as well as strike against the nation's collective psyche.

Critical assets and infrastructure are systems whose incapacity or destruction would have a debilitating effect on the County:

- Government services
- Emergency services
- Water supply systems
- Transportation networks
- Telecommunications infrastructure
- Electrical power systems
- Gas and oil facilities

4.3.16.3. Past Occurrence

There has been a high consciousness of terrorist activity in the press with few catastrophic events. The most significant terrorist attack on US soil occurred on September 11, 2001; Flight 93, the fourth hijacked aircraft in the attack, crashed in Somerset County, Pennsylvania. Adams County has experienced terrorist incidents in the past. Table 4.3.16-1 presents a list of terrorism incidents from 2004, according to PEIRS. Since 2004, there were 26 terrorism incidents reported in Adams County to PEIRS. Of these reported incidents, there have been nine bomb threats and 11 incidents of suspicious substances, packages, or devices. All incidents were closed and were considered harmless. The appropriate departments and agencies were notified to respond. Since PEMA no longer uses the PEIRS system to collect incident information, terrorism events since 2009 have not been comprehensively collected. The succeeding PEMA reporting system, WebEOC, has no category for terrorism- like events.

Table 4.3.16-1 Terrorism events in Adams County reported to PEIRS (PEMA, 2009).

LOCATION	DATE	FACILITY	EVENT
New Oxford Borough	3/27/2004	Brethren Nursing Home	Bomb Threat
Huntington Township	4/29/2004	Bermudian Springs High School	Bomb Threat
Gettysburg Borough	10/14/2004	Gettysburg Area High School	Bomb Threat
Gettysburg Borough	12/14/2004	Gettysburg Area High School	Bomb Threat
Abbottstown Borough	12/20/2004	31 W. King Street	Explosives
Gettysburg Borough	1/22/2005	9-1-1 Center	Suspicious Activity
Cumberland Township	6/2/2005	PennDOT District Office	Suspicious Package
Gettysburg Borough	8/6/2005	David Wills House	Suspicious Package
New Oxford Borough	9/14/2005	113 E. High Street	Suspicious Package
Mount Pleasant Township	3/17/2006	1120 Storm Store Road	Suspicious Device
Gettysburg Borough	3/20/2006	Adams County Courthouse	Bomb Threat
Gettysburg Borough	3/26/2006	State Police Gettysburg	Suspicious Substance
New Oxford Borough	3/26/2006	Tim Bar Packaging	Bomb Threat
New Oxford Borough	4/7/2006	Tim Bar Packaging	Bomb Threat
Highland Township	4/18/2006	Glenwood	Suspicious Device
Berwick Township	8/14/2006	Carma Industrial Coating	Explosive Material
Huntington Township	9/8/2006	Bermudian Springs High School	Bomb Threat
New Oxford Borough	9/25/2006	New Oxford Post Office	Suspicious Package

Table 4.3.16-1 Terrorism events in Adams County reported to PEIRS (PEMA, 2009).

LOCATION	DATE	FACILITY	EVENT
Menallen Township	10/8/2006	National Apple Festival	Terroristic Threat
Huntington Township	11/14/2006	Bermudian Springs High School	Bomb Threat
Franklin Township	4/2/2007	Long Pine Dam	Suspicious Device
New Oxford Borough	6/12/2007	5160 Carlisle Pike	Explosive Device
Straban Township	9/13/2007	Adams County Prison	Suspicious Substance
Cumberland Township	3/10/2009	First Baptist Church	School Threat
Gettysburg	3/24/2009	Blue Sky Motel	Suspicious Device
Arendtsville Borough	5/22/2009	Adams County National Bank	Suspicious Package

4.3.16.4. Future Occurrence

An important consideration in estimating the likelihood of a terrorist incident is the existence of facilities, landmarks, or other buildings of national importance. Other than the National Military Park in the Borough of Gettysburg, Adams County does not contain sites with national symbolism (e.g., the Statue of Liberty); therefore, the likelihood of a terrorist attack (from a national standpoint) is considered *unlikely*, as defined by the Risk Factor Methodology (see Table 4.4-1).

However, terrorism takes many forms, and terrorists have a wide range of local, state, and national political interests or personal agendas, making the identification of potential targets especially difficult.

The County has identified the following potential terrorist targets, in order of decreasing relative vulnerability based on visibility, criticality, value, access, threat, site population, and collateral damage:

- Hanover Water Treatment Plant
- Gettysburg College
- County Courthouse
- Gettysburg National Military Park (including annual battle re-enactments)
- Knouse Foods (Biglerville, Ortanna, and Peach Glen)

4.3.16.5. Vulnerability Assessment

With the possible exception of the Gettysburg National Military Park, Adams County does not have facilities, buildings, or landmarks of national importance that are more likely to be terrorism targets than other areas in the United States. Notable County landmarks are of a local historical interest. Any critical infrastructure is vulnerable to terrorist attacks; the degree to which they are vulnerable can be assessed through the tool provided in Section 4.3.7.1.

Of greater concern to the community may be agriterrorism and intentional hazardous material releases. Intentional hazardous material releases are possible at the many SARA Title III

facilities found throughout the County and along the two interstate highways that traverse the County. These releases would affect population centers as well as water supply areas.

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 Pennsylvania, planning efforts can be put in place to reduce the risk of attack. FEMA's *Integrating Manmade Hazards into Mitigation Planning* (2003) encourages site-specific assessments that should be based on the relative importance of a particular site to the surrounding community or population, threats that are known to exist and vulnerabilities including:

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

  Site Perimeter
  - Site planning and Landscape Design – Is the facility designed with security in mind – both site-specific and with regard to adjacent land uses?
  - Parking Security – Are vehicle access and parking managed in a way that separates vehicles and structures?

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

  Facility Interior
  - Architectural and Interior Space Planning – Does security screening cover all public and private areas?
  - Mechanical Engineering – Are utilities and Heating, Ventilating and Air Conditioning (HVAC) systems protected and/or backed up with redundant systems?
  - Electrical Engineering – Are emergency power and telecommunications available? Are alarm systems operational? Is lightning sufficient?
  - Fire Protection Engineering – Are the building's water supply and fire suppression systems adequate, code-compliant and protected? Are on-site personnel trained

appropriately? Are local first responders aware of the nature of the operations at the facility?

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

4.3.17. Transportation Accident

4.3.17.1. Location and Extent

For the purposes of this plan, transportation accidents are defined as incidents involving highway, air, and rail travel. The county is home to two significant transportation routes: US 15 and US 30. There are two rail lines operating in the County which transport freight, including hazardous materials; the CSX line runs east-west through Gettysburg and the Gettysburg and Northern Railroad line runs from Gettysburg north to Mount Holly Springs. Finally, while there are no public passenger airports in the county, there are four private airports in the county - the Gettysburg Airport and Travel Center, Mid-Atlantic Soaring Center, Hanover Airport, and Southern Adams County Heliport. Figure 4.3.17-1 illustrates the major transportation systems in the County while Figure 4.3.13-2 shows the traffic volume on key roadways.

PennDOT defines seven roadway crash types:

- 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; and
- Hit pedestrian – a collision between a motor vehicle and any person not in or upon the vehicle (PennDOT, 2012).

Rail transportation accidents are generally classified as one of three types:

- Derailment – an accident on a railway in which a train leaves the rails;
- Collision – an accident in which a train strikes something such as another train or highway motor vehicle; and
- Other – accidents caused by other circumstances like obstructions on rails, fire, or explosion (Federal Railway Administration, 2010).

Traffic accidents and rail accidents can occur anywhere along their respective corridors in Adams County. Aviation accidents typically occur within 5 miles of take-off or landing, but can occur countywide since Adams County is in the flight path of larger airports.

Figure 4.3.17-1 Adams County's transportation network, including highways, rail, and aviation.

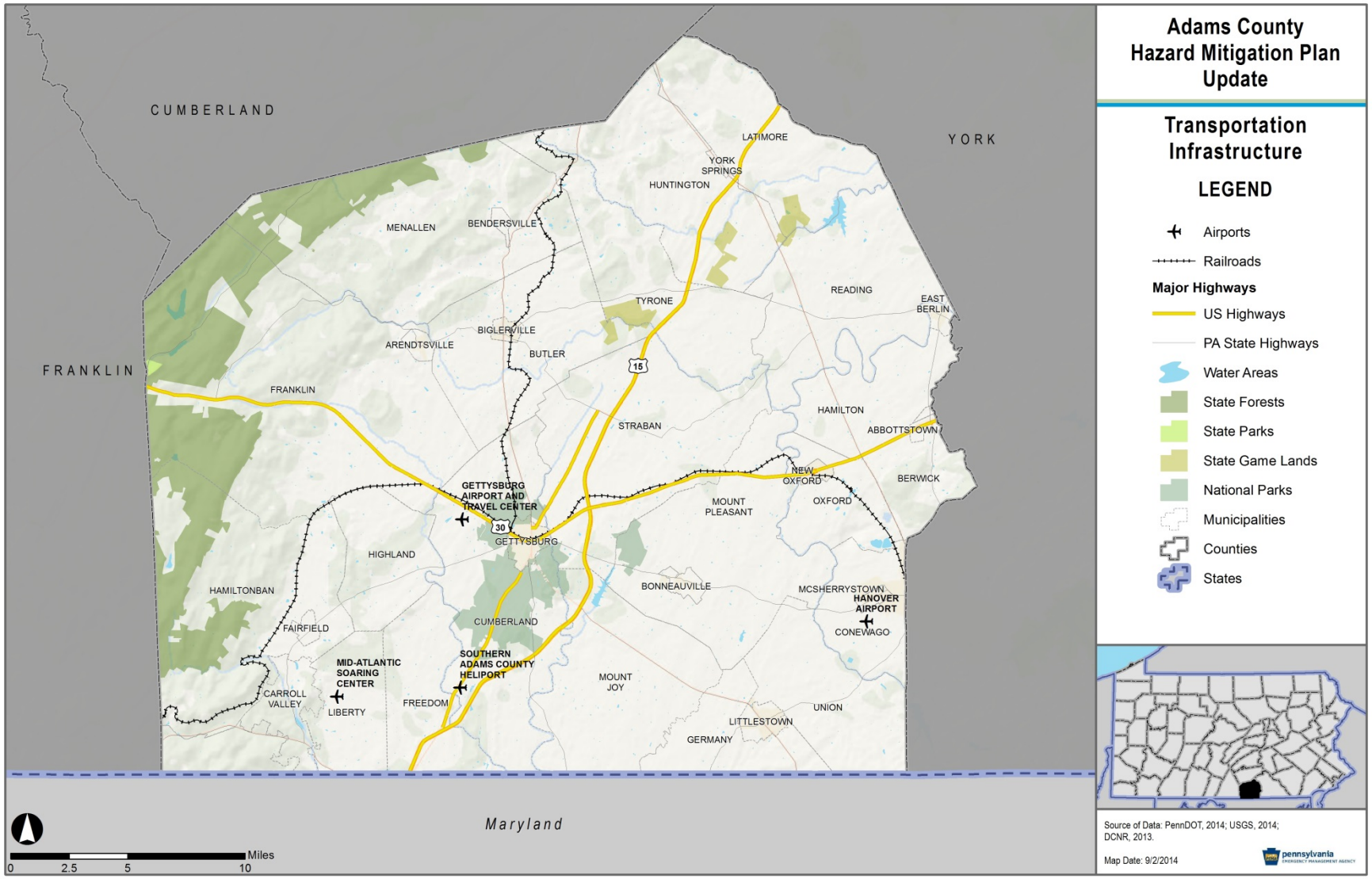
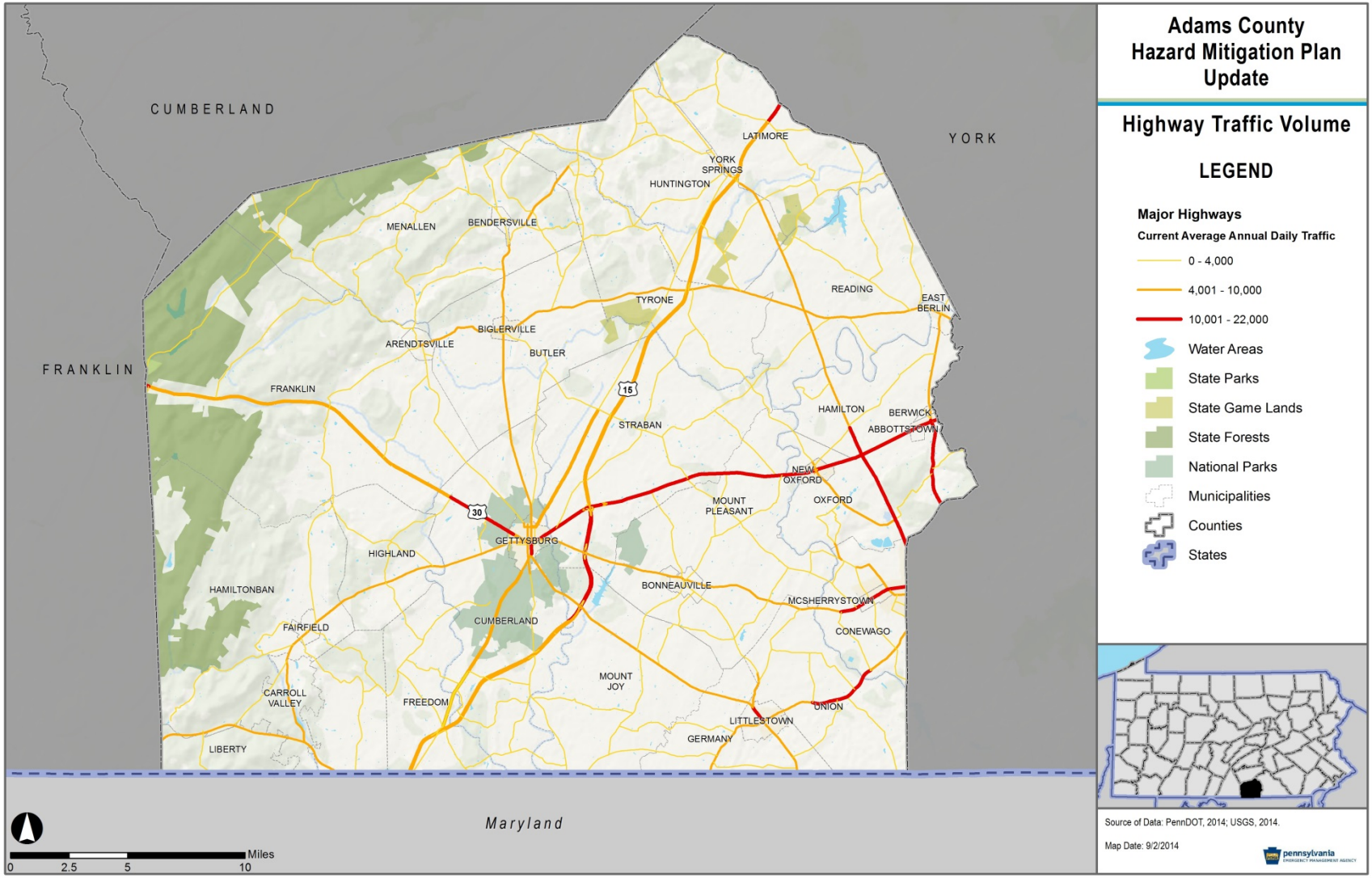


Figure 4.3.17-2 Traffic volume on state roads in Adams County.



4.3.17.2. Range of Magnitude

At a minimum, transportation accidents can result in damage to the vehicles and minor injuries to passengers and drivers. At worst, significant transportation accidents can result in death or serious injury or extensive property loss or damage coupled with business interruptions and hours of congestion. Most air 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 ten people are injured in a car crash, and every seven hours someone dies as a result of a car crash (PennDOT, 2012). Most fatal crashes occur in the summer months of July, and August, and September. Road and railway accidents in particular have the potential to result in hazardous materials releases if the vehicle involved in an accident is hauling hazardous materials. The expected impacts of transportation accidents are amplified by the fact that there is often little warning of accidents.

A worst case scenario for transportation accidents in Adams County would be if a train carrying hazardous materials was to derail near Gettysburg with damage to the rail infrastructure as well as exposing residents and visitors alike to potentially toxic chemicals. An accident of this nature would cause not only environmental harm and endanger human health but would also cause a disruption in Adams County's economy since freight transport would need to be re-routed for the duration of the incident and its damage.

4.3.17.3. Past Occurrence

The most common transportation accidents in the County are highway accidents involving motor vehicles. Vehicular transportation accidents like this are a daily occurrence throughout Pennsylvania. The County's most serious transportation concerns involve US 15 and US 30. These routes have the highest annual average traffic counts and the most truck traffic. Additionally, there is a temporal aspect to highway transportation accidents; in the spring and early summer, when construction and narrowed lanes are commonplace, the incidence of large-scale transportation accidents increases.

Overall, though, over the ten-year period from 2003-2013, highway accidents have decreased by over 700 crashes per year. Table 4.3.17-1 summarizes the overall vehicular crash data from 2003-2013 for Adams County and indicates that vehicular crashes have hovered around 1,000 per year, but fatalities across the state have been decreasing. The data was gathered through the PennDOT Crash Statistics Reports.

Table 4.3.17-1 Total number of crashes, fatal crashes, and property damage-only crashes in Adams County (PennDOT, 2014).

YEAR	TOTAL CRASHES	TOTAL FATAL CRASHES	TOTAL PROPERTY DAMAGE-ONLY CRASHES
2003	1,085	23	526
2004	1,096	15	534
2005	1,026	25	496
2006	974	16	490
2007	1,061	17	519
2008	1,054	21	528
2009	1,158	21	571
2010	1,007	14	520
2011	1,076	12	578

Table 4.3.17-1 Total number of crashes, fatal crashes, and property damage-only crashes in Adams County (PennDOT, 2014).

YEAR	TOTAL CRASHES	TOTAL FATAL CRASHES	TOTAL PROPERTY DAMAGE-ONLY CRASHES
2012	995	13	538
2013	1063	5	569
TOTAL	**11,595**	**182**	**5,869**

Aviation accidents are the least frequent type of transportation accident. Most accidents involve small aircraft and many resulted in only minimal injuries. However, there have been recent aviation accidents in Adams County. Most notably, in December 2013, two people died after a small Piper plane crashed in Butler Township. According to the PA State Police, the plane was "severely mangled" and left a 0.25 mile debris trail (Associated Press, 2013). There had been winter weather the morning of the crash.

According to the Federal Railroad Administration, there have been 14 railroad incidents in Adams County from 2005-2014. None of these incidents were fatal, but ten did involve injuries (one of which was related to trespassing). Four were highway-rail crossing incidents (FRA, 2014).

4.3.17.4. Future Occurrence

The county's population is growing, meaning it is likely that traffic volumes will likely rise accordingly. New residents have limited knowledge of detour routes and alternate routes around accidents, contributing to the accident-related congestion experienced recently in the County. The trucking industry is expected to continue, maintaining and possibly increasing the number of tractor-trailers on the county's road system. Transportation accidents may increase slightly over the next five years without proper mitigation strategies in place. Based on this and past occurrences, the probability of transportation accidents is characterized as *highly likely* as defined by the Risk Factor Methodology probability criteria (see Table 4.4.4-1). However, the low number of rail and air traffic accidents in the County indicates that the bulk of future transportation accidents will be roadway accidents.

4.3.17.5. Vulnerability Assessment

A transportation-related incident can occur on any stretch of road or railway in Adams County. However, severe accidents are more likely on the County's highways, such as US 15 and US 30, 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 accidents occurring. Like highway incidents, rail incidents can impact populations living near rail lines and airports.

Jurisdictional vulnerability for transportation accidents is different for each of the three major modes of transportation in the Commonwealth. For this analysis, vulnerability for highway accidents was defined as jurisdictions falling within a ¼ mile of Interstate and US highways, the high-speed roads likely to yield deadly crashes. Vulnerability for air traffic accidents is defined as jurisdictions falling within five miles of both public and private airports. Similar to highway accidents, jurisdictions that are vulnerable to rail accidents are those located within ¼ mile of rail

lines. Table 4.3.17-2 illustrates the vulnerability of structures and critical facilities for each kind of transportation accident, and Tables 4.3.7-3, 4.3.17-4, and 4.3.17-5 break down the vulnerability of structures by generalized land use type.

Table 4.3.17-2 Structures and critical facilities within 0.25 mi of major highways (interstates, US highways, state highways) and rail lines and within 5 miles of an airport.

MUNICIPALITY	TOTAL STRUCT.	STRUCT.S WITHIN 0.25 MI OF MAJOR ROADS	PERCENT OF STRUCT. WITHIN 0.25 MI OF MAJOR ROADS	STRUCT. WITHIN 0.25 MI OF RAIL LINES	PERCENT OF STRUCT. WITHIN 0.25 MI OF RAIL LINES	STRUCT. WITHIN 5 MI OF AIRPORT/ HELIPORT	PERCENT OF STRUCT. WITHIN 5 MI OF AIRPORT	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN 0.25 MI OF MAJOR ROADS	PERCENT CRITICAL FACILITIES WITHIN 0.25 MI OF MAJOR ROADS	TOTAL CRITICAL FACILITIES WITHIN 0.25 MI OF RAIL LINES	PERCENT CRITICAL FACILITIES WITHIN 0.25 MI OF RAIL LINES	CRITICAL FACILITIES WITHIN 5 MI OF AIRPORT/ HELIPORT	PERCENT OF CRITICAL FACILITIES WITHIN 5 MI OF AIRPORT
Abbottstown Borough	378	360	95.2%	0	0.0%	0	0.0%	5	5	100.0%	0	0.0%	0	0.0%
Arendtsville Borough	342	301	88.0%	0	0.0%	0	0.0%	6	6	100.0%	0	0.0%	0	0.0%
Bendersville Borough	243	13	5.3%	0	0.0%	0	0.0%	9	1	11.1%	0	0.0%	0	0.0%
Berwick Township	1,032	539	52.2%	0	0.0%	413	40.0%	5	5	100.0%	0	0.0%	1	20.0%
Biglerville Borough	444	444	100.0%	192	43.2%	337	75.9%	13	13	100.0%	8	61.5%	0	0.0%
Bonneauville Borough	659	442	67.1%	0	0.0%	0	0.0%	5	5	100.0%	0	0.0%	0	0.0%
Butler Township	1,141	543	47.6%	266	23.3%	0	0.0%	12	9	75.0%	3	25.0%	2	16.7%
Carroll Valley Borough	1,535	543	35.4%	46	3.0%	1535	100.0%	8	4	50.0%	0	0.0%	8	100.0%
Conewago Township	3,067	1,056	34.4%	119	3.9%	3067	100.0%	20	8	40.0%	3	15.0%	20	100.0%
Cumberland Township	3,208	1,985	61.9%	511	15.9%	3208	100.0%	27	26	96.3%	4	14.8%	27	100.0%
East Berlin Borough	634	574	90.5%	0	0.0%	0	0.0%	12	12	100.0%	0	0.0%	0	0.0%
Fairfield Borough	287	270	94.1%	0	0.0%	287	100.0%	8	8	100.0%	0	0.0%	8	100.0%
Franklin Township	2,394	941	39.3%	77	3.2%	708	29.6%	31	11	35.5%	0	0.0%	13	41.9%
Freedom Township	399	106	26.6%	0	0.0%	399	100.0%	2	1	50.0%	0	0.0%	2	100.0%
Germany Township	1,102	456	41.4%	0	0.0%	312	28.3%	9	7	77.8%	0	0.0%	1	11.1%
Gettysburg Borough	2,129	1,966	92.3%	1,143	53.7%	2129	100.0%	30	28	93.3%	16	53.3%	30	100.0%
Hamilton Township	1,117	311	27.8%	0	0.0%	0	0.0%	6	2	33.3%	0	0.0%	0	0.0%
Hamiltonban Township	1,059	172	16.2%	247	23.3%	714	67.4%	21	10	47.6%	5	23.8%	16	76.2%

Table 4.3.17-2 Structures and critical facilities within 0.25 mi of major highways (interstates, US highways, state highways) and rail lines and within 5 miles of an airport.

MUNICIPALITY	TOTAL STRUCT.	STRUCT.S WITHIN 0.25 MI OF MAJOR ROADS	PERCENT OF STRUCT. WITHIN 0.25 MI OF MAJOR ROADS	STRUCT. WITHIN 0.25 MI OF RAIL LINES	PERCENT OF STRUCT. WITHIN 0.25 MI OF RAIL LINES	STRUCT. WITHIN 5 MI OF AIRPORT/ HELIPORT	PERCENT OF STRUCT. WITHIN 5 MI OF AIRPORT	TOTAL CRITICAL FACILITIES	CRITICAL FACILITIES WITHIN 0.25 MI OF MAJOR ROADS	PERCENT CRITICAL FACILITIES WITHIN 0.25 MI OF MAJOR ROADS	TOTAL CRITICAL FACILITIES WITHIN 0.25 MI OF RAIL LINES	PERCENT CRITICAL FACILITIES WITHIN 0.25 MI OF RAIL LINES	CRITICAL FACILITIES WITHIN 5 MI OF AIRPORT/ HELIPORT	PERCENT OF CRITICAL FACILITIES WITHIN 5 MI OF AIRPORT
Highland Township	450	116	25.8%	24	5.3%	450	100.0%	5	2	40.0%	0	0.0%	5	100.0%
Huntington Township	977	393	40.2%	32	3.3%	0	0.0%	18	9	50.0%	0	0.0%	0	0.0%
Latimore Township	1,117	160	14.3%	0	0.0%	0	0.0%	13	5	38.5%	0	0.0%	0	0.0%
Liberty Township	627	90	14.4%	0	0.0%	592	94.4%	5	0	0.0%	0	0.0%	5	100.0%
Littlestown Borough	1,869	1,531	81.9%	0	0.0%	1368	73.2%	25	18	72.0%	0	0.0%	23	92.0%
McSherrystow n Borough	1,050	1,047	99.7%	0	0.0%	1050	100.0%	14	14	100.0%	0	0.0%	14	100.0%
Menallen Township	1,603	316	19.7%	171	10.7%	0	0.0%	16	6	37.5%	5	31.3%	0	0.0%
Mt Joy Township	1,683	556	33.0%	0	0.0%	830	49.3%	9	6	66.7%	0	0.0%	4	44.4%
Mt Pleasant Township	1,968	575	29.2%	145	7.4%	717	36.4%	6	1	16.7%	1	16.7%	0	0.0%
New Oxford Borough	677	611	90.3%	551	81.4%	111	16.4%	19	15	78.9%	12	63.2%	1	5.3%
Oxford Township	2,257	553	24.5%	250	11.1%	1375	60.9%	19	4	21.1%	2	10.5%	13	68.4%
Reading Township	2,416	629	26.0%	0	0.0%	0	0.0%	13	6	46.2%	0	0.0%	0	0.0%
Straban Township	1,998	1,323	66.2%	274	13.7%	861	43.1%	27	18	66.7%	8	29.6%	10	37.0%
Tyrone Township	911	240	26.3%	93	10.2%	0	0.0%	8	5	62.5%	2	25.0%	0	0.0%
Union Township	1,226	293	23.9%	0	0.0%	1224	99.8%	8	0	0.0%	0	0.0%	8	100.0%
York Springs Borough	207	207	100.0%	0	0.0%	0	0.0%	5	5	100.0%	0	0.0%	0	0.0%
TOTAL	**42,206**	**19,662**	**46.6%**	**4,141**	**9.8%**	**21,687**	**51.4%**	**439**	**275**	**62.6%**	**69**	**15.7%**	**211**	**48.1%**

Table 4.3.17-3 Structures Vulnerable to Highway Accidents by Generalized Structure Type.

MUNICIPALITY	TOTAL STRUCTURES	CIVIC/ INSTITUTIONAL	COMMERCIAL	INDUSTRIAL	RESIDENTIAL	TRANSPORTATION/ UTILITIES	UNKNOWN	GRAND TOTAL
Abbottstown Borough	378	6	17	6	325	0	6	360
Arendtsville Borough	342	11	14	0	276	0	0	301
Bendersville Borough	243	1	2	1	8	0	1	13
Berwick Township	1,032	6	43	2	467	1	20	539
Biglerville Borough	444	10	30	4	386	2	12	444
Bonneauville Borough	659	7	15	0	377	0	43	442
Butler Township	1,141	13	27	3	450	2	48	543
Carroll Valley Borough	1,535	3	8	0	523	3	6	543
Conewago Township	3,067	9	61	2	970	1	13	1056
Cumberland Township	3,208	27	82	7	1569	8	292	1985
East Berlin Borough	634	13	55	7	481	2	16	574
Fairfield Borough	287	6	20	1	210	2	31	270
Franklin Township	2,394	8	64	0	823	4	42	941
Freedom Township	399	1	6	0	97	1	1	106
Germany Township	1,102	7	21	1	410	1	16	456
Gettysburg Borough	2,129	77	385	4	1424	3	73	1966
Hamilton Township	1,117	3	30	1	262	1	14	311
Hamiltonban Township	1,059	6	9	0	147	0	10	172
Highland Township	450	3	9	0	96	0	8	116
Huntington Township	977	6	14	0	351	2	20	393
Latimore Township	1,117	3	11	0	114	1	31	160
Liberty Township	627	0	1	0	79	0	10	90
Littlestown Borough	1,869	16	78	7	1334	0	96	1531
McSherrystown Borough	1,050	12	38	1	971	1	24	1047
Menallen Township	1,603	6	12	1	243	2	52	316
Mt Joy Township	1,683	5	26	0	497	4	24	556

Table 4.3.17-3 Structures Vulnerable to Highway Accidents by Generalized Structure Type.

MUNICIPALITY	TOTAL STRUCTURES	CIVIC/ INSTITUTIONAL	COMMERCIAL	INDUSTRIAL	RESIDENTIAL	TRANSPORTATION/ UTILITIES	UNKNOWN	GRAND TOTAL
Mt Pleasant Township	1,968	1	28	1	522	2	21	575
New Oxford Borough	677	17	54	5	528	1	6	611
Oxford Township	2,257	5	287	2	243	0	16	553
Reading Township	2,416	5	14	2	550	2	56	629
Straban Township	1,998	19	187	8	1040	4	65	1323
Tyrone Township	911	8	16	1	204	2	9	240
Union Township	1,226	3	10	1	270	0	9	293
York Springs Borough	207	7	16	0	169	0	15	207
TOTAL	**42,206**	**330**	**1,690**	**68**	**16,416**	**52**	**1,106**	**19,662**

Table 4.3.17-4 Structures Vulnerable to Rail Accidents by Generalized Structure Type.

MUNICIPALITY	TOTAL STRUCTURES	CIVIC/ INSTITUTIONAL	COMMERCIAL	INDUSTRIAL	RESIDENTIAL	TRANSPORTATION/ UTILITIES	UNKNOWN	GRAND TOTAL
Abbottstown Borough	378	0	0	0	0	0	0	0
Arendtsville Borough	342	0	0	0	0	0	0	0
Bendersville Borough	243	0	0	0	0	0	0	0
Berwick Township	1,032	0	0	0	0	0	0	0
Biglerville Borough	444	4	15	4	157	1	11	192
Bonneauville Borough	659	0	0	0	0	0	0	0
Butler Township	1,141	4	14	1	209	0	38	266
Carroll Valley Borough	1,535	0	0	0	46	0	0	46
Conewago Township	3,067	2	27	4	83	1	2	119
Cumberland Township	3,208	2	33	2	463	1	10	511
East Berlin Borough	634	0	0	0	0	0	0	0
Fairfield Borough	287	0	0	0	0	0	0	0
Franklin Township	2,394	0	4	1	69	0	3	77
Freedom Township	399	0	0	0	0	0	0	0
Germany Township	1,102	0	0	0	0	0	0	0
Gettysburg Borough	2,129	48	272	4	766	1	52	1143
Hamilton Township	1,117	0	0	0	0	0	0	0
Hamiltonban Township	1,059	7	2	3	224	2	9	247
Highland Township	450	1	0	1	17	0	5	24
Huntington Township	977	0	0	1	30	0	1	32
Latimore Township	1,117	0	0	0	0	0	0	0
Liberty Township	627	0	0	0	0	0	0	0
Littlestown Borough	1,869	0	0	0	0	0	0	0
McSherrystown Borough	1,050	0	0	0	0	0	0	0
Menallen Township	1,603	4	11	4	141	0	11	171
Mt Joy Township	1,683	0	0	0	0	0	0	0

Table 4.3.17-4 Structures Vulnerable to Rail Accidents by Generalized Structure Type.

MUNICIPALITY	TOTAL STRUCTURES	CIVIC/ INSTITUTIONAL	COMMERCIAL	INDUSTRIAL	RESIDENTIAL	TRANSPORTATION/ UTILITIES	UNKNOWN	GRAND TOTAL
Mt Pleasant Township	1,968	0	9	1	129	1	5	145
New Oxford Borough	677	9	51	7	476	1	7	551
Oxford Township	2,257	1	9	2	235	1	2	250
Reading Township	2,416	0	0	0	0	0	0	0
Straban Township	1,998	10	75	7	166	1	15	274
Tyrone Township	911	2	10	1	76	0	4	93
Union Township	1,226	0	0	0	0	0	0	0
York Springs Borough	207	0	0	0	0	0	0	0
TOTAL	**42,206**	**94**	**532**	**43**	**3,287**	**10**	**175**	**4,141**

Table 4.3.17-5 Structures Vulnerable to Aviation Accidents by Generalized Structure Type.

MUNICIPALITY	TOTAL STRUCTURES	CIVIC/ INSTITUTIONAL	COMMERCIAL	INDUSTRIAL	RESIDENTIAL	TRANSPORTATION/ UTILITIES	UNKNOWN	GRAND TOTAL
Abbottstown Borough	378	0	0	0	0	0	0	0
Arendtsville Borough	342	0	0	0	0	0	0	0
Bendersville Borough	243	0	0	0	0	0	0	0
Berwick Township	1,032	1	15	1	383	0	13	413
Biglerville Borough	444	0	0	0	0	0	0	0
Bonneauville Borough	659	0	0	0	0	0	0	0
Butler Township	1,141	1	14	0	281	1	40	337
Carroll Valley Borough	1,535	3	13	0	1,508	4	7	1,535
Conewago Township	3,067	16	90	19	2,718	2	222	3,067
Cumberland Township	3,208	38	98	8	2,623	9	432	3,208
East Berlin Borough	634	0	0	0	0	0	0	0
Fairfield Borough	287	6	20	2	226	2	31	287
Franklin Township	2,394	10	15	1	656	4	22	708
Freedom Township	399	2	7	0	381	1	8	399
Germany Township	1,102	0	6	0	288	0	18	312
Gettysburg Borough	2,129	82	396	4	1,559	3	85	2,129
Hamilton Township	1,117	0	0	0	0	0	0	0
Hamiltonban Township	1,059	14	10	1	648	3	38	714
Highland Township	450	6	11	1	396	3	33	450
Huntington Township	977	0	0	0	0	0	0	0
Latimore Township	1,117	0	0	0	0	0	0	0
Liberty Township	627	6	2	0	512	0	72	592
Littlestown Borough	1,869	20	69	7	1,162	0	110	1,368
McSherrystown Borough	1,050	12	38	1	974	1	24	1,050
Menallen Township	1,603	0	0	0	0	0	0	0
Mt Joy Township	1,683	4	18	0	711	2	95	830

Table 4.3.17-5 Structures Vulnerable to Aviation Accidents by Generalized Structure Type.

MUNICIPALITY	TOTAL STRUCTURES	CIVIC/ INSTITUTIONAL	COMMERCIAL	INDUSTRIAL	RESIDENTIAL	TRANSPORTATION/ UTILITIES	UNKNOWN	GRAND TOTAL
Mt Pleasant Township	1,968	0	10	2	684	1	20	717
New Oxford Borough	677	0	3	4	98	0	6	111
Oxford Township	2,257	10	242	2	1,011	2	108	1,375
Reading Township	2,416	0	0	0	0	0	0	0
Straban Township	1,998	13	145	3	681	3	16	861
Tyrone Township	911	0	0	0	0	0	0	0
Union Township	1,226	8	13	2	1,168	2	31	1,224
York Springs Borough	207	0	0	0	0	0	0	0
TOTAL	**42,206**	**252**	**1,235**	**58**	**18,668**	**43**	**1,431**	**21,687**

4.4. Hazard Vulnerability Summary

Risk and vulnerability to natural and human-made hazard events are not static. Risk will increase or decrease as states, counties, and municipalities see changes in land use and development as well as changes in population. For Pennsylvania, these changes in risk and vulnerability are likely to differ greatly from one area of the Commonwealth to another.

4.4.1. Methodology

Ranking hazards helps communities set goals and priorities for mitigation based on their vulnerabilities. A Risk Factor (RF) is a tool used to measure the degree of risk for identified hazards in a particular planning area. The RF can also 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, general consensus opinions 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 seventeen hazards profiled in the 2015 HMP. Those categories include: *probability*, *impact*, *spatial extent*, *warning time* and *duration*. Each degree of risk was assigned a value ranging from 1 to 4. The weighting factor is shown in Table 4.4-1. To calculate the RF value for a given hazard, the assigned risk value for each category was multiplied by the weighting factor. The sum of all five categories equals the final RF value, as demonstrated in the example equation:

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

Table 4.4.1-1 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 *What is the likelihood of a hazard event occurring in a given year?*	**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 PROBABILTY	**4**	
IMPACT *In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?*	**MINOR**	VERY FEW INJURIES, IF ANY. ONLY MINOR PROPERTY DAMAGE & MINIMAL DISRUPTION ON QUALITY OF LIFE. TEMPORARY SHUTDOWN OF CRITICAL FACILITIES.	**1**	**30%**
	LIMITED	MINOR INJURIES ONLY. MORE THAN 10% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE DAY.	**2**	
	CRITICAL	MULTIPLE DEATHS/INJURIES POSSIBLE. MORE THAN 25% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR MORE THAN ONE WEEK.	**3**	
	CATASTROPHIC	HIGH NUMBER OF DEATHS/INJURIES POSSIBLE. MORE THAN 50% OF PROPERTY IN AFFECTED AREA DAMAGED OR DESTROYED. COMPLETE SHUTDOWN OF CRITICAL FACILITIES FOR 30 DAYS OR MORE.	**4**	
SPATIAL EXTENT *How large of an area could be impacted by a hazard event? Are impacts localized or regional?*	**NEGLIGIBLE**	LESS THAN 1% OF AREA AFFECTED	**1**	**20%**
	SMALL	BETWEEN 1 & 10.9% OF AREA AFFECTED	**2**	
	MODERATE	BETWEEN 11 & 25% OF AREA AFFECTED	**3**	
	LARGE	GREATER THAN 25% OF AREA AFFECTED	**4**	
WARNING TIME *Is there usually some lead time associated with the hazard event? Have warning measures been implemented?*	**MORE THAN 24 HRS**	SELF-DEFINED	**1**	**10%**
	12 TO 24 HRS	SELF-DEFINED *(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)*	**2**	
	6 TO 12 HRS	SELF-DEFINED	**3**	
	LESS THAN 6 HRS	SELF-DEFINED	**4**	
DURATION *How long does the hazard event usually last?*	**LESS THAN 6 HRS**	SELF-DEFINED	**1**	**10%**
	LESS THAN 24 HRS	SELF-DEFINED *(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)*	**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 seventeen potential hazards identified in the 2015 HMP. Hazards identified as *high* risk have risk factors greater than 2.5. Risk Factors ranging from 2.0 to 2.4 were deemed *moderate* risk hazards. Hazards with Risk Factors 1.9 and less are considered *low* risk.

Table 4.4.2-1 Ranking of hazard types based on Risk Factor methodology.

HAZARD RISK	HAZARD NATURAL (N) or MAN-MADE (M)	RISK ASSESSMENT CATEGORY					RISK FACTOR
		PROBABILITY (1-4)	IMPACT (1-4)	SPATIAL EXTENT (1-4)	WARNING TIME (1-4)	DURATION (1-4)	
HIGH	Flood, Flash Flood, Ice Jam (N)	4	4	3	3	4	3.7
	Winter Storm (N)	4	4	4	1	3	3.6
	Drought (N)	3	4	4	1	4	3.4
	Wildfire (N)	3	4	3	4	2	3.3
	Environmental Hazards (M)	3	3	2	4	2	2.8
	Nuclear Incidents (M)	1	3	3	4	4	2.6
	Tornado, Windstorm (N)	3	3	2	2	1	2.5
MODERATE	Extreme Temperature (N)	2	2	4	1	3	2.4
	Terrorism (M)	1	3	2	4	2	2.2
	Transportation Accidents (M)	4	1	1	4	1	2.2
	Hurricane, Tropical Storm, Nor'easter (N)	2	2	3	1	2	2.1
	Dam Failure (M)	1	2	2	4	4	2.1
LOW	Subsidence, Sinkhole (N)	2	2	1	1	4	1.9
	Pandemic (M)	2	1	2	1	4	1.8
	Invasive Species	1	1	3	1	4	1.7
	Hailstorm	2	1	2	2	1	1.6
	Earthquake (N)	1	1	1	4	1	1.3

Based on these results, there are seven *high* risk hazards, five *moderate* risk hazards and five *low* risk hazards in Adams County. Mitigation actions were developed for all hazards (see Section 6.4) with an emphasis on the higher-ranked hazards.

A risk assessment result for the entire county does not mean that each municipality is at the same amount of risk to each hazard. Table 4.4.2-2 shows the different municipalities in Adams County and whether their risk is greater than (>), less than (<), or equal to (=) the risk factor assigned to the County as a whole. This table was developed by the consultant team based on the findings in the hazard profiles of Section 4.3 and municipal input from the "Hazards in Your Community" worksheet distributed at the July 24, 2014 HMP update meeting. Those changes are reflected in the table.

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

JURISDICTION	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR																
	Flood, Flash Flood, Ice Jam (N)	Winter Storm (N)	Drought (N)	Wildfire (N)	Environmental Hazards (M)	Nuclear Incidents (M)	Tornado, Windstorm (N)	Extreme Temperature (N)	Terrorism (M)	Transportation Accidents (M)	Hurricane, Tropical Storm, Nor'easter (N)	Dam Failure (M)	Subsidence, Sinkhole (N)	Pandemic (M)	Invasive Species (N)	Hailstorm (N)	Earthquake (N)
	3.7	*3.6*	*3.4*	*3.3*	*2.8*	*2.6*	*2.5*	*2.4*	*2.2*	*2.2*	*2.1*	*2.1*	*1.9*	*1.8*	*1.7*	*1.6*	*1.3*
Abbottstown Borough	=	=	<	<	=	=	<	<	<	=	=	<	=	=	>	=	=
Arendstville Borough	=	=	=	<	=	=	=	=	=	=	=	=	=	=	=	=	=
Bendersville Borough	=	=	=	<	=	=	=	=	=	=	=	=	=	=	=	=	=
Berwick Township	=	=	=	=	<	=	<	=	<	=	=	<	>	=	>	=	=
Biglerville Borough	=	=	=	<	=	=	<	<	<	=	=	<	=	=	>	=	=
Bonneauville Borough	=	=	=	<	=	=	=	=	=	=	=	=	=	=	=	=	=
Butler Township	=	=	=	=	<	=	<	<	<	=	=	<	=	=	>	=	=
Carroll Valley Borough	=	=	<	<	=	=	<	=	<	=	=	<	>	=	=	>	=
Conewago Township	=	=	=	=	=	=	<	<	<	=	=	<	>	=	=	=	=
Cumberland Township	=	=	=	=	=	=	<	>	=	=	=	<	>	>	=	>	=
East Berlin Borough	=	=	<	<	=	=	<	=	<	>	=	=	>	=	=	=	=
Fairfield Borough	=	=	=	<	=	=	=	=	<	=	>	<	>	=	=	>	=
Franklin Township	=	=	=	=	=	=	<	<	=	=	>	<	=	>	>	>	=
Freedom Township	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Germany Township	=	=	<	=	=	=	<	=	<	=	=	<	=	=	=	=	=
Gettysburg Borough	=	=	<	<	=	=	=	=	=	=	=	=	=	>	<	=	=
Hamilton Township	=	=	=	=	=	=	=	=	=	>	=	<	>	>	=	=	=
Hamiltonban Township	=	=	<	=	=	=	<	<	<	=	=	=	>	=	>	=	=
Highland Township	=	=	<	=	<	=	<	<	<	<	=	<	=	>	=	=	=
Huntington Township	=	=	=	=	=	=	<	<	<	=	=	<	>	=	=	=	=
Latimore Township	=	=	<	=	<	=	<	<	<	=	=	<	>	=	=	=	=
Liberty Township	=	=	<	=	<	=	<	<	<	<	=	<	=	>	>	=	=
Littlestown Borough	=	=	=	<	=	=	<	=	<	=	=	<	>	=	=	=	=
McSherrystown Borough	=	=	=	<	=	=	<	=	<	=	=	<	>	=	=	=	=
Menallen Township	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Mount Joy Township	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=

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

JURISDICTION	IDENTIFIED HAZARD AND CORRESPONDING COUNTYWIDE RISK FACTOR																
	Flood, Flash Flood, Ice Jam (N)	Winter Storm (N)	Drought (N)	Wildfire (N)	Environmental Hazards (M)	Nuclear Incidents (M)	Tornado, Windstorm (N)	Extreme Temperature (N)	Terrorism (M)	Transportation Accidents (M)	Hurricane, Tropical Storm, Nor'easter (N)	Dam Failure (M)	Subsidence, Sinkhole (N)	Pandemic (M)	Invasive Species (N)	Hailstorm (N)	Earthquake (N)
	3.7	*3.6*	*3.4*	*3.3*	*2.8*	*2.6*	*2.5*	*2.4*	*2.2*	*2.2*	*2.1*	*2.1*	*1.9*	*1.8*	*1.7*	*1.6*	*1.3*
Mount Pleasant Township	=	=	=	=	=	=	=	=	=	=	=	=	>	=	=	=	=
New Oxford Borough	<	=	=	<	=	=	=	=	=	=	=	<	=	=	=	=	=
Oxford Township	=	=	=	=	=	=	=	=	=	=	=	=	>	=	=	>	=
Reading Township	=	=	=	=	=	=	=	=	<	>	>	=	=	=	=	>	=
Straban Township	=	=	<	=	=	=	<	=	<	=	=	=	=	=	=	=	=
Tyrone Township	=	=	=	=	=	=	<	=	=	=	=	<	=	>	>	>	=
Union Township	=	=	=	=	=	=	=	=	=	=	=	=	>	=	=	=	=
York Springs Borough	=	=	=	<	=	=	=	=	=	=	=	=	>	=	=	=	=

Additional stakeholder organizations (such as the National Park Service- Gettysburg, Gettysburg College, Gettysburg Seminary, Fairfield Area School District, etc.) participated in the process. Amongst their submissions, there was a notable trend. School districts, colleges, and seminaries – all institutions with a higher population density and more person-to-person contact than the average for Adams County – considered pandemic to be have a higher risk factor for their locations. This is appropriate given that rate of infection in the case of a pandemic is generally higher at higher densities.

4.4.3. Potential Loss Estimates

Potential loss estimates for hazard events help a community understand the monetary value of what might be at stake during a hazard event. 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.

Loss estimates provided in this section fall into three broad categories: historical losses, current-condition losses, and predictive losses. Historical loss estimates come from three primary sources: the NCDC storm events database, the NFIP, and the USDA's Risk Management Agency annual crop indemnities dating from 1980-2013. Current condition losses come from geospatial analysis of the value of buildings identified as vulnerable in the Vulnerability Assessment section of hazard profiles for floods, subsidence, wildfires, and transportation accidents. Finally, predictive losses were generated using HAZUS-MH, version 2.1. Historical losses do not take into account any of the aforementioned components, but they do provide insight into what future losses might be. The current-condition losses take into account replacement value only. HAZUS modeling takes into account all four components and provides the most comprehensive description of potential losses.

Historical Loses

Historical losses were able to be determined for drought, extreme temperature, flooding, hailstorms, coastal storms (hurricanes/tropical storms/tropical depressions), tornado and windstorms, and winter storms from NCDC, USDA RMA, and the NFIP.

NCDC reports include property and crop damage estimates with their incident reports. As noted in many of the hazard profiles, though, many of the events have no damages reported. This does not mean that there were no damage; rather, it indicates that no damages were reported to NCDC. As a result, these should be considered low-end estimates of losses. For example, the flood and flash flood events reported in NCDC list $164,000 in property damage and one fatality over the history of flooding in the county. Hailstorm losses reported to the NCDC totaled $15,000 from 1980-2014. Property damage estimates for tornado were reported at nearly $2.9 million, with a range of property damage from $2,500 to $2.5 million. Wind events of over 50 knots had estimated losses of one fatality as well as $200 in crop damage and $364,000 in property damage. Historical losses for winter storms, including ice storms, freezing rain, sleet, and heavy snow, include one fatality, two injuries, and over $2 million in property damage.

Agriculture is an integral part of Adams County's economy, and agricultural production is highly vulnerable to natural hazard events. As previously mentioned, losses are available from the USDA RMA. The RMA operates and manages the Federal Crop Insurance Corporation, which provides crop insurance to American farmers. While not all crops are insured through RMA, their records provide strong insight into agricultural losses nationwide and in Adams County. Table 4.4.3-1 illustrates the total amount of indemnities paid through RMA since 1980 in Adams County by type of crop failure. Only crop failures related to the hazards discussed in this plan are listed. By far the most historical crop losses have been due to drought conditions, followed by excessive precipitation, and hail.

Table 4.4.3-1 Historic Insured Crop Losses, 1980-2013 (USDA RMA, 2014)	
REASON FOR LOSS	**INDEMNITY AMOUNT**
Cold Wet Weather	$19,685,191.95
Cold Winter	$654,800.50
Cyclone	$18,134.40
Drought	$241,668,220.57
Excess Moisture/Precipitation /Rain	$69,842,648.65
Excess Sun	$2,612,792.85
Fire	$33,539.00
Flood	$3,736,140.61
Freeze	$17,762,998.15
Frost	$15,839,110.50
Hail	$43,626,040.50
Heat	$16,445,132.54
Hot Wind	$69,808.91
Hurricane/Tropical Depression	$1,185,383.82
Tornado	$26,164.00
Wind/Excess Wind	$2,755,388.54
Grand Total	**$435,961,495.49**

The final set of historic losses relates solely to prior flood losses and comes from the NFIP's records of claims paid. Table 4.4.3-2 shows the total amount of claims paid in each municipality according to CIS. Reading and Cumberland Townships have had the highest amount of claims paid, and there are eight communities that have never had a claim paid despite having policies in force in the community.

Table 4.4.3-2 Adams County Historic Flood Losses (FEMA CIS, 2014).		
COMMUNITY	**PARTICIPATION STATUS**	**TOTAL AMOUNT OF PAID CLAIMS**
Abbottstown Borough	Participating	$47,627.87
Arendtsville Borough	Participating	$877.74
Bendersville Borough	Participating	$0.00
Berwick Township	Participating	$34,107.53
Biglerville Borough	Participating	$12,088.73
Bonneauville Borough	Participating	$4,549.07
Butler Township	Participating	$22,392.44

Table 4.4.3-2 Adams County Historic Flood Losses (FEMA CIS, 2014).

COMMUNITY	PARTICIPATION STATUS	TOTAL AMOUNT OF PAID CLAIMS
Carroll Valley Borough	Participating	$106,589.51
Conewago Township	Participating	$10,529.85
Cumberland Township	Participating	$1,598,925.45
East Berlin Borough	Participating	$430,484.64
Fairfield Borough	Participating	$9,235.71
Franklin Township	Participating	$84,171.86
Freedom Township	Participating	$111,028.85
Germany Township	Participating	$0.00
Gettysburg Borough	Participating	$661,230.41
Hamilton Township	Participating	$366,808.79
Hamiltonban Township	Participating	$0.00
Highland Township	Participating	$3,000.00
Huntington Township	Participating	$101,093.79
Latimore Township	Participating	$0.00
Liberty Township	Participating	$6,596.80
Littlestown Borough	Participating	$0.00
McSherrystown Borough	Participating	$0.00
Menallen Township	Participating	$129,384.55
Mt Joy Township	Participating	$8,037.80
Mt Pleasant Township	Participating	$53,257.26
New Oxford Borough	Not Participating (No SFHAs)	N/A
Oxford Township	Participating	$61,082.18
Reading Township	Participating	$2,210,697.63
Straban Township	Participating	$89,800.21
Tyrone Township	Participating	$0.00
Union Township	Participating	$0.00
York Springs Borough	Participating	$10,521.97
TOTAL		**$6,174,120.64**

Current-Condition Losses

As discussed previously, current-condition losses look at the total value of structures in each community in Adams County along with the value of buildings identified as vulnerable in the 4.3.X.5 section of hazard profiles for floods, subsidence, wildfires, and transportation accidents.

These losses are enumerated in Table 4.4.3-3 below. It is important to note that there were some structures that had no value information populated in the addresses database. As a result, there may be communities that have structures identified as vulnerable to a particular hazard, but do not have an estimated dollar amount of exposed value. These instances are marked in the table with a NP, denoting no value was provided. Adams County buildings have a cumulative value of over $13 billion, with the highest cumulative values in Straban Township, Gettysburg, and Oxford Township. When looking at the potential losses of exposed buildings, highway accidents rank highest in potential loss estimates with over $8 billion in exposed building value. However, it is unlikely all structures in areas prone to highway accidents would be damaged in a single incident. The potential losses are lowest for structures located in wooded areas (at $177 million) and flooding, where structures in the SFHA have a value of over $222 million.

Table 4.4.3-3 Loss estimates based on the value of buildings in Adams County vulnerable to profiled hazards.

MUNICIPALITY	TOTAL BUILDING VALUE OF STRUCTURES IN COMMUNITY	TOTAL BUILDING VALUE OF STRUCTURES IN SFHA	TOTAL BUILDING VALUE OF STRUCTURES IN SUBSIDENCE-PRONE AREAS	TOTAL BUILDING VALUE OF STRUCTURES IN WILDFIRE HIGH HAZARD AREAS	TOTAL BUILDING VALUE OF STRUCTURES IN WOODED AREAS	TOTAL BUILDING VALUE OF STRUCTURES WITHIN 0.25 MILES OF MAJOR ROADS	TOTAL BUILDING VALUE OF STRUCTURES WITHIN 0.25 MILES OF RAIL LINES	TOTAL BUILDING VALUE OF STRUCTURES WITHIN 5 MILES OF AIRPORTS
Abbottstown Borough	$45,569,200	$332,800	$0	$0	$0	$42,859,700	$0	$0
Arendtsville Borough	$55,581,900	$0	$0	$0	$0	$49,890,100	$0	$0
Bendersville Borough	$36,612,000	$212,000	$0	$0	$0	$1,732,700	$0	$0
Berwick Township	$174,540,500	$560,800	$0	$0	$8,284,200	$109,884,700	$0	$60,604,200
Biglerville Borough	$93,692,900	$0	$0	$0	$0	$93,692,900	$31,925,100	$0
Bonneauville Borough	$87,685,000	$524,600	$0	$0	$170,500	$57,989,200	$0	$0
Butler Township	$164,947,700	$3,532,600	$0	$0	$4,526,800	$78,018,800	$24,617,200	$38,075,800
Carroll Valley Borough	$257,757,200	$2,329,500	$0	$0	$5,754,400	$79,883,800	$8,105,100	$257,757,200
Conewago Township	$590,213,500	$3,716,000	$504,999,900	$0	NP	$185,856,900	$29,682,700	$590,213,500
Cumberland Township	$665,592,900	$8,347,700	$0	$0	$9,650,000	$383,395,700	$119,891,900	$665,592,900
East Berlin Borough	$108,523,600	$2,388,100	$0	$0	$40,000	$99,365,100	$0	$0
Fairfield Borough	$46,437,000	$7,124,900	$10,061,100	$0	$0	$42,099,000	$0	$46,437,000
Franklin Township	$557,835,100	$29,222,000	$0	$557,835,100	$37,698,400	$360,730,200	$9,888,900	$111,829,200
Freedom Township	$72,257,700	$754,400	$0	$0	$3,076,900	$14,883,900	$0	$72,257,700
Germany Township	$182,941,600	$2,340,400	$1,935,100	$0	$2,328,300	$76,321,600	$0	$54,107,400
Gettysburg Borough	$1,162,728,300	$2,748,100	$0	$0	$0	$1,037,959,400	$673,643,800	$1,162,728,300
Hamilton Township	$180,644,900	$4,734,000	$0	$0	$2,468,200	$67,677,600	$0	$0
Hamiltonban Township	$194,653,700	$6,358,500	$19,569,200	$194,653,700	$12,655,300	$66,654,000	$43,111,000	$149,251,600
Highland Township	$78,430,700	$644,000	$0	$0	$2,209,500	$19,031,300	$3,219,900	$78,430,700
Huntington Township	$186,901,800	$1,035,400	$2,313,700	$0	$3,532,600	$82,228,100	$3,909,500	$0
Latimore Township	$153,473,400	$5,853,900	$146,900	$0	$4,351,500	$18,454,700	$0	$0
Liberty Township	$101,755,900	$754,500	$0	$0	$5,282,800	$13,122,400	$0	$94,965,800
Littlestown Borough	$405,521,500	$0	$295,697,600	$0	NP	$320,207,600	$0	$317,131,300

Table 4.4.3-3 Loss estimates based on the value of buildings in Adams County vulnerable to profiled hazards.

MUNICIPALITY	TOTAL BUILDING VALUE OF STRUCTURES IN COMMUNITY	TOTAL BUILDING VALUE OF STRUCTURES IN SFHA	TOTAL BUILDING VALUE OF STRUCTURES IN SUBSIDENCE-PRONE AREAS	TOTAL BUILDING VALUE OF STRUCTURES IN WILDFIRE HIGH HAZARD AREAS	TOTAL BUILDING VALUE OF STRUCTURES IN WOODED AREAS	TOTAL BUILDING VALUE OF STRUCTURES WITHIN 0.25 MILES OF MAJOR ROADS	TOTAL BUILDING VALUE OF STRUCTURES WITHIN 0.25 MILES OF RAIL LINES	TOTAL BUILDING VALUE OF STRUCTURES WITHIN 5 MILES OF AIRPORTS
McSherrystown Borough	$306,196,700	$45,055,100	$306,196,700	$0	NP	$305,735,300	$0	$306,196,700
Menallen Township	$264,335,500	$19,544,100	$0	$264,335,500	$14,675,900	$54,131,400	$50,025,800	$0
Mt Joy Township	$324,311,300	$930,500	$0	$0	$6,195,300	$94,105,600	$0	$155,154,000
Mt Pleasant Township	$250,478,400	$2,874,200	$0	$0	$3,784,800	$73,152,400	$12,422,400	$86,462,800
New Oxford Borough	$164,837,200	$0	$0	$0	$145,400	$153,849,300	$141,983,500	$21,852,300
Oxford Township	$5,096,193,100	$51,123,000	$0	$0	$5,270,600	$2,959,642,200	$36,640,400	$2,761,959,900
Reading Township	$319,636,200	$14,098,000	$0	$0	$10,909,900	$69,273,900	$0	$0
Straban Township	$1,105,960,300	$2,222,700	$0	$0	$18,765,600	$954,309,000	$216,607,500	$904,896,200
Tyrone Township	$111,684,800	$594,300	$0	$0	$14,459,300	$34,655,000	$10,211,300	$232,453,100
Union Township	$232,575,800	$335,900	$79,107,600	$0	$810,900	$58,935,100	$0	$0
York Springs Borough	$28,871,700	$1,960,700	$648,200	$0	$0	$28,871,700	$0	$0
TOTAL	**$13,809,379,000**	**$222,252,700**	**$1,220,676,000**	**$1,016,824,300**	**$177,047,100**	**$8,088,600,300**	**$1,415,886,000**	**$8,168,357,600**

Modeled Losses (via HAZUS)

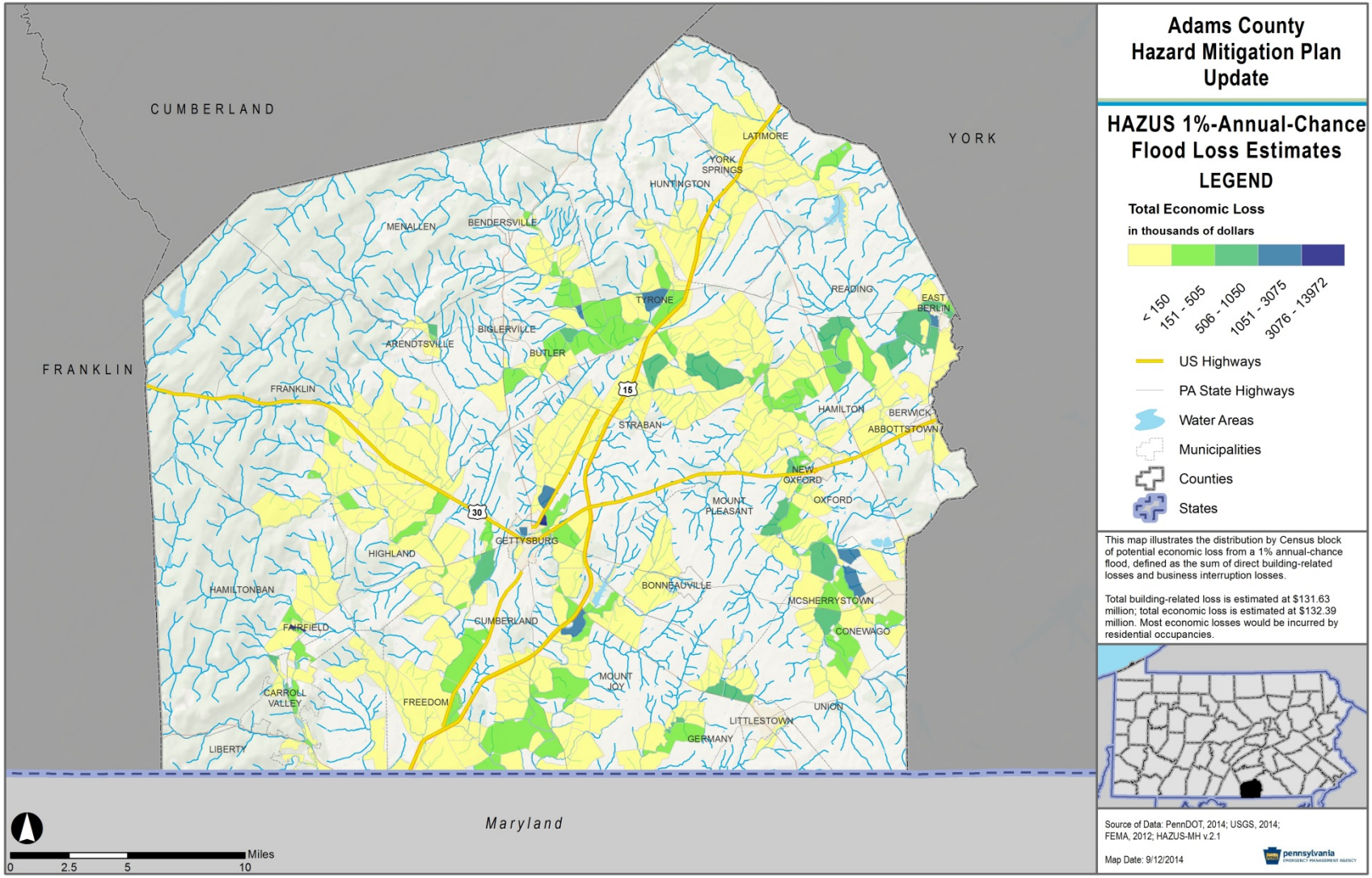
This plan employed an enhanced HAZUS analysis for floods. As opposed to basic analysis using only default data, enhanced analysis incorporates some kind of more recent, up-to-date, or specific data for inclusion in the hazard models. The enhanced data incorporated into this HMP update include:

- Updated demographic data from the 2010 Census,
- Updated essential facilities data from the County and other sources, and
- A user-delineated 100-year depth grid derived for Cumberland County from the effective DFIRM data and the 3.2 ft statewide LiDAR dataset from DCNR.

For more details on the HAZUS methodology used and additional results reports, see Appendix F.

Using these datasets in HAZUS-MH Version 2.1, total economic losses from a 1%-annual-chance flood in Adams County are estimated to equal $131.63 million. Residential occupancies make up 44% of the total estimated building-related losses. Figure 4.4.3-1 shows a distribution of building-related losses by census block across Adams County. The highest losses are expected in and around Gettysburg. Total economic loss, including replacement value, content loss, functional loss and displacement cost, from a countywide 1%-annual-chance flood are estimated to equal $132.39 million. In this scenario, an expected 87 buildings would be moderately damaged. In addition, and estimated 1,534 households would be displaced, and 2,938 people would require shelter. Essential facilities would remain undamaged in this scenario.

Figure 4.4.3-2 Enhanced HAZUS flood analysis results for Adams County.



4.4.4. Future Development and Vulnerability

Population change is perhaps the most significant indicator of changes in vulnerability and risk in the future. A rise or decrease in population not only impacts the level of risk (as to how many individuals could be affected), but also foreshadows development and land use changes for the County and its municipalities. Adams 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. Much of this is dependent on future population and land use and development patterns.

Population projections are useful in determining if a given area's population trends will continue into the future. ACOPD produces county and municipal population projections to support comprehensive planning and related planning purposes, with the most recent projections dated 2012. U.S. Census data from the 2000 and 2010 U.S. Census serve as the baseline for the 2012 projections. Projections for the years 2015, 2020, 2025, and 2030 are based on analyzing building permitting and development submission trends. Projections developed for each of Adams County's municipalities are shown in Table 4.4.4-1.

As discussed in Section 2.3, the total population of Adams County has grown by more than 10.8% from 2000 to 2010. The projections demonstrate a steady increase in population at the County level of 27% between 2010 and 2030. Several municipalities are expected to exceed this rate of growth. Berwick Township and Hamilton Township are expected to increase population by more than 50% during this period, while Bonneauville Borough, Cumberland Township, and Germany Township are projected to increase population by more than 40% during the period. There are only five municipalities with a projected growth rate under 10%, and all are boroughs: Abbottstown, Gettysburg, McSherrystown, New Oxford, and York Springs. This is in line with statewide trends, where boroughs are experience smaller rates of growth.

This predicted growth would make Adams one of the fastest growing counties in Pennsylvania, which is expecting a population growth of 9.94% as a whole by 2040. Table 4.4.4-1 details the projections.

Table 4.4.4-1 Municipal Population and Population Projections

MUNICIPALITY	BASELINE POPULATION 2010 US CENSUS	POPULATION PROJECTIONS				PERCENT CHANGE, 2010-2030
		2015	2020	2025	2030	
Abbottstown Borough	1,011	1,028	1,047	1,076	1,104	9.2%
Arendtsville Borough	952	962	1,021	1,054	1,086	14.1%
Bendersville Borough	641	652	664	707	750	17.0%
Biglerville Borough	1,200	1,225	1,295	1,325	1,354	12.8%
Bonneauville Borough	1,800	1,937	2,225	2,438	2,651	47.3%
Carroll Valley Borough	3,876	4,034	4,498	4,834	5,171	33.4%

Table 4.4.4-1 Municipal Population and Population Projections

MUNICIPALITY	BASELINE POPULATION 2010 US CENSUS	POPULATION PROJECTIONS				PERCENT CHANGE, 2010-2030
		2015	2020	2025	2030	
East Berlin Borough	1,521	1,537	1,600	1,693	1,787	17.5%
Fairfield Borough	507	520	563	582	601	18.5%
Gettysburg Borough	7,620	7,714	7,753	7,818	7,884	3.5%
Littlestown Borough	4,434	4,536	4,850	5,092	5,333	20.3%
McSherrystown Borough	3,038	3,065	3,115	3,161	3,207	5.6%
New Oxford Borough	1,783	1,790	1,811	1,823	1,835	2.9%
York Springs Borough	833	848	859	873	887	6.5%
TOTAL: Boroughs	*29,216*	*29,848*	*31,301*	*32,476*	*33,650*	*15.2%*
Berwick Township	2,389	2,571	3,085	3,412	3,740	56.6%
Butler Township	2,567	2,700	2,950	3,066	3,183	24.0%
Conewago Township	7,085	7,550	7,835	8,646	9,456	33.5%
Cumberland Township	6,162	6,829	7,663	8,290	8,918	44.7%
Franklin Township	4,877	5,014	5,448	5,738	6,027	23.6%
Freedom Township	831	855	913	950	986	18.7%
Germany Township	2,700	2,820	3,232	3,514	3,796	40.6%
Hamilton Township	2,530	2,750	3,434	3,731	4,028	59.2%
Hamiltonban Township	2,372	2,481	2,651	2,796	2,941	24.0%
Highland Township	943	1,006	1,143	1,237	1,332	41.3%
Huntington Township	2,369	2,445	2,671	2,824	2,977	25.7%
Latimore Township	2,580	2,643	2,856	3,013	3,170	22.9%
Liberty Township	1,237	1,316	1,405	1,523	1,642	32.7%
Menallen Township	3,515	3,721	4,037	4,302	4,567	29.9%
Mount Joy Township	3,670	3,945	4,382	4,741	5,100	39.0%
Mount Pleasant Township	4,693	4,906	5,305	5,627	5,948	26.7%
Oxford Township	5,517	5,730	6,359	6,773	7,187	30.3%
Reading Township	5,780	6,095	6,543	6,958	7,372	27.5%
Straban Township	4,928	5,100	5,600	5,860	6,120	24.2%
Tyrone Township	2,298	2,370	2,587	2,748	2,908	26.5%
Union Township	3,148	3,255	3,476	3,661	3,846	22.2%

Table 4.4.4-1 Municipal Population and Population Projections

MUNICIPALITY	BASELINE POPULATION 2010 US CENSUS	POPULATION PROJECTIONS				PERCENT CHANGE, 2010-2030
		2015	2020	2025	2030	
TOTAL: Townships	*72,191*	*76,102*	*83,575*	*89,409*	*95,242*	*31.9%*
Adams County	**101,407**	**105,950**	**114,876**	**121,884**	**128,893**	**27.1%**

Source: Adams County Office of Planning and Development.

Making use of the analysis of Adam County's current and population and demographics along with future population trends, it is important to explore how these projected changes may influence the County's future vulnerability to the profiled hazards. Hazard vulnerability and loss potential will be higher in the places of higher density (namely the boroughs) throughout the County, so as areas continue to grow and densify, these communities might become more vulnerable to hazards. For example, population growth and its associated development is likely to create increases in loss potential, as more people may be living in areas prone to hazards, especially flooding, winter storms, droughts, and wildfires.

The 2013 Subdivision/Land Development and Building Permit Activity Report helps provide a picture of ongoing development in Adams County. This report indicates not only where loss potential might be increasing in the future, but also by how much, based on the amount of new development. According to the report, there was a significant decline in proposed development, since 2005 (the peak year in the past two decades). Residential development in the last five years has been close to stagnant. In 2013, there were 33 new residential units proposed for subdivision and a sketch plan for another 173 single family homes that had not yet moved into the preliminary plan stage. Development and population growth can increase risk based on two factors: increased impact to the land and ecosystem and increase population at risk.

Developed land frequently puts additional stress on the ecosystem, which can lead to increased hazard risk. In total, in 2013, the creation of new parcels or land development activity proposed conversion of 1,475 acres. Included among this acreage, is the conversion of 76 acres of agricultural land to new development or new land parcels, however, Adams County has devoted 15% (or 3,354 acres) of the total acreage (22,848 acres) included in subdivision or land development plans to active agriculture. Agricultural uses are particular stressors to the water supply, as most agriculture often has intensive water uses and agricultural run-off can be detrimental to the water supply. Given the County's reliance on agriculture as a major sector of the local economy and one that it is shifting toward a year-round practice, water supply will likely continue to be a key issue, especially if agriculture continues to grow as a land use.

At the same time, though, as discussed in Section 2.4, Adams County's comprehensive plan and a number of the multi-municipal comprehensive plans incorporate growth management

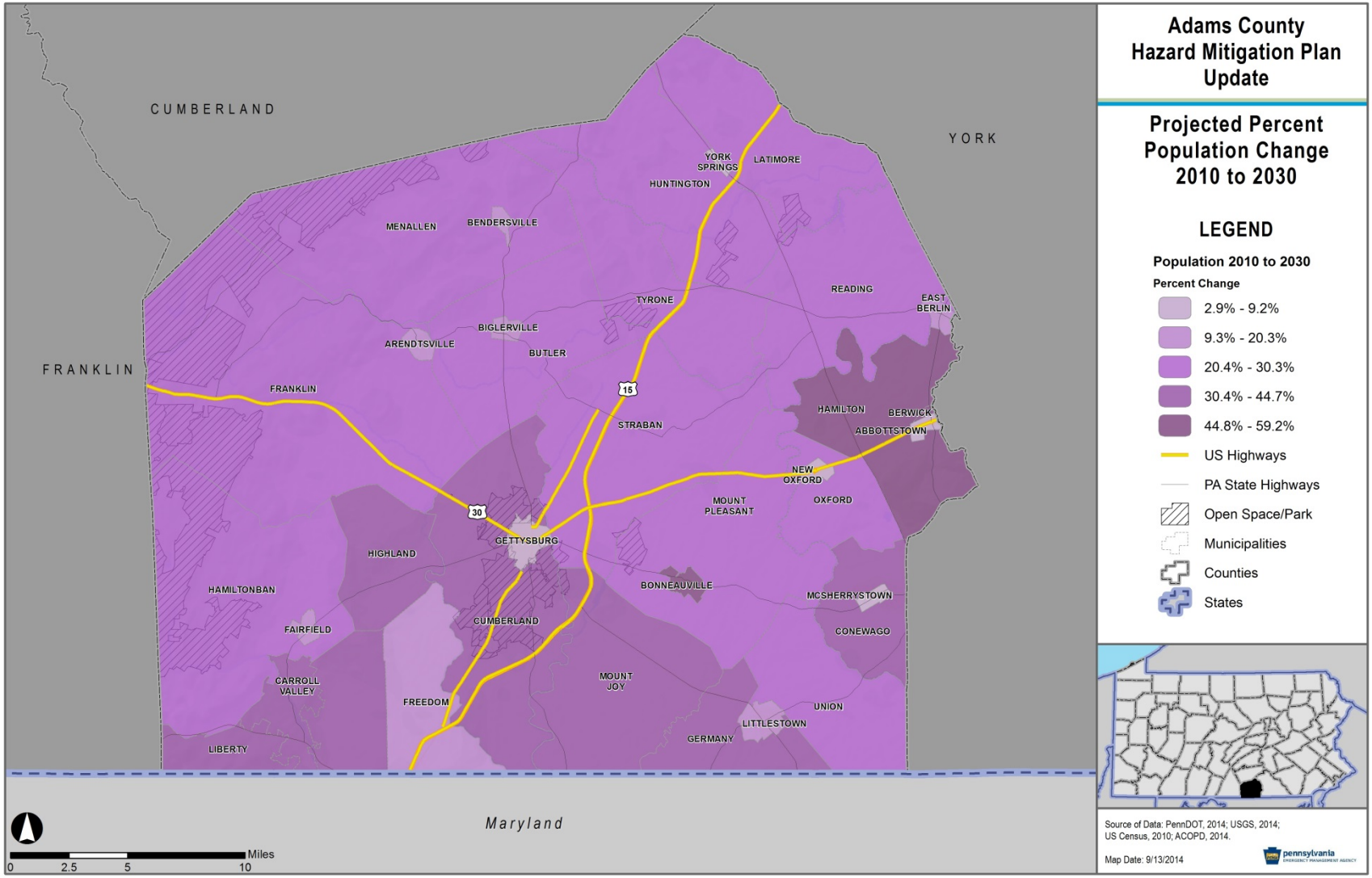
strategies to protect agricultural land and existing open space. Adams County is one of only three counties in Pennsylvania to have agricultural security areas in each township, and the county has prioritized open space preservation, which may help to funnel growth away from hazard-prone areas.

Another three key hazards to highlight that are specific to Adams County's growth include nuclear incidents, wildfires, and flooding.

- The whole of Adams County is within the 50-mile EPZ, or Ingestion Exposure Pathway and is therefore the agriculture and food supply is at risk of being contaminated in the case of an **nuclear incident** at either the Three Mile Island or Peach Bottom nuclear power plants. Though nuclear incidents are often few and far between, they can have catastrophic effects. As future development occurs to expand the agriculture industry in Adams County, especially as it moves from seasonal to year-round added value production, it is important that the County take into consideration the best ways to mitigate this type of hazard given its high risk to a primary sector of the County's economy.
- Menallen Township, Franklin Township, and Hamiltonban Township are all expected to gain population at a rate of between 23 – 37% by 2040. However, state forests and wooded areas make up the bulk of the three municipalities. These communities are at high risk in the **wildfire** assessment of the County. As more development occurs in proximity to these highly wooded areas, more structures are vulnerable to wildfires and the risk of wildfires increases as the urban-wildland interface shrinks.
- Finally, nearly all traditional development increases impervious surface, one of the leading contributors to flooding and an affecting factor of the water supply. As a result, as impervious surfaces increase (or shrink), **flooding** hazards will change, and has the potential to make some areas even more prone to flooding, which the County will need to take into account. The preservation of open space can be one of the best methods of ensuring both healthy ecosystem and guiding growth.

Development can often change the hazard threat level of an area by placing additional critical facilities, businesses, transportation networks, and populations within vulnerable areas. For example, while development occurs most often along transportation network, because of their access and the increased demand for travel and access to services, this additional development increases the vulnerability to transportation incidents and hazardous material spills. In 2013, there were 206 new lots/units proposed for subdivision and land development, and an additional 191 permitted new residential units, bringing in more people and structures that need to be accounted for and are at risk in cases of wildfire, winter storms, flooding, etc.

Figure 4.4.4-2 Projected Percent Population Change from 2010 – 2040 by Municipality.



5. Capability Assessment

5.1. Update Process Summary

Adams County has a number of resources to access to implement hazard mitigation initiatives including planning and regulatory tools; administrative assistance and technical expertise; fiscal resources; use of local, regional, state, and federal funding sources; and educational outreach methods. These resources facilitate community resiliency through actions taken before, during, and after a hazard event.

The 2010 HMP identified the most commonly used resources available in Adams County to support hazard mitigation with a focus on planning and regulatory tools. The resources were collected using a survey divided into 6 sections; 3 sections cataloging existing resources and 3 sections soliciting qualitative assessment on community readiness for implementing mitigation actions. The capability assessment sections for the 2010 HMP planning process included: planning and regulatory capability which summarized the status of planning and regulatory tools such as plans, ordinances, codes, or programs; administrative and technical capability which summarized staffing resources available to carry out mitigation actions; fiscal capability identifying financial tools being used by the community; community political capability which measured a community's political willingness to enact policies and programs that reduce hazard vulnerabilities; community resiliency capability post-event which measured the system impact and consequences of a hazard event occurrence; and self-assessment of capability which measured the community's degree of capability for each of the aforementioned areas.

For the 2015 HMP update, a revised Capability Assessment Survey was developed based on the most recent FEMA and PEMA guidance. The survey contained 5 sections including: planning and regulatory capability, administrative and technical capability, financial capability, education and outreach, and self-assessment of capability. The community political and resiliency capabilities were removed from the Capability Assessment Survey and replaced with education and outreach capability which identified existing outreach initiatives or programs that could be used to implement hazard mitigation activities.

In addition, communities completed FEMA's National Flood Insurance Program (NFIP) Worksheet as a part of assessing their capabilities. The NFIP Worksheet was developed to obtain information on participation in and compliance with the NFIP as well as to identify areas for potential mitigation actions. A number of the data points and statistics available via FEMA's Community Information System (CIS) were pre-populated on the worksheet, allowing municipalities to focus their comments on how they implement the NFIP in their community.

To assist municipalities in reducing the amount of time needed to complete the survey, survey responses received from each municipality as part of the 2010 HMP Update were pre-populated in a survey for each municipality. If a municipality did not complete a survey from the 2010 HMP Update, they were provided with a survey including the municipal name but no pre-populated information. Communities were then invited to update and/or confirm the information for 2015. The Capability Assessment survey was provided in both hard copy (via mail) and electronic format (via e-mail) to each municipality. In addition, Adams County Department of Emergency

Services (Adams County DES) and Adams County Office of Planning and Development (ACOPD) completed a Capability Assessment Survey to identify county-level capabilities.

The capability assessment is not only a good tool to identify local capabilities but it also provides a means for recognizing gaps and weaknesses that can be resolved through future mitigation actions. The results provide useful information for developing an effective mitigation strategy.

5.2. Capability Assessment Findings

Findings from the Capability Assessment Survey are presented in this section. Thirty-two (32) of Adams County's 34 municipalities updated and completed the Capability Assessment Survey/NFIP Worksheet. Review of the Capability Assessment Survey indicated the following municipal trends which demonstrate an increased level of hazard mitigation planning in Adams County.

- **Multi-Municipal Planning Efforts Continue**. Adams County currently has 4 multi-municipal plans in place with 18 municipalities participating. Two (2) multi-municipal plans are under adoption consideration with 8 municipalities participating. Coordinated through ACOPD, multi-municipal planning provides enhanced cohesion between local resources, resulting in increased ability to address hazard mitigation planning in a coordinated manner.
- **Special Purpose Taxes Address Fire Protection**. Eleven (11) Adams County municipalities have adopted a fire tax that will help improve operational readiness of fire departments. Fire departments can use the tax revenues to support capital expenditures such as new equipment purchases and facility upgrades. Ten (10) municipalities adopted a .25 mil fire tax in 2014 resulting from the efforts of Adams County Council of Governments (ACCOG) in conjunction with Adams County DES, ACOPD, and the Adams County Tax Assessment Office. The fire tax was recommended by a 2013 Fire Funding Study completed by ACCOG.
- **Municipal Partnerships are Increasing**. Thirteen (13) of Adams County's municipalities partner and share Emergency Management Coordinators (EMCs). This is helpful from a hazard mitigation perspective in that EMCs have greater in depth knowledge of hazards impacting multiple communities and are able to coordinate efforts efficiently. In addition to emergency management services and comprehensive planning noted above, Adams County municipalities are working on other types of partnering arrangements such as the ACCOG, firefighting services, and multi-municipal purchases. Municipal partnerships are effective and critical for leveraging local resources.
- **Capital Improvement Programming is Expanding**. Capital Improvement Programming is a useful tool to identify needed capital improvements and program financing to ensure projects are completed in a timeframe that meets local needs. It could potentially be a useful tool to fund hazard mitigation projects. The 2010 HMP reported only one municipality with a capital improvement plan. Results of the 2015 Capability Assessment Survey show this number has increased to 5 municipalities, suggesting that municipalities are increasingly becoming aware of how important capital improvement planning can be to establish priorities for future spending based on community need.

- **Plan Integration is Increasing**. Plan integration ensures that hazard mitigation planning is woven into each jurisdiction's planning and regulatory documents. Adams County included several objectives and actions in the 2010 HMP that address plan integration such as encouraging the revision of local planning and regulatory documents to limit development in high-hazard areas, encouraging adoption of building codes that provide protection from the impacts of identified hazards, and considering hazards in project-specific reviews.

Capability Assessment Surveys completed by the municipalities and County are included in Appendix C - Meeting and Other Participation Documentation.

5.2.1. Planning and Regulatory Capability

5.2.1.1. Comprehensive Plans, Zoning, and Subdivision Regulations

Pennsylvania municipalities have the authority to govern more restrictively than state and county minimum requirements, provided municipalities are in compliance with criteria established in the Pennsylvania Municipalities Planning Code (MPC) and respective municipal codes. Municipalities can develop their own policies and programs and implement their own rules and regulations to protect and serve their local residents. Local policies are typically identified in a Comprehensive Plan, implemented via a local ordinance, and enforced through the governmental body or its appointee.

In addition to comprehensive plans, some of the most important planning and regulatory capabilities that can be utilized for hazard mitigation include comprehensive plans, building codes, floodplain ordinances, subdivision and land development ordinances (SALDOS), and zoning ordinances. These planning tools provide mechanisms for the implementation of adopted mitigation strategies. ACOPD is proactive in working with the County's municipalities on preparing and updating these important tools. Table 5.2.1-1 summarizes major planning tools in each Adams County municipality.

Table 5.2.1-1 Available Planning Tools

MUNICIPALITY	COMPREHENSIVE LAND USE PLAN	BUILDING CODE	NFIP	SUBDIVISION REGULATIONS	ZONING REGULATIONS
Abbottstown Borough	X	X	X	X	X
Arendstville Borough	X	X	X	X	
Bendersville Borough	X	X	X	X	X
Berwick Township	X	X	X	X	X
Biglerville Borough	X	X	X	X	X
Bonneauville Borough	X	X	X	X	X
Butler Township	X	X	X	X	County zoning
Carroll Valley Borough	X	X	X	X	X
Conewago Township	X	X	X	X	X
Cumberland Township	X	X	X	X	X
East Berlin Borough	X	X	X	X	X
Fairfield Borough	X	X	X	X	X

Table 5.2.1-1 Available Planning Tools

MUNICIPALITY	COMPREHENSIVE LAND USE PLAN	BUILDING CODE	NFIP	SUBDIVISION REGULATIONS	ZONING REGULATIONS
Franklin Township	X	X	X	X	X
Freedom Township	X	X	X	X	X
Germany Township	X	X	X	X	County zoning
Gettysburg Borough	X	X	X	X	X
Hamilton Township	X	X	X	X	X
Hamiltonban Township	X	X	X	X	X
Highland Township	X	X	X	X	X
Huntington Township		X	X	X	X
Latimore Township		X	X	X	X
Liberty Township	X	X Opt-out	X	X	X
Littlestown Borough	X	X	X	X	
McSherrystown Borough	X	X	X	X	X
Menallen Township	X	X Opt-out	X	X	County Zoning
Mount Joy Township	X	X Opt-out	X	X	X
Mt. Pleasant Township	X	X	X	X	X
New Oxford Borough	X	X		X	X
Oxford Township	X	X	X	X	X
Reading Township	X	X	X	X	X
Straban Township	X	X	X	X	X
Tyrone Township		X	X	X	X
Union Township	X	X	X	X	X
York Springs Borough		X	X	X	

X – in place

Adams County's Comprehensive Plan was adopted in 1991. The Comprehensive Plan's Land Use Plan includes a description of the growth areas for Adams County; they are focused on existing boroughs and a small number of "crossroads villages" because of their established residential neighborhoods, commercial downtowns, community services, and public utilities. These areas include: Littlestown, McSherrystown, New Oxford, Abbottstown, Bonneauville, and East Berlin Boroughs; portions of Conewago, Mount Pleasant, Oxford, Union, Germany, Berwick, Hamilton, and Reading Townships; the Hampton Area (Rt. 94/394), Green Springs (near the county line in Hanover), and at Lake Meade; and the Gettysburg Area.

All of these areas except New Oxford have some SFHAs identified. However, according to the Adams County Office of Planning and Development, while there may be growth areas that include SFHA or other hazard areas, to comply with State requirements Adams County municipalities have floodplain regulations that limit construction within flood-prone areas and other hazard or environmentally sensitive areas. These provisions are included within each municipality's subdivision and land development ordinance. Further, through multi-municipal

and municipal comprehensive plans, environmentally sensitive areas such as designated floodplains, wetlands, steep slopes, watercourses, and water bodies are addressed and appropriate recommendations pertaining to environmentally sensitive areas are provided.

Functional plans have been adopted as amendments to the comprehensive plan such as the Adams County Vision for Parks, Recreation, and Open Space (1997) and Adams County Greenways Plan (2010).

Thirty (30) of Adams County's 34 municipalities have adopted a comprehensive plan with Gettysburg Borough adopting the County's first municipal comprehensive plan in 1980. Multi-municipal planning is very strong in Adams County with ACOPD facilitating planning efforts. Four multi-municipal comprehensive plans involving 18 municipalities have been adopted. A draft multi-municipal comprehensive plan involving 5 municipalities is under consideration for adoption and an additional multi-municipal comprehensive plan involving 3 municipalities is currently being developed. Table 5.2.1-2 lists comprehensive plans by municipality.

Table 5.2.1-2 Adams County Summary of Municipal Comprehensive Plans

MUNICIPALITY	COMPREHENSIVE PLAN ADOPTED (Y/N)	NAME OF PLAN	YEAR ADOPTED
Abbottstown Borough	Y	Eastern Adams Joint Comprehensive Plan	2012
Arendtsville Borough	Y	Northwest Adams Joint Comprehensive Plan	2010
Bendersville Borough	Y	Northwest Adams Joint Comprehensive Plan	2010
Berwick Township	Y	Berwick Township Comprehensive Plan	1998
Biglerville Borough	Y	Northwest Adams Joint Comprehensive Plan	2010
Bonneauville Borough	Y	Bonneauville-Mt. Pleasant Joint Comprehensive Plan	2003
Butler Township	Y	Northwest Adams Joint Comprehensive Plan	2010
Carroll Valley Borough	Y(1)	Carroll Valley Borough Comprehensive Plan	2012
Conewago Township	Y	Conewago Township Comprehensive Plan	2008
Cumberland Township	Y(3)	Cumberland Township Comprehensive Plan	2000
East Berlin Borough	Y	Eastern Adams Joint Comprehensive Plan	2012
Fairfield Borough	Y (1)	Fairfield Borough Comprehensive Plan	1984

Table 5.2.1-2 Adams County Summary of Municipal Comprehensive Plans

MUNICIPALITY	COMPREHENSIVE PLAN ADOPTED (Y/N)	NAME OF PLAN	YEAR ADOPTED
Franklin Township	Y	Northwest Adams Joint Comprehensive Plan	2010
Freedom Township	Y (1)	Freedom Township Comprehensive Plan	1993
Germany Township	Y	Southeast Adams Joint Comprehensive Plan	2008
Gettysburg Borough	Y(3)	Gettysburg Borough Comprehensive Plan	1980
Hamilton Township	Y	Eastern Adams Joint Comprehensive Plan	2012
Hamiltonban Township	Y (1)	Hamiltonban Township Comprehensive Plan	1991
Highland Township	Y(2)	Highland Township Comprehensive Plan	2004
Huntington Township	N	N/A	N/A
Latimore Township	N	N/A	N/A
Liberty Township	Y(1)	Liberty Township Comprehensive Plan	1991
Littlestown Borough	Y	Southeast Adams Joint Comprehensive Plan	2008
McSherrystown Borough	Y	Eastern Adams Joint Comprehensive Plan	2012
Menallen Township	Y	Northwest Adams Joint Comprehensive Plan	2010
Mount Joy Township	Y(4)	Mt. Joy Township Comprehensive Plan	2002
Mt. Pleasant Township	Y	Bonneauville-Mt. Pleasant Joint Comprehensive Plan	2003
New Oxford Borough	Y	Eastern Adams Joint Comprehensive Plan	2012
Oxford Township	Y	Eastern Adams Joint Comprehensive Plan	2012
Reading Township	Y	Eastern Adams Joint Comprehensive Plan	2012
Straban Township	Y(3)	Straban Township Comprehensive Plan	2005
Tyrone Township	N	N/A	N/A
Union Township	Y	Southeast Adams Joint Comprehensive Plan	2008

Table 5.2.1-2 Adams County Summary of Municipal Comprehensive Plans

MUNICIPALITY	COMPREHENSIVE PLAN ADOPTED (Y/N)	NAME OF PLAN	YEAR ADOPTED
York Springs Borough	N	N/A	N/A

Source: Adams County Department of Planning and Development, July 2014.

(1) Considering adoption of draft Southwest Adams Joint Comprehensive Plan.

(2) Municipality was part of effort in early stages to develop the draft Southwest Adams Joint Comprehensive Plan, but not currently considering adoption.

(3) Municipality currently involved in effort to develop the Central Adams Joint Comprehensive Plan.

(4) Mount Joy Township has prepared an update to its comprehensive plan. The updated plan is draft as of July 15, 2014.

All municipalities in Adams County, with the exception of Arendtsville Borough are have enacted zoning requirements. Butler, Germany, and Menallen Townships are subject to the Adams County zoning ordinance. Since the 2010 HMP Update, Highland Township has adopted its own zoning ordinance.

Adams County does not have a county-wide SALDO and all 34 municipalities in Adams County have adopted their own SALDO. Development plans are required to be submitted to the Adams County Planning Commission for review with comments provided to the municipality within 30 days.

5.2.1.2. Emergency Management

The Adams County DES coordinates county-wide emergency management services. Adams County DES operates the County's 911 Emergency Communications Center; runs the County's Hazardous Materials Planning and Response program, including carrying out requirements of PA ACT 165 and SARA Title III; and coordinates training for the County's emergency responders.

Each municipality has a designated local emergency management coordinator (EMC) who possesses a unique knowledge of the impact hazard events have on their community. Local EMCs were very proactive in supplying information required to prepare the HMP Update.

The Emergency Management Services Code (PA Title 35) requires all Pennsylvania municipalities have a Local Emergency Operations Plan (EOP) which is updated every two years. Adams County's EOP, updated and adopted in September 2014, is an all-hazards plan that complies with the National Incident Management System (NIMS) and is the basis for a coordinated and effective response to any disaster that may affect lives and property in Adams County. The EOP, or portions thereof, would be implemented when emergency circumstances warrant.

Carroll Valley Borough, Fairfield Borough, Liberty Township, and Highland Township have formed a Regional EMA function under FREMA (Fairfield Regional Emergency Management Agency). All are under the same EOP that was updated in June 2014. Similarly, Biglerville

Borough and Butler Township formed a Regional EMA under the name Biglerville-Butler EMA in January 2010. Its EOP was updated in January 2014.

Several Adams County municipalities have developed additional emergency management capabilities such as Disaster Recovery Plans DRPs), Evaluation Plans, and Continuity of Operations Plans (COOPS). A DRP, an additional method to ensure preparedness and ability to respond quickly and effectively to restore a community's essential services, is in place in 7 Adams County municipalities according to the results of the Capability Assessment Survey. An Evacuation Plan, used to quickly remove people from a hazard event to minimize death and injury, is in place in, 12 Adams County municipalities with one municipality (York Springs Borough) in the process of developing a plan.

As part of the Mitigation Action Plan prepared for this plan update, Berwick Township will be preparing an evacuation plan for Lincoln Speedway, a sprint car race track that has per event visitor rates up to 3,000 and 1,200 – 1,500 vehicles. Refer to Section 6.4 – Mitigation Action Plan.

A COOP, a necessary tool to help organizations prepare for and recover from disasters and emergencies, is in place in 15 Adams County municipalities.

5.2.1.3. Participation in the National Flood Insurance Program

Thirty-three (33) of Adams County's 34 municipalities participate in the NFIP with all participating municipalities in good standing. There are no outstanding compliance issues.

The Pennsylvania Floodplain Management Act (Act 166 of 1978) requires every municipality identified by the Federal Emergency Management Agency (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 certain that the risk of flood damage is not increased by property development. All municipalities in Adams County, with the exception of New Oxford Borough, participate in the NFIP.

FEMA Region III makes available to communities, an ordinance review checklist which lists required provisions for floodplain management ordinances. This checklist helps communities develop an effective floodplain management ordinance that meets federal requirements for participation in the NFIP. The Pennsylvania Department of Community and Economic Development (DCED) provides communities, based on their 44 CFR 60.3 level of regulations, with a suggested ordinance document to assist municipalities in meeting the minimum requirements of the NFIP and the Pennsylvania Flood Plain Management Act (Act 166). Act 166 mandates municipal participation in and compliance with the NFIP. It also establishes higher regulatory standards for hazardous materials and high risk land uses. As new Digital Flood Insurance Rate Maps (DFIRMs) are published, the Pennsylvania State NFIP Coordinator at DCED works with communities to ensure the timely and successful adoption of an updated floodplain management ordinance by reviewing and providing feedback on existing and draft ordinances. In addition, DCED provides guidance and technical support through Community Assistance Contacts (CAC) and Community Assistance Visits (CAV). Nine communities have

had CAVs over the years, with the most recent ones occurring in 2011 in Oxford and Reading Townships. With the exception of Biglerville Borough, all participating communities have had at least one CAC, with many occurring from 2009-2011. The effective date for FIRMS in all Adams County jurisdictions was February 18, 2009.

The following table shows the number of NFIP policies and claims for Adams County municipalities.

Table 5.2.1-3 NFIP Policies and Claims according to CIS.

MUNICIPALITY	# POLICIES	# CLAIMS	# SUBSTANTIAL DAMAGE CLAIMS
Abbottstown Borough	8	5	0
Arendtsville Borough	2	1	0
Bendersville Borough	2	0	0
Berwick Township	6	3	1
Biglerville Borough	1	2	1
Bonneauville Borough	11	2	0
Butler Township	11	5	1
Carroll Valley Borough	14	4	1
Conewago Township	20	3	0
Cumberland Township	48	19	0
East Berlin Borough	30	26	1
Fairfield Borough	10	3	0
Franklin Township	39	14	0
Freedom Township	3	3	1
Germany Township	6	0	0
Gettysburg Borough	83	33	1
Hamilton Township	35	19	1
Hamiltonban Township	21	0	0
Highland Township	4	1	0
Huntington Township	7	3	0
Latimore Township	12	0	0
Liberty Township	6	6	0
Littlestown Borough	2	0	0
McSherrystown Borough	19	0	0
Menallen Township	15	5	3
Mount Joy Township	20	2	0
Mount Pleasant Township	8	5	0

Table 5.2.1-3 NFIP Policies and Claims according to CIS.

MUNICIPALITY	# POLICIES	# CLAIMS	# SUBSTANTIAL DAMAGE CLAIMS
Oxford Township	18	13	0
Reading Township	109	142	15
Straban Township	11	2	1
Tyrone Township	4	0	0
Union Township	0	0	0
York Springs Borough	4	1	0

Currently, no Adams County municipalities participate in the CRS. Recognizing the benefits of participation in the CRS, the HMPSC would like to focus on municipal participation as part of the 2015 HMP Update mitigation strategy.

5.2.1.4. Stormwater and Floodplain Management

A stormwater management plan for Adams County was prepared to meet the requirements of the Pennsylvania Storm Water Management Act (Act of October 4, 1978, P.L. 864 No. 167). This law, commonly referred to as Act 167, requires Pennsylvania counties to prepare and adopt stormwater management plans. It also requires municipalities to amend or adopt stormwater management ordinances consistent with the plan. The Adams County Stormwater Management Plan is the result of a collaborative effort led by the Adams County Conservation District (ACCD) and ACOPD, with assistance from the Stormwater Plan Advisory Committee (SPAC). Updated in 2012, Adams County's Stormwater Management Plan was developed based on the requirements of Act 167 and the input of the SPAC, municipal Engineers, stakeholders, and the Pennsylvania Department of Environmental Protection (PA DEP). Adams County municipalities adopted stormwater management plans consistent with the County plan in 2012.

With the exception of New Oxford Borough, all municipalities in Adams County have regulated floodplains, have floodplain ordinances, and participate in the NFIP. According to the Capability Assessment Survey results, 18 municipalities have floodplain management plans.

The municipalities within the Monocacy River Watershed are subject to Monocacy River Watershed Stormwater Management Plans. Seventeen Adams County municipalities are situated in whole or in part within this watershed: Bonneauville Borough, Butler Township, Carroll Valley Borough, Cumberland Township, Fairfield Borough, Freedom Township, Franklin Township, Germany Township, Gettysburg Borough, Hamiltonban Township, Highland Township, Liberty Township, Littlestown Borough, Mount Joy Township, Mount Pleasant Township, Straban Township, and Union Township.

5.2.1.5. Building and Fire Codes

Building codes regulate standards for new construction and substantially renovated buildings. Standards can be adopted that require resistant or resilient building design practices to address

hazard impacts common to a given community. Enforcement of Pennsylvania's statewide building code, generally known as the Uniform Construction Code, began in 2004. The UCC establishes minimum regulations for most new construction, including additions and renovations to existing structures. Current UUC Regulations took effect on December 31, 2012 and include the 2009 International Codes issued by the International Code Council (ICC) and Chapter 11 and Appendix E of the 2012 International Building Code with exceptions identified by L & I (PA Department of Labor & Industry, 2014). Over 90% of Pennsylvania's municipalities administer and enforce the UCC locally (known as Opt-ins), using their own employees or a certified third party agencies (private code enforcement agencies) they have retained. Opt-outs are those municipalities that have handed over UCC enforcement authority to either L&I (for non-residential buildings and structures) or certified third-party agencies (hired by a property owner for residential code enforcement). All but three Adams County municipalities (Liberty Township, Menallen Township, and Mount Joy Township) are opt-in municipalities (PA Department of Labor & Industry, August 2014).

Fire code requirements are integrated into the UCC, to which all 34 municipalities are subject, as required by PA Act 45. Under the UCC, the International Fire Code 2009 is adopted only to the extent referenced in the International Building Code 2009. Hamiltonban Township has incorporated most of the international Fire Code Standards into their SALDO and has deferred to Fairfield Fire review and comment on each commercial and/or large scale housing plan submitted. This represents a proactive approach towards hazard mitigation planning.

5.2.1.6. Additional Planning Tools

Several municipalities have adopted additional functional plans to protect valuable community resources such as farmland, open space, and historic resources. Adams County has a very active Agricultural Land Preservation Program. The County Agriculture Land Preservation Board administers the Agricultural Conservation Easement Purchase Program for the County through current program guidance dated 2013. In November 2013 the Adams County Commissioners adopted the Adams County Agricultural Preservation Priority Area Map. The map identifies areas of the County that have a concentration of certain features which contribute to productive farming areas and is intended to be used in conjunction with the evaluation completed through the County's Land Preservation Program. Mount Joy Township has an active farmland preservation program and several additional municipalities have ordinance provisions designed to advance the conservation of farmland and farm uses.

Cumberland, Hamiltonban, and Mount Joy Townships have adopted an historic preservation plan with Mount Joy Township adopting its ordinance since the 2010 HMP update. Fairfield Borough noted it was in the process of developing a plan. Gettysburg Borough noted an historic preservation plan component will be included as part of the Central Adams Joint Comprehensive Plan which is under development

Cumberland Township has adopted a dangerous structures ordinance to regulate structures that have been damaged by fire, wind or other causes to the extent the structure cannot provide amenities essential to decent living and are unfit for human habitation.

A capital improvement plan is a multi-year policy guide that identifies needed capital projects and is used to coordinate the financing and timing of public improvements such as streets, stormwater systems, water distribution, sewage treatment, and other major public facilities. From a hazard mitigation planning perspective, capital improvement planning can identify and program hazard mitigation projects. According to Capability Assessment Survey results, 5 municipalities have capital improvement plans: Cumberland Township, East Berlin Borough, Germany Township, Hamiltonban Township, and Straban Township. The 2010 HMP reported only one municipality as having a capital improvement plan, suggesting that municipalities are increasingly becoming aware of how important capital improvement planning can be to establish priorities for future spending based on community need.

An economic development plan serves as a road map for economic development decision making, based on the collection of statistical data, historical perspective, and human potential. Adams County is currently working on the development of an economic development plan. The plan is being prepared by ACOPD in conjunction with Adams County Economic Development Corporation (ACEDC). McSherrystown Borough and East Berlin Borough report having an economic development plan and a few municipalities noted they are in the process of preparing plans. In 2014 McSherrystown Borough joined a multi-municipal effort to be part of the Hanover Region Economic Development Plan. The planning area spans Adams County and adjacent York County lines and includes the York County municipalities of Hanover Borough and Penn Township.

Adams County has a few additional plans in place that are related to hazards profiled in the HMP, particularly transportation accidents and environmental hazards.

The Adams County Long Range Transportation Plan was updated in 2012 by ACOPD. Long Range Transportation Plans are completed by Pennsylvania counties/or planning regions and set forth strategies to address needed transportation improvements.

The South Central Pennsylvania Regional Goods Movement Study was completed in 2006 by the Southcentral Regional Metropolitan Planning Organizations (MPOs) including: Harrisburg Area Transportation Study (HATS) Metropolitan Planning Organization (MPO), Lancaster MPO, the Lebanon MPO, York MPO, the Adams County Rural Planning Organization, and Franklin County. The study included analysis of how the growth in freight and rail freight movement in Southcentral Pennsylvania impacts the region socially and environmentally. The report finds that the majority of freight moves through Adams County rather than inbound or outbound movements.

The Adams County Municipal Waste Management Plan was prepared in 2005 by ACOPD. In accordance with Act 101 of 1988 (the Municipal Waste Planning, Recycling, and Waste Reduction Act), Pennsylvania counties are required to develop comprehensive, integrated municipal waste management plans.

The Adams County Water Supply and Wellhead Protection Plan was prepared in 2002 to evaluate existing community water systems. Evaluating existing community water systems

ensures adequate, safe water supply for Adams County residents relying in community water systems for their potable water supply.

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 geographic information systems, resource development staff or grant writers, fiscal staff to handle complex grant application processes.

Based on Capability Assessment Survey results, Adams County municipalities have moderate levels of administrative and technical staff needed to conduct hazard mitigation-activities. There appear to be sufficient emergency management and land use planning staff across the County.

Thirteen (13) municipalities take a multi-municipal approach to address emergency management by sharing an emergency management coordinator:

- Butler Township and Biglerville Borough (BBEMA);
- Carroll Valley Borough, Fairfield Borough, Highland Township, and Liberty Township (FREMA);
- Huntington Township and York Springs Borough;
- Gettysburg Borough, Cumberland Township, and Straban Township; and
- Germany Township and Union Township.

Many municipalities report that rather than having an in-house engineer or planning staff, they retain the services of a consulting engineering firm or planning firm. Less than one-third of the municipalities have access to staff for floodplain management, land surveying, scientists familiar with community hazards, GIS, and grant writing; but several noted they could retain outside services or rely on assistance from ACOPD.

In addition other organizations are available to act as partners in mitigating hazards including stakeholders participating in the HMP update such as: Adams County Conservation District, Adams County Water Resource Advisory Committee, Adams County Extension Office, and Watershed Alliance of Adams County.

State agencies which can provide technical assistance for mitigation activities 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, and
- Pennsylvania Department of Transportation.

Federal agencies which can provide technical assistance for mitigation activities include, but are not limited to:

- Army Corp of Engineers,
- Department of Housing and Urban Development,
- Department of Agriculture,
- Economic Development Administration,
- Emergency Management Institute,
- Environmental Protection Agency,
- FEMA, and
- Small Business Administration.

5.2.3. Financial Capability

Financial capability is important to the implementation of hazard mitigation activities. 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 a large number of 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.

The decision and capacity to implement hazard mitigation activities is often highly dependent on available local financial resources. While some mitigation actions are less costly than others and can be accomplished using existing staff resources, it is important that funding is available locally to implement policies and projects.

Financial resources are particularly important if communities are trying to take advantage of state or federal mitigation grant funding opportunities that require local match contributions. Based on Capability Assessment Survey results, most municipalities within the County perceive financial capability to be limited to moderate. The most common type of fiscal capability is not a funding source, but rather partnering agreements between municipalities that enable resource sharing.

With state funding levels decreasing, the amount of state programs available to fund hazard mitigation activities as well as associated dollar amounts has decreased significantly since the 2010 HMP Update. Current state funding sources that may be available for hazard mitigation planning activities include, but are not limited to:

- CFA/DCED Flood Mitigation Program,
- CFA/DCED H2O PA Flood Control Projects,
- CFA/DCED H2O PA High Hazard Unsafe Dam Projects,

- CFA/DCED H2O PA Water Supply, Sanitary Sewer and Storm Water Projects,
- CFA/DCED PA Small Water and Sewer,
- DCED Business Financing
- DCED Keystone Communities Program,
- DCED Local Government Capital Project Loan Program,
- DCED Municipal Assistance Program ,
- DCNR Community Conservation Partnerships Program,
- DEP Growing Greener Program,
- PennDOT Pennsylvania Infrastructure Bank (PIB) Loan,
- Pennsylvania Infrastructure Investment Authority (PENNVEST), and
- Pennsylvania Redevelopment Assistance Capital Program (RACP).

Federal programs which may provide financial support for mitigation activities include, but are not limited to:

- Department of Commerce (DOC)/Economic Development Authority (EDA) Construction Grant Program
- Department of Energy Weatherization Assistance Program
- Department of Homeland Security Grant Program (HSGP)
- Department of Transportation/Federal Highway Administration Emergency Relief Program
- DOC/EDA Planning Grants
- DOC/EDA Revolving Loan Fund
- DOC/EDA Technical Assistance Grants
- FEMA Community Assistance Program – State Support Services Element (CAP-SSSE)
- FEMA Community Disaster Loan Program
- FEMA Community Rating System
- FEMA Emergency Management Performance Grants (EMPG)
- FEMA Environmental Planning and Historic Preservation Program (EHP)
- FEMA Flood Mitigation Assistance Program
- FEMA Hazard Mitigation Grant Program (HMGP)
- FEMA Individuals and Households Program (IHAP)
- FEMA National Dam Safety Program
- FEMA National Flood Insurance Program
- FEMA Pre-Disaster Mitigation Program
- FEMA Public Assistance Program (PA)
- FEMA Regional Catastrophic Preparedness Grant Program
- Housing and Urban Development (HUD) 5-H Homeownership Program
- HUD Community Development Block Grants (CDBG)
- HUD Disaster Housing Assistance Program
- HUD/Federal Housing Administration (FHA) Title 1 Home Repair Loan Program
- HUD/FHA Section 203(h) Mortgage Insurance for Disaster Victims
- HUD/FHA Section 203(k) Rehabilitation Mortgage Insurance Program

- HUD Partnership for Advancing Technology in Housing
- HUD Section 108 Loan Guarantee Programs
- Internal Revenue Service Casualty Loss-Special Disaster Provisions
- National Oceanic and Atmosphere Administration (NOAA) StormReady Program
- Natural Resources Conservation Service (NRCS) easement programs
- Small Business Administration Disaster Loan Programs
- United States Army Corps of Engineers (USACE) General Investigation (GI)
- USACE Continuing Authorities Program
- USACE Flood Plain Management Services Program (FPMS)
- USACE Inspection of Completed Works Program (ICW)
- USACE National Levee Safety Program
- USACE Planning Assistance to States
- USACE Rehabilitation and Inspection Program (RIP)
- United States Department of Agriculture (USDA)/Farm Service Agency (FSA) Emergency Conservation Program
- USDA/FSA Emergency Farm Loans
- USDA Non-insured Crop Disaster Assistance Program (NAP)
- USDA/NRCS Emergency Watershed Protection Program
- USDA Repair and Rehabilitation Loan
- USDA/Rural Housing Service (RHS) Community Facilities Loans and Grants
- USDA/RHS Rural Rental Loans
- USDA/RHS Section 502 Single-Family Housing Direct and Guaranteed Loans
- USDA/RHS Section 504 Repair Loans and Grants
- USDA/RHS Self-Help Housing Loans
- USDA/Risk Management Agency Federal Multi-Peril Crop Insurance
- USDA/Rural Business Service Business and Industrial Loans
- USDA Watershed Protection and Flood Prevention Program

A few specific financial tools being deployed in Adams County municipalities are important to note. Adams County receives CDBG funding through the State entitlement. Adams County has two (2) entitlement communities: Gettysburg Borough and Littlestown Borough. These municipalities work with DCED to obtain CDBG entitlement funds. Littlestown Borough was recently designated as an entitlement community in 2012.

Communities may exercise their taxing authority to raise funds. This includes special taxes to fund mitigation measures. Several municipalities report the use of special purpose taxes with the most significant being a recent effort to encourage municipalities to adopt a fire tax. ACCOG in conjunction with Adams County DES, ACOPD, and the Adams County Tax Assessment Office prepared a Fire Funding Study in 2013 which recommend a .25 mil fire tax to help improve the operational readiness of Adams County's fire departments. Fire departments can use the tax revenues to support capital expenditures such as new equipment purchases and facility upgrades. Eleven (11) Adams County municipalities have adopted a fire

tax with 10 municipalities adopting the fire tax in 2014. Municipalities that have adopted a fire tax include:

- Berwick Township (adopted fire tax prior to 2014),
- Bonneauville Borough,
- Butler Township,
- Carroll Valley Borough,
- Cumberland Township,
- Fairfield Borough,
- Franklin Township,
- Gettysburg Borough,
- Hamiltonban Township,
- Menallen Township, and
- Straban Township.

It is reported that Highland Township has line item donation in their budget that equals the amount the tax would generate. Mount Pleasant Township increased the municipal tax millage rate by .25 mills and placed a line item in for donation in their general fund.

Stormwater utility fees are assessed and collected to offset the cost of maintaining and upgrading stormwater management structures such as drains, retention ponds, and culverts. Hamiltonban Township and Mount Pleasant Township collect such fees.

Intergovernmental cooperation is one manner of accomplishing common goals, solving mutual problems, and reducing expenditures. Adams County municipalities have many types of partnering arrangements in place. According to results of the Capability Assessment Survey 16 municipalities participate in such efforts which include the following:

- Emergency management,
- Council of Governments,
- Joint comprehensive planning,
- Firefighting services,
- Multi-municipal purchasing(PA COSTARS),
- Police service,
- Road maintenance,
- Recreation,
- Trash hauling and recycling, and
- Water and sewer.

Collectively, these partnering arrangements increase the County's capability for multi-municipal hazard mitigation planning.

5.2.4. Education and Outreach Capability

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 Communities Certification or StormReady Certification; 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. Overwhelmingly, Adams County municipalities report limited education and outreach capability.

Bendersville Borough, East Berlin Borough through Liberty Fire Company, and McSherrytown Borough (through SAVES - Southeastern Adams Volunteer Emergency Services) report Firewise Communities Certification. Adams County is one of 52 Pennsylvania counties with StormReady Certification with Adams County DES maintaining the County's certification. Five (5) Adams County municipalities maintain StormReady Certification: Bendersville Borough, East Berlin Borough, McSherrytown Borough, Mount Joy Township, and New Oxford Borough.

Carroll Valley Borough reports that the Fairfield Area School District, which includes students living in the municipalities of Carroll Valley Borough, Fairfield Borough, Hamiltonban Township, and Liberty Township, has a natural disaster or school safety programming. Hamiltonban Township noted that it worked with the school district to arrange for an Active School Shooter Training in 2011.

Adams County DES staff conducts public outreach throughout the year to share preparedness and safety information. Carroll Valley Borough and Union Township report ongoing public education or information programs. Union Township newsletters provide information and reminders on responsible stromwater management, maintaining groundwater, creating an emergency preparedness kit, and keeping the area around fire hydrants free of plantings and snow in the winter.

BBEMA and Upper Adams School District work together on education and preparedness along assigned Point of Dispensing Requirements.

5.2.5. Plan Integration

Plan integration ensures that hazard mitigation planning is woven into each jurisdiction's planning and regulatory documents. Per FEMA, plan integration is described as the regular consideration and management of hazard risks in a community's existing planning framework. The planning framework is the collection of plans, policies, codes, and programs that guide land use and development, how those are maintained and implemented, and the roles of a range of stakeholders to evaluate and update them. 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 (FEMA, 2013).

In Pennsylvania, integrating hazard mitigation into planning tools is afforded through the MPC in that protecting and promoting safety and health is a purpose of the code. Further, a purpose of the MPC is "to minimize such problems as may presently exist or which may be foreseen", which is the focus of hazard mitigation planning.

Plan integration is not only accomplished through the MPC and planning tools such as comprehensive plans and zoning ordinances, but through capital improvement planning, area plans such as highway corridors and downtown plans, functional plans like stormwater and open space plans, and public and stakeholder outreach and education.

Adams County has been successful at integrating hazard mitigation planning into its planning tools through goals, objectives, and actions and will continue to do so as part of the 2015 HMP Update. The following table reflects actions completed since the 2010 HMP or are ongoing in the 2015 HMP that demonstrate plan integration.

Table 5.2-1 Integration of Adams County HMP with Planning Framework

PLANNING FRAMEWORK	EXAMPLES OF PLAN INTEGRATION
Comprehensive Plan, Zoning Ordinances, and Municipal Codes	• Objective: Encourage and facilitate the development or revision of comprehensive plans and zoning/land use ordinances to limit development in high-hazard areas. • Action: Distribute and promote the inclusion of vulnerability analysis information as part of periodic plan review and revisions at the township/borough level. • Action: Evaluate ordinances to standardize hydrant connections and provide sprinkler systems for new development. • Adams County multi-municipal planning efforts have focused on the development of joint municipal comprehensive plans that establish growth areas in low hazard areas.
Building Codes	• Objective: Encourage and facilitate the adoption of building codes that provide protection for new construction and substantial renovations from the effects of identified hazards. • Action: Evaluate adequacy of township/borough building codes. • Action: Encourage adoption of International Building Code in all townships/boroughs.
Functional Plans	• Adams County's stormwater management plan was prepared to meet PADEP Act 167 requirements and includes a model stormwater ordinance. Each municipality is required to amend or adopt stormwater management ordinances consistent with the plan.
Project Review	• Action: Integrate evaluation of snow-removal and emergency access logistics with new development planning.
Public and Stakeholder Engagement	• Objective: Provide public education to increase awareness of hazards and opportunities for mitigation. • Action: Adams County DES conducts outreach pertaining to hazard mitigation and actions to take during an emergency. • Partnerships: Adams County municipalities have formed many multi-municipal partnerships that result in creating efficiency and effectiveness in addressing hazard mitigation. Examples of partnerships include: o Establishing a County Council of Governments o Partnering for emergency management services o Joint municipal firefighting services o Joint comprehensive planning o Multi-municipal purchasing o Regional police service

	o Multi-municipal road maintenance • Public outreach via newsletters: Several municipalities create newsletters to provide information and reminders on responsible stromwater management, maintaining groundwater, creating an emergency preparedness kit, and keeping areas around fire hydrants free of plantings and snow in the winter.

While Adams County has been successful in working towards plan integration, more can be done. In Pennsylvania's communities and communities around the country, an inherent barrier to optimal plan integration is the lack of resources to accomplish activities that plan integration requires. Several municipalities noted that lack of financial resources precludes development of some planning tools. For the Adams County HMP Update, this lack of resources was identified through the results of the Self-Assessment portion of the Capability Assessment Survey. The Self-Assessment provided each municipality an opportunity to estimate the jurisdiction's capability to implement hazard mitigation strategies. The assessment reflects this capability in each of the major capability areas addressed in the survey.

The majority of Adams County municipalities responding to this portion of the assessment reported moderate planning and regulatory and administrative and technical capability; limited and moderate financial capability; and limited education and outreach capability. Table 5.2.5-1 summarizes the number of limited, moderate, and high capability responses received from municipalities while Table 5.2.5-2 identifies responses received from each municipality. With available resources being limited and stretched into the foreseeable future, plan integration is extremely relevant and will help leverage existing resources to the maximum extent possible.

Table 5.2-2 Summary of Municipal Self-Assessment of Capability

AREA	DEGREE OF CAPABILITY		
	LIMITED	MODERATE	HIGH
Planning and Regulatory	5	19	6
Administrative and Technical	7	19	4
Financial	15	13	2
Education and Outreach	15	6	0

6. Mitigation Strategy

6.1. Update Process Summary

Mitigation goals are general guidelines that explain what the County wants to achieve. Goals are usually expressed as broad policy statements representing desired long-term results. Mitigation objectives describe strategies or implementation steps to attain the identified goals. Objectives are more specific statements than goals and the described steps are usually measurable and can have a defined completion date.

Eight (8) goals and associated objectives were identified in Adams County's 2010 HMP. The goals and objectives were examined during the Hazard Mitigation Planning Workshop (HMP Workshop) held on July 24, 2014 by the planning team (municipalities and HMPSC) and stakeholders using the 5-Year Mitigation Strategy Evaluation Form. Planning team members not able to attend the HMP Workshop were asked to review and comment during office hours held by the Consultant POC in August 2014. The office hours gave municipalities the opportunity to discuss the hazard mitigation planning process one-on-one. During a Steering Committee meeting held August 18, 2014, the HMPSC reviewed results from the 5-Year Mitigation Strategy Evaluation Form in detail.

The HMPSC recommended merging Goal 8 (Improve response and recovery capabilities) with Goal 7 (Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population). This recommendation was made as several of the objectives and associated actions in Goal 8 were focused on public outreach and would fit well under Goal 7. In addition, objectives and actions in Goal 8 were more emergency management driven rather than mitigation driven.

A full review of goals and objectives based on comments received from the planning team and stakeholders who completed 5-Year Mitigation Strategy Evaluation Form is included in Table 6.1-1. This review includes recommendations to continue, change, or delete goals and objectives; reason for the continuation, change, or deletion; and status of the goal/objective. A compilation of the 5-Year Mitigation Strategy Evaluation Forms completed as part of the hazard mitigation planning process is included in Appendix C - Meeting and Other Participation Documentation.

Table 6.1-1 Review of 2010 Mitigation Strategy Goals and Objectives

GOALS AND OBJECTIVES	CONTINUE	CHANGE	DELETE	REASON/STATUS
Goal 1 Reduce potential injury/death and damage to existing community assets due to flooding.	X			Flooding continues to be an issue in many Adams County municipalities. The Adams County Water Resources Advisory Committee (WRAC) noted the importance of being proactive in removing hazards such as fallen trees from streams and against

Table 6.1-1 Review of 2010 Mitigation Strategy Goals and Objectives				
GOALS AND OBJECTIVES	**CONTINUE**	**CHANGE**	**DELETE**	**REASON/STATUS**
				bridges and the importance of being proactive with stormwater planning to mitigate flooding issues through innovative BMPs. Several municipalities are completing projects to reduce flood impacts such as roadside/swale clearing, drainage rock installation, bridge replacement, and road improvements (Carroll Valley Borough, Germany Township). Hamiltonban Township has been working with PennDOT, Adams County FEMA /PEMA, U.S. Army Corps, and Adams County Conservation District to control flooding and road damage.
Objective 1.A Identify by municipality and evaluate protection, acquisition, or relocation of existing facilities with the highest relative vulnerability in the 1%-chance floodplain.	X			Continue objective. Properties have been identified in several municipalities.
Objective 1.B Identify and evaluate strategies for repetitive-loss properties.	X			Continue as there are several repetitive loss properties in the County. Germany Township notes loss of property and livestock in the floodplain. Reading Township reports as many as 40 repetitive-loss properties. WRAC suggests evaluating buy-out strategies with FEMA/PEMA. A few municipalities noted that some outreach has been conducted with owners whose properties are in the floodplain (Carroll Valley Borough, Germany Township).
Objective 1.C Provide public outreach/education regarding strategies (e.g., flood proofing) for property owners in 1%-chance floodplain.	X			Continue as flooding continues to be an issue for properties located in the 1%-chance floodplain. It was noted that continued education is required.

Table 6.1-1 Review of 2010 Mitigation Strategy Goals and Objectives

GOALS AND OBJECTIVES	CONTINUE	CHANGE	DELETE	REASON/STATUS
Objective 1.D Address identified data limitations regarding lack of detailed information about individual structures located in the 1%-chance floodplain.	X			Detailed flood studies have been conducted in Hamitonban Township by the U.S. Army Corps of Engineers. HMPSC: mapping structures within the floodplain would be a useful tool in discussing mitigation actions with property owners.
Objective 1.E Obtain updated detailed flood studies and Flood Insurance Rate Maps (FIRMs) [including 0.2%-chance flood] for areas with the greatest potential damage and threat to residents.			X	This objective can be deleted as updated FEMA FIRMs became effective on 2/18/2009.
Goal 2 Reduce potential injury/death and damage to existing community assets due to severe weather.	X			Several municipalities noted the need to continue delivering information and communicating regarding severe weather events.
Objective 2.A Identify the most vulnerable and critical existing structures and infrastructure due to the effects of severe weather.	X			Maintaining a list of vulnerable and critical structures and infrastructure is ongoing.
Objective 2.B Evaluate communities that require warning systems and storm shelters.		X		Several municipalities noted this objective has been achieved. HMPSC suggested modifying the objective to encourage the public to seek personal storm shelters.
Objective 2.C Address identified data limitation regarding lack of detailed information about characteristics of individual structures.			X	HMPSC suggested deleting the objective as resources to achieve would be considerable.
Objective 2.D. Assess the adequacy of municipal zoning/land-use ordinances and building-code implementation.	X	X		HMPSC and municipalities noted this objective is ongoing. Cumberland Township, Gettysburg Borough, and Straban Township are currently working to develop the Central Adams Joint Comprehensive Plan.
Goal 3 Reduce potential injury/death and damage to existing community assets due to fires.	X			
Objective 3.A Identify by municipality the most vulnerable			X	Municipal status of the objective varies.

Table 6.1-1 Review of 2010 Mitigation Strategy Goals and Objectives

GOALS AND OBJECTIVES	CONTINUE	CHANGE	DELETE	REASON/STATUS
and critical existing structures to wildfires.				HMPSC recommended deleting as the objective has been achieved.
Objective 3.B Address identified data limitation regarding lack of detailed information about individual structures (e.g., roof and siding construction materials) located within areas more prone to wildfire.			X	HMPSC recommended deleting as the objective has been achieved.
Objective 3.C Ensure adequate water supply for firefighting.	X			Both municipalities and the HMPSC suggest continuing to ensure an adequate supply of water for firefighting. Hamiltonban Township stressed that dry wells need to be identified and improved. Adams County COG Financing Fire Services Study (4/18/2013) identified the need to develop a reliable and sustainable water supply as it is critical for fire protection.
Goal 4 Reduce potential injury/death and damage to existing community assets due to hazardous material releases.	X	X		Change. Include transportation corridors to address new hazard: Transportation Accidents.
Objective 4.A Identify by municipality the most vulnerable residents and critical existing facilities.	X			HMPSC recommended deleting as this objective has been achieved.
Objective 4.B Develop comprehensive approach to reducing potential injury/damages for nearby critical facilities and vulnerable populace.	X			Continue. Developing a comprehensive approach is necessary.
Objective 4.C Evaluate potential contamination of drinking water sources along transportation corridors.	X			Continue as drinking water is not only required for County citizens, but to ensure water is available for agricultural production. This is critical for the County's economy.
Goal 5 Reduce potential injury/death and damage to existing community assets due to terrorism and nuclear incidents.	X			Continue. Noted that local facilities may be targets and that terrorism is a societal reality. Noted that It is important to not be complacent just because the County is predominantly rural.
Objective 5.A Identify by municipality the most vulnerable and critical structures and infrastructure	X	X		Continue. ACOPD suggested modifying objective to identify nuclear incidents in addition to terrorism.

Table 6.1-1 Review of 2010 Mitigation Strategy Goals and Objectives

GOALS AND OBJECTIVES	CONTINUE	CHANGE	DELETE	REASON/STATUS
relative to terrorism.				
Objective 5.B Assess the inherent and tactical vulnerability to terrorism of critical structures/infrastructure.	X	X		Modify objective to add nuclear incidents.
Objective 5.C Enhance response capability of County and municipal services.	X	X		Ongoing. Modify to note the objective has been addressed, but it is continuing. It was noted that response is always an area that can use improvement and efficiency.
Goal 6 Promote disaster-resistant future development.	X			A few municipalities noted that this objective is incorporated into planning, policy, and ordinances.
Objective 6.A Encourage and facilitate the development or revision of comprehensive plans and zoning/land use ordinances to limit development in high-hazard areas.	X			ACOPD noted this is a continuous objective. WRAC noted the importance of working with county/municipal planning commissions to accomplish this objective including education Municipalities report that efforts are ongoing.
Objective 6.B Encourage and facilitate the adoption of building codes that provide protection for new construction and substantial renovations from the effects of identified hazards.		X		ACOPD noted that UCC is in place and objective should be modified to ensure applicable provisions of the UCC are fully implemented. Several municipalities noted this is a municipal responsibility to facilitate.
Objective 6.C Provide adequate and consistent enforcement.			X	Many municipalities noted this is a local responsibility to facilitate. HMPSC recommended deleting as consistent enforcement is accomplished through inspectors certified by the state.
Goal 7 Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.	X			
Objective 7.A Provide public education to increase awareness of hazards and opportunities for mitigation.	X			Adams County DES noted this is an ongoing objective.

Table 6.1-1 Review of 2010 Mitigation Strategy Goals and Objectives

GOALS AND OBJECTIVES	CONTINUE	CHANGE	DELETE	REASON/STATUS
Objective 7.B Promote partnerships between the municipalities and the County to continue to develop a County-wide approach to identifying and implementing mitigation actions.	X			Several municipalities have formed a regional EMA function (Carroll Valley Borough, Fairfield Borough, Liberty Township, and Highland Township).
Objective 7.C Continue the promotion of disaster resistance in the business community via the hazard mitigation planning initiative.				HMPSC recommended combining with Objective 7.A as public education also includes the business community.
Goal 8 Improve response and recovery capabilities.			X	HMPSC suggested incorporating the outreach components of this goal and associated objectives with Goal 7 and deleting Goal 8.
Objective 8.A Increase awareness by residents (e.g., through public outreach/education) of actions to take during an emergency.		X	X	ACOPD commented that this objective should be part of Goal 7. Several municipalities noted that while there are continuous outreach efforts; many residents are still not aware of actions to take during an emergency. A few municipalities noted the importance of updating county/municipal websites to provide this information Move outreach components of objective to Objective 7.A.
Objective 8.B Enhance response capability of County and municipal fire, police, and emergency medical services personnel to special populations.		X	X	Relocate under Goal 7 and re-word to focus on identifying and providing outreach to special populations.

Mitigation actions provide more detailed descriptions of specific work tasks to help the County and its municipalities achieve identified goals and objectives. There were 53 actions identified as part of the 2010 HMP. As it was unrealistic to assume that time and resources were available for each of these actions to be pursued, actions were prioritized as High, Medium, and Low. Only High and Medium actions were included as part of the 2010 Mitigation Action Plan, a total of 27 actions.

The 2010 mitigation actions were listed as part of the 5-Year Mitigation Strategy Evaluation Form. Both municipalities and the HMPSC were given the opportunity to review and provide comments on the status of the actions. Two versions of the form were prepared for review. One version included municipal-specific actions from the 2010 HMP, while the other version included actions specific to the HMPSC. The HMPSC form included actions for the Adams County DES, ACOPD, and HMPSC. As members of both Adams County DES and ACOPD are on the HMPSC, actions were included in one form.

Municipalities reviewed the actions at the Hazard Mitigation Planning Workshop on July 24, 2014 and during office hours held in August. The HMPSC reviewed the actions in detail at a meeting on August 18, 2014. A list of the actions as well as a review and summary of their progress based on comments from the planning team (municipalities and the HMPSC) is included in Table 6.1-2.

Actions were evaluated with the intent of carrying over any actions that were incomplete, only partially complete, or continuous but still viable for the next five years. Many actions were complete and are ongoing. Only 4 actions were deferred with no progress during the previous 5 year period. The HMPSC recommended that 3 of these actions be deleted from the 2015 HMP Update.

Table 6.1-2 Review of 2010 Mitigation Actions

ACTION TITLE	Complete	Canceled	Deferred	Ongoing	DESCRIPTION OF PROGRESS AND/OR REASON FOR DISCONTINUATION
Action 1.A.1 Identify and conduct cost-benefit analysis of protection, acquisition, or relocation of existing facilities with the highest relative vulnerabilities.			X		Deferred, but still relevant to accomplish.
Action 1.A.2 Utilize generators, battery backups, and sump pumps in municipal buildings and other critical facilities.	X			X	Complete and ongoing action.
Action 1.E.1 Apply to PEMA for funding to undertake detailed flood studies for the County's high-hazard areas to determine BFE and a full range of flood-recurrence intervals (50%-, 20%-, 10%-, 4%-, 2%-, and 1%-chance) for use in future refinements of the mitigation plan.			X		HMPSC: Delete as new FEMA mapping is in place and detailed studies have been accomplished in several communities.
Action 2.B.4 Install NOAA weather radios in all schools, nursing homes, day cares, and municipal offices.	X				Remove as PEMA completed this within the past 2 years.

Table 6.1-2 Review of 2010 Mitigation Actions

ACTION TITLE	Complete	Canceled	Deferred	Ongoing	DESCRIPTION OF PROGRESS AND/OR REASON FOR DISCONTINUATION
Action 3.C.1 Communicate with fire companies to identify any deficiencies in water supply for firefighting.				X	Continual action. HMPSC: add new action to continue to identify dry wells by municipality.
Action 4.B.1 CP The HMSC should work with facility owners and operators identified as having the greatest potential impact (based on population in the immediate vicinity) to ensure facilities are in compliance with all relevant local, state, and federal requirements; neighboring property owners understand the potential extent of the risk; traffic routing signs and trucker education are adequate; and alert and warning systems are appropriate to the situation.	X			X	HMPSC: Ongoing. Replace HMSC with LEPC.
Action 4.B.3 Inform fire companies along the rail lines of the potential for hazmat releases.				X	Consistent action; update fire department and railroads as needed
Action 5.A.1 Identify by municipality existing critical facilities with the highest relative vulnerability.	X			X	HMPSC: This is an ongoing action.
Action 5.B.1 Conduct a detailed evaluation process to determine inherent and tactical vulnerability of critical facilities; gather information for subsequent refinements of this mitigation plan.				X	Update for new facilities.
Action 5.B.2 Consider reducing vulnerability of a select number of critical facilities.			X		HMPSC: This specific action was so general that it has been deleted in favor of more specific actions related to reducing the vulnerability of critical facilities. Actions 2.A.1, 2.A.2, 2.A.3, and 5.A.1 in the 2015 Action Plan are all designed to reduce the vulnerability of critical facilities countywide.

Table 6.1-2 Review of 2010 Mitigation Actions

ACTION TITLE	Complete	Canceled	Deferred	Ongoing	DESCRIPTION OF PROGRESS AND/OR REASON FOR DISCONTINUATION
Action 5.B.3 Work with PEMA, FEMA, and the U.S. Department of Homeland Security to stay abreast of developments in procedures for identifying and determining benefits/costs for potential mitigation actions for terrorist activities.				X	HMPSC: This is an ongoing action.
Action 5.C.1 Work with the South Central Regional Counterterrorism Task Force to plan and prepare for terrorist activities, including training and exercises.				X	HMPSC: add emergency responders.
Action 6.A.1 M Distribute and promote the inclusion of vulnerability analysis information as part of periodic plan review and revisions at the township/borough level.				X	Ongoing action for municipalities and ACOPD.
Action 6.A.2 CP Present cost-benefit analysis to townships/boroughs that do not have comprehensive plans and/or zoning/land use ordinances.			X		HMPSC: Delete as comprehensive planning and zoning is well-established in Adams County municipalities. Two joint comprehensive plans completed since 2010 HMP: Eastern Adams Joint Comprehensive Plan, Northwest Adams Joint Comprehensive Plan.
Action 6.A.3 M/CP Integrate evaluation of snow-removal and emergency access logistics with new development planning.				X	ACOPD: This item is ongoing as development plans are submitted. ACOPD staff provides recommendations to municipalities with regard to snow removal and emergency access when reviewing development plan. Action ongoing in many municipalities and completed as part of SALDO review. Conewago Township notes a snow emergency ordinance.
Action 6.A.4 M Evaluate ordinances to standardize hydrant connections and provide sprinkler systems for new development.	X			X	ACOPD: Ongoing action. Several municipalities note the action is complete. A few municipalities note the action is not relevant to their community.

Table 6.1-2 Review of 2010 Mitigation Actions

ACTION TITLE	Complete	Canceled	Deferred	Ongoing	DESCRIPTION OF PROGRESS AND/OR REASON FOR DISCONTINUATION
Action 6.B.1 M Evaluate adequacy of township/borough building codes.	X			X	HMPSC: As the UCC has been adopted, suggest re-wording to ensure implementation of applicable provisions of the UCC.
Action 6.B.2 M Encourage adoption of International Building Code in all townships/boroughs.				X	HMPSC: Continue encouraging adoption of International Building Code. A few municipalities noted the UCC was sufficient.
Action No: 6.C.1 M Train the municipal building inspectors to consistently enforce the building code from jurisdiction to jurisdiction.				X	HMPSC: Delete as certified code officials are certified by the Pennsylvania Department Labor & Industry (L & I).
Action 7.B.1 Convene regular meetings of a restructured HMSC to discuss issues and progress related to the implementation of the plan.				X	This is an ongoing action.
Action 7.C.1 Renew and expand commitments to hazard mitigation planning among partner organizations.				X	Incorporate under Action 7.A.1.
Action 8.A.1 Increase residents' awareness of actions to take during an emergency, including sheltering and evacuation procedures. Methods to be used can include public outreach (e.g., Web site, mailings, workshops, media coverage) and education.				X	Incorporate under Action 7.A.1.
Action 8.A.2 Provide outreach and public education on the County's Pandemic Plan and Mass Casualty Incident Plan.				X	Incorporate action under Goal 7 and add new action addressing education and outreach for the County's Pandemic Plan and addressing invasive species.
Action 8.B.1 Identify special populations requiring additional emergency response.	X			X	Identified as completed and ongoing in several municipalities. Move action and incorporate under Goal 7.
Action 8.B.2 HMP/M Evaluate means to enhance response capability for special population residents.	X			X	Identified as completed and ongoing in several municipalities. Move action and incorporate under Goal 7.
Action 8.B.3 Establish partnerships with municipalities that have a Mobile Emergency Communications Unit.				X	Ongoing action. Remove as action is emergency response focused.

Table 6.1-2 Review of 2010 Mitigation Actions					
ACTION TITLE	Complete	Canceled	Deferred	Ongoing	DESCRIPTION OF PROGRESS AND/OR REASON FOR DISCONTINUATION
Action 8.B.4 Establish multiagency coordination (e.g., hospitals, Red Cross, EMS, State Police, PEMA, and Task Force) while exercising all plans.				X	Ongoing action. Remove as action is emergency response focused.

6.2. Mitigation Goals and Objectives

Based on results of the goals and objectives evaluation exercise and input from the HMPSC, seven (7) goals and eighteen (18) corresponding objectives were developed for the 2015 HMP Update. Table 6.2-1 lists these mitigation goals and objectives.

Table 6.2-1 2015 Mitigation Strategy Goals and Objectives	
Goal 1	**Reduce potential injury/death and damage to existing community assets due to flooding.**
Objective 1.A	Identify by municipality and evaluate protection, acquisition, or relocation of homes and existing facilities with the highest relative vulnerability in the 1%-chance floodplain.
Objective 1.B	Identify and evaluate strategies for repetitive-loss properties and frequently impacted structures.
Objective 1.C	Provide public outreach/education regarding strategies (e.g., flood proofing) for property owners in 1%-chance floodplain.
Objective 1.D	Address identified data limitations regarding lack of detailed information about the County's high-hazard areas and individual structures located in the 1%-chance floodplain.
Goal 2	**Reduce potential injury/death and damage to existing community assets due to severe weather.**
Objective 2.A	Identify the most vulnerable and critical existing structures and infrastructure due to the effects of severe weather.
Objective 2.B	Encourage the public to identify personal storm shelters and identify warning systems during the event of severe weather.
Objective 2.C	Assess the adequacy of municipal zoning/land-use ordinances and building-code implementation.
Goal 3	**Reduce potential injury/death and damage to existing community assets due to fires.**
Objective 3.A	Ensure adequate water supply for firefighting.

Table 6.2-1 2015 Mitigation Strategy Goals and Objectives	
Goal 4	**Reduce potential injury/death and damage to existing community assets due to environmental hazards.**
Objective 4.A	Develop comprehensive approach to reducing potential injury/damages for nearby critical facilities and vulnerable populace.
Objective 4.B	Evaluate potential contamination of drinking water sources along transportation corridors.
Goal 5	**Reduce potential injury/death and damage to existing community assets due to terrorism and nuclear incidents.**
Objective 5.A	Identify by municipality the most vulnerable and critical structures and infrastructure relative to terrorism and nuclear incidents and identify tactical vulnerability.
Objective 5.B	Enhance response capability of County and municipal services.
Goal 6	**Promote disaster-resistant future development.**
Objective 6.A	Encourage and facilitate the development or revision of comprehensive plans and zoning/land use ordinances to limit development in high-hazard areas.
Objective 6.B	Ensure implementation of applicable provisions of the UCC to provide protection for new construction and substantial renovations from the effects of identified hazards.
Goal 7	**Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.**
Objective 7.A	Provide public education to increase awareness of hazards, opportunities for hazard mitigation, and actions to take during an emergency.
Objective 7.B	Promote partnerships between the municipalities and the County to continue to develop a County-wide approach to identifying and implementing mitigation actions.
Objective 7.C	Develop a comprehensive approach to reduce potential injury to vulnerable populace.
Objective 7.D	Promote public education and outreach to address Pandemic and Infectious Disease and Invasive Species.

6.3. Identification & Analysis of Mitigation Techniques

The mitigation strategy in the updated HMP 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.

- **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 also 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.

To identify possible mitigation actions a mitigation technique matrix was developed. Refer to Table 6.3-1. The matrix identifies mitigation techniques for each hazard identified in the risk assessment. The matrix is used to help identify specific mitigation actions to be included in the mitigation action plan. The planning team reviewed the four types of mitigation techniques and examples of actions at the HMP Workshop. Municipalities were informed at the HMP Workshop, during office hours, and via e-mail that a minimum of one mitigation action needed to be developed for each municipality. Copies of FEMA's 2013 Local Mitigation Planning Handbook were available for municipalities to take and review.

Table 6.3-1 Mitigation Techniques Matrix

HAZARD	MITIGATION TECHNIQUES			
	LOCAL PLANS AND REGULATIONS	STRUCTURE AND INFRASTRUCTURE PROJECTS	NATURAL SYSTEMS PROTECTION	EDUCATION AND AWARENESS PROGRAMS
Drought	X	X	X	X
Earthquake	X			X
Extreme Temperature				X
Flood, Flash Flood, Ice Jam	X	X	X	X
Hailstorm				X
Hurricane, Tropical Storm, Nor'easter	X			X
Invasive Species			X	X
Pandemic and Infectious Disease				X
Subsidence, Sinkhole	X			X
Tornado, Wind Storm	X	X		X

Wildfire	X			X
Winter Storm	X	X		X
Dam Failure	X			X
Environmental Hazards	X		X	X
Nuclear Incidents				X
Terrorism				X
Transportation Accidents	X			X

6.4. Mitigation Action Plan

Using the results obtained from the 5-Year Mitigation Strategy Evaluation Form, summarized in Table 6.1-2, as a base to start, the planning team identified actions for the HMP Update.

Municipalities identified actions listed on the 5-Year Mitigation Strategy Evaluation Form; they wished to continue as part of the HMP Update. In addition, a new mitigation action template was available for municipalities to identify new actions they wished to pursue as part of the HMP Update. The form was provided at the HMP Workshop, during office hours, and via the project website. Several municipalities identified new actions through the new action template. Each of the new actions was obtained from one-on-one meetings with municipalities during office hours in August.

The HMPSC conducted a detailed review of draft actions at a Steering Committee meeting on August 18 which resulted in the 2015 HMP actions listed in Table 6.4-1. Draft actions were developed by the Consultant POC using planning team input obtained through the 5-Year Mitigation Strategy Evaluation Form, new municipal actions identified through office hours, and comments provided at project meetings. The HMPSC reviewed each draft action and determined if a draft action should be kept, modified, or deleted. The HMPSC added several new actions and also considered Low Priority Actions from the 2010 HMP. These were actions that were identified as one of 53 actions from the 2010 HMP, but the prioritization of the action was low and was; therefore, not included as part of the final 2010 Mitigation Action Plan. Several of the 2010 Low Priority Actions were included as part of the 2015 actions to consider.

Table 6.4-1 lists the mitigation actions, by goal and objective, for the 2015 HMP update. A total 38 mitigation actions were selected for the 2015 HMP Update. At least one mitigation action was established for each hazard profiled, but more than one action is identified for several hazards. Each participating municipality has at least one action. Each mitigation action is intended to address one or more of the goals and objectives identified in Section 6.2 - Mitigation Goals and Objectives. Underlined actions will contribute toward continued compliance with and participation in the NFIP.

Table 6.4-1 2015 Mitigation Actions by Goal and Objective	
Goal 1	**Reduce potential injury/death and damage to existing community assets due to flooding.**
Objective 1.A	Identify by municipality and evaluate protection, acquisition, or relocation of homes and existing facilities with the highest relative vulnerability in the 1%-chance floodplain.
Action 1.A.1	Identify and conduct cost-benefit analysis of protection, acquisition, or relocation of existing facilities with the highest relative vulnerabilities.
Action 1.A.2	Utilize generators, battery backups, and sump pumps in municipal buildings and other critical facilities.
Objective 1.B	Identify and evaluate strategies for repetitive-loss properties and frequently impacted structures.
Action 1.B.1	Develop strategy to address repetitive flooding impacting residential structures along Conewago Creek in Reading Township.
Action 1.B.2	Identify stormwater management improvements in Biglerville Borough and Butler Township.
Action 1.B.3	Identify stormwater management improvements along Carrolls Tract Road in Hamiltonban Township.
Action 1.B.4	Assess locally owned (county/township/borough) bridges for direct flooding impacts and evaluate means to mitigate flood hazards to ensure bridges remain open during flood events.
Objective 1.C	Provide public outreach/education regarding strategies (e.g., flood proofing) for property owners in 1%-chance floodplain.
Action 1.C.1	Continue to conduct outreach with municipalities to provide information regarding flood mitigation actions.
Action 1.C.2	Promote the Community Rating System (CRS) in an effort to reduce insurance premiums and flood damage In Adams County municipalities prone to flooding.
Objective 1.D	Address identified data limitations regarding lack of detailed information about the County's high-hazard areas and individual structures located in the 1%-chance floodplain.
Action 1.D.1	Use County GIS to inventory structures in floodplains.
Action 1.D.2	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods. The information to be obtained includes: lowest-floor elevation, number of stories, presence of a basement, and market and/or replacement value.
Action 1.D.3	Obtain information for all remaining structures in the 1%-chance floodplain to determine the best property protection methods to promote with individual property owners.
Goal 2	**Reduce potential injury/death and damage to existing community assets due to severe weather.**
Objective 2.A	Identify the most vulnerable and critical existing structures and infrastructure due to the effects of severe weather.
Action 2.A.1	Conduct qualitative evaluation process for critical facilities and infrastructure to determine relative vulnerability and gather information for subsequent refinements of this mitigation plan.
Action 2.A.2	Identify critical facilities with the highest relative vulnerability to the effects of power

Table 6.4-1 2015 Mitigation Actions by Goal and Objective	
	outage (i.e., hospitals, nursing homes, personal care facilities, day care facilities, fire, police, rescue, and emergency management).
Action 2.A.3	Assist in developing action plans for reducing potential damage and loss of function at identified critical facilities and infrastructure.
Objective 2.B	Encourage the public to identify personal storm shelters and identify warning systems during the event of severe weather.
Action 2.B.1	Continue to identify residents with the highest relative vulnerability to the effects of severe weather and prepare implementation plan.
Objective 2.C	Assess the adequacy of municipal zoning/land-use ordinances and building-code implementation.
Action 2.C.1	Continue to monitor existing municipal ordinances from a hazard mitigation perspective.
Action 2.C.2	Ensure implementation of applicable provisions of the UCC.
Goal 3	**Reduce potential injury/death and damage to existing community assets due to fires.**
Objective 3.A	Ensure adequate water supply for firefighting.
Action 3.A.1	Continue to identify dry wells by municipality.
Action 3.A.2	Continue to encourage municipalities to address the adequacy of water for firefighting.
Action 3.A.3	Communicate with fire companies to identify any deficiencies in water supply for firefighting.
Goal 4	**Reduce potential injury/death and damage to existing community assets due to environmental hazards.**
Objective 4.A	Develop comprehensive approach to reducing potential injury/damages for nearby critical facilities and vulnerable populace.
Action 4.A.1	The LEPC should work with facility owners and operators identified as having the greatest potential impact (based on population in the immediate vicinity) to ensure facilities are in compliance with all relevant local, state, and federal requirements; neighboring property owners understand the potential extent of the risk; traffic routing signs and trucker education are adequate; and alert and warning systems are appropriate to the situation.
Action 4.A.2	Inform fire companies along the rail lines of the potential for hazmat releases.
Action 4.A.3	Develop an evacuation plan for Lincoln Speedway in Berwick Township.
Action 4.B.1	Distribute the County Commodity Flow Study to municipalities, municipal authorities, and fire departments.
Objective 4.B	Evaluate potential contamination of drinking water sources along transportation corridors.
Action 4.B.1	Distribute the County Commodity Flow Study to municipalities, municipal authorities, and fire departments.
Goal 5	**Reduce potential injury/death and damage to existing community assets due to terrorism and nuclear incidents.**

Table 6.4-1 2015 Mitigation Actions by Goal and Objective	
Objective 5.A	Identify by municipality the most vulnerable and critical structures and infrastructure relative to terrorism and nuclear incidents and identify tactical vulnerability.
Action 5.A.1	Identify by municipality existing critical facilities with the highest relative vulnerability.
Action 5.A.2	Work with PEMA, FEMA, and the U.S. Department of Homeland Security to stay abreast of developments in procedures for identifying and determining benefits/costs for potential mitigation actions for terrorist activities.
Objective 5.B	Enhance response capability of County and municipal services.
Action 5.B.1	Work with the South Central Regional Counterterrorism Task Force and emergency responders to plan and prepare for terrorist activities, including training and exercises.
Goal 6	**Promote disaster-resistant future development.**
Objective 6.A	Encourage and facilitate the development or revision of comprehensive plans and zoning/land use ordinances to limit development in high-hazard areas.
Action 6.A.1	Include hazard-specific information from the vulnerability analysis as part of periodic plan review and revisions at the township/borough level.
Action 6.A.2	Continue to integrate evaluation of snow-removal and emergency access logistics with new development planning.
Action 6.A.3	Update municipal subdivision and land development ordinances to address subsidence and sinkhole development due to identified near-surface limestone or Karst geologic features and require a carbonate study for development within Karst areas.
Objective 6.B	Ensure implementation of applicable provisions of the UCC to provide protection for new construction and substantial renovations from the effects of identified hazards.
Action 6.B.1	Ensure implementation of applicable provisions of the UCC.
Action 6.B.2	Encourage adoption of International Building Code in all townships/boroughs.
Goal 7	**Promote hazard mitigation as a public value in recognition of its importance to the health, safety, and welfare of the population.**
Objective 7.A	Provide public education to increase awareness of hazards, opportunities for hazard mitigation, and actions to take during an emergency.
Action 7.A.1	Continue to educate and conduct outreach pertaining to hazard mitigation and actions to take during an emergency. Methods to be used may include meetings, workshops, websites, mailings, and media coverage.
Objective 7.B	Promote partnerships between the municipalities and the County to continue to develop a County-wide approach to identifying and implementing mitigation actions.
Action 7.B.1	Convene regular meetings of the HMPC to discuss issues and progress related to the implementation of the plan.
Objective 7.C	Develop a comprehensive approach to reduce potential injury to vulnerable populace.
Action 7.C.1	Identify special populations requiring additional emergency response during any

Table 6.4-1 2015 Mitigation Actions by Goal and Objective	
	hazard event and evaluate means to enhance response capability.
Objective 7.D	Promote public education and outreach to address Pandemic and Infectious Disease and Invasive Species.
Action 7.D.1	Work with appropriate county and regional partners to conduct public education on the County's Pandemic Plan.
Action 7.D.2	Work with appropriate county and regional partners to conduct public education on the impacts of invasive species.

Table 6.4-1 lists 38 mitigation actions, many of which will require substantial time commitments from Adams County DES, ACOPD, and local municipalities. The HMPSC believes these actions are attainable and can be implemented over the next five-years. While all activities will be pursued over the next five years, the reality of limited time and resources requires the evaluation and prioritization of mitigation actions.

Evaluating mitigation actions involves judging each action against certain criteria to determine whether or not it can be executed. The HMPSC evaluated the feasibility of mitigation actions using the ten evaluation criteria set forth in the Mitigation Action Evaluation methodology. The methodology solicits input on whether each action is highly effective or feasible and ineffective or not feasible for the criteria. These criteria are listed below and aid in determining the feasibility of implementing one action over another.

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

To evaluate the mitigation actions, the HMPSC identified each action as highly effective or feasible and ineffective or not feasible using the Mitigation Action Evaluation form. Results are included in Table 6.4-2.

Table 6.4-2 Evaluation of Mitigation Action Results

Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA (+) highly effective or feasible (-) ineffective or not feasible (N) neutral or not applicable										TOTAL SCORE
Action No.	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
1.A.1	Identify and conduct cost-benefit analysis of protection, acquisition, or relocation of existing facilities with the highest relative vulnerabilities.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
1.A.2	Utilize generators, battery backups, and sump pumps in municipal buildings and other critical facilities.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
1.B.1	Develop strategy to address repetitive flooding impacting residential structures along Conewago Creek in Reading Township.	+	+	+	+	+	+	-	+	+	-	8 (+) 2 (-) 0 (N)
1.B.2	Identify stormwater management improvements in Biglerville Borough and Butler Township.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
1.B.3	Identify stormwater management improvements along Carrolls Tract Road in Hamiltonban Township.	+	+	+	-	+	+	-	+	+	+	8 (+) 2 (-) 0 (N)
1.B.4	Assess locally owned (county/ township/ borough) bridges for direct flooding impacts and evaluate means to mitigate flood hazards to ensure bridges remain open during flood events.	+	+	+	-	+	+	+	+	-	+	8 (+) 2 (-) 0 (N)

Table 6.4-2 Evaluation of Mitigation Action Results

Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA (+) highly effective or feasible (-) ineffective or not feasible (N) neutral or not applicable										TOTAL SCORE
Action No.	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
1.C.1	Continue to conduct outreach with municipalities to provide information regarding flood mitigation actions.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
1.C.2	Promote the Community Rating System (CRS) in an effort to reduce insurance premiums and flood damage In Adams County municipalities prone to flooding.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
1.D.1	Use County GIS to inventory structures in floodplains.	+	+	+	+	+	+	+	-	-	+	8 (+) 2 (-) 0 (N)
1.D.2	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods.	+	+	-	-	-	-	-	-	-	-	2 (+) 8 (-) 0 (N)
1.D.3	Obtain information for all remaining structures in the 1%-chance floodplain to determine the best property protection methods to promote with individual property owners.	+	+	+	-	+	+	-	+	-	-	6 (+) 4 (-) 0 (N)

Table 6.4-2 Evaluation of Mitigation Action Results

Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA (+) highly effective or feasible (-) ineffective or not feasible (N) neutral or not applicable										TOTAL SCORE
Action No.	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
2.A.1	Conduct qualitative evaluation process for critical facilities and infrastructure to determine relative vulnerability and gather information for subsequent refinements of this mitigation plan.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
2.A.2	Identify critical facilities with the highest relative vulnerability to the effects of power outage (i.e., hospitals, nursing homes, personal care facilities, day care facilities, fire, police, rescue, and emergency management).	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
2.A.3	Assist in developing action plans for reducing potential damage and loss of function at identified critical facilities and infrastructure.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
2.B.1	Continue to identify residents with the highest relative vulnerability to the effects of severe weather and prepare implementation plan.	+	+	+	-	+	+	-	+	-	+	7 (+) 3 (-) 0 (N)
2.C.1	Continue to monitor existing municipal ordinances from a hazard mitigation perspective.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)

Table 6.4-2 Evaluation of Mitigation Action Results

Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA (+) highly effective or feasible (-) ineffective or not feasible (N) neutral or not applicable										TOTAL SCORE
Action No.	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
2.C.2	Ensure implementation of the UCC.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
3.A.1	Continue to identify dry wells by municipality.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
3.A.2	Continue to encourage municipalities to address the adequacy of water for firefighting.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
3.A.3	Communicate with fire companies to identify any deficiencies in water supply for firefighting.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
4.A.1	The LEPC should work with facility owners and operators identified as having the greatest potential impact to ensure facilities are in compliance with all relevant local, state, and federal requirements; neighboring property owners understand the potential extent of the risk; traffic routing signs and trucker education are adequate; and alert and warning systems are appropriate to the situation.	+	+	+	-	-	+	+	+	+	+	8 (+) 2 (-) 0 (N)

Table 6.4-2 Evaluation of Mitigation Action Results

Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA (+) highly effective or feasible (-) ineffective or not feasible (N) neutral or not applicable										TOTAL SCORE
Action No.	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
4.A.2	Inform fire companies along the rail lines of the potential for hazmat releases.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
4.A.3	Develop an evacuation plan for Lincoln Speedway in Berwick Township.	+	+	+	+	+	+	-	+	+	-	8 (+) 2 (-) 0 (N)
4.B.1	Distribute the County Commodity Flow Study to municipalities, municipal authorities, and fire departments.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
5.A.1	Identify by municipality existing critical facilities with the highest relative vulnerability.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
5.A.2	Work with PEMA, FEMA, and the U.S. Department of Homeland Security to stay abreast of developments in procedures for identifying and determining benefits/costs for potential mitigation actions for terrorist activities.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
5.B.1	Work with the South Central Regional Counterterrorism Task Force and emergency responders to plan and prepare for terrorist activities, including training and exercises.	+	+	+	+	+	+	+	+	-	+	9 (+) 1 (-) 0 (N)

Table 6.4-2 Evaluation of Mitigation Action Results

Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA (+) highly effective or feasible (-) ineffective or not feasible (N) neutral or not applicable										TOTAL SCORE
Action No.	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
6.A.1	Include hazard-specific information from the vulnerability analysis as part of periodic plan review and revisions at the township/borough level.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
6.A.2	Continue to integrate evaluation of snow-removal and emergency access logistics with new development planning.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
6.A.3	Update municipal subdivision and land development ordinances to address subsidence and sinkhole development due to identified near-surface limestone or Karst geologic features and require a carbonate study for development within Karst areas.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
6.B.1	Ensure implementation of applicable provisions of the UCC.	+	+	+	-	+	+	+	+	+	+	9 (+) 1 (-) 0 (N)
6.B.2	Encourage adoption of International Building Code in all townships/boroughs.	+	+	+	-	-	+	-	-	-	-	4 (+) 6 (-) 0 (N)
7.A.1	Continue to educate and conduct outreach pertaining to hazard mitigation and actions to take during an emergency.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)

Table 6.4-2 Evaluation of Mitigation Action Results

Mitigation Action		MITIGATION ACTION EVALUATION CRITERIA (+) highly effective or feasible (-) ineffective or not feasible (N) neutral or not applicable										TOTAL SCORE
Action No.	Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	
7.B.1	Convene regular meetings of the HMPC to discuss issues and progress related to the implementation of the plan.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
7.C.1	Identify special populations requiring additional emergency response during any hazard event and evaluate means to enhance response capability.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
7.D.1	Work with appropriate county and regional partners to conduct public education on the County's Pandemic Plan.	+	+	+	+	+	+	+	-	+	+	9 (+) 1 (-) 0 (N)
7.D.2	Work with appropriate county and regional partners to conduct public education on the impacts of invasive species.	+	+	+	+	+	+	+	-	+	+	9 (+) 1 (-) 0 (N)

Actions were then compared with one another to determine a ranking or priority by applying the Multi-Objective Mitigation Action Prioritization criteria. The HMPSC used the Mitigation Action Prioritization form to assign scores 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. Actions were prioritized using the cumulative score assigned to each. Each mitigation action was given a priority ranking (Low, Medium, and High) based on the following:

- Low Priority (highlighted green): 1.0 – 1.8
- Medium Priority (highlighted yellow): 1.9 – 2.4
- High Priority (highlighted red): 2.5 – 3.0

Cumulative results of the HMPSC's prioritization of mitigation actions are included in Table 6.4-3 with HMPSC member forms included in Appendix C - Meeting and Other Participation Documentation.

Table 6.4-3 Prioritization of Mitigation Action Results

MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					PRIORITY
ACTION NO.	NAME	EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES CRITICAL COMMUNICATIONS/ INFRASTRUCTURE	
1.A.1	Identify and conduct cost-benefit analysis of protection, acquisition, or relocation of existing facilities with the highest relative vulnerabilities.	2.3	2.5	2.5	3.0	1.3	2.3
1.A.2	Utilize generators, battery backups, and sump pumps in municipal buildings and other critical facilities.	2.8	2.5	2.0	3.0	2.5	2.5
1.B.1	Develop strategy to address repetitive flooding impacting residential structures along Conewago Creek in Reading Township.	2.8	2.5	2.3	3.0	2.3	2.5
1.B.2	Identify stormwater management improvements in Biglerville Borough and Butler Township.	2.5	2.0	2.0	3.0	1.8	2.2
1.B.3	Identify stormwater management improvements along Carrolls Tract Road in Hamiltonban Township.	2.8	1.8	2.0	3.0	2.3	2.3
1.B.4	Assess locally owned (county/township/borough) bridges for direct flooding impacts and evaluate means to mitigate flood hazards to ensure bridges remain open during flood events.	2.8	2.8	2.3	3.0	3.0	2.7
1.C.1	Continue to conduct outreach with municipalities to provide information regarding flood mitigation actions.	2.8	3.0	2.8	3.0	2.0	2.8
1.C.2	Promote the Community Rating System (CRS) in an effort to reduce insurance premiums and flood damage In Adams County municipalities prone to flooding.	2.5	2.3	1.8	3.0	2.5	2.4
1.D.1	Use County GIS to inventory structures in floodplains.	3.0	2.3	2.3	3.0	2.8	2.6

Table 6.4-3 Prioritization of Mitigation Action Results

MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					PRIORITY
ACTION NO.	NAME	EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES CRITICAL COMMUNICATIONS/ INFRASTRUCTURE	
1.D.2	Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods.	2.8	2.5	2.8	3.0	2.3	2.6
1.D.3	Obtain information for all remaining structures in the 1%-chance floodplain to determine the best property protection methods to promote with individual property owners.	2.3	2.3	2.0	3.0	2.0	2.3
2.A.1	Conduct qualitative evaluation process for critical facilities and infrastructure to determine relative vulnerability and gather information for subsequent refinements of this mitigation plan.	2.3	1.8	2.3	2.0	2.3	2.1
2.A.2	Identify critical facilities with the highest relative vulnerability to the effects of power outage (i.e., hospitals, nursing homes, personal care facilities, day care facilities, fire, police, rescue, and emergency management).	3.0	2.8	2.5	2.0	3.0	2.7
2.A.3	Assist in developing action plans for reducing potential damage and loss of function at identified critical facilities and infrastructure.	2.8	2.3	2.5	2.0	2.8	2.4
2.B.1	Continue to identify residents with the highest relative vulnerability to the effects of severe weather and prepare implementation plan.	2.8	2.5	2.5	2.0	2.8	2.5
2.C.1	Continue to monitor existing municipal ordinances from a hazard mitigation perspective.	2.0	1.3	1.8	2.0	1.8	1.7
2.C.2	Ensure implementation of the UCC.	2.3	1.8	2.5	2.0	2.0	2.1
3.A.1	Continue to identify dry wells by municipality.	3.0	2.8	2.3	3.0	2.3	2.7
3.A.2	Continue to encourage municipalities to address the adequacy of water for firefighting.	2.8	2.8	2.5	3.0	2.3	2.7

Table 6.4-3 Prioritization of Mitigation Action Results

MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					PRIORITY
ACTION NO.	NAME	EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES CRITICAL COMMUNICATIONS/ INFRASTRUCTURE	
3.A.3	Communicate with fire companies to identify any deficiencies in water supply for firefighting.	3.0	2.5	2.3	3.0	2.0	2.6
4.A.1	The LEPC should work with facility owners and operators identified as having the greatest potential impact to ensure facilities are in compliance with all relevant local, state, and federal requirements; neighboring property owners understand the potential extent of the risk; traffic routing signs and trucker education are adequate; and alert and warning systems are appropriate to the situation.	2.5	2.5	1.5	3.0	2.0	2.3
4.A.2	Inform fire companies along the rail lines of the potential for hazmat releases.	2.5	2.5	1.5	3.0	2.0	2.3
4.A.3	Develop an evacuation plan for Lincoln Speedway in Berwick Township.	2.5	2.0	1.8	2.0	1.3	1.9
4.B.1	Distribute the County Commodity Flow Study to municipalities, municipal authorities, and fire departments.	1.8	2.3	2.5	3.0	2.3	2.3
5.A.1	Identify by municipality existing critical facilities with the highest relative vulnerability.	2.8	2.3	2.5	2.0	2.0	2.3
5.A.2	Work with PEMA, FEMA, and the U.S. Department of Homeland Security to stay abreast of developments in procedures for identifying and determining benefits/costs for potential mitigation actions for terrorist activities.	2.3	1.8	2.0	3.0	2.0	2.1
5.B.1	Work with the South Central Regional Counterterrorism Task Force and emergency responders to plan and prepare for terrorist activities, including training and exercises.	2.3	2.3	2.3	2.0	2.3	2.2

Table 6.4-3 Prioritization of Mitigation Action Results

MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					PRIORITY
ACTION NO.	NAME	EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES CRITICAL COMMUNICATIONS/ INFRASTRUCTURE	
6.A.1	Include hazard-specific information from the vulnerability analysis as part of periodic plan review and revisions at the township/borough level.	2.3	2.0	2.5	2.0	2.0	2.2
6.A.2	Continue to integrate evaluation of snow-removal and emergency access logistics with new development planning.	2.3	1.5	2.0	2.0	1.8	1.9
6.A.3	Update municipal subdivision and land development ordinances to address subsidence and sinkhole development due to identified near-surface limestone or Karst geologic features and require a carbonate study for development within Karst areas.	2.0	3.0	1.0	1.0	3.0	2.1
6.B.1	Ensure implementation of applicable provisions of the UCC.	2.5	1.8	2.0	2.0	1.8	2.0
6.B.2	Encourage adoption of International Building Code in all townships/boroughs.	2.3	2.0	2.3	2.0	1.8	2.1
7.A.1	Continue to educate and conduct outreach pertaining to hazard mitigation and actions to take during an emergency.	2.8	2.5	2.5	2.0	2.0	2.4
7.B.1	Convene regular meetings of the HMPC to discuss issues and progress related to the implementation of the plan.	2.0	1.8	1.8	2.0	1.5	1.8
7.C.1	Identify special populations requiring additional emergency response during any hazard event and evaluate means to enhance response capability.	2.8	2.3	2.5	2.0	2.0	2.3

Table 6.4-3 Prioritization of Mitigation Action Results

MITIGATION ACTIONS		MULTI-OBJECTIVE MITIGATION ACTION PRIORITIZATION CRITERIA					PRIORITY
ACTION NO.	NAME	EFFECTIVENESS	EFFICIENCY	MULTI-HAZARD MITIGATION	ADDRESSES HIGH RISK HAZARD	ADDRESSES CRITICAL COMMUNICATIONS/ INFRASTRUCTURE	
7.D.1	Work with appropriate county and regional partners to conduct public education on the County's Pandemic Plan.	2.8	1.8	1.5	1.0	1.8	1.8
7.D.2	Work with appropriate county and regional partners to conduct public education on the impacts of invasive species.	2.0	1.5	1.5	1.0	1.3	1.5

All but 4 actions were ranked High Priority or Medium Priority. Actions 7.B.1, 7.D.1, 2.C.1, and 7.D.2 were ranked Low Priority.

A Mitigation Action Plan was developed for each action and included, to the extent available, the following information:

- **Community(ies):** Communities assisted by implementing the mitigation action.
- **Mitigation Technique Category**: The mitigation action category (local plans and regulations, structure and infrastructure projects, natural systems protection, and education and awareness programs).
- **Hazard(s) Addressed:** Hazard or hazards addressed by the action.
- **Priority:** High, Medium, or Low priority based on the mitigation action prioritization.
- **Estimated Cost:** An informal cost estimate or credible source from which to develop a cost estimate.
- **Potential Funding Sources**: The programs and/or agencies or entities that could fund the mitigation action.
- **Lead Agency or Department**: The active leader in implementing the action.
- **Implementation Schedule**: An approximate time frame for completion.

A Mitigation Action Plan prepared for each action is included in Table 6.4-4.

Documentation demonstrating planning team involvement in developing the Mitigation Action Plan is included in Appendix C - Meeting and Other Participation Documentation.

Table 6.4-4 Mitigation Action Plan	
Action No: 1.A.1	**Action:** Identify and conduct cost-benefit analysis of protection, acquisition, or relocation of existing facilities with the highest relative vulnerabilities.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Flood, Flash Flood, Ice Jam
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD

Table 6.4-4 Mitigation Action Plan	
Potential Funding Sources	General Fund
Lead Agency/Department	Adams County Department of Emergency Services, municipalities
Implementation Schedule	1 year
Action No: 1.A.2	**Action:** Utilize generators, battery backups, and sump pumps in municipal buildings and other critical facilities.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Flood, Flash Flood, Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	TBD
Potential Funding Sources	TBD; FEMA Hazard Mitigation Grant Program (HMGP), FEMA Pre-Disaster Mitigation (PDM), explore utilization of existing PEMA generators
Lead Agency/Department	Adams County Department of Emergency Services
Implementation Schedule	3 years
Action No: 1.B.1	**Action:** Develop strategy to address repetitive flooding impacting residential structures along Conewago Creek in Reading Township.
Community(ies): Reading Township	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Flood, Flash Flood, Ice Jam
Priority (High, Medium, Low)	Medium

Table 6.4-4 Mitigation Action Plan	
Estimated Cost	TBD
Potential Funding Sources	TBD, FEMA HMGP, FEMA PDM, FEMA Flood Mitigation Assistance (FMA)
Lead Agency/Department	Adams County Department of Emergency Services, Adams County Office of Planning and Community Development, Reading Township
Implementation Schedule	5 years
Action No: 1.B.2	**Action:** Identify stormwater management improvements in Biglerville Borough and Butler Township.
Community(ies): Biglerville Borough, Butler Township	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Flood, Flash Flood, Ice Jam
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	TBD, FEMA HMGP, FEMA PDM, FEMA FMA
Lead Agency/Department	Adams County Department of Emergency Services, Adams County Office of Planning and Community Development, Biglerville Borough, Butler Township
Implementation Schedule	5 years
Action No: 1.B.3	**Action:** Identify stormwater management improvements along Carrolls Tract Road in Hamiltonban Township.
Community(ies): Hamiltonban Township	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Flood, Flash Flood, Ice Jam
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	TBD, FEMA HMGP, FEMA PDM, FEMA FMA

Table 6.4-4 Mitigation Action Plan	
Lead Agency/Department	Adams County Department of Emergency Services, Adams County Office of Planning and Community Development, Hamiltonban Township
Implementation Schedule	5 years
Action No: 1.B.4	**Action:** Assess locally owned (county/township/borough) bridges for direct flooding impacts and evaluate means to mitigate flood hazards to ensure bridges remain open during flood events.
Community(ies): Freedom Township, Germany Township, other municipalities TBD	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Flood, Flash Flood, Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	TBD
Potential Funding Sources	TBD, FEMA HMGP, FEMA PDM, FEMA FMA, Pennsylvania Infrastructure Bank Loan
Lead Agency/Department	Adams County Department of Emergency Services, Adams County Office of Planning and Community Development,Freedom Township, Germany Township
Implementation Schedule	5 years
Action No: 1.C.1	**Action:** Continue to conduct outreach with municipalities to provide information regarding flood mitigation actions.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Education and Awareness Programs
Hazard(s) Addressed	Flood, Flash Flood, Ice Jam
Priority (High, Medium, Low)	High

Table 6.4-4 Mitigation Action Plan	
Estimated Cost	TBD, FEMA HMGP
Potential Funding Sources	General Fund
Lead Agency/Department	Adams County Department of Emergency Services
Implementation Schedule	Ongoing
Action No: 1.C.2	**Action:** Promote the Community Rating System (CRS) in an effort to reduce insurance premiums and flood damage In Adams County municipalities prone to flooding.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Education and Awareness Programs
Hazard(s) Addressed	Flood, Flash Flood, Ice Jam
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	TBD, FEMA HMGP
Lead Agency/Department	Adams County Department of Emergency Services, Adams County Office of Planning and Development
Implementation Schedule	5 years
Action No: 1.D.1	**Action:** Use County GIS to inventory structures in floodplains.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	

Table 6.4-4 Mitigation Action Plan	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	Flood, Flash Flood, Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	TBD
Potential Funding Sources	General Fund
Lead Agency/Department	Adams County Office of Planning and Development
Implementation Schedule	1 year
Action No: 1.D.2	**Action:** Obtain information for structures in the areas with the highest relative vulnerability to determine the best property protection methods.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Flood, Flash Flood, Ice Jam
Priority (High, Medium, Low)	High
Estimated Cost	TBD
Potential Funding Sources	General Fund
Lead Agency/Department	Adams County Office of Planning and Development, municipalities
Implementation Schedule	3 years
Action No: 1.D.3	**Action:** Obtain information for all remaining structures in the 1%-chance floodplain to determine the best property protection methods to promote with individual property owners.

Table 6.4-4 Mitigation Action Plan	
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Structure and Infrastructure Projects
Hazard(s) Addressed	Flood, Flash Flood, Ice Jam
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	General Fund
Lead Agency/Department	Adams County Office of Planning and Development, municipalities
Implementation Schedule	3 years
Action No: 2.A.1	**Action:** Conduct qualitative evaluation process for critical facilities and infrastructure to determine relative vulnerability and gather information for subsequent refinements of this mitigation plan.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	General fund
Lead Agency/Department	Adams County Department of Emergency Services

Table 6.4-4 Mitigation Action Plan	
Implementation Schedule	1 year
Action No: 2.A.2	**Action:** Identify critical facilities with the highest relative vulnerability to the effects of power outage (i.e., hospitals, nursing homes, personal care facilities, day care facilities, fire, police, rescue, and emergency management).
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	All
Priority (High, Medium, Low)	High
Estimated Cost	TBD
Potential Funding Sources	General fund
Lead Agency/Department	Adams County Department of Emergency Services
Implementation Schedule	1 year
Action No: 2.A.3	**Action:** Assist in developing action plans for reducing potential damage and loss of function at identified critical facilities and infrastructure.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	All

Table 6.4-4 Mitigation Action Plan	
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	General fund
Lead Agency/Department	Adams County Department of Emergency Services
Implementation Schedule	3 years
Action No: 2.B.1	**Action:** Continue to identify residents with the highest relative vulnerability to the effects of severe weather and prepare implementation plan.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	General fund
Lead Agency/Department	Adams County Department of Emergency Services
Implementation Schedule	Continual
Action No: 2.C.1	**Action:** Continue to monitor existing municipal ordinances from a hazard mitigation perspective.

Table 6.4-4 Mitigation Action Plan	
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Low
Estimated Cost	TBD
Potential Funding Sources	General fund
Lead Agency/Department	Adams County Office of Planning and Development
Implementation Schedule	Continual
Action No: 2.C.2	**Action:** Ensure implementation of the UCC.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	General Fund
Lead Agency/Department	Adams County Office of Planning and Development; municipalities

Table 6.4-4 Mitigation Action Plan	
Implementation Schedule	Continual
Action No: 3.A.1	**Action:** Continue to identify dry wells by municipality.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Education and awareness programs
Hazard(s) Addressed	Drought, Wildfire
Priority (High, Medium, Low)	High
Estimated Cost	TBD
Potential Funding Sources	General fund
Lead Agency/Department	Adams County Department of Emergency Services
Implementation Schedule	Continual
Action No: 3.A.2	**Action:** Continue to encourage municipalities to address the adequacy of water for firefighting.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Education and Awareness Programs
Hazard(s) Addressed	Drought, Wildfire
Priority (High, Medium, Low)	HIgh

Table 6.4-4 Mitigation Action Plan	
Estimated Cost	TBD
Potential Funding Sources	General fund
Lead Agency/Department	Adams County Department of Emergency Services
Implementation Schedule	Continual
Action No: 3.A.3	**Action:** Communicate with fire companies to identify any deficiencies in water supply for firefighting.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Education and Awareness Programs
Hazard(s) Addressed	Drought, Wildfire
Priority (High, Medium, Low)	High
Estimated Cost	TBD
Potential Funding Sources	General fund
Lead Agency/Department	Adams County Department of Emergency Services
Implementation Schedule	Daily
Action No: 4.A.1	**Action:** The LEPC should work with facility owners and operators identified as having the greatest potential impact to ensure facilities are in compliance with all relevant local, state, and federal requirements; neighboring property owners understand the potential extent of the risk; traffic routing signs and trucker education are adequate; and alert and warning systems are appropriate to the situation.

Table 6.4-4 Mitigation Action Plan	
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Education and Awareness Programs
Hazard(s) Addressed	Environmental Hazards, Transportation Accidents
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	County and municipal general funds
Lead Agency/Department	Adams County LEPC
Implementation Schedule	Annually
Action No: 4.A.2	**Action:** Inform fire companies along the rail lines of the potential for hazmat releases.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Education and Awareness Programs
Hazard(s) Addressed	Environmental Hazards, Transportation Accidents
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	TBD

Table 6.4-4 Mitigation Action Plan	
Lead Agency/Department	Adams County Department of Emergency Services
Implementation Schedule	Ongoing
Action No: 4.A.3	**Action:** Develop an evacuation plan for Lincoln Speedway in Berwick Township.
Community(ies): Berwick Township	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	County and municipal general funds
Lead Agency/Department	Berwick Township, Adams County Department of Emergency Services
Implementation Schedule	3 years
Action No: 4.B.1	**Action:** Distribute the County Commodity Flow Study to municipalities, municipal authorities, and fire departments.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	Environmental Hazards, Transportation Accidents
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD

Table 6.4-4 Mitigation Action Plan	
Potential Funding Sources	General fund
Lead Agency/Department	Adams County Department of Emergency Services
Implementation Schedule	1 year
Action No: 5.A.1	**Action:** Identify by municipality existing critical facilities with the highest relative vulnerability.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	General fund, FEMA PDM
Lead Agency/Department	Adams County Office of Planning and Development
Implementation Schedule	1 year
Action No: 5.A.2	**Action:** Work with PEMA, FEMA, and the U.S. Department of Homeland Security to stay abreast of developments in procedures for identifying and determining benefits/costs for potential mitigation actions for terrorist activities.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	

Table 6.4-4 Mitigation Action Plan	
Mitigation Technique Category	Education and Awareness Programs
Hazard(s) Addressed	Terrorism, Environmental Hazards
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	State Homeland Security Grant Program; Emergency Management Performance Grant (EMPG); General fund; Pennsylvania Hazardous Materials Response Grant (Act 165)
Lead Agency/Department	Adams County Department of Emergency Services
Implementation Schedule	Ongoing
Action No: 5.B.1	**Action:** Work with the South Central Regional Counterterrorism Task Force and emergency responders to plan and prepare for terrorist activities, including training and exercises.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Education and awareness programs
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	General fund; Homeland Security Grant Program; Pennsylvania Hazardous Materials Response Grant (Act 165)
Lead Agency/Department	Adams County Department of Emergency Services
Implementation Schedule	1 year

Table 6.4-4 Mitigation Action Plan	
Action No: 6.A.1	**Action:** Distribute and promote the inclusion of vulnerability analysis information as part of periodic plan review and revisions at the township/borough level.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	General fund
Lead Agency/Department	Municipal planning departments
Implementation Schedule	One year
Action No: 6.A.2	**Action:** Continue to integrate evaluation of snow-removal and emergency access logistics with new development planning.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD

Table 6.4-4 Mitigation Action Plan	
Potential Funding Sources	County and municipal general funds; Pennsylvania Hazardous Materials Response Grant (Act 165)
Lead Agency/Department	Adams County Office of Planning and Development; municipalities
Implementation Schedule	2 years
Action No: 6.A.3	**Action:** Update municipal subdivision and land development ordinances to address subsidence and sinkhole development due to identified near-surface limestone or Karst geologic features and require a carbonate study for development within Karst areas.
Community(ies):, Berwick Township, Carroll Valley Borough, Conewago Township, Fairfield Borough, Franklin Township, Germany Township, Hamiltonban Township, Huntington Township, Latimore Township, Littlestown Borough, McSherrystown Borough, Mount Pleasant Township, Oxford Township, Union Township, York Springs Borough	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	Subsidence, Sinkhole
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	General fund
Lead Agency/Department	Adams County Office of Planning and Development; Municipal planning departments
Implementation Schedule	5 years
Action No: 6.B.1	**Action:** Ensure implementation of applicable provisions of the UCC.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	All

Table 6.4-4 Mitigation Action Plan	
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	General fund
Lead Agency/Department	Municipal planning departments
Implementation Schedule	Ongoing
Action No: 6.B.2	**Action:** Encourage adoption of International Building Code in all townships/boroughs.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Local Plans and Regulations
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	General fund
Lead Agency/Department	Adams County Office of Planning and Development; Municipal planning departments
Implementation Schedule	5 years
Action No: 7.A.1	**Action:** Continue to educate and conduct outreach pertaining to hazard mitigation and actions to take during an emergency.

Table 6.4-4 Mitigation Action Plan	
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Education and awareness programs
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	County and municipal general funds
Lead Agency/Department	Adams County Department of Emergency Services
Implementation Schedule	Ongoing
Action No: 7.B.1	**Action:** Convene regular meetings of the HMPC to discuss issues and progress related to the implementation of the plan.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Local plans and regulations
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Low
Estimated Cost	$10,000
Potential Funding Sources	County and municipal general funds

Table 6.4-4 Mitigation Action Plan	
Lead Agency/Department	Adams County Department of Emergency Services
Implementation Schedule	Quarterly
Action No: 7.C.1	**Action:** Identify special populations requiring additional emergency response during any hazard event and evaluate means to enhance response capability.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Education and awareness programs
Hazard(s) Addressed	All
Priority (High, Medium, Low)	Medium
Estimated Cost	TBD
Potential Funding Sources	County and municipal general funds
Lead Agency/Department	Adams County Department of Emergency Services; Municipal Emergency Management Coordinators
Implementation Schedule	Quarterly
Action No: 7.D.1	**Action:** Work with appropriate county and regional partners to conduct public education on the County's Pandemic Plan.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Education and awareness programs

Table 6.4-4 Mitigation Action Plan	
Hazard(s) Addressed	Pandemic and infectious disease
Priority (High, Medium, Low)	Low
Estimated Cost	TBD
Potential Funding Sources	General fund
Lead Agency/Department	Adams County Department of Emergency Services; regional partners to be determined
Implementation Schedule	5 years
Action No: 7.D.2	**Action:** Work with appropriate county and regional partners to conduct public education on the impacts of invasive species.
Community(ies): Abbottstown Borough, Arendtsville Borough, Bendersville Borough, Berwick Township, Biglerville Borough, Bonneauville Borough, Butler Township, Carroll Valley Borough, Conewago Township, Cumberland Township, East Berlin Borough, Fairfield Borough, Franklin Township, Freedom Township, Germany Township, Gettysburg Borough, Hamilton Township, Hamiltonban Township, Highland Township, Huntington Township, Latimore Township, Liberty Township, Littlestown Borough, McSherrystown Borough, Menallen Township, Mount Joy Township, Mount Pleasant Township, New Oxford Borough, Oxford Township, Reading Township, Straban Township, Tyrone Township, Union Township, York Springs Borough	
Mitigation Technique Category	Education and awareness programs
Hazard(s) Addressed	Invasive Species
Priority (High, Medium, Low)	Low
Estimated Cost	TBD
Potential Funding Sources	General fund
Lead Agency/Department	Adams County Department of Emergency Services; regional partners to be determined
Implementation Schedule	5 years

7. Plan Maintenance

7.1. Update Process Summary

Monitoring, evaluating and updating this plan, is critical to maintaining its value and success in Adams County's hazard mitigation efforts. Ensuring effective implementation of mitigation activities paves the way for continued momentum in the planning process and gives direction for the future. This section explains who will be responsible for maintenance activities and what those responsibilities entail. It also provides a methodology and schedule of maintenance activities including a description of how the public will be involved on a continued basis.

The plan maintenance procedures proposed herein are quite similar to those discussed in the 2010 HMP. The primary difference is the elimination of Project Opportunity Forms, as PEMA is moving towards using letters of interest and pre-application forms to gather projects. The HMPSC recognizes the importance of monitoring, evaluating, and updating the plan and will strive for yearly progress reports with each municipality providing information as needed. The 2015 HMP update builds on the spirit of the 2010 plan maintenance procedures, stating that the County will conduct both an annual review and a review of the plan within 30 days of a disaster event to help identify mitigation opportunities. This HMP update also defines the municipalities' role in updating and evaluating the plan. Finally, the 2015 HMP update elaborates upon continued public involvement.

To the best knowledge of the HMPSC, there were no HMP progress reports submitted from municipalities for the period from 2010-2014, though the public had continual access to the HMP through the County's website and though some mitigation actions had been accomplished in the interim, especially in the aftermath of Tropical Storm Lee. Adams County reports the following mitigation activity related reducing flood damages after Tropical Storm Lee:

- Since Tropical Storm Lee, Reading Township has tightened their inspections and zoning compliance for property owners on Kuhn Fording Road (as known as Laughman's Bottom). This is a repetitive loss area.
- Gettysburg Borough was instructed to have their Code Enforcement Officer go and inspect flooded homes and business. The Gettysburg Municipal Authority with the Gettysburg Borough is replacing deteriorating sewer lines which are a source of storm water-related flooding.
- Mount Joy, Huntington, Straban, Freedom and Cumberland Townships rebuilt culverts and bridge approaches to better withstand future flood events.
- The Small Business Administration made low interest loans available to home owners and businesses to restore damaged structures following Tropical Storm Lee.
- The Adams County Department of Emergency Services started to develop a Debris Management Plan due to the impact of the following on our streams and creeks.

In addition, the Adams County Department of Emergency Services and Planning Department work together year-round to advance mitigation and preparedness through the following activities:

- Adams County Department of Emergency Services conducts training exercises each year that feature flooding scenarios.
- The County Planning Department holds meetings and trainings for municipality road crews throughout the year.
- The County Emergency Management Coordinator was appointed to the County Water Resources Advisory Council (WRAC) in order to advise the group on issues of heavy rain and drought conditions.
- Municipal Planning Commissions and Municipal Governments have enacted strict storm water management codes throughout the county.

These activities, together with the updated Mitigation Action Plan in Section 6.4 will help reduce and/or eliminate long-term risks countywide. The following sections describe the specific methodology that will be used to keep the HMP up-to-date.

7.2. Monitoring, Evaluating and Updating the Plan

The plan maintenance procedures established for the 2015 HMPU is designated to administer the plan maintenance processes of monitoring, evaluation and updating with support and representation from all 34 participating municipalities. The Adams County Hazard Mitigation Steering Committee (listed in Section 3.2), under the direction of the Adams County Emergency Services Department, will be responsible for maintaining this Multi-Jurisdictional HMP. The Steering Committee will meet annually and following each emergency declaration, with the purpose of reviewing the Plan. John Eline, the Director of the Adams County Emergency Services Department, will lead the Steering Committee for annual reviews of the HMP.

The HMPSC will coordinate maintenance efforts, but the input needed for effective periodic evaluations will come from community representatives, local emergency management coordinators and planners, the general public and other important stakeholders. The HMPSC will oversee the progress made on the implementation of action items identified in the 2015 HMP update and modify actions, as needed, to reflect changing conditions. The HMPSC will meet annually on or around the anniversary of plan adoption to discuss specific coordination efforts that may be needed with other stakeholders. Should a significant disaster occur within the County, the HMPSC will reconvene within 30 days of the disaster to review and update the HMP.

Each review process will ensure that the Hazard Vulnerability Analysis and Risk Assessment reflect current conditions in the County and the municipalities, the Capabilities 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 Adams County Emergency Services Department will maintain a copy of these records.

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. This individual will be asked to work with the HMPSC to provide updates on applicable mitigation actions and feedback on changing hazard vulnerabilities within their community.

Upon each HMP evaluation, the HMPSC will consider whether applications should be submitted for existing mitigation grant programs. A decision to apply for funding will be based on appropriate eligibility and financial need requirements. The HMPSC will also support local and county officials in applying for post-disaster mitigation funds when they are available. All state and federal mitigation funding provided to the County or local municipalities will be reported in subsequent plan updates. In addition, new plans and programs being developed within the County will be evaluated as to the ability and necessity to incorporate the 2015 HMP Update into them. For example, portions of the HMP may be helpful for future updates of the county and multi-municipal comprehensive plans, the county Emergency Operations Plan, and Act 167 Stormwater Management Plans.

The 2015 HMP Update will be updated every five years, as required by the Disaster Mitigation Act of 2000, or following a disaster event. Future plan updates will account for any new hazard vulnerabilities, special circumstances, or new information that becomes available. During the five-year review process, the following questions will be considered as criteria for assessing the effectiveness the Adams County HMP.

- Has the nature or magnitude of hazards affecting the County changed?
- Are there new hazards that have the potential to impact the County?
- 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?

Issues that arise during monitoring and evaluation which require changes to the risk assessment, mitigation strategy and other components of the plan will be incorporated during future updates.

7.3. Continued Public Involvement

The Adams County Emergency Services Department will ensure that the HMP is posted and maintained on the County Web site, and will continue to encourage public review and comment on the Plan.

The citizens of Adams County were encouraged to submit their comments on this plan, both during the plan update process and moving forward. The project team collected comments beginning on September 15, 2014 via the project website, www.pennsylvaniahmp.com/adams-hmp. Comments may also be submitted after the plan has been adopted and approved by FEMA to elected officials and/or members of the HMPSC. All comments received will be

maintained and considered by the Hazard Mitigation Steering Committee when updating the HMP.

Adams County will continue to reach out via telephone, email, and mail to municipalities regarding mitigation projects. Any additional hazard mitigation actions received during the life of this five-year HMP will be incorporated into the Plan as an interim, and will be updated and included in the next five-year Plan update. Stakeholders will be informed of the location and time of review meetings through public notice in the newspapers, and information posted to the County Web site.

The Multi-Jurisdictional HMP will continue to have a permanent home online at: www.adamscounty.us.

8. Plan Adoption

The Plan was submitted to the Pennsylvania Emergency Management Agency on September 30, 2014. It was forwarded to FEMA for final review and approval-pending-adoption on January 26, 2015. FEMA granted approval-pending-adoption on February 5, 2015. Adams County adopted the plan on XXXX, 2015. Full approval from FEMA was received on XXXX, 2015.

This section of the plan includes copies of the local adoption resolutions passed by Adams County and its municipal governments; the completed Local Mitigation Plan Review Tool can be found in **Appendix B**. Adoption resolution templates are provided to assist the County and municipal governments with recommended language for future adoption of the HMP.

Adams County 2015 Hazard Mitigation Plan

County Adoption Resolution

Resolution No. _____

Adams County, Pennsylvania

WHEREAS, the municipalities of Adams 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, Adams County acknowledges the requirements 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 Adams County 2015 Hazard Mitigation Plan has been developed by the Adams County Department of Emergency Services and the Adams County Planning Commission in cooperation with other county departments, local municipal officials, non-profit and institutional stakeholders, and the citizens of Adams County, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Adams County 2015 Hazard Mitigation Plan, and

WHEREAS, the Adams County 2015 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 Adams that:

- The Adams County 2015 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 Adams County 2015 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2015

ATTEST:

_____

ADAMS COUNTY COMMISSIONERS

By _____

By _____

By _____

Adams County 2015 Hazard Mitigation Plan

Municipal Adoption Resolution

Resolution No. _____
<*Borough/Township of Municipality Name*>, Adams County, Pennsylvania

WHEREAS, the <*Borough/Township of Municipality Name*>, Adams 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 requirements 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 Adams County 2015 Hazard Mitigation Plan has been developed by the Adams County Emergency Management Agency and the Adams County Planning Commission 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 Adams County 2015 Hazard Mitigation Plan, and

WHEREAS, the Adams County 2015 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 Adams County 2015 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 Adams County 2015 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2015

ATTEST: ***<BOROUGH/TOWNSHIP OF MUNICIPALITY NAME>***

_____ By _____

By _____

9. Appendices

Appendix A – Bibliography
Appendix B – Local Mitigation Plan Review Tool
Appendix C – Meeting and Other Participation Documentation
Appendix D – Local Municipality Flood Vulnerability Maps
Appendix E – Critical Facilities
Appendix F – HAZUS Methodology and Results Reports
Appendix G – Dam Failure Profile