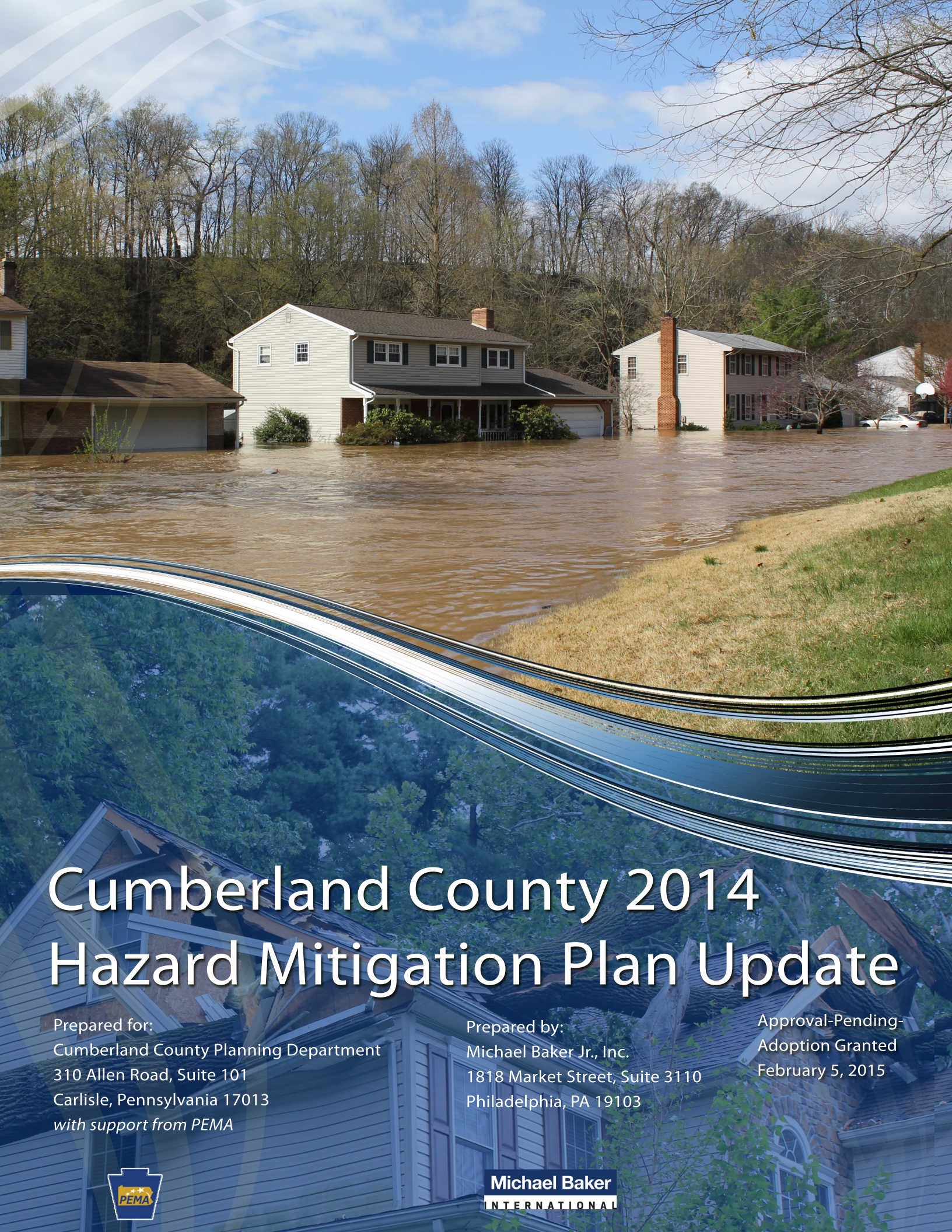


Cumberland County 2014 Hazard Mitigation Plan Update

Prepared for:
Cumberland County Planning Department
310 Allen Road, Suite 101
Carlisle, Pennsylvania 17013
with support from PEMA

Prepared by:
Michael Baker Jr., Inc.
1818 Market Street, Suite 3110
Philadelphia, PA 19103

Approval-Pending-Adoption Granted
February 5, 2015

Michael Baker
INTERNATIONAL

Cumberland County Hazard Mitigation Plan

Certification of Annual Review Meetings

The Cumberland County Hazard Mitigation Steering Committee has reviewed this Hazard Mitigation Plan. See Section 8 of the Cumberland County 2014 Hazard Mitigation Plan 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
2015			
2016			
2017			
2018			
2019			

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

Cumberland County Hazard Mitigation Plan

Record of Changes

Date	Description Of Change Made, Mitigation Action Completed, Or Public Outreach Performed	Change Made By (Print Name)	Change Made By (Signature)

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

Revision Number	Revision Description
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	

Table of Contents

Certification of Annual Review Meetings i
Record of Changes ii
1. Introduction 1
1.1 Background 1
1.2 Purpose 1
1.3 Scope 1
1.4 Authority and References 2
2. Community Profile 4
2.1 Geography and Environment 4
2.2 Community Facts 7
2.3 Population and Demographics 7
2.4 Land Use and Development 10
2.5 Data Sources and Limitations 10
3. Planning Process 13
3.1 Update Process and Participation Summary 13
3.2 The Planning Team 14
3.3 Meetings and Documentation 16
3.4 Public & Stakeholder Participation 17
3.5 Multi-Jurisdictional Planning 19
4. Risk Assessment 20
4.1 Update Process Summary 20
4.2 Hazard Identification 21
4.2.1. Table of Presidential Disaster Declarations 21
4.2.2. Summary of Hazards 23
4.3 Hazard Profiles 27
NATURAL HAZARDS 27
4.3.1. Drought 27
4.3.1.1 Location and Extent 27
4.3.1.2 Range of Magnitude 28
4.3.1.3 Past Occurrence 30
4.3.1.4 Future Occurrence 31

4.3.1.5 Vulnerability Assessment 33
4.3.2. Earthquake 35
4.3.2.1 Location and Extent 35
4.3.2.2 Range of Magnitude 35
4.3.2.3 Past Occurrence 37
4.3.2.4 Future Occurrence 39
4.3.2.5 Vulnerability Assessment 39
4.3.3. Flood, Flash Flood & Ice Jam 41
4.3.3.1 Location and Extent 41
4.3.3.2 Range of Magnitude 44
4.3.3.3 Past Occurrence 45
4.3.3.4 Future Occurrence 55
4.3.3.5 Vulnerability Assessment 55
4.3.4. Hurricane, Tropical Storm, & Nor'easter 63
4.3.4.1 Location and Extent 63
4.3.4.2 Range of Magnitude 63
4.3.4.3 Past Occurrence 65
4.3.4.4 Future Occurrence 68
4.3.4.5 Vulnerability Assessment 71
4.3.5. Landslide 71
4.3.5.1 Location and Extent 71
4.3.5.2 Range of Magnitude 74
4.3.5.3 Past Occurrence 74
4.3.5.4 Future Occurrence 75
4.3.5.5 Vulnerability Assessment 75
4.3.6. Pandemic 79
4.3.6.1 Location and Extent 79
4.3.6.2 Range of Magnitude 80
4.3.6.3 Past Occurrence 81
4.3.6.4 Future Occurrence 81
4.3.6.5 Vulnerability Assessment 82
4.3.7. Subsidence & Sinkholes 82
4.3.7.1 Location and Extent 82
4.3.7.2 Range of Magnitude 85
4.3.7.3 Past Occurrence 86
4.3.7.4 Future Occurrence 87
4.3.7.5 Vulnerability Assessment 87
4.3.8. Tornado & Windstorm 91
4.3.8.1 Location and Extent 91
4.3.8.2 Range of Magnitude 92
4.3.8.3 Past Occurrence 96
4.3.8.4 Future Occurrence 100
4.3.8.5 Vulnerability Assessment 101
4.3.9. Wildfire 104
4.3.9.1 Location and Extent 104

4.3.9.2 Range of Magnitude 106
4.3.9.3 Past Occurrence 106
4.3.9.4 Future Occurrence 109
4.3.9.5 Vulnerability Assessment 109
4.3.10. Winter Storm 115
4.3.10.1 Location and Extent 115
4.3.10.2 Range of Magnitude 117
4.3.10.3 Past Occurrence 117
4.3.10.4 Future Occurrence 120
4.3.10.5 Vulnerability Assessment 120
HUMAN-MADE OR TECHNOLOGICAL HAZARDS 121
4.3.11. Civil Disturbance 121
4.3.11.1 Location and Extent 121
4.3.11.2 Range of Magnitude 121
4.3.11.3 Past Occurrence 123
4.3.11.4 Future Occurrence 123
4.3.11.5 Vulnerability Assessment 123
4.3.12. Dam Failure 123
4.3.13. Environmental Hazards 124
4.3.13.1 Location and Extent 124
4.3.13.2 Range of Magnitude 127
4.3.13.3 Past Occurrence 128
4.3.13.4 Future Occurrence 129
4.3.13.5 Vulnerability Assessment 129
4.3.14. Levee Failure 138
4.3.14.1 Location and Extent 138
4.3.14.2 Range of Magnitude 140
4.3.14.3 Past Occurrence 140
4.3.14.4 Future Occurrence 140
4.3.14.5 Vulnerability Assessment 140
4.3.15. Nuclear Incidents 140
4.3.15.1 Location and Extent 140
4.3.15.2 Range of Magnitude 143
4.3.15.3 Past Occurrence 145
4.3.15.4 Future Occurrence 145
4.3.15.5 Vulnerability Assessment 145
4.3.16. Terrorism 146
4.3.16.1 Location and Extent 146
4.3.16.2 Range of Magnitude 148
4.3.16.3 Past Occurrence 148
4.3.16.4 Future Occurrence 149
4.3.16.5 Vulnerability Assessment 149
4.3.17. Transportation Accidents 150
4.3.17.1 Location and Extent 150

4.3.17.2 Range of Magnitude 154
4.3.17.3 Past Occurrence 154
4.3.17.4 Future Occurrence 158
4.3.17.5 Vulnerability Assessment 159
4.3.18. Urban Fire 166
4.3.18.1 Location and Extent 166
4.3.18.2 Range of Magnitude 166
4.3.18.3 Past Occurrence 167
4.3.18.4 Future Occurrence 168
4.3.18.5 Vulnerability Assessment 168
4.3.19. Utility Interruption 168
4.3.19.1 Location and Extent 168
4.3.19.2 Range of Magnitude 169
4.3.19.3 Past Occurrence 169
4.3.19.4 Future Occurrence 170
4.3.19.5 Vulnerability Assessment 170
4.4 Hazard Vulnerability Summary 171
4.4.1. Methodology 171
4.4.2. Ranking Results 173
4.4.3. Potential Loss Estimates 178
4.4.4. Future Development and Vulnerability 183
5. Capability Assessment 188
5.1 Update Process Summary 188
5.2 Capability Assessment Findings 188
5.2.1. Planning and Regulatory Capability 188
5.2.1.1 Local Plans and Ordinances 188
5.2.1.2 Participation in the National Flood Insurance Program (NFIP) 191
5.2.1.3 Emergency Management 193
5.2.2. Administrative and Technical Capability 194
5.2.3. Financial Capability 195
5.2.4. Education and Outreach 198
5.2.5. Plan Integration 198
6. Mitigation Strategy 200
6.1 Update Process Summary 200
6.2 Mitigation Goals and Objectives 208
6.3 Identification and Analysis of Mitigation Techniques 209
6.4 Mitigation Action Plan 210
7. Plan Maintenance 239

7.1 Update Process Summary 239
7.2 Monitoring, Evaluating and Updating the Plan 239
7.3 Continued Public Involvement 240
8. Plan Adoption 242
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 – Dam Failure Hazard Profile
Appendix G – 2014 HMP HAZUS Reports
Appendix H – Mitigation Projects
Appendix I – Annual Review Meeting Documentation

1. Introduction

1.1 Background

Across the United States, natural and human-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 1972 there have been 13 Presidential Disaster Declarations and five Presidential Emergency Declarations affecting Cumberland County in addition to 14 Gubernatorial Declarations or Proclamations affecting Cumberland County since 1963. The emergency management community, citizens, elected officials, and other stakeholders in Cumberland 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.

Accordingly, the Cumberland County Hazard Mitigation Steering Committee (HMSC), composed of government leaders from Cumberland 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 toward greater disaster resistance, but will also respect the character and needs of the community.

1.2 Purpose

This Hazard Mitigation Plan was developed for the purpose of:

- Providing a blueprint for reducing property damage and saving lives from the effects of future natural and human-made disasters in Cumberland County;
- Qualifying the County for pre-disaster and post-disaster grant funding;
- Complying with state and federal legislative requirements related to local hazard mitigation planning;
- Demonstrating a firm local commitment to hazard mitigation principles; and
- Improving community resiliency following a disaster event.

1.3 Scope

The Cumberland County 2014 Hazard Mitigation Plan 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 following significant disasters or at a minimum, every five years.

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. June 1, 2010.
- 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 PEMA guides and reference documents were used to prepare this document:

- PEMA. *Hazard Mitigation Planning Made Easy!*
- PEMA Mitigation Ideas: *Potential Mitigation Measures by Hazard Type; A Mitigation Planning Tool for Communities*. March 6, 2009.

- PEMA. Pennsylvania's *Hazard Mitigation Planning Standard Operating Guide*. October 18, 2013.
- 2012 Pennsylvania Threat and Hazard Identification and Risk Assessment. December 2012.

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.

Please note that hazard mitigation falls within PEMA's Bureau of Recovery and Mitigation (BORM). PEMA's work is both guided and regulated by additional federal and state guidance, including FEMA's Logistics Capability Assessment Tool; FEMA Comprehensive Preparedness Guidance 101; the Federal Critical Infrastructure Protection Act; the Patriot Act; Department of Homeland Security Directives; Presidential Directives 5 and 8; CFR Titles 10, 29, and 49; and the Pennsylvania State Emergency Operations Plan.

2. Community Profile

2.1 Geography and Environment

Cumberland County covers approximately 550 square miles and is located in the south-central portion of the Commonwealth of Pennsylvania. It lies within the Cumberland Valley, a wide fertile valley between two chains of the Appalachian Mountain Range running from northeast to southwest across eastern and south-central Pennsylvania. From the Borough of Shippensburg to the west to the Susquehanna River to the east, Cumberland County stretches approximately 42 miles across. It is bordered by Blue Mountain and North Mountain to the north, South Mountain to the south, and the Susquehanna River, which separates eastern edge of the County from the City of Harrisburg. The western edge of the County has no significant natural border. A map of Cumberland County is provided as Figure 2.1-1.

Two major tributaries to the Susquehanna River, Yellow Breeches Creek and Conodoguinet Creek, traverse the County in an approximately west-east direction. A map of major watersheds in the County is provided as Figure 2.1-2. Water bodies make up approximately 0.18 percent of the County's geographic area.

Adjacent counties include Perry County to the north, Dauphin County across the Susquehanna River to the east, Adams and York Counties to the south, and Franklin County, which shares the Borough of Shippensburg, to the west.

Figure 2.1-1: Map of Cumberland County showing municipal boundaries, major roads, water bodies and surrounding counties.

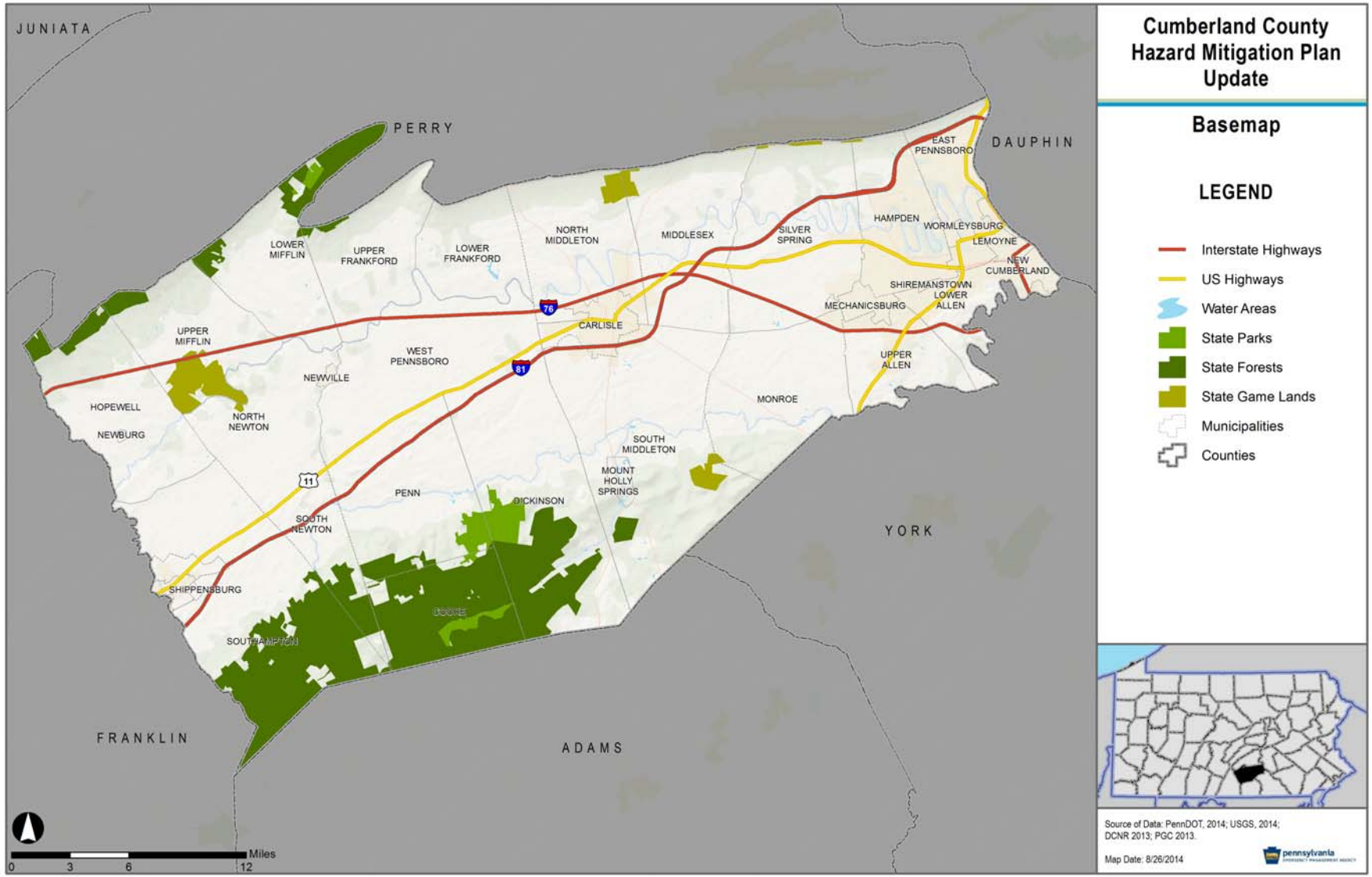
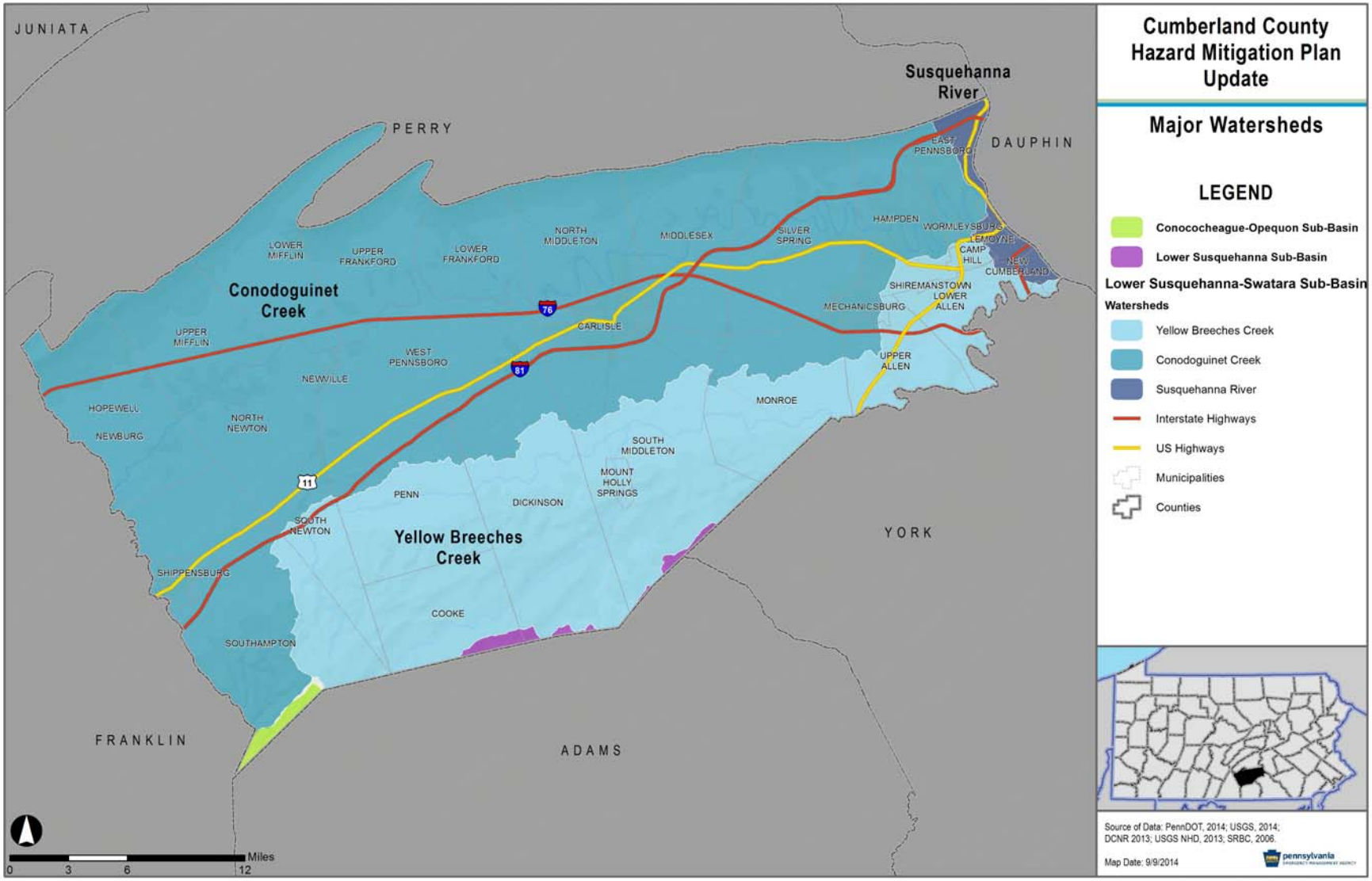


Figure 2.1-2: Major watersheds in Cumberland County.



2.2 Community Facts

Cumberland County was established as a political entity on January 27, 1750 by order of Governor James Hamilton. The County was named in honor of Cumberland, England and at one time covered 35,252 square miles. Other counties were created from the original county territory until its present size was achieved in 1855. Today, the County consists of 22 townships and 11 boroughs which are listed in Table 2.3-1. Several colleges and universities are located in the County, including: Central Pennsylvania College, Dickinson College, Messiah College, Penn State Dickinson School of Law, Shippensburg University, and U.S. Army War College. There are nine public school districts throughout the County.

2.3 Population and Demographics

As of the 2010 Decennial Census, the population of Cumberland County was 235,406. According to the US Census's 2013 Population Estimates Program, Cumberland County's population reached 241,212 people. Population density is highest in the vicinity of Harrisburg (commonly known as the West Shore Area), the Borough of Carlisle (the County seat), and the Borough of Shippensburg. Significant population growth was seen in Silver Spring Township between 2010 and 2013, and this municipality has experienced a large number of residential subdivisions. Table 2.3-1 provides a distribution of County population per municipality obtained from the U.S. Census Bureau, Population Estimates Program.

Table 2.3-1: List of municipalities in Cumberland County with associated populations.

Municipality	2010 Population	2013 Estimated Population	Percent Change
Borough of Camp Hill	7,888	7,892	0.05%
Borough of Carlisle	18,682	18,927	1.31%
Township of Cooke	179	181	1.12%
Township of Dickinson	5,223	5,295	1.38%
Township of East Pennsboro	20,228	21,138	4.50%
Township of Hampden	28,044	28,659	2.19%
Township of Hopewell	2,329	2,370	1.76%
Borough of Lemoyne	4,553	4,620	1.47%
Township of Lower Allen	17,980	18,582	3.35%
Township of Lower Frankford	1,732	1,723	-0.52%
Township of Lower Mifflin	1,783	1,767	-0.90%
Borough of Mechanicsburg	8,981	8,982	0.01%
Township of Middlesex	7,040	7,240	2.84%
Township of Monroe	5,823	5,945	2.10%
Borough of Mount Holly Springs	2,030	2,028	-0.10%
Borough of New Cumberland	336	339	0.90%
Borough of Newburg	7,277	7,286	0.12%
Borough of Newville	1,326	1,323	-0.23%
Township of North Middleton	11,143	11,317	1.56%
Township of North Newton	2,430	2,466	1.48%

Table 2.3-1: List of municipalities in Cumberland County with associated populations.			
Municipality	**2010 Population**	**2013 Estimated Population**	**Percent Change**
Township of Penn	2,924	2,940	0.55%
Township of Shippensburg	4,416	4,460	1.00%
Borough of Shippensburg	5,429	5,439	0.18%
Borough of Shiremanstown	1,569	1,570	0.06%
Township of Silver Spring	13,657	15,086	10.46%
Township of South Middleton	14,663	14,927	1.80%
Township of South Newton	1,383	1,417	2.46%
Township of Southampton	6,359	6,652	4.61%
Township of Upper Allen	18,059	18,660	3.33%
Township of Upper Frankford	2,005	2,016	0.55%
Township of Upper Mifflin	1,304	1,319	1.15%
Township of West Pennsboro	5,561	5,574	0.23%
Borough of Wormleysburg	3,070	3,072	0.07%
TOTAL	**235,406**	**241,212**	**2.47%**

It is important to note that the County's population increases significantly during *Carlisle Events*. *Carlisle Events*, the largest car, truck and motorcycle collector event in the country, is held annually at the old Carlisle Fairgrounds (~150 acres) in Carlisle Borough and North Middleton Township. There are eight specialty shows held between April and October, plus spring and fall events which serve as the basis for the spring and fall Collector Car Auctions. The spring and fall events bring 150,000 to 300,000 people to the area with the spring show being the organization's biggest draw of the year. Population values used for Carlisle Borough, North Middleton Township and other surrounding municipalities in the hazard assessments included in this HMP do not directly account for the large volume of people attending *Carlisle Events*. However, the potential impact of a hazard event occurring during *Carlisle Events* on an above normal population is recognized by the County and affected municipalities.

Population density has a strong correlation with hazard vulnerability and loss. For example, more developed areas like the Borough of Carlisle naturally have larger populations and number of structures; therefore they naturally will experience greater loss during hazard events.

The age of populations can also correlate with vulnerability to hazards. Elderly populations and children may be more susceptible to hazards such as extreme temperature and some pandemics. Table 2.3-2 depicts age distribution and median age of the population of each Cumberland County municipality.

Table 2.3-2: Age Distribution and Median Age of Municipal Populations, 5-Year Estimates 2008-2012 (Census, 2013).

Municipality	Age Under 5	Age 5 - 19	Age 65+	Median Age
Borough of Camp Hill	406	1,554	1,424	43.0
Borough of Carlisle	994	3,971	2,639	33.5
Township of Cooke	12	38	20	47.0
Township of Dickinson	313	765	726	47.9
Township of East Pennsboro	1,231	3,809	2,823	38.7
Township of Hampden	1,598	4,858	4,439	42.7
Township of Hopewell	164	642	355	40.1
Borough of Lemoyne	340	698	668	37.8
Township of Lower Allen	742	2,312	3,496	41.7
Township of Lower Frankford	109	337	318	43.5
Township of Lower Mifflin	87	318	218	43.2
Borough of Mechanicsburg	566	1,659	1,370	38.3
Township of Middlesex	365	1,149	1,076	42.6
Township of Monroe	113	1,156	914	47.1
Borough of Mount Holly Springs	95	306	340	42.1
Borough of New Cumberland	526	1,200	1,170	40.4
Borough of Newburg	9	55	32	45.8
Borough of Newville	142	247	154	33.0
Township of North Middleton	667	2,312	1,563	40.7
Township of North Newton	215	445	315	37.7
Township of Penn	183	517	324	43.0
Township of Shippensburg	16	2,135	378	20.7
Borough of Shippensburg	300	631	494	26.8
Borough of Shiremanstown	76	268	266	40.4
Township of Silver Spring	756	2,691	2,320	43.6
Township of South Middleton	554	2,773	2,950	45.6
Township of South Newton	67	330	141	40.6
Township of Southampton	452	1,308	906	37.1
Township of Upper Allen	969	3,828	3,122	39.7
Township of Upper Frankford	81	409	251	42.0
Township of Upper Mifflin	76	231	172	43.3
Township of West Pennsboro	202	1,166	1,071	44.8
Borough of Wormleysburg	163	261	495	34.5
TOTAL	12,589	44,379	36,950	40.3

The median income of households in Cumberland County is $60,883. This is approximately $8,000 more than the national median household income (U.S. Census, 2013). However, 8.2 percent of the Cumberland County population lives in poverty; 10.7 percent of related children

under 18 are below the poverty line, compared with 5.7 percent of people 65 years or older. The impact of disasters tends to be worse in low-income populations, as those living in poverty have fewer resources for evacuation during an event and less available funds for mitigation or other protective measures. The median age of the County population is 40.1 years with 20.3 percent of the population under 18 years of age and 16.6 percent 65 years or older. Seventy-five percent of housing units in the County are single-unit structures and 20 percent are multi-unit structures. The median monthly housing costs for mortgaged home-owners is $1,489 and non-mortgaged owners is $484. Renters pay an average of $823 per month. Approximately 88.0 percent of the County population is White, 3.7 percent is Black or African-American, 3.3 percent is Hispanic, 3.6 percent is Asian, and 1.8 percent is Two or More Races (U.S. Census, 2013).

2.4 Land Use and Development

The northeast and southern portions of Cumberland County are mountainous and forested with most development occurring in the relatively flat valley between North and South Mountains. The suburbs of Harrisburg extend across the Susquehanna River into the eastern portion of the County. The central and western sections of the County are primarily rural with significant agricultural development.

There are two major (interstate) highways that traverse the County from east to west: I-81 and the Pennsylvania (PA) Turnpike (I-76). Other major highways include I-83, US Routes 11, 15, 11/15, and PA Route 581. The County is part of the Harrisburg metropolitan statistical area and a significant amount of east-west traffic crosses the Susquehanna River on bridges for the three interstate highways. A map of the County is provided in Figure 2.1-1. Additional discussion of future land development is provided in Section 4.4.4.

2.5 Data Sources and Limitations

Cumberland County GIS provided site address points and the county tax assessment database to be used as an inventory of structures and parcels throughout the County. It is important to note that the structure database did not include building values, so while this HMP identifies the number of vulnerable structures, it cannot clearly provide the value of structures. The tax assessment database does provide property value information, but each parcel may have one or more structures on it. The list of critical facilities provided in Appendix E was developed based on information available from the Cumberland County GIS Department and was confirmed by the Cumberland County Planning Department. Information on the location of hazardous material facilities as well as other data sets were provided by the Cumberland County GIS Department.

The countywide Digital Flood Insurance Rate Map (DFIRM), published on March 16, 2009, was downloaded from the FEMA Map Service Center. This data provides flood frequency and elevation information used in the flood hazard risk assessment. Traffic crash analysis data was provided by the Tri-County Regional Planning Commission (TCRPC). Population data from the 2010 Census and 2013 estimated populations were obtained from the U.S. Census Bureau (2014). The County is confident in the precision of the 2013 population values even though they are considered estimates.

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 with full references listed in Appendix A. 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 Cumberland 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.

Several data limitations were encountered during development of the 2014 HMP. 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, construction type, foundation type and the age and condition of the structure. While the County maintains a property tax assessment database that includes information on the age and value of structures, specific information on building height, construction type and first floor elevations is not available for all parcels. Address points did not include any structural attributes and were not assigned a value.

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

vulnerability. The County and municipalities would be capable of producing an even more robust vulnerability assessment in future updates to the HMP by taking two actions. First, the County and municipal building permit and data collection systems should be modified to require and keep on file elevation certificates for all new construction, elevated structures, and other substantial improvements within the 1 percent and 0.2 percent-annual-chance flood hazard areas. Secondly, tax and GIS databases should include information on foundation type, construction type, basement presence, and first-floor elevations for all structures. These recommendations are noted under Action 7 in the Mitigation Action Plan (see Section 6.4).

3. Planning Process

3.1 Update Process and Participation Summary

Development of the Cumberland County Hazard Mitigation Plan has undergone several phases. A *Hazards/Vulnerability Analysis* was developed in August 1984 by the Cumberland County Office of Emergency Preparedness in cooperation with PEMA. This report provided an analysis of natural and human-made hazards using criteria including history, vulnerability, maximum threat, and probability of occurrence (Cumberland EOP, 1984). Documented previous events and other information considered still-valid from the 1984 assessment are included in the 2010 and 2014 HMPs.

The Cumberland County HMSC was first formed in 2004 to construct a plan in order to review hazards that affect the County, assess potential damages from those hazard events, select actions to address the County's vulnerability to such hazards, and develop an implementation-strategy action plan in order to mitigate potential losses. The County contracted the services of URS Corporation to aid in the development of the 2004 HMP. The County HMSC met several times from May 2003 to August 2004; all meetings were open to the public.

An update to the 2004 HMP was initiated in August 2009. With funding support from FEMA, PEMA selected Michael Baker Jr., Inc. (Baker), a full-service engineering firm that provides hazard mitigation planning guidance and technical support, to assist the County through the update process. The 2010 Hazard Mitigation Plan was completed for submission to PEMA and FEMA on December 7, 2009. Based on comments received from communities, PEMA, and FEMA, revisions were made and the plan was re-submitted to PEMA and FEMA on June 14, 2010.

The 2010 HMP followed the Standard Operating Guide and outline (developed by PEMA in 2009), which provide a standardized format for all local hazard mitigation plans in the Commonwealth of Pennsylvania. As a result, the format of the 2010 HMP contrasted significantly with the previous 2004 version.

The County's current plan is a product of the 2014 Hazard Mitigation Plan update. This update was initiated in June 2014 and follows the 2013 Pennsylvania Standard Operating Guide and FEMA's 2013 Local Hazard Mitigation Planning guidance. Use of these guidance documents resulted in additional changes to the formatting of the plan as well as increased emphasis on soliciting other stakeholder participation (see Table 3.2.2) and on plan integration (see Section 5.2.5). Baker was again selected to assist the County through the update process. In addition to Cumberland County, 33 of 33 local municipalities participated in the 2014 plan update (see Section 3.5). The 2014 Hazard Mitigation Plan was completed for submission to PEMA on October 21, 2014. Based on comments received from PEMA, revisions were made and the plan was submitted to FEMA on November 5, 2014. The Local Mitigation Plan Review Tool is included as Appendix B.

3.2 The Planning Team

During development of the 2010 HMP, the following individuals served as members of the HMSC:

- Jim Bennett, County Planning Department Coordinator
- Eric Hoerner, County Emergency Management Chief of Operations
- Kirk Stoner, County Planning Department Director
- Robert Shively, Emergency Management Deputy Director

The HMSC for the 2014 Hazard Mitigation Plan Update included:

- Kirk Stoner, County Planning Department Director
- Steve Hoffman, County Planning Specialist/Assistant HMO
- Eric Hoerner, County Emergency Management Chief of Operations
- J. Theodore Wise, County Public Safety Director
- John Owen, East Pennsboro Township Community Development Director
- John Kuntzelman, East Pennsboro Township Commissioner
- Lance Hoover, Shippensburg Borough Manager
- Ron Hamilton, South Middleton Township Supervisor and LEMC
- Ed Beam, Middlesex Township LEMC and Fire Chief
- Doug Gochenaur, Hampden Township Fire Administrator and LEMC
- Darrell McMillan, Hampden Township Community Development Director
- Deb Ealer, North Middleton Township Manager
- Jen Boyer, Upper Allen Township Community Development Director
- Scott Fraser, Upper Allen Township Assistant Township Manager
- John Epley, West Pennsboro Township Manager
- Frank Williamson, Lower Allen Township Police Chief
- Larry Barrick, Dickinson Township Zoning Officer
- Jeff Snyder, Borough of Carlisle Fire Chief
- Barry Shughart, Carlisle Barracks, Chief Plans and Ops/IEM

Additionally, the community representatives shown in Table 3.2-1 served on the 2014 countywide planning team and actively participated in the planning process through attendance at meetings, completion of assessment surveys, and/or submission of comments. Participants representing multiple jurisdictions are listed more than once. Barry Shughart, representing U.S. Army War College/Carlisle Barracks, participated in the plan update, as did William Shoemaker, Director of the Environmental Health and Safety Department at Dickinson College.

Table 3.2-1: Municipalities represented by the 2014 HMP and local community representatives who participated in the planning process.

Municipality	Participant(S)
Borough of Camp Hill	Anne Shambaugh
Borough of Carlisle	Jeff Snyder, Mike Guido, Matt Candland
Township of Cooke	Andre Weltman, Carl William Jones III
Township of Dickinson	Larry Barrick, Greg Bretzman
Township of East Pennsboro	John Kuntzelman, Erik Owen, John Owen
Township of Hampden	Doug Gochenaur, Darrell McMillan
Township of Hopewell	Greg Alleman, Kim Myers
Borough of Lemoyne	Robert Ihlein
Township of Lower Allen	Frank Williamson, Erin Trone, Tom Vernau
Township of Lower Frankford	Jim Burkholder, Karen Heishman
Township of Lower Mifflin	Brandi Lay
Borough of Mechanicsburg	Roger Ciecierski
Township of Middlesex	Ed Beam
Township of Monroe	Marjorie E. Metzger
Borough of Mount Holly Springs	Cheryl Smith
Borough of New Cumberland	Steve Sultzaberger
Borough of Newburg	Chris Bender
Borough of Newville	Fred Potzer
Township of North Middleton	Deb Ealer
Township of North Newton	David Parthemore, Bonnie Myers
Township of Penn	Robert Kough, Vicki Knepp
Township of Shippensburg	Stephen Oldt
Borough of Shippensburg	Lance Hoover
Borough of Shiremanstown	Brad Wright
Township of Silver Spring	Jim Hall, Jim Bennett
Township of South Middleton	Ron Hamilton
Township of South Newton	Dave Durff, Trena Durff
Township of Southampton	Tom Ginnick
Township of Upper Allen	Jen Boyer, Scott Fraser
Township of Upper Frankford	Vonda Kelso
Township of Upper Mifflin	Robert Shively, Ruth Ann Myers
Township of West Pennsboro	John Epley
Borough of Wormleysburg	Gary Berresford

Invitations to participate in the update process were also sent to many other stakeholder groups in an effort to assemble a well-rounded planning team. However, not all invitees chose to participate. The stakeholders invited are listed in Table 3.2-2 and detailed in Appendix C.

Table 3.2-2: Stakeholder organizations invited to participate in the 2014 planning process.	
Organization	**Organization**
Cumberland County Conservation District	Big Spring Watershed Association
Cumberland County Forester	Conodoguinet Creek Watershed Association
Penn State Extension	Yellow Breeches Watershed Association
Governor's Center for Local Government Services	Middle Spring Watershed Association
Perry County	Friends of Opossum Lake Conservancy
Dauphin County	Central Pennsylvania College
York County	Messiah College
Adams County	Shippensburg University
Franklin County	Penn State Dickinson School of Law
PA Department of Conservation and Natural Resources	PA Fish and Boat Commission
LeTort Regional Authority	PA State Police
South Middleton Township Municipal Authority	Red Cross, Cumberland Valley Chapter

3.3 Meetings and Documentation

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

June 26, 2014: A Hazard Mitigation Steering Committee meeting was held on June 26, 2014 at the Cumberland County Planning Office to discuss the project scope, schedule, goals, data requests, and upcoming meetings and to solicit response to the *Evaluation of Identified Hazards and Risk* worksheet (worksheet was also subsequently emailed to all municipalities on June 30, 2014). Requests were made at the meeting for photographs of historic hazard events and other administrative items. Invitations to this meeting were sent via email.

July 24, 2014: A municipal official and stakeholder kick-off meeting was held on July 24, 2014, at the Cumberland County Planning Office to introduce the project to local municipal officials and stakeholders and to solicit response to the *Hazards in your Community* worksheet. Notice was given of upcoming requests (subsequently emailed to all municipalities on August 4, 2014) to review and comment on additional worksheets pre-populated by the County including the *Action and Goal Progress Worksheet*, *Capability Assessment Survey*, and *NFIP Worksheet*, and also to identify new actions and flood mitigation projects. Invitations to this meeting were sent via email.

August 18, 2014: A Hazard Mitigation Steering Committee meeting was held on August 18, 2014, at the Cumberland County Planning Office to discuss participation to-date, upcoming webinar and public meetings, the project website, and HMP content. Reminders were issued to review worksheets pre-populated by the County, confirm relevance of actions and mitigation projects from the 2010 HMP, identify new actions and mitigation projects, and submit photographs of historic hazard events. Invitations to this meeting were sent via email.

August 18, 2014: A webinar was held on August 18, 2014, through Cisco WebEx to provide hazard mitigation overview, project overview and schedule, participation requirements, project website, and HMP components. Reminders were issued to review worksheets pre-populated by the County, confirm relevance of actions and flood mitigation projects from the 2010 HMP, identify new actions and flood mitigation projects, and submit photographs of historic hazard events. Invitations to this meeting were sent via email with follow-up invitation phone calls to municipalities who had not yet participated.

August 20-21, 2014: Steve Hoffman, Planning Specialist with the Cumberland County Planning Department, contacted the municipalities which had not yet met the participation requirements of attending at least one meeting and completing at least one form. Each phone call included a detailed explanation of the HMP update process, purpose and need for the HMP, and participation requirements. The municipal representatives were reminded about the opportunities to submit new projects and to review and comment on worksheets completed by the County and posted to the project website.

September 18, 2014: A planning session was held on September 18, 2014, at the Cumberland County Planning Office to review the Draft HMP. A public notice announcing this meeting was published in *The Sentinel* one week in advance of the event and was also posted to the project website. In addition, an email invitation was sent directly to municipal partners. Attendees were also informed of the opportunity to review the entire draft HMP and provide comments via the project website, www.pennsylvaniahmp.com/cumberland-hmp.

3.4 Public & Stakeholder Participation

Each municipality was given multiple opportunities to participate in the HMP update process through invitations to meetings and a webinar, review of risk assessment results and mitigation actions, and completion of worksheets and surveys. All participants were also given the opportunity to review and comment on the draft HMP. The six tools listed below were posted to the project website and were also distributed via live meetings and email to solicit data, information, and comments from all 33 local municipalities in Cumberland County. Responses to these worksheets and surveys, which were largely received via email, are included Appendix C.

1) ***Evaluation of Identified Hazards and Risk Worksheet***: Requests feedback from municipal officials regarding perceived changes to hazards in terms of frequency of occurrence, magnitude of impact, and/or geographic extent and solicits additional comments as well.

2) ***Hazards in your Community Worksheet***: Identifies the most significant hazards in each municipality in terms of spatial extent, probable impact, probability of future events, and overall significance.

3) ***Capability Assessment Survey***: Collects information on municipal planning and regulatory, administrative and technical, fiscal, and education and outreach capabilities that can be included in the countywide mitigation strategy.

4) ***National Flood Insurance Program (NFIP) Worksheet***: Collects information on each municipality's participation in and continued compliance with the NFIP and identifies areas for improvement that could be potential mitigation actions.

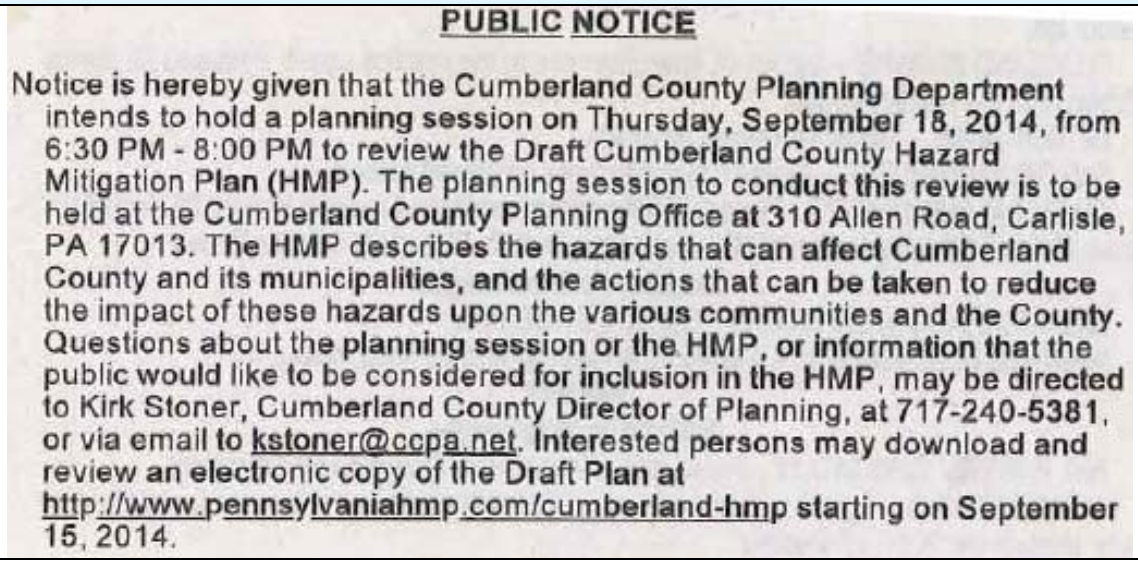
5) ***Action and Goal Progress Worksheet***: Evaluates previous mitigation goals, objectives, actions, and projects for the purpose of determining whether they should be continued, modified, or removed from updated plan. This worksheet also aims to record progress made on actions contained in the 2010 HMP and to suggest new actions for inclusion in the 2014 plan.

6) **New Mitigation Action Form:** Requests information for proposed new mitigation actions and flood mitigation projects.

The project website was discussed at each of the meetings. The website includes a calendar with meeting information and other project milestones; a library with the 2014 worksheets, the 2010 HMP (replaced with the draft 2014 HMP on September 15, 2014), and FEMA's *Mitigation Ideas* (January 2013); and announcements. Each announcement includes a phone number and email for the Cumberland County Hazard Mitigation Officer, Kirk Stoner, and the website also includes a "contact us" feature to submit comments or questions directly via the website. This website is available at http://www.pennsylvaniahmp.com/cumberland-hmp. As of October 3, 2014, the website had 206 views.

Public comment was encouraged throughout the planning process. A newspaper notice was published in *The Sentinel* on September 11, 2014, to notify the citizens of Cumberland County of the planning session held on September 18, 2014 and the draft plan review. The notice was also posted to the project website. A copy of this notice is shown in Figure 3.4-1. Additionally, notification of the HMP update sent to representatives from neighboring counties is included in Appendix C Section C-3.

Figure 3.4-1: Notice of September 18, 2014, planning session published in *The Sentinel* (also posted on the project website).



PUBLIC NOTICE

Notice is hereby given that the Cumberland County Planning Department intends to hold a planning session on Thursday, September 18, 2014, from 6:30 PM - 8:00 PM to review the Draft Cumberland County Hazard Mitigation Plan (HMP). The planning session to conduct this review is to be held at the Cumberland County Planning Office at 310 Allen Road, Carlisle, PA 17013. The HMP describes the hazards that can affect Cumberland County and its municipalities, and the actions that can be taken to reduce the impact of these hazards upon the various communities and the County. Questions about the planning session or the HMP, or information that the public would like to be considered for inclusion in the HMP, may be directed to Kirk Stoner, Cumberland County Director of Planning, at 717-240-5381, or via email to kstoner@ccpa.net. Interested persons may download and review an electronic copy of the Draft Plan at http://www.pennsylvaniahmp.com/cumberland-hmp starting on September 15, 2014.

3.5 Multi-Jurisdictional Planning

This hazard mitigation plan was developed using a multi-jurisdictional approach. With funding support from PEMA, County level departments had resources such as technical expertise and data which local jurisdictions lacked. To undertake such a regional planning effort, the County depended on involvement from local municipalities. This involvement was critical to the collection of local knowledge related to hazard events. Local municipalities also have the legal authority to enforce compliance with land use planning and development issues. The County undertook an intensive effort to involve all 22 townships and 11 boroughs in the planning process.

A participation matrix is provided in Appendix C, which documents community presence at the meetings and webinar described in Section 3.3 and other involvement from each jurisdiction throughout the planning process. In addition to Cumberland County, 33 of 33 local municipalities participated in the 2014 plan update. This is an improvement in community participation compared to the 2004 HMP when 25 of 33 local municipalities participated in the planning process (see Table ii in 2004 HMP); note that 31 of 33 municipalities adopted the 2004 HMP (see Table 8-1). The 2010 HMP had participation and adoption from 33 of the 33 municipalities.

Note that part of Shippensburg Borough is in Franklin County. This plan only addresses the risks to Cumberland County residents. Shippensburg Borough must adopt both the Cumberland County and Franklin County hazard mitigation plans.

4. Risk Assessment

4.1 Update Process Summary

This risk assessment provides a factual basis for activities proposed by the County in their mitigation strategy. Hazards that may affect Cumberland County are identified and defined in terms of location and geographic extent, magnitude of impact, previous events and likelihood of future occurrence.

The HMSC and municipal representatives identified natural and human-made hazards that have the potential to impact Cumberland County. These parties were invited to complete the *Evaluation of Identified Hazards and Risk* worksheet both during an HMSC meeting held on June 26, 2014, and via an email sent to all municipalities in the County on June 30, 2014. Completed worksheets are included in Appendix C. Most respondents indicated “no change” to the risk levels of most hazards profiled in the 2010 HMP, but nearly half of the respondents indicated “increased” risk level for flood, subsidence/sinkhole, and transportation accident hazards. Additionally, the worksheet provided the opportunity to comment on whether any hazards not previously profiled in the county HMP have the potential to affect the community significantly. Hazards receiving the largest number of positive responses included hailstorm, lightning strike, invasive species, and extreme temperature. However, the County elected not to add hazard profiles to the HMP at this time, in order to focus mitigation efforts on the most pressing issues.

The occurrence of a past hazard event in the County provided an indication of future possible incidence, but the fact that a hazard event has not previously occurred did not exclude the hazard from further investigation. Hazard profiles have been developed in order to define the characteristics of the hazard as it applies to Cumberland County.

Following hazard identification, municipal representatives and stakeholders were invited to assess the level of risk for each hazard via the *Hazards in your Community* worksheet distributed at the meeting held on July 24, 2014. Completed worksheets are included in Appendix C; these results also contributed to the development of the Risk Factor Rankings, seen in Table 4.4-2. Per the 2013 Standard Operating Guide, a jurisdictional risk comparison matrix has been added to the 2014 HMP as Table 4.4-3 to indicate whether each municipality’s level of risk for each hazard is greater than, less than, or equal to the County’s risk factor.

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

Section 4.2 provides an updated summary of previous disaster declarations affecting Cumberland County as well as a review of hazards identified as having the potential to impact the County in 2014. Earthquake, coastal storm (i.e., hurricanes, tropical storms, and nor'easters), landslide, pandemic, subsidence and sinkhole, civil disturbance, dam failure, levee failure, transportation accident, and utility interruption hazards were not fully profiled in the 2004 HMP or previous risk assessments, but have been included in the 2010 and 2014 HMP updates. A more detailed storyline summary of risk assessments completed for Cumberland County dating back to 1984 and the hazards identified through those efforts is provided in Section 4.2.2. Only the most current and credible sources were used to complete the hazard profiles included in Section 4.3. In some instances, sources providing improved information have superseded those used in the 2004 and 2010 HMP; see citations and Appendix A for source details.

Results of structure inventory analyses for various hazards may differ from what was previously shown in the 2010 HMP. For example, the 2010 HMP identified 252 structures located in the 1 percent-annual-chance floodplain for Hampden Township while Table 4.3.3-5 now identifies 190 structures in the 1 percent-annual-chance floodplain. These differences are generally a result of more recent structure inventory data, and values provided in the 2014 HMP should be considered the most up-to-date best estimates. Also, in some instances, the 2010 analysis may have acquired data on structures while the 2014 analysis acquired data on parcels, or vice versa.

Other additions to the risk assessment in 2014 include photographs illustrating past hazard events in Cumberland County, a discussion of environmental impacts caused by each relevant hazard, supplemental mapping, and additional tables to indicate the number of structures and critical facilities vulnerable to each hazard.

4.2 Hazard Identification

4.2.1. Table of Presidential Disaster Declarations

Presidential Disaster and Emergency Declarations are issued when it has been determined that state and local governments need assistance in responding to a disaster event. Table 4.2-1 identifies Presidential Disaster and Emergency Declarations issued between 1955 and 2014 that have affected Cumberland County. Additional declarations beyond 2014 can be found on the FEMA website at: https://www.fema.gov/disasters/grid/state-tribal-government/44?field_disaster_type_term_tid_1=All. Table 4.2-2 lists Gubernatorial Disaster Declarations or Proclamations that have been issued for Cumberland County between 1954 and 2014. Additional declarations and proclamations beyond 2014 can be found on the PEMA website at: http://www.portal.state.pa.us/portal/server.pt/community/governors_proclamations/4725. Both Presidential and Gubernatorial actions provide preliminary information on previous hazard events.

Table 4.2-1: Presidential Disaster and Emergency Declarations affecting Cumberland County.		
Declaration Number	**Date**	**Event**
3356*	October-November, 2012	Hurricane Sandy
3340*	September-October, 2011	Remnants of Tropical Storm Lee
4030	September-October, 2011	Tropical Storm Lee
1898	February, 2010	Severe Winter Storms and Snowstorms
1649	June, 2006	Severe Storms, Flooding, Mudslides
3235*	September, 2005	Hurricane Katrina Evacuee Assistance
1557	September, 2004	Tropical Depression Ivan
1497	September, 2003	Tropical Storms Henri & Isabel
3180*	February, 2003	Severe Winter Storm
1294	September, 1999	Hurricane Floyd
1138	September, 1996	Hurricane Fran
1085	January, 1996	Severe Winter Storm
1093	January, 1996	Flooding
1015	January, 1994	Severe Winter Storm
3105*	March, 1993	Severe Winter Storm
523	October, 1976	Severe Storms, Flooding
485	September, 1975	Hurricane Eloise
340	June, 1972	Hurricane Agnes
* Presidential Emergency Declaration		

Table 4.2-2: Gubernatorial Disaster Declarations or Proclamations affecting Cumberland County.	
Date	**Event**
May, 2013	Dauphin County Bridge (Transportation Accident)
April, 2012	Severe Winter Storm
January, 2011	Severe Winter Storm
April, 2007	Severe Winter Storm
February, 2007	Winter Fuel Delivery (Extreme Cold)
September, 2006	Tropical Depression Ernesto
February, 2003	Severe Winter Storm
February, 2002	Drought
July, 1999	Drought
July, 1991	Drought
November, 1980	Drought
February, 1978	Severe Winter Storm
January, 1978	Severe Winter Storm
September, 1963	Drought

Since 1955, declarations have been issued for various hazard events including hurricanes or tropical storms, severe summer and winter storms, flooding, and drought. A unique Presidential Emergency Declaration was issued in September 2005. Through Emergency Declaration 3235, President George W. Bush declared that a state of emergency existed in the Commonwealth of Pennsylvania and ordered federal aid to supplement Commonwealth and local response efforts to help people evacuated from their homes due to Hurricane Katrina. All counties within the Commonwealth, including Cumberland County, were indirectly affected by Hurricane Katrina as a result of evacuee assistance.

In May 2013 a unique Gubernatorial Disaster was declared when a tanker truck carrying about 7,500 gallons of diesel fuel overturned on the ramp and highway bridge that carries two lanes of traffic over Interstate Route 81 North to US Route 22/322 westbound in Dauphin County. The massive fire that resulted caused damage to the surface of the bridge and also to the highway bridge above the scene of the fire. The disaster resulted in closure of Interstate 81 and US Route 22/322 westbound during the demolition and replacement of damaged components, causing a severe disruption to transportation in the Capitol Region, including Cumberland County.

4.2.2. Summary of Hazards

As discussed in the Risk Assessment Update Process Summary (Section 4.1), the HMSC and municipalities were invited in 2014 to complete the *Evaluation of Identified Hazards and Risk* worksheet both during an HMSC meeting and via an email sent to all municipalities in the County. The respondents provided feedback on perceived changes to the level of risk for each hazard profiled in 2010 and also suggested hazards that were not previously profiled but have the potential to affect the community significantly. After evaluation of these forms, the Standard List of Hazards from the SOG, and the 2013 Standard State All-Hazard Mitigation Plan, the HMSC determined that Cumberland County's 2014 HMP would identify, profile, and analyze the same 19 hazards that were profiled in the 2010 HMP. Table 4.2-3 contains a complete list of the profiled hazards and their descriptions.

Table 4.2-3: List of hazards profiled in the 2010 and 2014 HMP with associated descriptions.

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).

Table 4.2-3: List of hazards profiled in the 2010 and 2014 HMP with associated descriptions.	
Profiled Hazards	**Description**
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).
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. 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).
Hurricane, Tropical Storm, & Nor'easter	Hurricanes and tropical storms 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 which extends from June through November (FEMA, 1997). 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 with a cyclone that has lost its 'tropical' characteristics. While an extra-tropical storm denotes a change in weather pattern and how the storm is gathering energy, it may still have northeast winds that are tropical storm or hurricane force. Nor'easters can also produce heavy precipitation in the form of rain, snow, or ice. Although not a concern for Cumberland County, nor'easters may cause coastal flooding and beach erosion.
Landslide	A landslide is the downward and outward movement of slope-forming soil, rock and vegetation reacting to the force of gravity. Landslides may be triggered by both natural and human-caused changes in the environment, including heavy rain, rapid snow melt, steepening of slopes due to construction or erosion, earthquakes and changes in groundwater levels. Mudflows, mudslides, rockfalls, rockslides and rock topples are all forms of a landslide. Areas that are generally prone to landslide hazards include previous landslide areas, the bases of steep slopes, the bases of drainage channels, developed hillsides and areas recently burned by forest and brush fires. (Delano & Wilshusen, 2001).
Pandemic and Infectious 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).

Table 4.2-3: List of hazards profiled in the 2010 and 2014 HMP with associated descriptions.

Profiled Hazards	Description
Subsidence & Sinkholes	Subsidence is a natural geologic process that commonly occurs in areas with underlying limestone bedrock and other rock types that are soluble in water. Water passing through naturally occurring fractures dissolves these materials leaving underground voids. Eventually, overburden on top of the voids causes a collapse which can damage structures with low strain tolerances. This collapse can take place slowly over time or quickly in a single event. Karst topography describes a landscape that contains characteristic structures such as sinkholes, linear depressions and caves. In addition to natural processes, human activity such as water, natural gas and oil extraction can cause subsidence and sinkhole formations. (FEMA, 1997).
Tornado & Windstorm	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 percent of wildfires in Pennsylvania are a direct result of people, often caused by debris burns (DCNR, 2009).
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).

Human-Made	
Civil Disturbance	Civil disturbance hazards encompass a set of hazards emanating from a wide range of possible events that cause civil disorder, confusion, strife, and economic hardship. Civil disturbance hazards include the following: • **Famine**; involving a widespread scarcity of food leading to malnutrition and increased mortality (Robson, 1981). • **Economic Collapse, Recession**; Very slow or negative growth, for example (Economist, 2009). • **Misinformation**; erroneous information spread unintentionally (Makkai, 1970). • **Civil Disturbance, Public Unrest, Mass Hysteria, Riot**; group acts of violence against property and individuals, for example (18 U.S.C. § 232, 2008). • **Strike, Labor Dispute**; controversies related to the terms and conditions of employment, for example (29 U.S.C. § 113, 2008).
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 (PADEP, 2008).
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. Environmental hazards in Cumberland County focus mainly 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)).
Levee Failure	A levee is a human-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding (Interagency Levee Policy Review Committee, 2006). Levee failures or breaches occur when a levee fails to contain the floodwaters for which it is designed to control or floodwaters exceed the height of the constructed levee. Fifty-one of Pennsylvania's 67 counties have been identified as having at least one levee (FEMA – Region III, 2009).
Nuclear Incidents	Nuclear accidents general 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.
Transportation Accidents	Transportation accidents can result from any form of air, rail, water, or road travel. It is unlikely that small accidents would significantly impact the larger community. However, certain accidents could have secondary regional impacts such as a hazardous materials release or disruption in critical supply/access routes, especially if vital transportation

Table 4.2-3: List of hazards profiled in the 2010 and 2014 HMP with associated descriptions.	
Profiled Hazards	**Description**
	corridors or junctions are present. (Research and Innovative Technology Administration, 2009). 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).
Urban Fire and Explosion	An urban fire involves a structure or property within an urban or developed area. For hazard mitigation purposes, major urban fires involving large buildings and/or multiple properties are of primary concern. The effects of a major urban fire include minor to significant property damage, loss of life and residential or business displacement. Explosions are extremely rapid releases of energy that usually generate high temperatures and often lead to fires. The risk of severe explosions can be reduced through careful management of flammable and explosive hazardous materials. (FEMA, 1997)
Utility Interruption	Utility interruption hazards are hazards that impair the functioning of important utilities in the energy, telecommunications, public works and information network sectors. Utility interruption hazards include the following: • **Geomagnetic Storms;** including temporary disturbances of the Earth's magnetic field resulting in disruptions of communication, navigation, and satellite systems (National Research Council et al., 1986). • **Fuel or Resource Shortage;** resulting from supply chain breaks or secondary to other hazard events, for example (Mercer County, PA, 2005). • **Electromagnetic Pulse;** originating from an explosion or fluctuating magnetic field and causing damaging current surges in electrical and electronic systems (Institute for Telecommunications Sciences, 1996). • **Information Technology Failure;** due to software bugs, viruses, or improper use (Rainer Jr., et al, 1991). • **Ancillary Support Equipment;** electrical generating, transmission, system-control, and distribution-system equipment for the energy industry (Hirst & Kirby, 1996). • **Public Works Failure;** damage to or failure of highways, flood control systems, deepwater ports and harbors, public buildings, bridges, dams, for example (U.S. Senate Committee on Environment and Public Works, 2009). • **Telecommunications System Failure;** damage to data transfer, communications, and processing equipment, for example (FEMA, 1997). • **Transmission Facility or Linear Utility Accident;** liquefied natural gas leakages, explosions, facility problems, for example (United States Department of Energy, 2005). • **Major Energy, Power, Utility Failure;** interruptions of generation and distribution, power outages, for example (United States DOE, 2000).

4.3 Hazard Profiles

NATURAL HAZARDS

4.3.1. Drought

4.3.1.1 Location and Extent

Droughts are regional climatic events, so when these events occur in Cumberland County, impacts are felt across the entire county as well as areas outside county boundaries. The spatial extent for areas of impact can range from south-central Pennsylvania to the entire mid-Atlantic region. Areas with extensive agricultural land use can experience particularly significant impacts. The distribution of agricultural land by municipality in Cumberland County is included in Section 4.3.1.5.

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.

Hydrologic drought events result in a reduction of stream flows, reduction of lake/reservoir storage and reduced groundwater levels. These events have a significant adverse impact 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 deficits (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 each county (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, 2014).

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

Phases of drought preparedness in Pennsylvania in order of increasing severity are:

- 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 the County. 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 five 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.

- 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 15 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.

- 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.

Environmental impacts of drought include:

- Hydrologic effects – lower water levels in reservoirs, lakes and ponds; reduced stream flow; loss of wetlands; estuarine impacts; groundwater depletion and land subsidence; effects on water quality such as increases in salt concentration and water temperature

- Damage to animal species – lack of feed and drinking water; disease; loss of biodiversity; migration or concentration; and reduction and degradation of fish and wildlife habitat

- Damage to plant communities – loss of biodiversity; loss of trees from urban landscapes and wooded conservation areas

- Increased number and severity of fires
- Reduced soil quality and erosion issues
- Air quality effects – dust and pollutants
- Loss of quality in landscape
- Loss of water for navigation and recreation
- Increase in nitrate levels which can have health impacts on pregnant women and children.

The worst drought in Cumberland County was the 1980-1983 event described in Section 4.3.1.3.

4.3.1.3 Past Occurrence

Declared drought status for Cumberland County from November 1980 to August 2014 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. Between 1930 and 2014, the Commonwealth of Pennsylvania experienced seven significant droughts extending from 1930-1934, 1939-1942, 1953-1955, 1961-1967, 1980-1983, 1991-1992, and 1999-2003. These were considered *emergency* events. The 1980-1983 event resulted in $196,000,000 in damages to crops across the Commonwealth and required the implementation of unusual consumption restraints in Cumberland County. Table 4.2-2 shows that since 1954, there have been five Gubernatorial Declarations or Proclamations issued (1963, 1980, 1991, 1999, and 2002) in response to drought conditions within Cumberland County and other areas of the Commonwealth. Through the 1999 Proclamation of Disaster Emergency, Governor Tom Ridge declared a drought emergency in 55 of the 67 Pennsylvania counties following extended dry weather through much of the summer. Water usage was restricted. Precipitation deficits for many counties for the months of May through July averaged between 5 and 7 inches. Precipitation departures for the 365 day period ending in mid-July were over one foot below normal in many places. This is about one-third of total annual normal precipitation in most areas. Streams were empty, wells dried up, and the Susquehanna River hit record low flows. Cumberland County has not been in a drought since 2010.

Table 4.3.1-2: Cumberland County Declared Drought Status from 1980 to 2014 (PADEP, 2014).

Date	Drought Status	Date	Drought Status
Nov 18, 1980 - Apr 20, 1982	Emergency	Mar 15, 1999 - Jun 10, 1999	Watch
Apr 26, 1985 - Jul 29, 1985	Watch	Jun 10, 1999 - Jun 18, 1999	Warning
Jul 29, 1985 - Oct 22, 1985	Watch	Jun 18, 1999 - July 20, 1999	Warning
Oct 22, 1985 - Oct 29, 1985	Watch	Jul 20, 1999 - Sep 30,1999	Emergency
Oct 29, 1985 - Dec 19, 1985	Watch	Sep 30, 1999 - Dec 16, 1999	Watch
Jul 7, 1988 - Aug 24, 1988	Watch	Dec 16, 1999 - Feb 25,2000	Watch
Aug 24, 1988 - Dec 12, 1988	Watch	Feb 25, 2000 - May 5, 2000	Watch

Table 4.3.1-2: Cumberland County Declared Drought Status from 1980 to 2014 (PADEP, 2014).

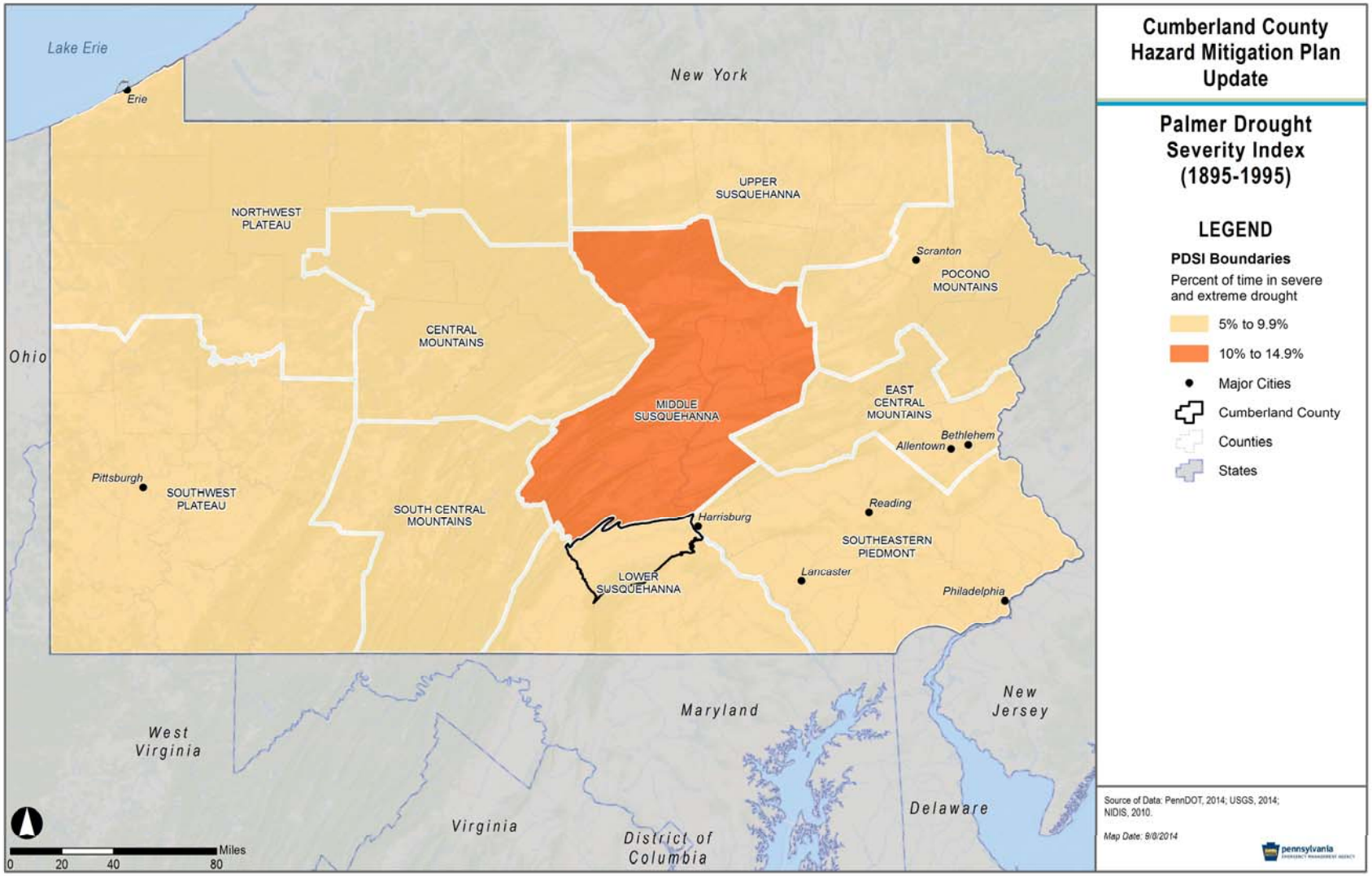
Date	Drought Status	Date	Drought Status
Jun 28, 1991 - Jul 24, 1991	Warning	Aug 8, 2001 - Aug 24, 2001	Watch
Jul 24, 1991 - Aug 16, 1991	Emergency	Aug 24, 2001 - Nov 6, 2001	Watch
Aug 16, 1991 - Sep 13, 1991	Emergency	Nov 6, 2001 - Dec 5, 2001	Warning
Sep 13, 1991 - Oct 21, 1991	Emergency	Dec 5, 2001 - Feb 12, 2002	Warning
Oct 21, 1991 - Jan 16, 1992	Warning	Feb 12, 2002 - May 13, 2002	Emergency
Jan 17, 1992 - Apr 20, 1992	Warning	May 13, 2002 - Jun 14, 2002	Emergency
Apr 20, 1992 - Jun 23, 1992	Warning	June 14, 2002 - Aug 9, 2002	Emergency
Sep 1, 1995 - Sep 20, 1995	Warning	Aug 9, 2003 - Sep 5, 2002	Emergency
Sep 20, 1995 - Nov 8, 1995	Warning	Sep 5, 2002 - Nov 7, 2002	Emergency
Nov 8, 1995 - Dec 18, 1995	Watch	Nov 7, 2003 - Dec 19, 2002	Emergency
Jul 17, 1997 - Oct 27, 1997	Watch	Dec 19, 2002 - Jan 8, 2003	Watch
Oct 27, 1997 - Nov 13, 1997	Watch	Apr 11, 2006 - Jun 30, 2006	Watch
Dec 3, 1998 - Dec 8, 1998	Watch	Aug 8, 2007 - Sep 5, 2007	Watch
Dec 8, 1998 - Dec 14, 1998	Watch	Sep 5, 2007 - Oct 5, 2007	Watch
Dec 14, 1998 - Dec 16, 1998	Warning	Oct 5, 2007 - Jan 11, 2008	Watch
Dec 16, 1998 - Jan 15, 1999	Warning	Jan 11, 2008 - Feb 15, 2008	Watch
Jan 15, 1999 - Mar 15, 1999	Warning	Sep 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 in Cumberland County. Central Pennsylvania has averaged 3.4 dry periods (defined as 10 or more consecutive days having less than 0.01 inch of precipitation) per year from 1950 through 1992. Based on historical events, Cumberland County is expected to experience seven to eight drought events per century which reach *emergency* status, with each event typically lasting two to four years. Note that this estimate is based on the occurrence of past events over a short period of time and is not the result of detailed statistical sampling.

Based on data from 1895 to 1995, Cumberland County is in severe or extreme drought five to 9.9 percent of the time (see Figure 4.3.1-1). This is equivalent to a Palmer Drought Severity Index value less than or equal to *-3* which represents drought warning conditions. Overall, the probability of future droughts can be considered *possible* according to the Risk Factor Methodology (see Table 4.4-1).

Figure 4.3.1-1: Percent of time areas of Pennsylvania have PSDI values <= -3.



4.3.1.5 Vulnerability Assessment

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

According to the USDA *2012 Census of Agriculture*, Cumberland County has 154,879 acres of land in farms which produce $195,356,000 in market value of agricultural products sold. The agriculture industry has a significant presence in the western portion of the County with products including dairy, meats, fruits and vegetables. Land O' Lakes Butter in South Middleton Township is a large producer.

With these agricultural assets, drought events can severely impair the local economy with prolonged drought negatively impacting the livelihood of residents within agricultural communities particularly. Table 4.3.1-3 summarizes the distribution of agricultural land by community using 2014 County land use data. Without mitigation strategies in place, North Newton Township and West Pennsboro Township are most vulnerable to a drought based on the proportion of land within those communities dedicated to agricultural use. According to County land use data, 37.4 percent of land in the county is considered agricultural.

Table 4.3.1-3: Summary of agricultural land by acreage and percent of total land per municipality (2014).

Municipality	Agriculture Acres	Total Acres	Percent Agricultural Land
Borough of Camp Hill	0.0	1,343.4	0%
Borough of Carlisle	74.4	3,544.0	2.10%
Township of Cooke	0.0	12,712.7	0%
Township of Dickinson	8,813.6	29,444.9	29.90%
Township of East Pennsboro	170.0	6,966.2	2.40%
Township of Hampden	498.2	11,372.4	4.40%
Township of Hopewell	8,408.5	17,807.6	47.20%
Borough of Lemoyne	0.0	1,035.3	0%
Township of Lower Allen	720.1	6,632.5	10.90%
Township of Lower Frankford	4,039.9	9,597.9	42.10%
Township of Lower Mifflin	6,895.3	15,294.7	45.10%
Borough of Mechanicsburg	177.8	1,541.2	11.50%
Township of Middlesex	6,275.8	16,613.3	37.80%
Township of Monroe	9,233.8	16,842.5	54.80%
Borough of Mount Holly Springs	7.0	929.2	0.80%
Borough of New Cumberland	0.0	1,084.6	0%
Borough of Newburg	20.5	118.1	17.30%
Borough of Newville	3.2	273.7	1.20%

Table 4.3.1-3: Summary of agricultural land by acreage and percent of total land per municipality (2014).			
Municipality	**Agriculture Acres**	**Total Acres**	**Percent Agricultural Land**
Township of North Middleton	5,334.4	15,058.7	35.40%
Township of North Newton	10,904.6	14,622.1	74.60%
Township of Penn	9,834.8	18,990.9	51.80%
Borough of Shippensburg	108.3	840.1	12.90%
Township of Shippensburg	396.8	1,616.9	24.50%
Borough of Shiremanstown	0.6	190.1	0.30%
Township of Silver Spring	6,919.3	20,992.4	33%
Township of South Middleton	10,136.6	31,381.5	32.30%
Township of South Newton	3,399.9	7,317.8	46.50%
Township of Southampton	12,606.4	33,010.6	38.20%
Township of Upper Allen	1,680.9	8,535.1	19.70%
Township of Upper Frankford	6,268.1	12,554.2	49.90%
Township of Upper Mifflin	5,523.9	14,146.3	39%
Township of West Pennsboro	13,454.2	19,375.0	69.40%
Borough of Wormleysburg	0.0	511.8	0%
TOTAL	131,906.9	352,297.8	37.40%
Note: Agriculture acres based upon 2011 Farmland dataset. Data was spot checked with 2012 aerial photography and updated accordingly.			

Those who rely on well water are also vulnerable to drought. Table 4.3.1-4 indicates the number of domestic wells by municipality. It is important to note that the well data was obtained from the Pennsylvania Groundwater Information System (PaGWIS). **PaGWIS relies on <u>voluntary submissions</u> 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: Number of domestic wells by municipality (PaGWIS, 2014).			
Municipality	**Total No. of Domestic Wells**	**Municipality**	**Total No. of Domestic Wells**
Borough of Camp Hill	1	Borough of Newville	2
Borough of Carlisle	4	Township of North Middleton	252
Township of Cooke	29	Township of North Newton	204
Township of Dickinson	344	Township of Penn	240
Township of East Pennsboro	218	Borough of Shippensburg	0
Township of Hampden	312	Township of Shippensburg	7
Township of Hopewell	235	Borough of Shiremanstown	0

Table 4.3.1-4: Number of domestic wells by municipality (PaGWIS, 2014).

Municipality	Total No. of Domestic Wells	Municipality	Total No. of Domestic Wells
Borough of Lemoyne	2	Township of Silver Spring	425
Township of Lower Allen	111	Township of South Middleton	356
Township of Lower Frankford	154	Township of South Newton	101
Township of Lower Mifflin	146	Township of Southampton	202
Borough of Mechanicsburg	4	Township of Upper Allen	169
Township of Middlesex	242	Township of Upper Frankford	130
Township of Monroe	396	Township of Upper Mifflin	103
Borough of Mount Holly Springs	11	Township of West Pennsboro	416
Borough of New Cumberland	0	Borough of Wormleysburg	1
Borough of Newburg	6	Unknown Municipality	92
TOTAL	**4,915**		

4.3.2. Earthquake

4.3.2.1 Location and Extent

Earthquake events in the Pennsylvania region including Cumberland County are mild. When events occur, they impact very small areas less than 100 kilometers in diameter. 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.

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. Based on historical events, earthquakes in the Pennsylvania region do not exceed magnitudes greater than 6.0. Per the table below, destruction from a 6.0 earthquake centered in Cumberland County would include slight damage to well-designed buildings but major damage to poorly constructed buildings.

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 in areas where people live up to about 100 kilometers across.
7.0-7.9	Major earthquake; can cause serious damage over large areas.
8.0 or greater	Great earthquake; can cause serious damage in areas several hundred kilometers across.

The impact an earthquake event has on an area is typically measured in terms of earthquake intensity. Intensity is most commonly measured using the Modified Mercalli Intensity (MMI) Scale based on direct and indirect measurements of seismic effects. A detailed description of the Modified Mercalli Intensity Scale is shown in Table 4.3.2-2. The earthquakes that occur in Pennsylvania originate deep within the Earth's crust, not on an active fault. Therefore, little or no damage is expected. No injury or severe damage from earthquake events has been reported in Cumberland County.

Table 4.3.2-2: Modified Mercalli Intensity Scale with associated impacts.			
Scale	**Intensity**	**Description Of Effects**	**Corresponding Richter Scale Magnitude**
I	**Instrumental**	Detected only on seismographs	<4.2
II	**Feeble**	Some people feel it	
III	**Slight**	Felt by people resting; like a truck rumbling by	
IV	**Moderate**	Felt by people walking	
V	**Slightly Strong**	Sleepers awake; church bells ring	<4.8
VI	**Strong**	Trees sway; suspended objects swing; objects fall off shelves	<5.4
VII	**Very Strong**	Mild alarm, walls crack, plaster falls	<6.1
VIII	**Destructive**	Moving cars uncontrollable, masonry fractures, poorly constructed buildings damaged	<6.9
IX	**Ruinous**	Some houses collapse, ground cracks, pipes break open	
X	**Disastrous**	Ground cracks profusely, many buildings destroyed, liquefaction and landslides widespread	<7.3
XI	**Very Disastrous**	Most buildings and bridges collapse, roads, railways, pipes and cables destroyed, general triggering of other hazards	<8.1
XII	**Catastrophic**	Total destruction, trees fall, ground rises and falls in waves	>8.1

Environmental impacts of earthquakes can be numerous, widespread, and devastating, particularly if indirect impacts are considered. Some examples are shown below, but are unlikely to occur in Cumberland County:

- Induced tsunamis and flooding or landslides and avalanches,
- Poor water quality,
- Damage to vegetation, and
- Breakage in sewage or toxic material containments.

4.3.2.3 Past Occurrence

No earthquake epicenters have been measured in Cumberland County. However, minor tremors or aftershocks have been reported as a result of earthquake events with epicenters in nearby Lancaster County (Cumberland EOP, 1984) and in Virginia in 2011 (PennLive 2011). Figure 4.3.2-1 shows recorded earthquake events in Pennsylvania between 1724 and 2003. Earthquake events are shown in other areas of Pennsylvania, with a particular concentration of events occurring to the east of Cumberland County between Lancaster and Reading. Two events are shown in nearby York County as well as one event in Adams County. Prior to 1960, an earthquake event occurred on the eastern border of York County which had a magnitude measured greater than four on the Richter Scale. Figure 4.3.2-2 provides an example of damage in Cumberland County caused by the 2011 Virginia earthquake.

Figure 4.3.2-1: Map showing the location of significant earthquake epicenters in Pennsylvania.

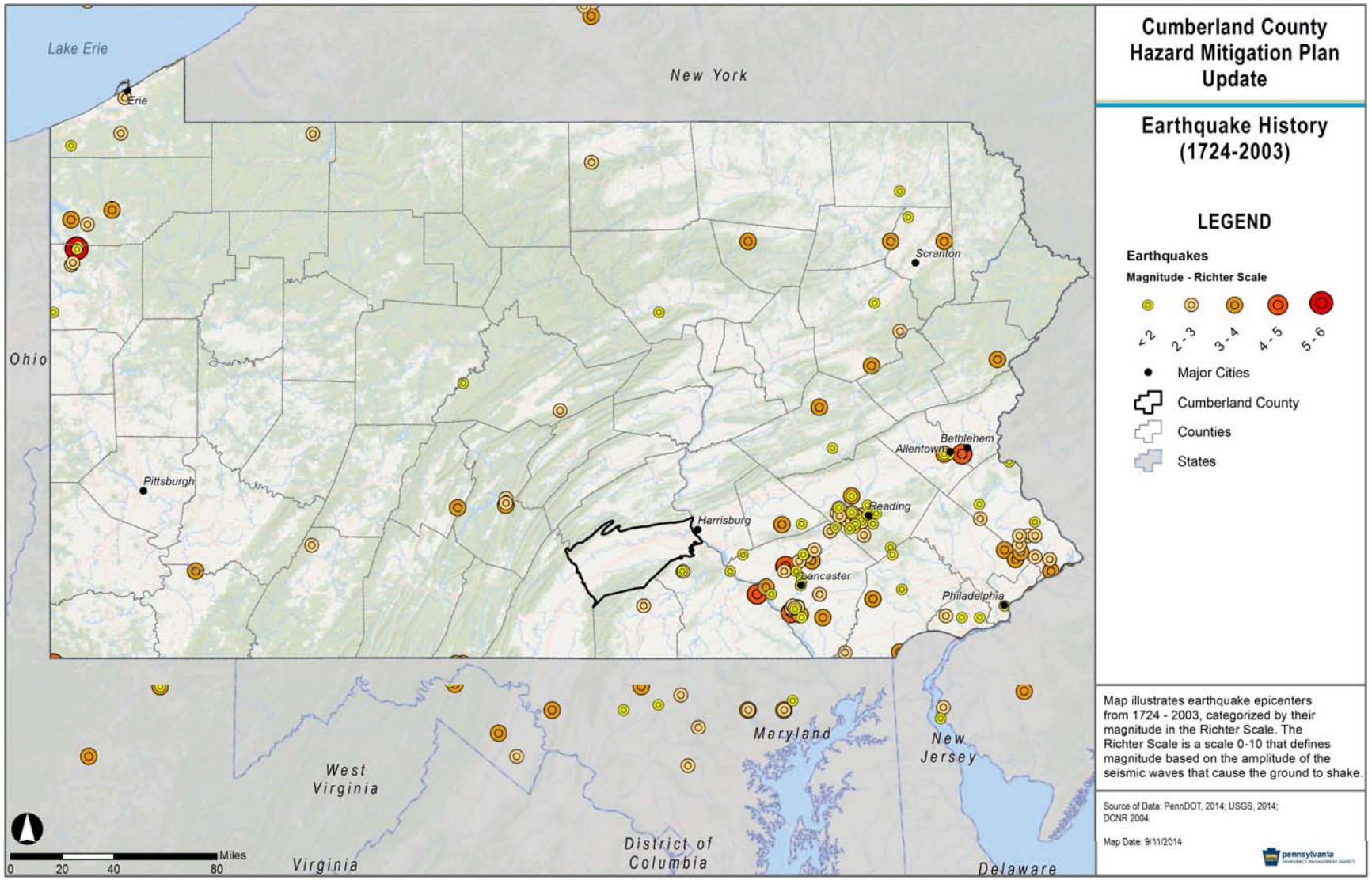


Figure 4.3.2-2: Earthquake damage (collapse of brick chimneys) in Mount Holly Springs, Cumberland County, PA on August 23, 2011 (Photograph courtesy of Jason Malmont/*The Sentinel*, 2014).

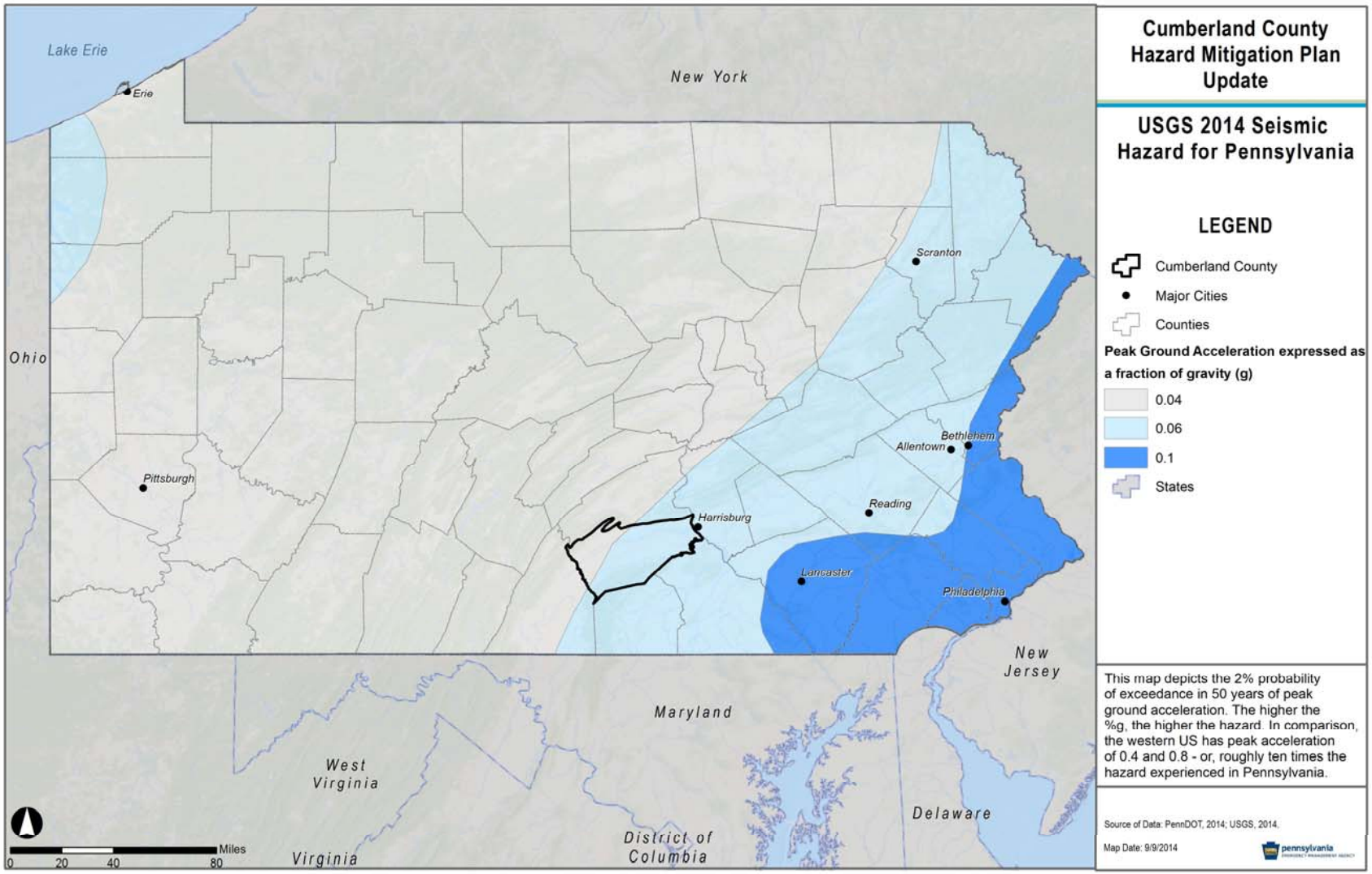
4.3.2.4 Future Occurrence

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 4.3.2-2, Cumberland County has very low PGA ratios of 0.04 and 0.06. Overall, the probability of future earthquakes can be considered *unlikely* according to the Risk Factor Methodology (see Table 4.4-1).

4.3.2.5 Vulnerability Assessment

Cumberland County is located in a zone where only minor earthquake damage is expected (Cumberland EOP, 1984), and no damage or casualties have been reported from earthquakes to date. Based on historical events, earthquakes in the Pennsylvania region do not exceed magnitudes greater than 6.0, which could cause slight damage to well-designed buildings but major damage to poorly constructed buildings. While all structures and infrastructure in the County are equally at risk of experiencing an earthquake, older structures are most likely to be damaged. Section 4.3.8.5 provides building age distribution by municipality. According to the limited data available, approximately 19,062 parcels (23 percent of all parcels in the County as of 2014) had primary structures built prior to 1950. Modern structures built in compliance with the Uniform Construction Code (see Section 5.2.1.1) will likely be the least vulnerable to earthquake damage. Damages to critical facilities could have the greatest impact to the health and safety of County residents. Earthquakes could also potentially damage roads, bridges, power lines, water lines, gas lines, and other infrastructure in Cumberland County.

Figure 4.3.2-3: Map of Pennsylvania earthquake hazard zones.

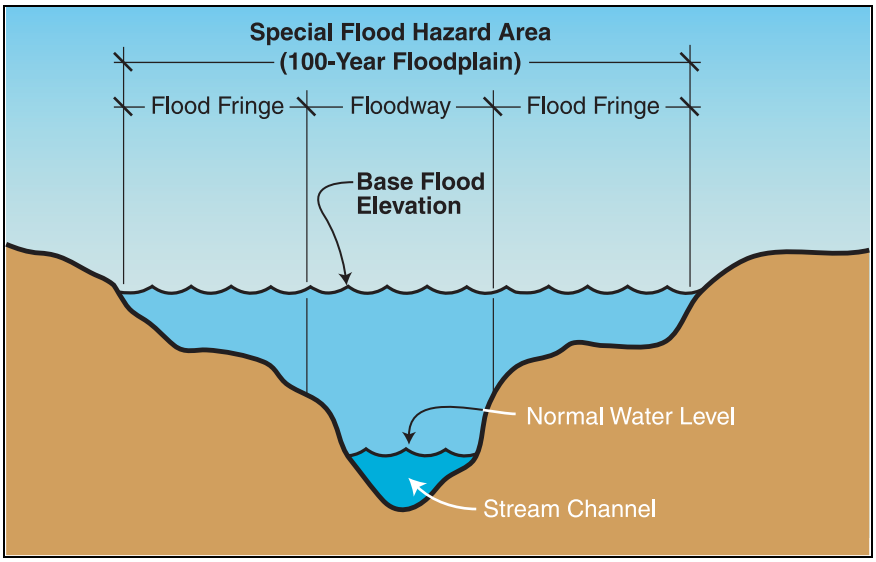


4.3.3. Flood, Flash Flood & Ice Jam

4.3.3.1 Location and Extent

Flood sources within Cumberland County include rivers and streams. For inland areas like Central Pennsylvania, excess water from snowmelt or rainfall accumulates and overflows onto 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 4.3.3.4. 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 percent-annual-chance of occurring. The National Flood Insurance Program (NFIP), for which Flood Insurance Rate Maps (FIRMs) are published, identifies the 1 percent-annual-chance flood which is used to delineate the *Special Flood Hazard Area* (SFHA) and identify *Base Flood Elevations*. Figure 4.3.3-1 illustrates these terms. The Special Flood Hazard Area serves as the primary regulatory boundary used by FEMA, the Commonwealth of Pennsylvania, and Cumberland County local governments.

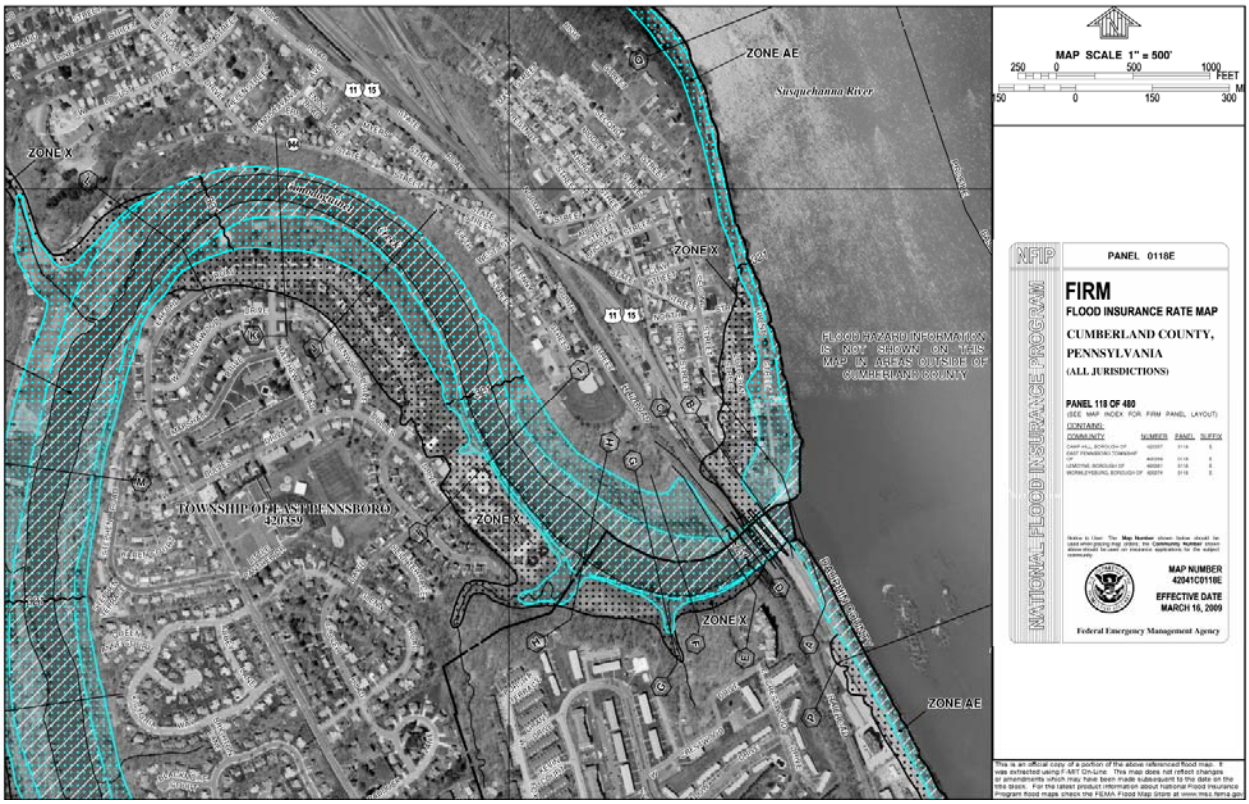
Figure 4.3.3-1: Diagram identifying *Special Flood Hazard Area*, *1 percent-annual-chance (100-Year) floodplain*, *floodway* and *flood fringe*.



Countywide digital FIRM (DFIRM) were published for Cumberland County on March 16, 2009. All communities within the County are now shown on a single set of countywide DFIRMs. Previous FIRMs and Flood Boundary and Floodway Maps (FBFM) were digitized to produce a DFIRM that is compatible with geographic information systems. Prior to the publication of this digital data, flood hazard information from FEMA was available through paper FIRMs and Q3 data. An example of the mapping products published is shown in Figure 4.3.3-2. DFIRMs for the entire county can be obtained from the FEMA Map Service Center

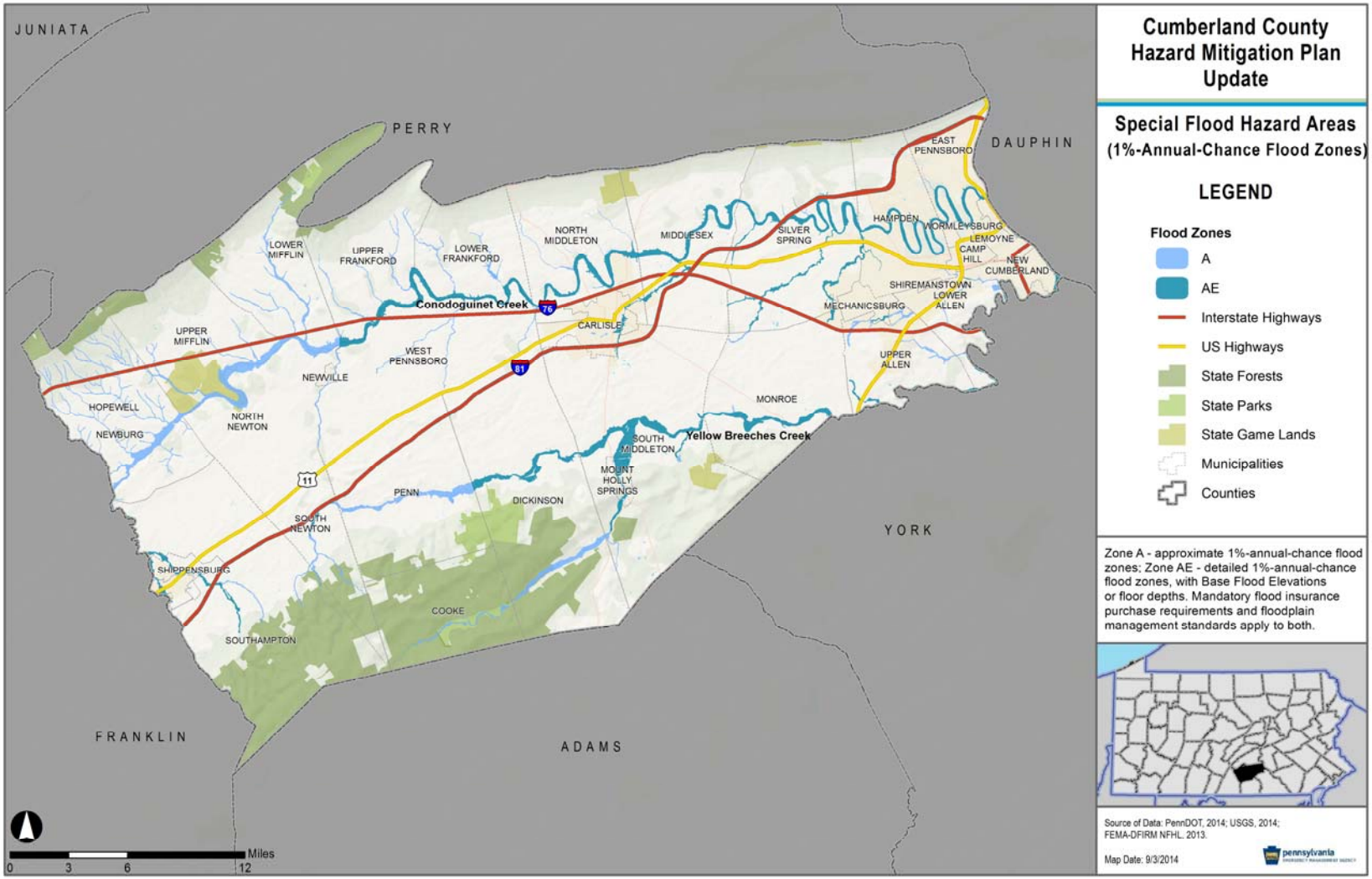
(http://www.msc.fema.gov). These maps can be used to identify the expected spatial extent of flooding from a 1 percent- and 0.2 percent-annual-chance event.

Figure 4.3.3-2: FIRM Panel 42041C0118E, effective March 16, 2009, showing flood hazard areas along the Conodoguinet Creek and Susquehanna River in East Pennsboro Township and Wormleysburg Borough.



Flood sources identified in the most recent DFIRMs include: Conodoguinet Creek, Dogwood Run, Green Ridge Run, Gum Run, Hogestown Run, Letort Spring Run, Long Pine Run, Middle Spring Creek, Middle Spring Creek Tributary, Mountain Creek, Navy Ship Parts Control Center Drainage Channel, Old Town Run, Potteiger Run, Susquehanna River, Taggerts Run, Trindle Spring Run, Trout Run, Wertz Run, Yellow Breeches Creek and Yellow Breeches Creek Northern Split. Figure 4.3.3-3 shows the location of watercourses in Cumberland County. The location of approximate and detailed (which include Base Flood Elevations) Special Flood Hazard Areas are shown. Flood events caused by ice jams are limited primarily to the Susquehanna River and Conodoguinet Creek.

Figure 4.3.3-3: Map showing the location of watercourses and flood zones throughout Cumberland County.



4.3.3.2 Range of Magnitude

Floods are considered hazards when people and property are affected. Injuries and deaths can occur when people are swept away by flood currents or when 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. Conditions can be exacerbated by obstructions, which prevent normal flow through the waterway, such as fallen trees. During the 2014 update process, HMSC members noted that when a tree falls and obstructs a bridge (as illustrated in Figure 4.3.3-4), then the bridge owner is responsible for removal. However, if a tree obstructs a waterway where there is no bridge, then the property owner is responsible for removal.

Figure 4.3.3-4: Obstruction of a bridge with fallen trees and other debris in East Pennsboro Township (Photograph courtesy of East Pennsboro Township, 2014).

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. The County has sloping terrain, especially near the South and Blue Mountains, which can contribute to more severe floods as runoff reaches receiving water bodies more rapidly over steep terrain. 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 Cumberland County, there are seasonal differences in how floods are caused. 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 (i.e., especially the Susquehanna River and Conodoguinet Creek).

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, as detailed in Section 4.3.4, the County occasionally experiences intense rainfall from tropical storms in late summer and early fall.

The most severe flooding in Central Pennsylvania has been associated with the Susquehanna River Basin, which drains directly into the Chesapeake Bay and is the largest river basin on the U.S. Atlantic Coast. Cumberland County lies within the Lower Susquehanna River Basin, which means that it is subject to heavy precipitation events that may occur outside of the County in the upper reaches of the Basin. Tropical Storm Agnes in 1972 created the worst flooding conditions on record for Cumberland County.

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, which improves soil fertility. However, the destruction of riparian buffers, changes to land-use and land cover throughout a watershed, and 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. These facilities are discussed in Section 4.3.13; however it is important to note that there are nine SARA facilities in the 1 percent-annual-chance floodplain. Other environmental impacts of flooding include: water-borne diseases, suffocation of tree species non-tolerant to excess water, heavy siltation, damage or loss of crops, and drowning of both humans and animals.

4.3.3.3 Past Occurrence

Cumberland County has a long history of flooding events. Bordered to the east by the Susquehanna River and traversed by two of its tributaries, Yellow Breeches Creek and Conodoguinet Creek, the County has suffered damage from numerous major floods and localized flash flooding. Thirteen of the 18 Presidential Disaster and Emergency Declarations affecting Cumberland have been in response to hazard events related to flooding (see Table 4.2-1). Frequent flooding occurs at the confluence of Yellow Breeches Creek and the Susquehanna River in the Borough of New Cumberland. Flooding events, including those associated with Disaster Declarations, are listed in Table 4.3.3-1. Other information on previous flood events and historical losses can be found in Section 2.3 of the Cumberland County Flood Insurance Study report.

Table 4.3.3-1: Flood and flash flood events impacting Cumberland County from 1936-2014 (SHELDUS, 2009, NCDC, 2014, & community surveys). Note that property damage values are estimates based on best available information. "Countywide" indicates several locations in the County were affected.

Date	Location & Description	Estimated Property Damage ($)
3/1936	Countywide	5,724,000
4/2/1970	Countywide; Severe Thunderstorm	20,034
6/1972	Countywide; Tropical Storm Agnes	40,725,000
6/28/1973	Countywide; Severe Thunderstorm	15,152
9/1975	Countywide; Hurricane	1,515,152
10/1976	Countywide	*not provided*
1/24/1979	Countywide; Severe Thunderstorm	15,152
2/23/1979	Countywide; Severe Thunderstorm	15,152
2/2/1982	Countywide	1,515
3/14/1986	Countywide	14,706
9/12/1987	Countywide	12,500
11/28/1993	Countywide	*not provided*
8/25/1994	Countywide; Thunderstorms with very heavy rain produced significant poor drainage flooding throughout the County.	*not provided*
1/20/1995	Countywide	*not provided*
6/30/1995	Countywide; Heavy rain caused basement flooding within Cumberland County.	*not provided*
7/6/1995	Countywide; Severe thunderstorms throughout the County. Trees were uprooted in Mechanicsburg and within nearby Upper Allen Township. Eastern Cumberland County experienced three inches of rain within in an hour. The heavy rain caused flooding of basements and streets and created sinkholes in Mechanicsburg.	*not provided*
1/19/1996	Countywide; One flood-related death occurred in Cumberland County resulting from a vehicular accident involving a 32-year old male near Middlesex.	352,000
9/6/1996	Western Areas of the County; Newville had 9.8 inches of rain. One flood-related death resulting from a vehicular accident involving a 26-year old woman.	*not provided*
9/13/1996	Western areas of the County	*not provided*
12/13/1996	Countywide	*not provided*
9/11/1997	Countywide	*not provided*
11/7/1997	Western areas of the County	*not provided*
1/8/1998	Countywide	*not provided*
3/21/1998	Countywide	*not provided*
9/6/1999	Eastern Areas of the County; Streets and underpasses were flooded in Shiremanstown and other eastern areas as heavy rain from Tropical Storm Dennis.	10,000
9/16/1999	Countywide	15,000
7/30/2000	Northeast Areas of the County; Heavy rains caused mud and water to flow into a couple of homes near an area under road construction.	*not provided*
9/1/2000	Mechanicsburg; Eight homes and one apartment were flooded in East Pennsboro Township.	50,000
1/3/2003	Rising waters on Conodoguinet Creek at Hogestown caused the river gauge to reach its flood stage of 8 feet briefly between 8 and 9 pm.	*not provided*
3/20/2003	Rainfall of over 1 inch caused the Yellow Breeches Creek at Camp Hill to exceed its flood stage of 7 feet. Minor flooding was reported, with several roads closed along the	*not provided*

Table 4.3.3-1: Flood and flash flood events impacting Cumberland County from 1936-2014 (SHELDUS, 2009, NCDC, 2014, & community surveys). Note that property damage values are estimates based on best available information. "Countywide" indicates several locations in the County were affected.

Date	Location & Description	Estimated Property Damage ($)
	creek in the Carlisle area.	
3/21/2003	Rainfall of over 1 inch caused the Conodoguinet Creek at Hogestown to exceed its flood stage of 8 feet. Minor flooding of low lying areas was reported.	*not provided*
6/7/2003	Heavy rainfall caused Yellow Breeches Creek at Camp Hill to exceed its flood stage of 7 feet.	*not provided*
6/8/2003	Heavy rainfall caused Conodoguinet Creek at Hogestown to reach flood Stage of 8 feet.	*not provided*
6/21/2003	Boiling Springs; Heavy rains caused rapid rises in streams and closed several roads in southern Cumberland County near the town of Boiling Springs. Lerew Road, Petersburg Road and Mount Zion Road, all directly adjacent to Old Town Run and Lerew Creek, were closed.	*not provided*
9/23/2003	Heavy rainfall caused Yellow Breeches Creek at Camp Hill to exceed its flood stage of 7 feet.	*not provided*
12/11/2003	Heavy rainfall caused the Conodoguinet Creek at Hogestown to exceed flood stage.	*not provided*
12/11/2003	Heavy rainfall caused Yellow Breeches Creek at Camp Hill to exceed flood stage.	*not provided*
8/1/2004	Shiremanstown; Heavy rain caused flash flooding along Yellow Breeches Creek in Cumberland County. Several homes were isolated by flood waters, accessible only by boat. One road was also flooded and impassable.	*not provided*
8/1/2004	Heavy rain caused flooding along Yellow Breeches Creek at Camp Hill.	*not provided*
9/17/2004	Countywide; As a result of this excessive rainfall from Hurricane Ivan and antecedent heavy rainfall from the remnants of Hurricane Frances one week earlier, widespread flooding occurred throughout central Pennsylvania from 9/17/2004 through 9/20/2004. Flood levels at many locations ranked in the top 5 for all flood events, with many river forecast points cresting above levels reached in the January 1996, flood. Moderate to major flooding was experienced on the larger tributaries of the Susquehanna River. The widespread flooding closed hundreds of roads and bridges across central Pennsylvania, causing a significant adverse impact on commerce and transportation for several days. Preliminary monetary estimates of flood damage from the remnants of Ivan across the state were over 260 million dollars.	1,515,152
9/18/2004	Heavy rain caused the Conodoguinet Creek at Hogestown to exceed its flood stage of 8 feet.	*not provided*
9/18/2004	Heavy rain caused the Yellow Breeches Creek at Camp Hill to exceed its flood stage of 7 feet.	*not provided*
9/28/2004	Heavy rain caused the Yellow Breeches Creek at Camp Hill to exceed its flood stage of 7 feet.	*not provided*
9/28/2004	Countywide; The remnants of Hurricane Jeanne moved northeast along the east slopes of the Appalachians during Tuesday, September 28th, eventually moving off the mid-Atlantic Coast by early Tuesday evening. However, a large plume of tropical moisture to the northwest of the system produced widespread heavy rainfall across south central Pennsylvania during Tuesday, with rainfall amounts of 2 to 4 inches. This rainfall, combined with excessively wet soil and swollen rivers from the remnants of 2 antecedent tropical systems, produced mainly minor flooding across portions of south central Pennsylvania, with several road closures and some basement flooding reported.	*not provided*
9/29/2004	Heavy rain caused the Conodoguinet Creek at Hogestown to exceed its flood stage of 8 feet.	*not provided*
9/29/2004	Heavy rain and local runoff caused the Yellow Breeches Creek at Camp Hill to exceed its flood stage of 7 feet.	*not provided*
3/28/2008	Countywide; A low pressure system combined with abundant low level moisture drawn from the Gulf of Mexico and western Atlantic Ocean produced very heavy rainfall across the lower Susquehanna Valley. As a result of the heavy rainfall, numerous streams overflowed their banks onto adjacent roadways, resulting in road closures.	*not provided*

Table 4.3.3-1: Flood and flash flood events impacting Cumberland County from 1936-2014 (SHELDUS, 2009, NCDC, 2014, & community surveys). Note that property damage values are estimates based on best available information. "Countywide" indicates several locations in the County were affected.

Date	Location & Description	Estimated Property Damage ($)
3/28/2005	Heavy rain caused Yellow Breeches Creek at Camp Hill to flood.	*not provided*
3/29/2005	Heavy rain caused Conodoguinet Creek at Hogestown to flood.	*not provided*
3/30/2005	Heavy rain caused the Susquehanna River at Harrisburg to flood, exceeding 17 ft. flood stage.	*not provided*
4/2/2005	Countywide; Widespread heavy rainfall across the lower Susquehanna Valley. Average rainfall amounts of 1 to 3 inches occurred during this time. This heavy rainfall led to numerous road closures as smaller streams and creeks overflowed their banks during Saturday afternoon and evening.	*not provided*
4/2/2005	Heavy rain caused Yellow Breeches Creek at Camp Hill to flood.	*not provided*
4/3/2005	Heavy rain caused Conodoguinet Creek at Hogestown to flood.	*not provided*
4/3/2005	Heavy rain caused the Susquehanna River at Harrisburg to flood.	*not provided*
6/27/2006	Countywide; Heavy rain associated with a stalled frontal boundary, interacting with the remnants of a weak tropical system, caused flash flooding throughout central and eastern Pennsylvania from June 27 through June 28. While flash flooding ended on the 28th, flood waters continued in some locations until July 1st. In Cumberland County, numerous roads and bridges were closed due to flood waters. 30 homes were evacuated on Betham Hollow Road due to access road washing out. Flooding was also extensive in Silver Spring Township. Heavy rain caused the Conodoguinet Creek at Hogestown and Yellow Breeches Creek at Camp Hill to flood.	*not provided*
11/16/2006	Shiremanstown; Heavy rain caused flash flooding in Cumberland County. Cedar Run overflowed its banks and flooded roads in Lower Allen Township. Roads were also closed in Monroe Township due to Yellow Breeches Creek overflowing its banks.	*not provided*
5/10/2007	Carlisle; Heavy rain from strong thunderstorms produced flash flooding across portions of the Lower Susquehanna Valley. Flooded intersections and closed roads due to rapid rises on area creeks and streams just north of Carlisle. County Emergency Manager reported a water rescue in Silver Spring Township around 8 pm. Rainfall reports of as much as 3.5 inches of rain in a 3 hour period were received in Carlisle.	*not provided*
7/29/2007	Carlisle; Thunderstorms with torrential rain produced flash flooding across Cumberland County. Numerous roads were flooded and closed throughout the county, along with a number of reports of flooded urban intersections.	*not provided*
5/28/2009	Newburg; Thunderstorms produced heavy rain and flash flooding in northern portions of Cumberland County. Roads were closed in Upper and Lower Mifflin Township. In the vicinity of Doubling Gap Creek, several roads were also closed.	*not provided*
7/2009	North Middleton; two flash flooding events.	*not provided*
7/23/2009	Gettysburg; Heavy rain caused flash flooding just north of Carlisle in North Middletown Township. Three to five feet of water inundated several homes along Echo Road. Water was over the top of resident mailboxes in some areas. Several municipal roads were also closed due to the flooding.	$100,000
7/23/2009	Newburg; Heavy rain produced flash flooding along the Pennsylvania Turnpike near Neville.	*not provided*
7/23/2009	Mechanicsburg; Heavy rain produced flash flooding just southeast of Mechanicsburg in Upper Allen Township. Several residents were evacuated from flooded homes. The flash flooding persisted late into the evening and transitioned into countywide flooding.	$100,000
7/24/2009	Eberleys Mill; Heavy rain caused Yellow Breeches Creek at Camp Hill to exceed flood stage. Moderate flooding was reported along Creekwood Drive in the Allendale section of Camp Hill, where reports of several flooded vehicles were received. Also, Cedar Cliff Drive was inundated by flood waters from the Creek.	$10,000
8/19/2009	Sheperdstown; Heavy rain caused flash flooding along a small stream tributary of the Yellow Breeches Creek. The high water covered a bridge along Hertzler Road in Upper Allen Township. The flash flooding transitioned into areal county flooding, which	*not provided*

Table 4.3.3-1: Flood and flash flood events impacting Cumberland County from 1936-2014 (SHELDUS, 2009, NCDC, 2014, & community surveys). Note that property damage values are estimates based on best available information. "Countywide" indicates several locations in the County were affected.

Date	Location & Description	Estimated Property Damage ($)
	persisted until midnight.	
1/25/2010	Mechanicsburg; Heavy rain caused widespread areal flooding of low lying urban and poor drainage areas. The Williams Grove Mobile Home Park was evacuated due to flooding at the Williams Grove Water Treatment Plant in Mechanicsburg. A number of roads were closed including Blosserville Road at the Conodoguinet Creek Bridge on the border of West Pennsboro and Upper Frankford Townships. Creek Road was closed between Route 74 and Kuhn Road in Monroe Township.	*not provided*
8/12/2010	Mount Holly Springs; Heavy thunderstorm rains produced flash flooding in Mount Holly Springs. Several municipal streets and underpasses were flooded.	$5,000
3/10/2011	Plainfield; Heavy rain brought flooding and closed numerous roads. Flood waters also caused the mandatory evacuation of the Williams Grove Mobile Home Park. This included 81 mobile homes, where 250 persons were displaced.	*not provided*
3/10/2011	New Cumberland; Yellow Breeches Creek experienced moderate flooding. A number of homes in the Green Lane Farms development are affected by high water. Cedar Cliff Drive on the left bank upstream from the bridge was inundated. Creekwood Drive had several feet of water on it, and water was approaching homes.	*not provided*
3/10/2011	New Kingston; The Conodoguinet Creek near Hogestown experienced a moderate flood. Some residences in the vicinity of Erb's Bridge Road, Prowell Road, Stone Spring Lane, and Oyster Mill Road were flooded.	*not provided*
4/16/2011	Carlisle Springs; Flash flooding resulted in 12 water rescues of people in cars on flooded roads at several locations. Cedar Run was reported out of banks and flooding Old Gettysburg Road near Shiremanstown.	*not provided*
4/16/2011	Lisburn; Yellow Breeches Creek near Camp Hill crested above moderate flood stage. Numerous homes along the entire length of Yellow Breeches Creek are affected by high water levels in both York and Cumberland Counties.	*not provided*
4/28/2011	Camp Hill; Several road closures and water rescues were reported in and around New Cumberland. Widespread flooding in Lower Allen Township. Cedar Run out of its banks flooding Old Gettysburg Road. Cars reported flooded, two homes and a business also flooded.	*not provided*
4/28/2011	Lisburn; Yellow Breeches Creek near Camp Hill crested above moderate flood stage. A number of homes along the entire length of Yellow Breeches Creek are affected by high water.	*not provided*
7/8/2011	Carlisle; Torrential thunderstorm rainfall produced localized flash flooding in Carlisle.	*not provided*
9/7/2011	Plainfield; Yellow Breeches Creek near Camp Hill crested at moderate flood stage. The Conodoguinet Creek near Hogestown crested at moderate flood stage. Many roads in the county were closed due to flooding from creeks and streams. Flooding was reported along the Susquehanna River in the Wormleysburg area. A portion of Bridge Street in New Cumberland was underwater and residents in that area evacuated. The street was closed, and Olde Towne Beverage was underwater. The Borough of New Cumberland was under state of emergency. A preliminary total of 160 structures suffered major damage, and 100 suffered minor damage with a total of 448 structures impacted.	$1,000,000
9/28/2011	Mount Holly Springs; Heavy rain produced flash flooding, resulting in two structure collapses and many roads being flooded.	*not provided*
5/29/2012	Shippensburg; A line of intense heavy thunderstorm rains caused flash flooding across much of the county. Carlisle reported 2.3 inches of rainfall in a short period of time. Flooded roads were reported in Camp Hill, Carlisle, Shippensburg and Southampton Townships. A water rescue was reported on Hummel Avenue in Camp Hill. Two cars were rescued from flood waters in Carlisle.	*not provided*
8/14/2012	Hunters Run; Torrential thunderstorm rains of 1-2 inches in less than an hour produced numerous reports of flash flooding across the eastern half of Cumberland County. Flash flooding closed SR42 near Mt. Holly Springs, South Front and Market Streets in Lemoyne, SR 11 in Silver Springs Township and the 400 block of Front Street in	*not provided*

Table 4.3.3-1: Flood and flash flood events impacting Cumberland County from 1936-2014 (SHELDUS, 2009, NCDC, 2014, & community surveys). Note that property damage values are estimates based on best available information. "Countywide" indicates several locations in the County were affected.

Date	Location & Description	Estimated Property Damage ($)
	Hampden Township.	
8/26/2012	Shippensburg; Torrential thunderstorm rains produced localized flash flooding in and around the Shippensburg area. Several roads were closed and impassable at times including Walnut Bottom Road.	*not provided*
10/29/2012	Newburg; Generally minor flooding, with 1 flooded road and several flooded basements reported.	*not provided*
10/10/2013	Newburg; Excessive rainfall between 5-10 inches produced widespread significant flooding. Road closures were experienced near Boiling Springs and Mt. Holly Springs. Moderate river flooding occurred on the Yellow Breeches Creek in Camp Hill. Minor river flooding was observed on the Conodoguinet Creek at Hogestown.	*not provided*

There are no known significant flood events in Cumberland County which can be attributed directly to an ice jam. However, the presence of river ice has compounded the impact of certain winter flood events such as the January 1996 flood. The January 1996 event was the result of very rapid snowmelt punctuated by short, but intense rainfall and compounded by ice movement and jamming along the Susquehanna River. The Susquehanna River rose nearly 13 feet in two hours on the evening of January 19, 1996 in Harrisburg. This was the fastest rate of rise on the Susquehanna River ever recorded at Harrisburg in more than 100 years of record-keeping and was partly due to ice jams (NOAA – NWS, 1998). The event resulted in the collapse of portions of the pedestrian and bikeway Walnut Street Bridge ("The People's Bridge") which connected the Eastern and Western Shores of the Susquehanna River. High floodwaters and significant ice flow lifted two spans of the bridge off their foundations and carried them downstream.

The National Flood Insurance Program identifies Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties. 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.

Tables 4.3.3-2 and 4.3.3-3 show the number and type of Repetitive Loss and Severe Repetitive Loss properties in Cumberland County, respectively. Note that only communities with Repetitive Loss and Severe Repetitive Loss properties are shown. Based on input from the Pennsylvania Department of Community and Economic Development, an assumption is made that *non-residential* type is anything other than “residential” including, but not necessarily limited to “commercial” building types. Also, *ASMD Condo* type refers to a situation where an individual owns the structure, or portion of the structure, but not any of the land. As of July 2013, there were 157 Repetitive Loss buildings in Cumberland County, 114 of which are identified as *single family*. Most of these properties are located in Borough of New Cumberland, East Pennsboro Township, and the Borough of Camp Hill. Only five of these properties have been mitigated. In addition, there are seven Severe Repetitive Loss properties in Cumberland County. Table 4.3.3-4 shows the number of NFIP claims since 1978.

Table 4.3.3-2: Total and mitigated Repetitive Loss properties in Cumberland County. Data was obtained from the *PA Standard State All-Hazard Mitigation Plan* (2013).

Municipality	2-4 Family		Assmd Condo		Non-Residential		Other Residential		Single Family		Total	
	Total	Mit.	Total	Mit.	Total	Mit.	Total	Mit.	Total	Mit.	Total	Mit.
Borough of Camp Hill	0	0	0	0	0	0	0	0	15	0	15	0
Borough of Carlisle	0	0	0	0	0	0	0	0	1	0	1	0
Township of Dickinson	0	0	0	0	1	0	0	0	0	0	1	0
Township of East Pennsboro	0	0	0	0	0	0	0	0	25	1	25	1
Township of Hampden	0	0	0	0	1	1	0	0	8	0	9	1
Township of Lower Allen	0	0	0	0	0	0	0	0	10	2	10	2
Township of Lower Frankford	0	0	0	0	0	0	0	0	1	0	1	0
Township of Monroe	0	0	0	0	0	0	1	0	5	0	6	0
Borough of New Cumberland	14	0	0	0	15	0	4	0	28	0	61	0
Township of North Middleton	0	0	0	0	0	0	0	0	1	0	1	0
Township of Silver Spring	0	0	0	0	0	0	0	0	5	1	5	1
Township of South Middleton	0	0	0	0	0	0	0	0	3	0	3	0
Township of South Newton	0	0	0	0	0	0	0	0	1	0	1	0
Township of Upper Allen	0	0	0	0	0	0	0	0	5	0	5	0
Township of Upper Frankford	0	0	0	0	0	0	0	0	3	0	3	0
Borough of Wormleysburg	2	0	1	0	3	0	1	0	3	0	10	0
TOTAL	**16**	**0**	**1**	**0**	**20**	**1**	**6**	**0**	**114**	**4**	**157**	**5**

Table 4.3.3-3: Total and mitigated Severe Repetitive Loss properties in Cumberland County. Data was obtained from the *PA Standard State All-Hazard Mitigation Plan* (2013).

County	2-4 Family		Assmd Condo		Non-Residential		Other Residential		Single Family		Total	
	Total	Mit.	Total	Mit.	Total	Mit.	Total	Mit.	Total	Mit.	Total	Mit.
Borough of Camp Hill	0	0	0	0	0	0	0	0	1	0	1	0
Township of East Pennsboro	0	0	0	0	0	0	0	0	1	0	1	0
Township of Lower Allen	0	0	0	0	0	0	0	0	1	0	1	0
Township of Monroe	0	0	0	0	0	0	0	0	1	0	1	0
Borough of New Cumberland	1	0	0	0	0	0	0	0	0	0	1	0
Township of Upper Frankford	0	0	0	0	0	0	0	0	1	0	1	0
Borough of Wormleysburg	0	0	0	0	0	0	1	0	0	0	1	0
TOTAL	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**5**	**0**	**7**	**0**

Table 4.3.3-4: NFIP claims since 1978 (FEMA Community Information System, July 2014).

Community	Number Of Claims Paid	Total Paid Claims ($)	Substantial Damage Claims
Borough of Camp Hill	70	$1,686,814.49	3
Borough of Carlisle	19	$134,335.56	1
Township of Cooke	N/A	N/A	N/A
Township of Dickinson	3	$8,213.79	0
Township of East Pennsboro	127	$1,597,728.23	3
Township of Hampden	161	$897,079.50	1
Township of Hopewell	1	$19,320.10	0
Borough of Lemoyne	9	$18,301.63	1
Township of Lower Allen	84	$1,234,303.03	4
Township of Lower Frankford	7	$87,330.22	0
Township of Lower Mifflin	N/A	N/A	N/A
Borough of Mechanicsburg	39	$145,773.81	1
Township of Middlesex	3	$7,373.32	1
Township of Monroe	67	$618,335.59	4
Borough of Mount Holly Springs	11	$34,461.79	0
Borough of New Cumberland	253	$4,586,858.37	22
Borough of Newburg	N/A	N/A	N/A
Borough of Newville	3	$55,531.69	1
Township of North Middleton	14	$92,358.09	0
Township of North Newton	2	$23,816.03	0
Township of Penn	1	$467.40	0
Township of Shippensburg	4	$4,938.97	0
Borough of Shippensburg	N/A	N/A	N/A
Borough of Shiremanstown	1	$3,424.00	0
Township of Silver Spring	42	$296,512.10	1
Township of South Middleton	26	$107,492.05	1
Township of South Newton	6	$33,325.51	1
Township of Southampton	9	$212,568.85	0
Township of Upper Allen	34	$154,465.63	0
Township of Upper Frankford	27	$397,775.07	11
Township of Upper Mifflin	2	$3,862.47	0
Township of West Pennsboro	N/A	N/A	N/A
Borough of Wormleysburg	80	$2,734,154.14	2
TOTAL	**1,105**	**$ 15,196,921.43**	**58**

In addition to the past occurrences mentioned above, comments received indicate that the following roads and intersections commonly experience flooding problems:

- Pine Road and Centerville Road (both state roads) where the flow of a mountain stream is impeded by a bridge structure in Penn Township.
- 6445 Carlisle Pike and Millers Gap due to poor drainage in Silver Spring Township.
- 1200 Block of Hummel Avenue in Lemoyne Borough.
- Market Street in "the bottleneck" affecting the Borough of Lemoyne and Borough of Wormleysburg.
- Pine Road (SR 3006) and Centerville Road (SR 233) in Penn Township at Keck's Store. During heavy rains, the streams from Beetem Hollow and Kellars Gap Hollow flood the intersection.
- Bullshead Road between SR 641 and Steelstown in North Newton Township.
- Fish Hatchery Road in North Newton Township.
- Oakville Road between SR 641 and Mountain Road in North Newton Township.
- Springfield Road (T-333) between Koser and Oakville in North Newton Township.

In addition, a small subdivision at Pinebrook in Cooke Township experienced stormwater and flooding issues.

4.3.3.4 Future Occurrence

In Cumberland County, flooding occurs commonly and can take place during any season of the year. 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 such events to happen several years in succession. Floods are described in terms of their extent (including the horizontal area affected and the vertical depth of floodwaters) and related probability of occurrence. Historical records are used to determine the probability of occurrence (percent chance) for a flood of specific extent to occur.

The NFIP recognizes the 1 percent-annual-chance flood, also known as the *base flood*, as the standard for identifying properties subject to federal flood insurance purchase requirements. A 1 percent-annual-chance flood is a flood which has a 1 percent chance of occurring over a given year. The DFIRM published on March 16, 2009 can be used to identify areas subject to the 1 percent- and 0.2 percent-annual-chance flooding. Areas subject to 2 percent- and 10 percent-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 the Flood Insurance Study Report.

Overall, the probability of future floods can be considered *likely* according to the Risk Factor Methodology (see Table 4.4-1).

4.3.3.5 Vulnerability Assessment

Cumberland County is vulnerable to flooding that causes loss of lives, property damage, and road closures. For purposes of assessing vulnerability, the County focused on community assets that are located in the 1 percent-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 local municipality showing the FEMA-designated 1 percent-annual-chance flood hazard area, critical facilities, and transportation routes are included in Appendix D.

Using 2014 County structures data, 2,248 out of 100,467 (two percent) of structures in the County are located in the SFHA (Table 4.3.3-5). A total of 4,974 mobile home structures were identified with 267 (five percent) of those located in the SFHA. Table 4.3.3-5 reveals that the Borough of Carlisle, Borough of Mount Holly Springs, and Upper Allen Township each contain over 200 structures that are vulnerable to the impacts of a 1 percent-annual-chance flood. Hampden Township in particular has experienced stormwater management and continued land development issues related to flooding, and it has 190 structures located in the SFHA. Monroe Township and the Borough of Mount Holly Springs have more mobile homes within the 1 percent-annual-chance floodplain than any other municipalities, amounting to 37 percent and 34 percent, respectively, of all mobile homes in the SFHA in Cumberland County.

The 2,248 structures located in the SFHA are identified by generalized land use type in Table 4.3.3-6. A total of 2,022 (90 percent) of the structures are residential; 168 (seven percent) are commercial; and the remaining three percent is composed of various other types.

Table 4.3.3-5: Number of total structures and mobile homes both in and out of the 1 percent-annual-chance floodplain, by municipality.

Municipality	Total Structures	Structures In SFHA	Percent Of Total Structures In SFHA	Mobile Home Structures	Mobile Home Structures In SFHA	Percent Of Mobile Home Structures In SFHA
Borough of Camp Hill	3,629	14	0%	0	0	0%
Borough of Carlisle	8,248	249	3%	18	0	0%
Township of Cooke	326	1	0%	3	0	0%
Township of Dickinson	2,160	47	2%	121	1	1%
Township of East Pennsboro	8,637	97	1%	46	2	4%
Township of Hampden	12,335	190	2%	514	3	1%
Township of Hopewell	854	18	2%	46	0	0%
Borough of Lemoyne	2,057	0	0%	0	0	0%
Township of Lower Allen	7,012	71	1%	33	0	0%
Township of Lower Frankford	715	12	2%	157	4	3%
Township of Lower Mifflin	728	13	2%	218	1	0%
Borough of Mechanicsburg	4,292	3	0%	0	0	0%
Township of Middlesex	2,749	34	1%	767	13	2%
Township of Monroe	2,413	174	7%	160	100	63%
Borough of Mount Holly Springs	893	226	25%	107	91	85%
Borough of New Cumberland	3,296	122	4%	0	0	0%
Borough of Newburg	134	3	2%	0	0	0%
Borough of Newville	696	2	0%	11	0	0%
Township of North Middleton	4,928	89	2%	508	2	0%
Township of North Newton	924	2	0%	36	0	0%
Township of Penn	1,149	17	1%	83	0	0%
Borough of Shippensburg	1,796	121	7%	1	1	100%
Township of Shippensburg	1,236	77	6%	283	20	7%
Borough of Shiremanstown	742	0	0%	0	0	0%
Township of Silver Spring	6,492	86	1%	381	1	0%
Township of South Middleton	6,489	119	2%	397	1	0%
Township of South Newton	507	29	6%	13	0	0%
Township of Southampton	2,660	95	4%	369	16	4%
Township of Upper Allen	7,286	220	3%	125	0	0%
Township of Upper Frankford	873	23	3%	288	10	3%
Township of Upper Mifflin	534	2	0%	49	0	0%
Township of West Pennsboro	2,270	19	1%	240	1	0%
Borough of Wormleysburg	1,407	73	5%	0	0	0%
TOTAL	**100,467**	**2,248**	**2%**	**4,974**	**267**	**5%**

Table 4.3.3-6: Structures in the SFHA by Generalized Land Use Type

Municipality	Total Structures in Municipality	Agricultural	Civic/ Institutional	Commercial	Emergency Services	Government	Hospitals and Medical Centers	Industrial	Other/ Unspecified	Religious	Residential	School	Transportation	Grand Total
Borough of Camp Hill	3,629	0	0	0	0	0	0	0	0	0	14	0	0	**14**
Borough of Carlisle	8,248	0	0	24	0	0	0	0	1	0	223	1	0	**249**
Township of Cooke	326	0	0	0	0	0	0	0	0	0	1	0	0	**1**
Township of Dickinson	2,160	0	0	0	0	0	0	0	0	1	46	0	0	**47**
Township of East Pennsboro	8,637	0	0	2	0	0	0	0	0	0	95	0	0	**97**
Township of Hampden	12,335	0	0	1	0	0	0	0	1	0	188	0	0	**190**
Township of Hopewell	854	0	0	0	0	0	0	0	0	0	18	0	0	**18**
Borough of Lemoyne	2,057	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Township of Lower Allen	7,012	0	0	3	0	0	0	0	2	0	66	0	0	**71**
Township of Lower Frankford	715	0	0	0	0	0	0	0	1	0	11	0	0	**12**
Township of Lower Mifflin	728	0	0	1	0	0	0	0	1	0	11	0	0	**13**
Borough of Mechanicsburg	4,292	0	0	1	0	0	0	1	0	0	1	0	0	**3**
Township of Middlesex	2,749	0	0	2	0	0	0	0	1	0	31	0	0	**34**
Township of Monroe	2,413	0	0	8	0	0	0	1	0	0	165	0	0	**174**
Borough of Mount Holly Springs	893	0	0	11	0	0	0	3	5	1	206	0	0	**226**
Borough of New Cumberland	3,296	0	0	28	0	0	0	1	2	0	91	0	0	**122**
Borough of Newburg	134	0	0	0	0	0	0	0	0	0	3	0	0	**3**
Borough of Newville	696	0	0	0	0	0	0	0	0	0	2	0	0	**2**
Township of North Middleton	4,928	0	0	0	0	0	0	0	2	0	87	0	0	**89**
Township of North Newton	924	0	0	0	0	0	0	0	1	0	1	0	0	**2**
Township of Penn	1,149	0	0	0	0	0	0	0	0	0	17	0	0	**17**
Borough of Shippensburg	1,796	0	2	43	1	1	0	5	7	0	62	0	0	**121**
Township of Shippensburg	1,236	0	0	7	0	1	0	0	0	0	69	0	0	**77**

Table 4.3.3-6: Structures in the SFHA by Generalized Land Use Type

Municipality	Total Structures in Municipality	Agricultural	Civic/ Institutional	Commercial	Emergency Services	Government	Hospitals and Medical Centers	Industrial	Other/ Unspecified	Religious	Residential	School	Transportation	Grand Total
Borough of Shiremanstown	742	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Township of Silver Spring	6,492	0	0	5	0	0	0	1	1	0	79	0	0	**86**
Township of South Middleton	6,489	0	0	5	1	1	0	3	0	0	109	0	0	**119**
Township of South Newton	507	0	0	2	0	0	0	0	0	0	27	0	0	**29**
Township of Southampton	2,660	0	0	3	0	0	0	0	2	0	90	0	0	**95**
Township of Upper Allen	7,286	0	0	3	0	0	0	0	6	0	211	0	0	**220**
Township of Upper Frankford	873	0	0	0	0	0	0	0	0	0	23	0	0	**23**
Township of Upper Mifflin	534	0	0	0	0	0	0	0	0	0	2	0	0	**2**
Township of West Pennsboro	2,270	0	0	0	0	0	0	0	0	0	19	0	0	**19**
Borough of Wormleysburg	1,407	0	0	19	0	0	0	0	0	0	54	0	0	**73**
TOTAL	**100,467**	**0**	**2**	**168**	**2**	**3**	**0**	**15**	**33**	**2**	**2,022**	**1**	**0**	**2,248**

There are nine SARA facilities located in the 1 percent-annual-chance floodplain (see Appendix D). Communities where these facilities are located and communities downstream are vulnerable to hazardous material contamination during significant flooding events.

A total of 505 critical facilities were identified in Cumberland County. Of these, 17 are located in the SFHA (three percent). Details are provided in Table 4.3.3-7.

Past occurrence shows that flooding events of varying extents take place annually. These events have caused loss of life, repetitive inundation of roads, and significant dollar losses (see Section 4.3.3-2 and Section 4.4.3). A majority of the Repetitive Loss structures within the County are located in Borough of New Cumberland, East Pennsboro Township, and Borough of Camp Hill. These communities are particularly vulnerable to repeated flood damages and ensuing flood insurance claims.

When considering the population in the SFHA, the greatest number of at-risk residents live in Upper Allen Township (approximately 1,635 residents in SFHA), Shippensburg Township (approximately 748 residents in SFHA), Hampden Township (approximately 683 residents in SFHA), and East Pennsboro Township (approximately 667 residents in SFHA). In all, there are approximately 6,868 residents of Cumberland County living within the SFHA. This data is detailed in Table 4.3.3-8.

Table 4.3.3-7: Critical Facilities in the SFHA in Cumberland County (Cumberland County GIS, 2014).

Community	Total Critical Facilities In Municipality	Total Critical Facilities In SFHA	Percent Critical Facilities In SFHA
Borough of Camp Hill	16	0	0%
Borough of Carlisle	67	1	1%
Township of Cooke	2	0	0%
Township of Dickinson	9	0	0%
Township of East Pennsboro	29	0	0%
Township of Hampden	58	1	2%
Township of Hopewell	1	0	0%
Borough of Lemoyne	13	0	0%
Township of Lower Allen	30	0	0%
Township of Lower Frankford	1	0	0%
Township of Lower Mifflin	3	0	0%
Borough of Mechanicsburg	25	0	0%
Township of Middlesex	25	1	4%
Township of Monroe	7	2	29%
Borough of Mount Holly Springs	9	3	33%
Borough of New Cumberland	10	0	0%
Borough of Newburg	2	0	0%
Borough of Newville	10	0	0%
Township of North Middleton	23	1	4%
Township of North Newton	6	0	0%
Township of Penn	5	1	20%
Township of Shippensburg	9	2	22%
Borough of Shippensburg	13	1	8%
Borough of Shiremanstown	4	0	0%
Township of Silver Spring	35	1	3%
Township of South Middleton	42	1	2%
Township of South Newton	2	0	0%
Township of Southampton	9	1	11%
Township of Upper Allen	22	1	5%
Township of Upper Frankford	5	0	0%
Township of Upper Mifflin	1	0	0%
Township of West Pennsboro	10	0	0%
Borough of Wormleysburg	2	0	0%
TOTAL	**505**	**17**	**3%**

Table 4.3.3-8: Population in the SFHA in Cumberland County (US Census Bureau, 2010).

Community	Total 2010 Population	2010 Population In SFHA*	Percent Population In SFHA
Borough of Camp Hill	7,888	41	1%
Borough of Carlisle	18,682	404	2%
Township of Cooke	179	0	0%
Township of Dickinson	5,223	73	1%
Township of East Pennsboro	20,228	667	3%
Township of Hampden	28,044	683	2%
Township of Hopewell	2,329	249	11%
Borough of Lemoyne	4,553	0	0%
Township of Lower Allen	17,980	53	0%
Township of Lower Frankford	1,732	32	2%
Township of Lower Mifflin	1,783	17	1%
Borough of Mechanicsburg	8,981	0	0%
Township of Middlesex	7,040	24	0%
Township of Monroe	5,823	223	4%
Borough of Mount Holly Springs	2,030	487	24%
Borough of New Cumberland	336	241	72%
Borough of Newburg	7,277	16	0%
Borough of Newville	1,326	39	3%
Township of North Middleton	11,143	70	1%
Township of North Newton	2,430	47	2%
Township of Penn	2,924	108	4%
Township of Shippensburg	4,416	92	2%
Borough of Shippensburg	5,429	748	14%
Borough of Shiremanstown	1,569	0	0%
Township of Silver Spring	13,657	205	2%
Township of South Middleton	14,663	342	2%
Township of South Newton	1,383	17	1%
Township of Southampton	6,359	136	2%
Township of Upper Allen	18,059	1,635	9%
Township of Upper Frankford	2,005	18	1%
Township of Upper Mifflin	1,304	8	1%
Township of West Pennsboro	5,561	94	2%
Borough of Wormleysburg	3,070	99	3%
TOTAL	**235,406**	**6,868**	**3%**

**Calculated by selecting the 2010 census block centroids that intersect the SFHAs. This is an approximation of populations living near the SFHA.*

4.3.4. Hurricane, Tropical Storm, & Nor'easter

4.3.4.1 Location and Extent

Tropical storms impacting Cumberland County develop in tropical or sub-tropical waters found in the Atlantic Ocean, Gulf of Mexico, or Caribbean Sea. 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. While Cumberland County is located over 150 miles from the Atlantic Coast, tropical storms and hurricanes can track inland causing heavy rainfall and winds.

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 with a cyclone that has lost its 'tropical' characteristics. While an extra-tropical storm denotes a change in weather pattern and how the storm is gathering energy, it may still have northeast winds that are tropical storm or hurricane force. Nor'easters can also produce heavy precipitation in the form of rain, snow, or ice. Although not a concern for Cumberland County, nor'easters may cause coastal flooding and beach erosion.

Hurricanes, tropical storms, and nor'easters are regional events that can impact very large areas hundreds to thousands of miles across over the life of the storm. Therefore, all communities within Cumberland County are equally subject to the impacts of these storms. Areas subject to flooding, wind, and winter storm damage are particularly vulnerable.

4.3.4.2 Range of Magnitude

The impacts associated with hurricanes, tropical storms, and nor'easters are primarily wind damage and flooding, as well as winter weather impacts from nor'easters. 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, as well as northeast winds, which, combined with waterlogged soils, caused trees and utility poles to fall, as illustrated in Figure 4.3.4-1.

Figure 4.3.4-1: Hurricane Irene damage to a residence in Lower Allen Township, Cumberland County, PA on August 28, 2011 (Photograph courtesy of Lower Allen Township, 2014).

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 Cumberland County), which are combined to estimate potential damage. Table 4.3.4-1 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 percent of all tropical cyclones making landfall, they account for over 70 percent of the damage in the United States.

Table 4.3.4-1: Saffir-Simpson Scale categories with associated wind speeds and damages (NHC, 2014).

Storm Category	Wind Speed (Mph)	Description Of Damages
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	111-129	**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,

Table 4.3.4-1: Saffir-Simpson Scale categories with associated wind speeds and damages (NHC, 2014).		
Storm Category	**Wind Speed (Mph)**	**Description Of Damages**
		blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
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.

The likelihood of these damages occurring in Cumberland County is assessed in Section 4.3.4.4. It is important to recognize the potential for flooding during these storm events; the risk assessment for flood-related damages is discussed in Section 4.3.3. Environmental impacts associated with hurricanes and tropical storms are consistent with the impacts described for flooding in Section 4.3.3.2 and tornadoes and windstorms in Section 4.3.8.2. The impact of severe winter weather which sometimes occurs during nor'easter events is discussed in Section 4.3.10.2.

The worst hurricane or tropical storm event in Cumberland County was Hurricane Agnes in 1972, described in Section 4.3.4.3. The worst nor'easter event in Cumberland County occurred from January 6-8, 1996, resulting in Presidential Disaster Declaration 1085. Blizzard conditions including heavy snow, strong winds, and very cold temperatures caused $635,000 in property damage in Cumberland County (NWS, 1996 and NCDC, 2014). About a week later, unseasonably high temperatures and rainfall melted the thick snowpack left by the nor'easter and resulted in Presidential Disaster Declaration 1093 for flooding (USGS, 1996).

4.3.4.3 Past Occurrence

Previous tropical storm and hurricane events that have impacted Cumberland County are listed in Table 4.3.4-2; example damage can be seen in Figure 4.3.4-2. With the exception of Tropical Storm Beryl, Presidential or Gubernatorial Disaster Declarations were issued for all of these events. Storms with centers of circulation passing through or near Cumberland County are shown in Figure 4.3.4-3.

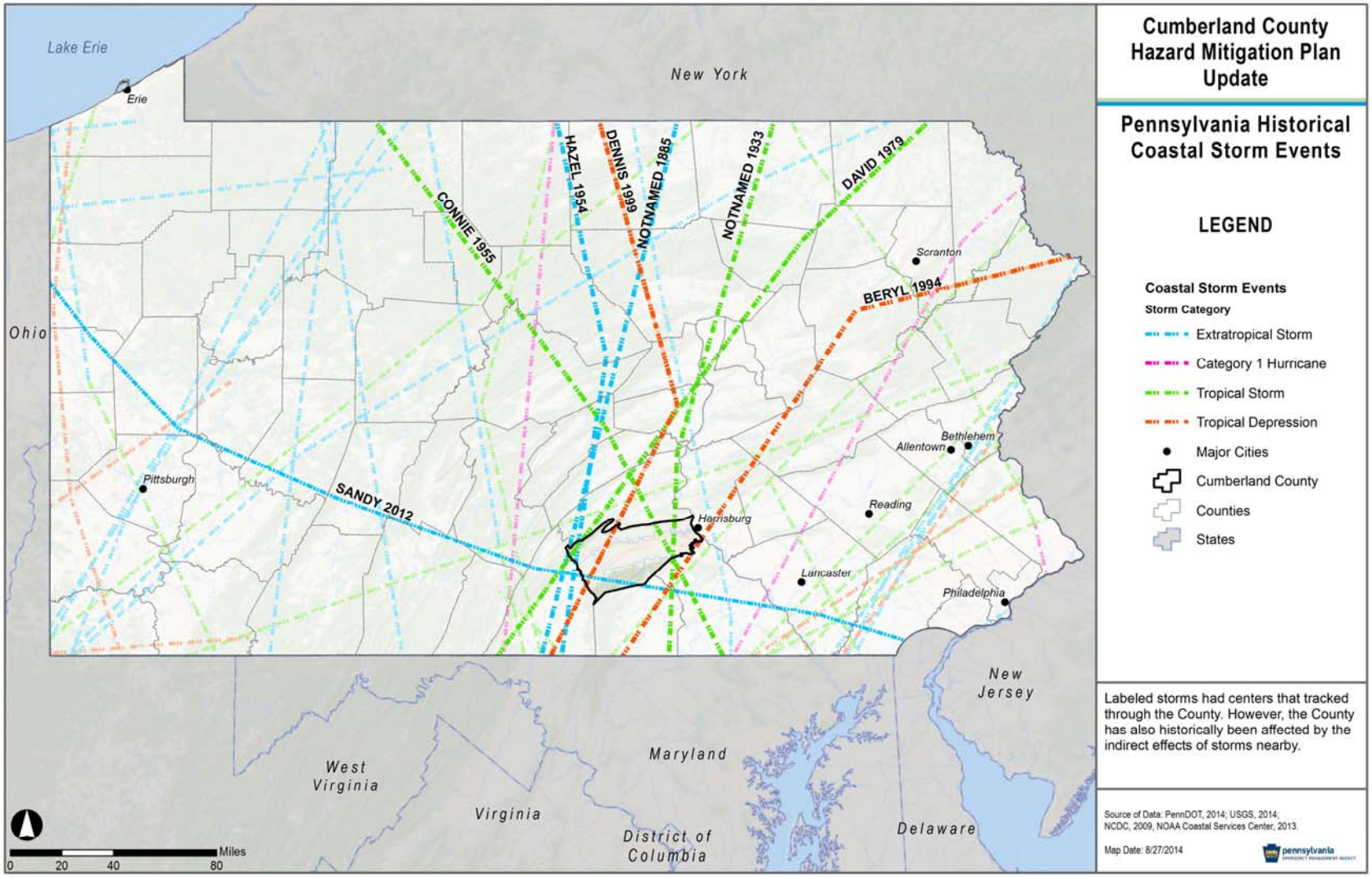
Table 4.3.4-2: Previous tropical storm events significantly affecting Cumberland County (NCDC, 2014).	
Year	**Event**
1972	Tropical Storm Agnes
1975	Hurricane Eloise
1994	Tropical Storm Beryl
1996	Hurricane Fran
1999	Hurricane Dennis

Table 4.3.4-2: Previous tropical storm events significantly affecting Cumberland County (NCDC, 2014).

Year	Event
1999	Hurricane Floyd
2003	Tropical Storm Henri
2003	Tropical Storm Isabel
2004	Tropical Depression Ivan
2006	Tropical Depression Ernesto
2011	Tropical Storm Lee
2012	Hurricane Sandy

Figure 4.3.4-2: Flooding at the intersection of Front and Market streets in Enola (East Pennsboro Township), Cumberland County, PA on September 9, 2011, due to Tropical Storm Lee (Photograph courtesy of East Pennsboro Township, 2014).

Figure 4.3.4-3: Pennsylvania Historical Coastal Storm Events



Of the storms listed in Table 4.3.4-2, Tropical Storm Agnes was the most devastating event the County experienced. Agnes made landfall in Florida as a minimal hurricane. However, it combined with a non-tropical low over the Mid-Atlantic Region to produce rainfall amounts of up to 19 inches in some locations. Table 4.3.4-3 provides a breakdown of the damages by municipality and flood source, some of which are centered in adjacent York County but were included in the database as affecting Cumberland County.

Table 4.3.4-3: Distribution of flood damages by municipality and flood source from Tropical Storm Agnes (SHELDUS, 2009).

Municipality	Flood Source	Damages ($)
Enola	Susquehanna River	2,212,000
Carlisle Borough	Letort Spring Run	5,151,000
Camp Hill Borough	Conodoguinet Creek	14,833,000
Shippensburg Borough	Middle Spring Creek	854,000
Wormleysburg Borough	Susquehanna River	4,588,000
New Cumberland Borough	Susquehanna River	9,092,000
Goldsboro Borough (York County)	Susquehanna River	1,712,000
Lemoyne Borough	Susquehanna River	708,000
Dillsburg Borough (York County)	Dogwood Run	614,000
Mount Holly Springs Borough	Mountain Creek	639,000
Huntsdale	Yellow Breeches Creek	49,000
Boiling Springs	Yellow Breeches Creek	219,000
Upper Allen Township (Grantham)	Yellow Breeches Creek	54,000

The NOAA NCDC database does not track nor'easters as a separate weather event; they are tracked as high wind, heavy snow, and/or coastal flooding events, so a complete listing is not available. However, other sources provide record that some of the winter storms listed in Section 4.3.10.3 were nor'easters. For instance, a severe nor'easter affected areas from North Carolina to Maine starting on January 4, 1994 and immobilized millions of people. The nor'easter brought icy rain and very heavy snow, which drifted up to three feet deep, closed major highways, and brought down power lines, resulting in Presidential Major Disaster Declaration 1015 (deCourcy Hinds, 1994). Another nor'easter starting on October 29, 2011, brought 6-10" of heavy, wet snow across Cumberland County. Because trees were still covered in leaves, the weight of the snow on the leaves brought down many trees and power lines. High winds followed the storm, causing more trees and power lines to fall, leaving thousands of Cumberland County residents without power for days (Cumberland County DPS, 2011). Across the Northeast, a state of emergency was declared in New Jersey, Massachusetts, Connecticut, and some counties in New York, and at least three million customers lost power (Barnard and Nir, 2011). The worst nor'easter event recorded in Cumberland County occurred in January 1996 and is described in Section 4.3.4.2.

4.3.4.4 Future Occurrence

Although hurricanes, tropical storms, and nor'easters can cause flood events consistent with 1 and 0.2 percent-annual-chance levels, their probability of occurrence is measured relative to

wind speed. Table 4.3.4-4 shows the probability of winds that reach the strength of tropical storms and hurricane conditions in Cumberland County and surrounding areas based on a statistical sample region of more than 30,000 square miles over a period of 46 years.

Table 4.3.4-4: Annual probability of tropical storm and hurricane strength wind speeds in Cumberland County and surrounding areas (FEMA, 2000).

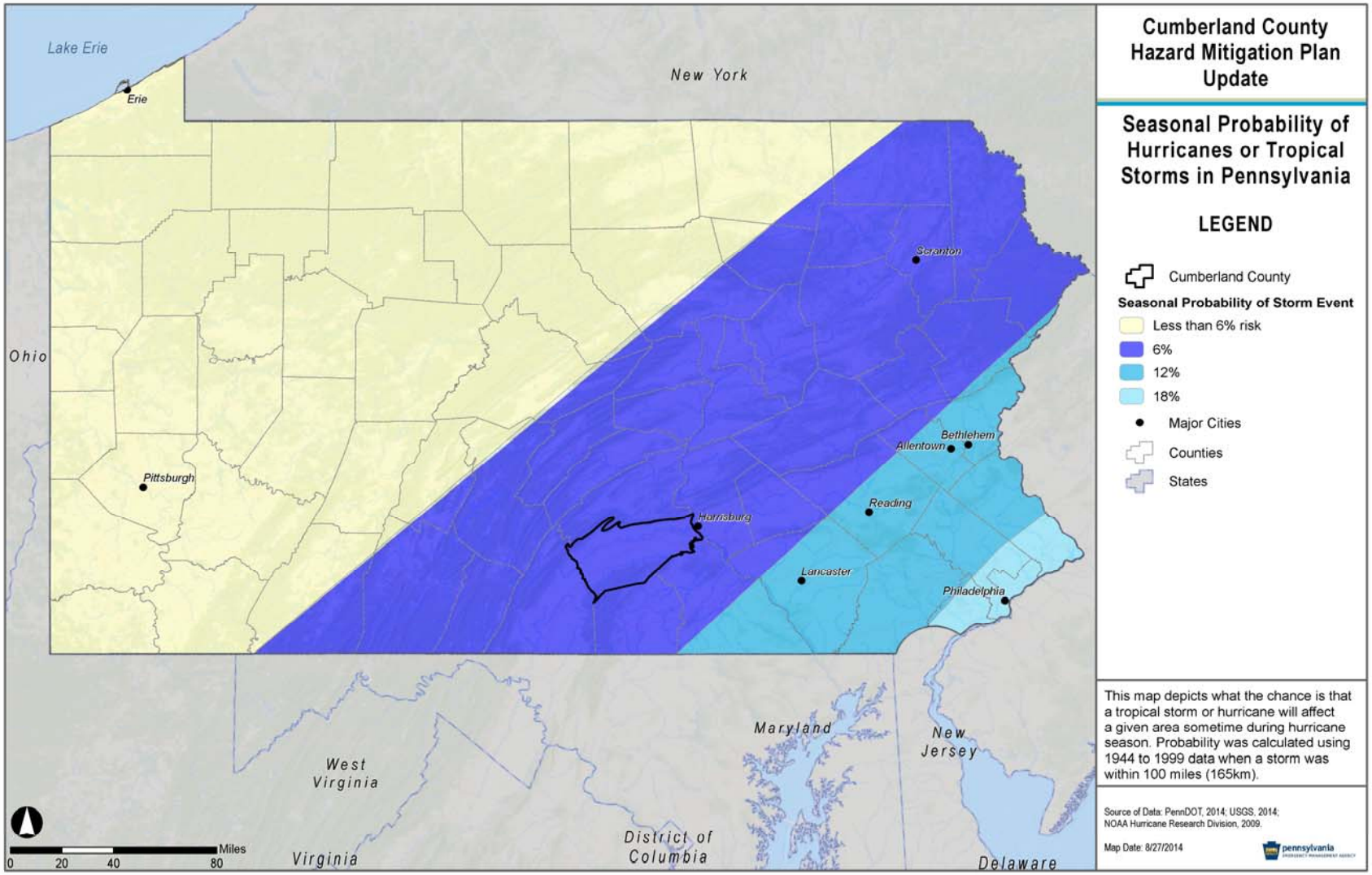
Wind Speed (Mph)	Corresponding Saffir-Simpson Tropical Storm/Hurricane Categories	Annual Probability Of Occurrence (%)
45-77	Tropical Storms and Category 1 Hurricanes	91.59
78-118	Category 1 to 2 Hurricanes	8.32
119-138	Category 3 to 4 Hurricanes	0.0766
139-163	Category 4 to 5 Hurricanes	0.0086
164-194	Category 5 Hurricanes	0.00054
195+	Category 5 Hurricanes	0.00001

Table 4.3.4-4 includes wind speeds for all types of storms and is not specific to cyclonic winds. In Cumberland County and surrounding areas, the annual probability for winds that equal the strength of tropical storms (over 39 mph) is over 90 percent. The probability for winds at category 1 or 2 hurricane strength (78-118 mph) is greater than eight percent in any given year. Using Table 4.3.4-1, these wind speeds correspond to *minimal* or *moderate* expected damages. The annual probability of winds exceeding 118 mph is less than 0.1 percent.

The National Oceanic and Atmospheric Administration Hurricane Research Division provided the data for the map included as Figure 4.3.4-3 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 that there is a six percent chance of Cumberland County experiencing a tropical storm or hurricane event between June and November of any given year.

Overall, the probability of future hurricanes, tropical storms, and nor'easters can be considered *possible* according to the Risk Factor Methodology (see Table 4.4-1).

Figure 4.3.4-3: Seasonal probability of hurricanes or tropical storms in Pennsylvania.



4.3.4.5 Vulnerability Assessment

Cumberland County is vulnerable to the impact of flooding and severe wind caused by hurricanes, tropical storms, and nor'easters. Flood vulnerability is addressed in Section 4.3.3.5 and vulnerability to wind damage is addressed in Section 4.3.8.5. The County is also vulnerable to severe winter weather impacts caused by nor'easters which are evaluated in Section 4.3.10.5.

4.3.5. Landslide

4.3.5.1 Location and Extent

As discussed in Section 2.1, Cumberland County is bordered by Blue Mountain and North Mountain to the north, South Mountain to the south, and the Susquehanna River to the east. The western edge of the County has no significant natural border.

Rockfalls and other slope failures can occur in areas of Cumberland County with moderate to steep slopes. Figure 4.3.5-1 illustrates areas of the County with steep slopes (gradient over 15 percent). The steep slopes of Blue Mountain and North Mountain along the northern border of the County and South Mountain across the southwestern portion of the County are evident in Figure 4.3.5-1. Much of the land in Cumberland County with slopes of over 15 percent has been incorporated into state forests or state parks (see Figure 2.1-1). Between the mountains and foothills of the north and south, the central valley floor runs east to west across the County with generally mild slopes of less than eight percent, other than localized ridges (Cumberland County Comprehensive Plan, 2003).

Many slope failures are associated with precipitation events – periods of sustained above-average precipitation, specific rainstorms, or snowmelt events. Areas experiencing erosion, decline in vegetation cover, and earthquakes are also susceptible to landslides. Human activities that contribute to slope failure include altering the natural slope gradient, increasing soil water content, and removing vegetation cover.

The Department of Conservation and Natural Resources describes landslide susceptibility in Cumberland County as *generally low*, but includes local areas of *high to moderate* susceptibility. Figure 4.3.5-2 shows areas of *low*, *moderate* and *combo-high* landslide susceptibility as determined by the U.S. Geological Survey. The majority of Cumberland County, including populated areas such as the Borough of Carlisle and the Borough of Mechanicsburg, has *low* susceptibility. However, there are areas of *moderate* and *combo-high* susceptibility, such as the North and South Mountain regions.

Figure 4.3.5-1: Map of steep slopes in Cumberland County.

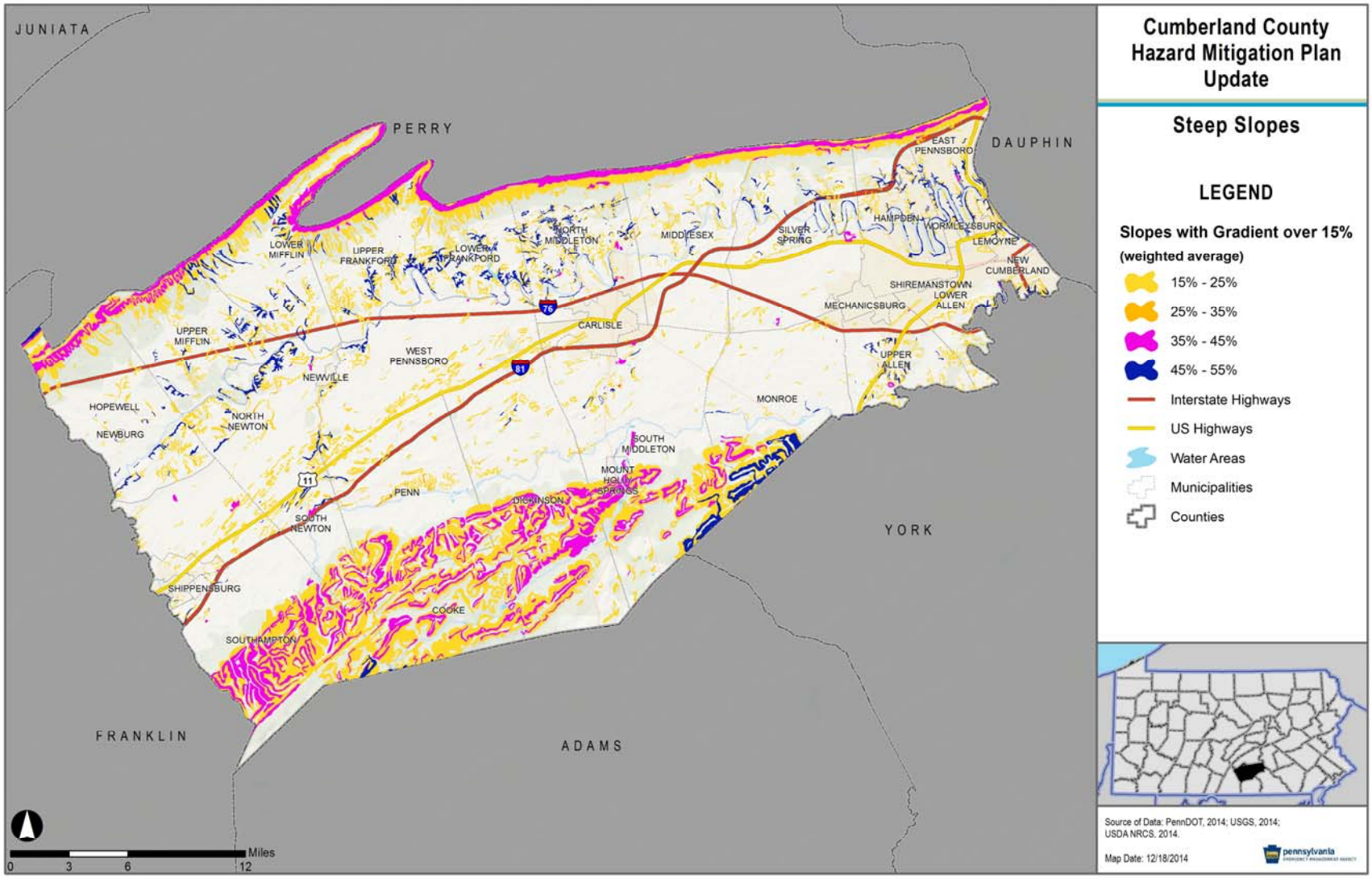
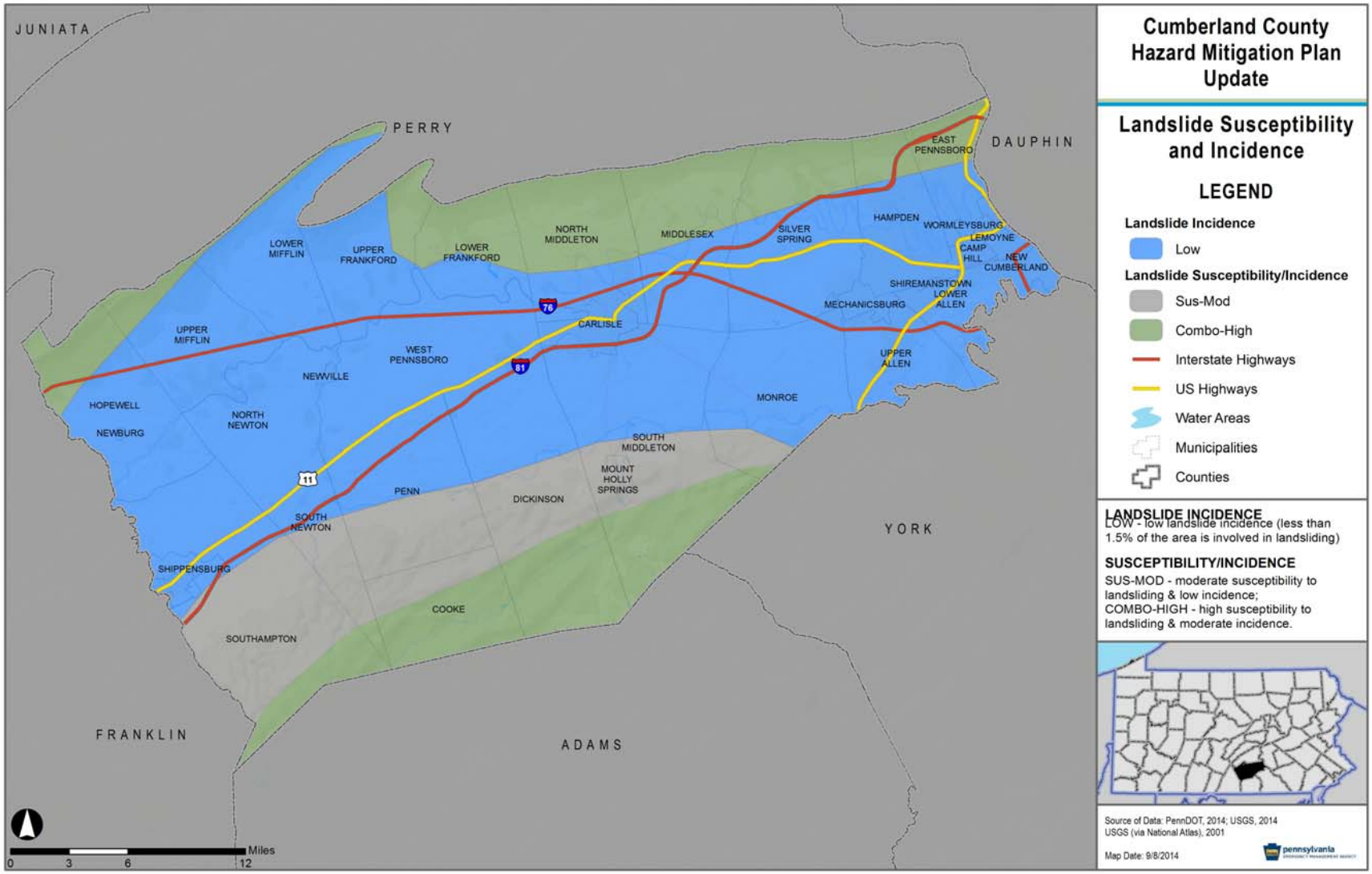


Figure 4.3.5-2: Map of general landslide hazard areas in Cumberland County.



4.3.5.2 Range of Magnitude

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

The Pennsylvania Department of Transportation and large municipalities incur substantial costs due to landslide damage and to extra construction costs for new roads in known landslide-prone areas. A 1991 estimate showed an average of $10 million per year is spent on landslide repair contracts across the Commonwealth and a similar amount is spent on mitigation costs for grading projects (DCNR, 2014).

The most serious historical landslide event in Cumberland County was the 2009 Colonel Denning State Park event discussed in Section 4.3.5.3. However, no documented events have resulted in fatalities.

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

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

Beyond the environmental impacts, landslides can have serious impacts on transportation routes, utilities, and buildings depending on their location. Landslides may decrease property values, and the costs of litigation may be significant to local communities.

4.3.5.3 Past Occurrence

A rock slide occurred along Route 233 southwest of Colonel Denning State Park during a heavy rain and flash flooding event on May 28, 2009. The event caused a road closure in Upper and Lower Mifflin townships, and campers were evacuated from the Park. There have been several landslides in the Commonwealth, but no other significant events of record in Cumberland County.

A comprehensive inventory of landslide events across the entire Commonwealth is not available, and the USGS does not maintain a formal inventory of landslides. Instead, the USGS Landslide Hazards Program collects data as events are reported to the agency. Landslide inventory maps were created in the late 1970s and early 1980s by the U.S. Geological Survey as part of an Appalachians-wide study of landslides. These maps show landslides and related features that were identified mainly from aerial photographs; however, Cumberland County was not included in this inventory (DCNR, 2014). The NCDC has begun capturing landslides as they occur in conjunction with severe storms, but no landslide events are listed for Cumberland County (NCDC, 2014).

4.3.5.4 Future Occurrence

Based on historical events, significant landslide events are unlikely in the County. Overall, the probability of future landslide events can be considered *unlikely* according to the Risk Factor Methodology (see Table 4.4-1). However, mismanaged intense development in steeply sloped areas could increase their frequency of occurrence. Figure 4.3.5-2 shows that a majority of the County has low incidence of landslide events.

4.3.5.5 Vulnerability Assessment

Most communities in Cumberland County are not particularly vulnerable to landslides. Comments received from those who participated in the 2010 and 2014 HMPs indicated that landslides do not pose a significant threat to the County. Any events that do occur would take place in steeply sloped areas such as those mentioned around North and South Mountains in Upper Mifflin Township, Lower Mifflin Township, Cooke Township, Dickinson Township, Penn Township, Southampton Township, South Newton Township, South Middleton Township, Monroe Township, and Mount Holly Springs Borough.

In addition, places where landforms have been altered for purposes of highway construction or other development may be uniquely vulnerable to landslide hazards. This is especially true if development is located at the base or crest of cliffs or near large highway cut-outs. These areas should be considered vulnerable to landslides, particularly if mitigation measures have not been implemented.

Table 4.3.5-1 lists the number of structures and the number of critical facilities located within the landslide Combo-High zone in each municipality. While this provides a generalized vulnerability to landslides, site-specific criteria like micro-level topography and vegetative cover play a significant role in the vulnerability of individual structures. Table 4.3.5-2 indicates the generalized land use type for each structure. Most of the 12,209 structures in landslide Combo-High zones are located in East Pennsboro Township (3,856), North Middleton Township (2,569), Middlesex (1,577), and Hampden Township (1,215). However, the highest percentages of structures located in Combo-High landslide zones are in Cooke Township (73.9 percent), Middlesex Township (57.4 percent), North Middleton Township (52.1 percent), and Lower Frankford (50.6 percent). The Borough of Carlisle and Hampden Township have the greatest number of critical facilities in the Combo-High landslide zone, at 67 and 58 respectively. The vast majority of structures (11,909 of the 12,209 total) in the Combo-High landslide zone are residential.

Table 4.3.5-1: Landslide Vulnerability for Cumberland County (Cumberland County GIS, 2014).

Municipality	Total Structures In Municipality	Structures In Landslide Combo-High Zones	Percent Of Structures In Landslide Combo- High Zones	Total Critical Facilities In Municipality	Total Critical Facilities In Landslide Combo-High Zones	Percent Critical Facilities In Landslide Combo-High Zones
Borough of Camp Hill	3,629	0	0.0%	16	0	0.0%
Borough of Carlisle	8,248	0	0.0%	67	0	0.0%
Township of Cooke	326	241	73.9%	2	1	50.0%
Township of Dickinson	2,160	680	31.5%	9	2	22.2%
Township of East Pennsboro	8,637	3,856	44.6%	29	11	37.9%
Township of Hampden	12,335	1,215	9.9%	58	2	3.4%
Township of Hopewell	854	135	15.8%	1	0	0.0%
Borough of Lemoyne	2,057	0	0.0%	13	0	0.0%
Township of Lower Allen	7,012	0	0.0%	30	0	0.0%
Township of Lower Frankford	715	362	50.6%	1	1	100.0%
Township of Lower Mifflin	728	0	0.0%	3	0	0.0%
Borough of Mechanicsburg	4,292	0	0.0%	25	0	0.0%
Township of Middlesex	2,749	1,577	57.4%	25	4	16.0%
Township of Monroe	2,413	0	0.0%	7	0	0.0%
Borough of Mount Holly Springs	893	0	0.0%	9	0	0.0%
Borough of New Cumberland	3,296	0	0.0%	10	0	0.0%
Borough of Newburg	134	0	0.0%	2	0	0.0%
Borough of Newville	696	0	0.0%	10	0	0.0%
Township of North Middleton	4,928	2,569	52.1%	23	5	21.7%
Township of North Newton	924	0	0.0%	6	0	0.0%
Township of Penn	1,149	0	0.0%	5	0	0.0%
Borough of Shippensburg	1,796	0	0.0%	9	0	0.0%
Township of Shippensburg	1,236	0	0.0%	13	0	0.0%
Borough of Shiremanstown	742	0	0.0%	4	0	0.0%
Township of Silver Spring	6,492	932	14.4%	35	1	2.9%
Township of South Middleton	6,489	437	6.7%	42	2	4.8%
Township of South Newton	507	0	0.0%	2	0	0.0%
Township of Southampton	2,660	28	1.1%	9	0	0.0%
Township of Upper Allen	7,286	0	0.0%	22	0	0.0%
Township of Upper Frankford	873	137	15.7%	5	0	0.0%
Township of Upper Mifflin	534	40	7.5%	1	0	0.0%
Township of West Pennsboro	2,270	0	0.0%	10	0	0.0%
Borough of Wormleysburg	1,407	0	0.0%	2	0	0.0%
TOTAL	**100,467**	**12,209**	**12.2%**	**505**	**29**	**5.7%**

Table 4.3.5-2: Structures in Landslide Combo-High Areas by Generalized Land Use Type (Cumberland County GIS, 2014).

Municipality	Total Structures in Municipality	Agricultural	Civic/ Institutional	Commercial	Emergency Services	Government	Hospitals and Medical Centers	Industrial	Other/ Unspecified	Religious	Residential	School	Transportation	Grand Total
Borough of Camp Hill	3,629	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of Carlisle	8,248	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Cooke	326	0	0	0	1	0	0	0	3	0	237	0	0	241
Township of Dickinson	2,160	1	0	5	0	0	0	1	7	2	663	1	0	680
Township of East Pennsboro	8,637	0	1	105	2	0	0	0	16	7	3,709	16	0	3,856
Township of Hampden	12,335	0	0	31	0	0	0	0	5	2	1,175	2	0	1,215
Township of Hopewell	854	0	0	2	0	0	0	0	1	1	131	0	0	135
Borough of Lemoyne	2,057	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Lower Allen	7,012	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Lower Frankford	715	0	0	1	0	1	0	0	1	1	358	0	0	362
Township of Lower Mifflin	728	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of Mechanicsburg	4,292	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Middlesex	2,749	1	0	9	1	1	0	0	5	3	1,556	1	0	1,577
Township of Monroe	2,413	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of Mount Holly Springs	893	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of New Cumberland	3,296	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of Newburg	134	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of Newville	696	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of North Middleton	4,928	1	0	14	1	1	0	1	15	2	2,534	0	0	2,569
Township of North Newton	924	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Penn	1,149	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of Shippensburg	1,796	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Shippensburg	1,236	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4.3.5-2: Structures in Landslide Combo-High Areas by Generalized Land Use Type (Cumberland County GIS, 2014).

Municipality	Total Structures in Municipality	Agricultural	Civic/ Institutional	Commercial	Emergency Services	Government	Hospitals and Medical Centers	Industrial	Other/ Unspecified	Religious	Residential	School	Transportation	Grand Total
Borough of Shiremanstown	742	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Silver Spring	6,492	1	0	10	0	0	0	1	3	3	913	1	0	932
Township of South Middleton	6,489	0	0	3	0	2	0	0	1	1	430	0	0	437
Township of South Newton	507	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Southampton	2,660	0	0	0	0	0	0	0	0	0	28	0	0	28
Township of Upper Allen	7,286	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Upper Frankford	873	0	0	0	0	0	0	0	1	1	135	0	0	137
Township of Upper Mifflin	534	0	0	0	0	0	0	0	0	0	40	0	0	40
Township of West Pennsboro	2,270	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of Wormleysburg	1,407	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**100,467**	**4**	**1**	**180**	**5**	**5**	**0**	**3**	**58**	**23**	**11,909**	**21**	**0**	**12,209**

4.3.6. Pandemic

4.3.6.1 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 Cumberland 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.

Cumberland County is primarily concerned with pandemic influenza, which is why staff participates in preparedness exercises (Figure 4.3.6-1). 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.

Figure 4.3.6-1: Thirty-three members of the Cumberland County Emergency Operations Center participated in the pandemic flu virtual table top exercise on May 20, 2014 (Photograph courtesy of Nick Smallwood/FEMA, 2014).

4.3.6.2 Range of Magnitude

The magnitude of a pandemic or infectious disease threat in Cumberland 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).

4.3.6.3 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 4.3.6-1.

Table 4.3.6-1: 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 431 confirmed flu cases in Cumberland County (PA DOH, 2014a).

4.3.6.4 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).

4.3.6.5 Vulnerability Assessment

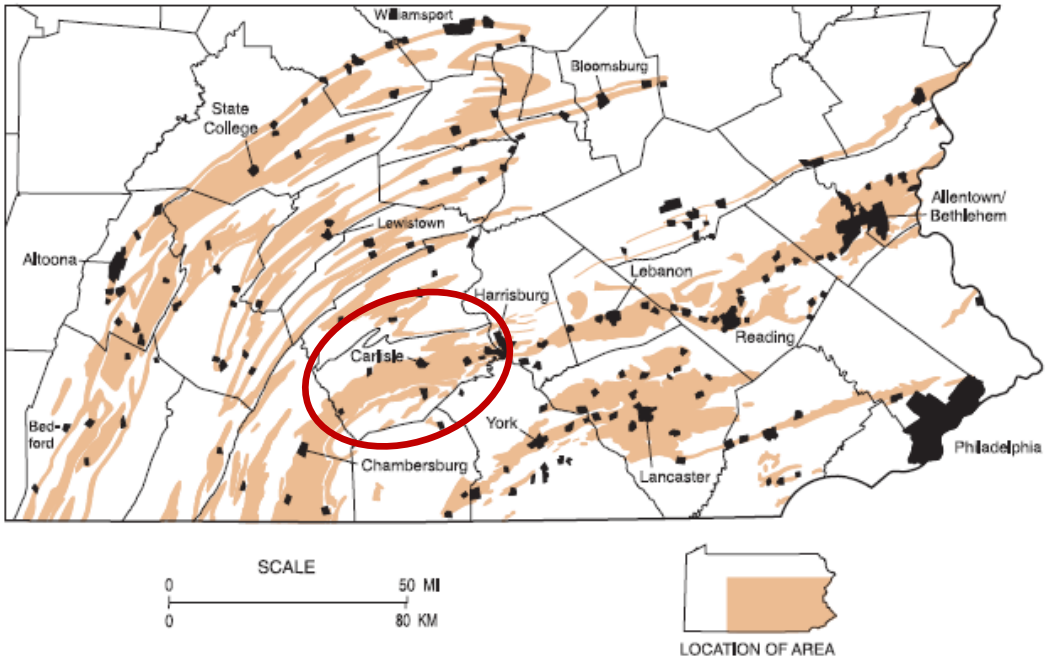
In general, jurisdictions that are more densely populated are more vulnerable to disease threats when the disease is directly spread from human to human, but every jurisdiction in Cumberland County has some vulnerability to pandemic and infectious disease threats. Certain population groups are at higher 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 schools, retirement homes and senior centers is found in the Carlisle Borough and West Shore areas (Appendix E).

4.3.7. Subsidence & Sinkholes

4.3.7.1 Location and Extent

Subsidence potential in Cumberland 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 dissolve the bedrock leaving voids below the surface. Eventually, overburden on top of the voids collapse, leaving surface depressions resulting in karst topography. Characteristics 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. natural gas, water, oil, etc.). Figure 4.3.7-1 shows that much of Cumberland County lies in an area of Pennsylvania where limestone, dolomite, or both are present near ground surface, thus making it more susceptible to natural sinkhole development. The map includes locations of larger towns and cities that are adjacent to these areas of underlain by carbonate bedrock.

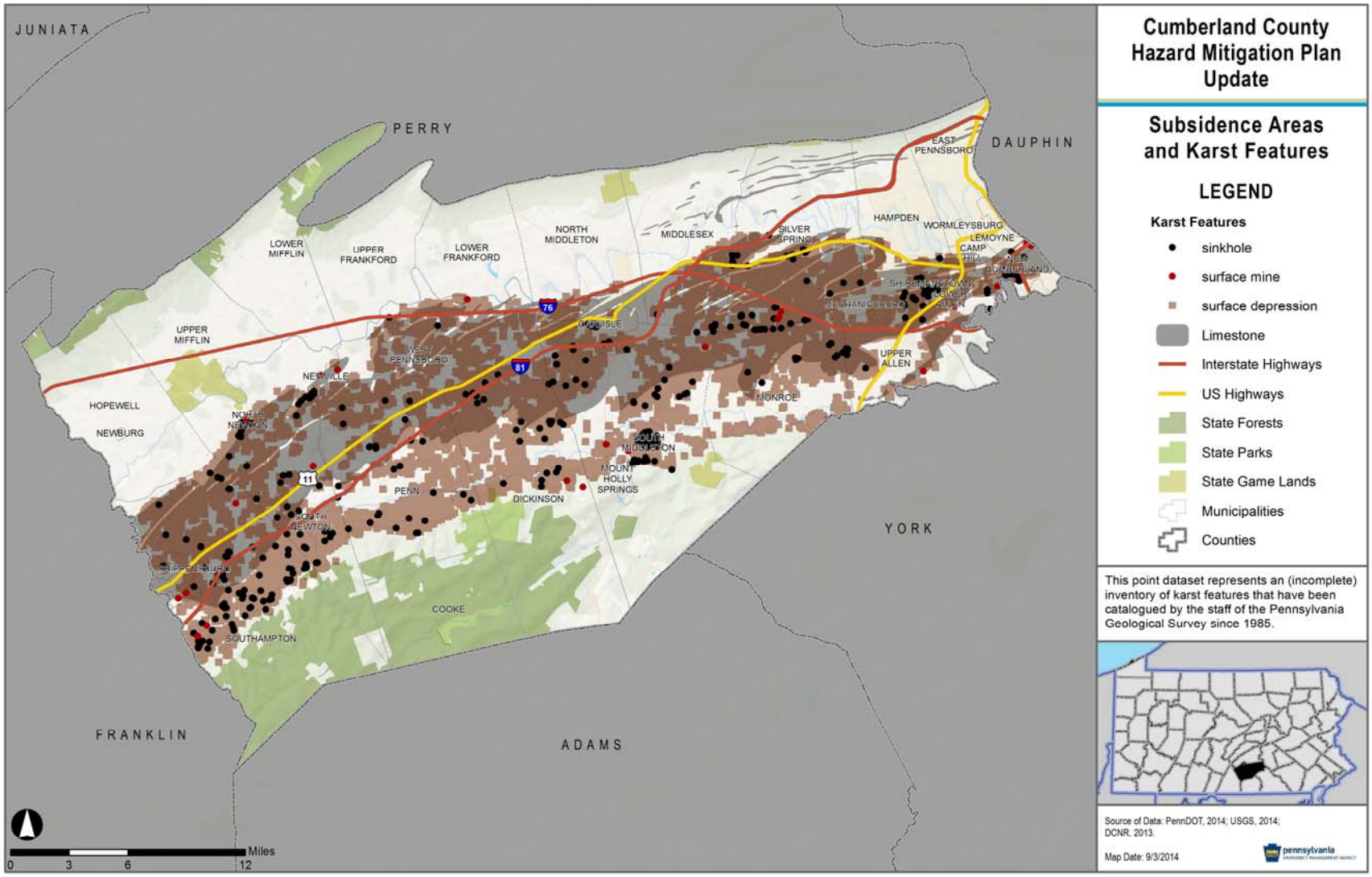
Figure 4.3.7-1: Map of areas in eastern and central Pennsylvania susceptible to subsidence based on the presence of underlying carbonate rock formations with urban areas shown in black (Kochanov, 1999).



Due to the nature of geology in the region, karst features typically occur along southwest-to-northeast deposits of limestone. These are located along an approximately 10-mile wide band that passes through the center of the County, roughly parallel to the counties' northern and southern borders. The deposits are predominantly Ordovician- and Cambrian-period layers, exposed at the surface through folding, faulting and long-term erosion.

The Pennsylvania Geological Survey maintains a partial inventory of karst features, as shown on Figure 4.3.7-2, for Cumberland County. Mapped karst features include sinkholes, surface mines, and surface depressions. There is wide variation in the size of karst features, and fewer karst features have been mapped in the existing urban areas of the County. However, this is likely a result of development activities that disguise, cover, or fill existing karst features rather than an absence of the features themselves.

Figure 4.3.7-2: Density of karst features in Cumberland County.



4.3.7.2 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 much of Cumberland 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, as illustrated in Figure 4.3.7-3. Subsidence and sinkhole events can cause severe damage in urban environments, although gradual events can be addressed before significant damage occurs. If long-term subsidence or sinkhole formation is not recognized and mitigation measures are not implemented, fractures or complete collapse of building foundations and roadways may result. General recommendations have been published for site investigations prior to construction of buildings due to the potential for karst subsidence (Root, 1978). These recommendations vary depending on the rock type immediately underlying soil cover and include thorough geotechnical investigations to identify un-collapsed karst features and potential excavation to solid rock prior to construction.

A worst case scenario for subsidence and sinkholes would be if a sinkhole occurred under a critical facility such as a hospital. Not only could structural damage occur to the building, but there could also be injuries to people as well. In addition, part of the facility would have to be closed in order to repair the structural damage, and this would reduce the hospital's capacity and ability to treat people with other illnesses and injuries.

Figure 4.3.7-3: Sinkhole that developed on Deerfield Road, Lower Allen Township, Cumberland County, PA on November 26, 2013 (Photograph courtesy of Lower Allen Township, 2014).

The presence of sinkholes can result in increased potential for groundwater contamination from contaminants such as sewage, fertilizers, herbicides, pesticides, or industrial products. Due to

their porous nature, sinkholes are sometimes used as instruments for enhancing groundwater recharge. However, if hazardous materials are spilled at a recharge point, groundwater can quickly be contaminated due to the lack of soil substrate which normally would slow migrating contaminants. Vegetation is usually damaged during abrupt subsidence events. However, regrowth takes place over time.

4.3.7.3 Past Occurrence

Cumberland County does not have a record of a significant subsidence-based disaster. Table 4.3.7-1 shows the number of karst features per municipality including a total of 13,270 caves, sinkholes, surface depressions, and surface mines. Surface depressions comprise 12,857 of the karst features.

Table 4.3.7-1: Number of karst features per municipality in Cumberland County (DCNR, 2014).

Municipality	Caves	Sinkholes	Surface Depressions	Surface Mines	Total
Borough of Camp Hill			28		28
Borough of Carlisle		8	144		152
Township of Dickinson		24	1,681	2	1,707
Township of East Pennsboro			1		1
Township of Hampden	1	3	133		137
Borough of Lemoyne	2	1	5	2	10
Township of Lower Allen		34	444	2	480
Borough of Mechanicsburg		1	149		150
Township of Middlesex	1	4	257		262
Township of Monroe		15	1,193		1,208
Borough of Mount Holly Springs			3		3
Borough of New Cumberland		1	25		26
Borough of Newville				1	1
Township of North Middleton	2		55		57
Township of North Newton	7	28	461	2	498
Township of Penn	2	23	1,279		1,304
Borough of Shippensburg			44	2	46
Township of Shippensburg		3	77	1	81
Borough of Shiremanstown		2	19		21
Township of Silver Spring		33	1,100	3	1,136
Township of South Middleton	2	73	1,294	3	1,372
Township of South Newton	1	18	538		557

Table 4.3.7-1: Number of karst features per municipality in Cumberland County (DCNR, 2014).

Municipality	Caves	Sinkholes	Surface Depressions	Surface Mines	Total
Township of Southampton	4	75	2,399	3	2,481
Township of Upper Allen	1	14	600	1	616
Township of West Pennsboro		6	928	2	936
TOTAL	**23**	**366**	**12,857**	**24**	**13,270**

4.3.7.4 Future Occurrence

Based on geological conditions and the presence of previously formed sinkholes, subsidence events are likely to occur in the future for the areas of Cumberland County underlain by carbonate rock. Overall, the probability of future subsidence events can be considered *highly likely* according to the Risk Factor Methodology (see Table 4.4-1).

4.3.7.5 Vulnerability Assessment

As shown in Figure 4.3.7-2, the central band of the County is most vulnerable to the effects of subsidence events. Local roads need annual repair and damage to gas lines, telephone and electrical entry road facilities could occur in highly populated areas (Cumberland EOP, 1984). Based on historical events, Southampton, Dickinson, South Middleton, Penn, Monroe, and Silver Spring townships have the most recorded karst features (see Table 4.3.7-1).

Table 4.3.7-2 lists the number of structures and critical facilities vulnerable to subsidence in each municipality. Table 4.3.7-3 provides the generalized land use types for the structures. There are 44,244 structures in areas vulnerable to subsidence, with the greatest number in the Borough of Carlisle (7,410), Lower Allen Township (4,699), the Borough of Mechanicsburg (4,244), Silver Spring Township (3,818), and South Middleton Township (3,394). Over 95 percent of structures are vulnerable to subsidence in the Borough of Newville, Shippensburg Township, the Borough of Mechanicsburg, and the Borough of Shippensburg. The Borough of Carlisle has 62 of the 283 total critical facilities in areas vulnerable to subsidence. Approximately 40,662 of the structures in areas vulnerable to subsidence are residential out of 44,244 total.

Table 4.3.7-2: Subsidence Vulnerability for Cumberland County (Cumberland County GIS, 2014).

Municipality	Total Structures in Municipality	Structures Vulnerable to Subsidence	Percent Structures Vulnerable to Subsidence	Total Critical Facilities in Municipality	Total Critical Facilities Vulnerable to Subsidence	Percent Critical Facilities Vulnerable to Subsidence
Borough of Camp Hill	3,629	978	26.9%	16	5	31.3%
Borough of Carlisle	8,248	7,410	89.8%	67	62	92.5%
Township of Cooke	326	0	0.0%	2	0	0.0%
Township of Dickinson	2,160	576	26.7%	9	3	33.3%
Township of East Pennsboro	8,637	310	3.6%	29	3	10.3%
Township of Hampden	12,335	2,437	19.8%	58	31	53.4%
Township of Hopewell	854	0	0.0%	1	0	0.0%
Borough of Lemoyne	2,057	810	39.4%	13	2	15.4%
Township of Lower Allen	7,012	4,699	67.0%	30	24	80.0%
Township of Lower Frankford	715	0	0.0%	1	0	0.0%
Township of Lower Mifflin	728	0	0.0%	3	0	0.0%
Borough of Mechanicsburg	4,292	4,224	98.4%	25	24	96.0%
Township of Middlesex	2,749	1,065	38.7%	25	14	56.0%
Township of Monroe	2,413	1,093	45.3%	7	0	0.0%
Borough of Mount Holly Springs	893	0	0.0%	9	0	0.0%
Borough of New Cumberland	3,296	1,986	60.3%	10	4	40.0%
Borough of Newburg	134	0	0.0%	2	0	0.0%
Borough of Newville	696	663	95.3%	10	10	100.0%
Township of North Middleton	4,928	809	16.4%	23	11	47.8%
Township of North Newton	924	349	37.8%	6	2	33.3%
Township of Penn	1,149	227	19.8%	5	1	20.0%
Borough of Shippensburg	1,796	1,795	99.9%	9	9	100.0%
Township of Shippensburg	1,236	1,190	96.3%	13	12	92.3%
Borough of Shiremanstown	742	413	55.7%	4	3	75.0%
Township of Silver Spring	6,492	3,818	58.8%	35	22	62.9%
Township of South Middleton	6,489	3,394	52.3%	42	23	54.8%
Township of South Newton	507	94	18.5%	2	0	0.0%
Township of Southampton	2,660	1,393	52.4%	9	6	66.7%
Township of Upper Allen	7,286	2,581	35.4%	22	6	27.3%
Township of Upper Frankford	873	0	0.0%	5	0	0.0%
Township of Upper Mifflin	534	0	0.0%	1	0	0.0%
Township of West Pennsboro	2,270	1,930	85.0%	10	6	60.0%
Borough of Wormleysburg	1,407	0	0.0%	2	0	0.0%
TOTAL	**100,467**	**44,244**	**44.0%**	**505**	**283**	**56.0%**

Table 4.3.7-3: Generalized Land Use Types for Structures in Areas Vulnerable to Subsidence (Cumberland County GIS, 2014).

Municipality	Total Structures in Municipality	Agricultural	Civic/ Institutional	Commercial	Emergency Services	Government	Hospitals and Medical Centers	Industrial	Other/ Unspecified	Religious	Residential	School	Transportation	Grand Total
Borough of Camp Hill	3,629	0	0	58	0	0	0	1	1	2	913	3	0	978
Borough of Carlisle	8,248	0	10	615	6	15	5	21	46	23	6,620	49	0	7,410
Township of Cooke	326	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Dickinson	2,160	0	0	8	0	0	0	0	1	2	565	0	0	576
Township of East Pennsboro	8,637	0	0	11	0	0	0	0	3	1	291	4	0	310
Township of Hampden	12,335	0	2	289	1	0	0	8	2	6	2,128	1	0	2,437
Township of Hopewell	854	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of Lemoyne	2,057	0	0	71	0	0	0	5	3	3	728	0	0	810
Township of Lower Allen	7,012	0	0	422	2	1	1	8	19	5	4,236	5	0	4,699
Township of Lower Frankford	715	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Lower Mifflin	728	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of Mechanicsburg	4,292	0	2	295	4	1	1	3	10	16	3,887	5	0	4,224
Township of Middlesex	2,749	0	0	88	0	2	1	7	9	3	955	0	0	1,065
Township of Monroe	2,413	1	0	26	0	0	0	1	1	2	1,062	0	0	1,093
Borough of Mount Holly Springs	893	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of New Cumberland	3,296	0	0	70	0	1	0	2	1	5	1,906	1	0	1,986
Borough of Newburg	134	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of Newville	696	0	2	64	2	0	0	5	1	3	586	0	0	663
Township of North Middleton	4,928	0	1	38	0	3	1	1	25	0	740	0	0	809
Township of North Newton	924	1	0	2	0	1	0	1	13	2	326	3	0	349
Township of Penn	1,149	0	0	2	0	0	0	0	0	1	224	0	0	227
Borough of Shippensburg	1,796	0	3	210	2	1	0	17	17	16	1,527	2	0	1,795
Township of Shippensburg	1,236	0	1	46	0	1	4	2	4	3	1,075	54	0	1,190

Table 4.3.7-3: Generalized Land Use Types for Structures in Areas Vulnerable to Subsidence (Cumberland County GIS, 2014).

Municipality	Total Structures in Municipality	Agricultural	Civic/ Institutional	Commercial	Emergency Services	Government	Hospitals and Medical Centers	Industrial	Other/ Unspecified	Religious	Residential	School	Transportation	Grand Total
Borough of Shiremanstown	742	0	0	12	1	1	0	0	0	3	396	0	0	413
Township of Silver Spring	6,492	1	0	177	3	1	0	10	9	9	3,604	4	0	3,818
Township of South Middleton	6,489	1	0	215	1	0	5	7	7	13	3,143	1	1	3,394
Township of South Newton	507	0	0	3	0	0	0	0	1	0	90	0	0	94
Township of Southampton	2,660	0	0	22	0	1	0	1	6	2	1,359	2	0	1,393
Township of Upper Allen	7,286	0	0	130	1	0	0	0	4	8	2,437	1	0	2,581
Township of Upper Frankford	873	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Upper Mifflin	534	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of West Pennsboro	2,270	4	0	33	1	1	1	2	10	12	1,864	2	0	1,930
Borough of Wormleysburg	1,407	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**100,467**	**8**	**21**	**2,907**	**24**	**30**	**19**	**102**	**193**	**140**	**40,662**	**137**	**1**	**44,244**

4.3.8. Tornado & Windstorm

4.3.8.1 Location and Extent

Both tornado and windstorm events can occur throughout Cumberland County. Tornado events are usually localized. 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. The forward motion of the tornado path can be a few hundred yards or several hundred miles in length. The width of tornadoes can vary greatly, but generally range in size from less than 100 feet to over a mile in width. Some tornadoes never touch the ground and are short-lived, while others may touch the ground several times.

Straight-line winds and windstorms are experienced on a more region-wide scale. Severe thunderstorms may result in conditions favorable to the formation of numerous or long-lived tornadoes which may travel over extended distances. While such winds usually accompany tornadoes, straight-lined winds are caused by the movement of air from areas of higher pressure to areas of lower pressure. Stronger winds are the result of greater differences in pressure. Dickinson Township official Larry Barrick commented during the 2014 HMP update process that straight line winds have been an increasing problem in Dickinson Township, and an example of straight line wind damage in South Middleton Township is provided in Figure 4.3.8-1. Windstorms are generally defined with sustained wind speeds of 40 mph or greater lasting for one hour or longer, or winds of 58 mph or greater for any duration.

Figure 4.3.8-1: Straight line wind damage at WG Rice Elementary School in South Middleton Township, Cumberland County, PA in July 2000 (Photograph courtesy of Cumberland County, 2014).

4.3.8.2 Range of Magnitude

Each year, tornadoes account for $1.1 billion in damages and cause over 80 deaths nationally (NCAR, 2001). Previous events in Cumberland County are estimated to have caused approximately $1,210,000 in total damages (see Table 4.3.8-2). 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. Wind speeds from the strongest recorded tornado in Cumberland County did not exceed 206 mph (see 4/3/1961 event in Table 4.3.8-2).

Damages and deaths can be especially significant when tornadoes move through populated, developed areas. The destruction caused by tornadoes ranges from light to inconceivable depending on the intensity, size and duration of the storm. Typically, tornadoes cause the greatest damages to structures of light construction such as mobile homes. The Enhanced Fujita Scale, also known as the “EF-Scale,” measures tornado strength and associated damages. The EF-Scale is an update to the earlier Fujita Scale, also known as the “F-Scale,”

that was published in 1971. It classifies United States tornadoes into six intensity categories, as shown in Table 4.3.8-1, based upon the estimated maximum winds occurring within the wind vortex. 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 provided in Table 4.3.8-1 since previous tornado occurrences listed in Table 4.3.8-2 are based on the F-Scale.

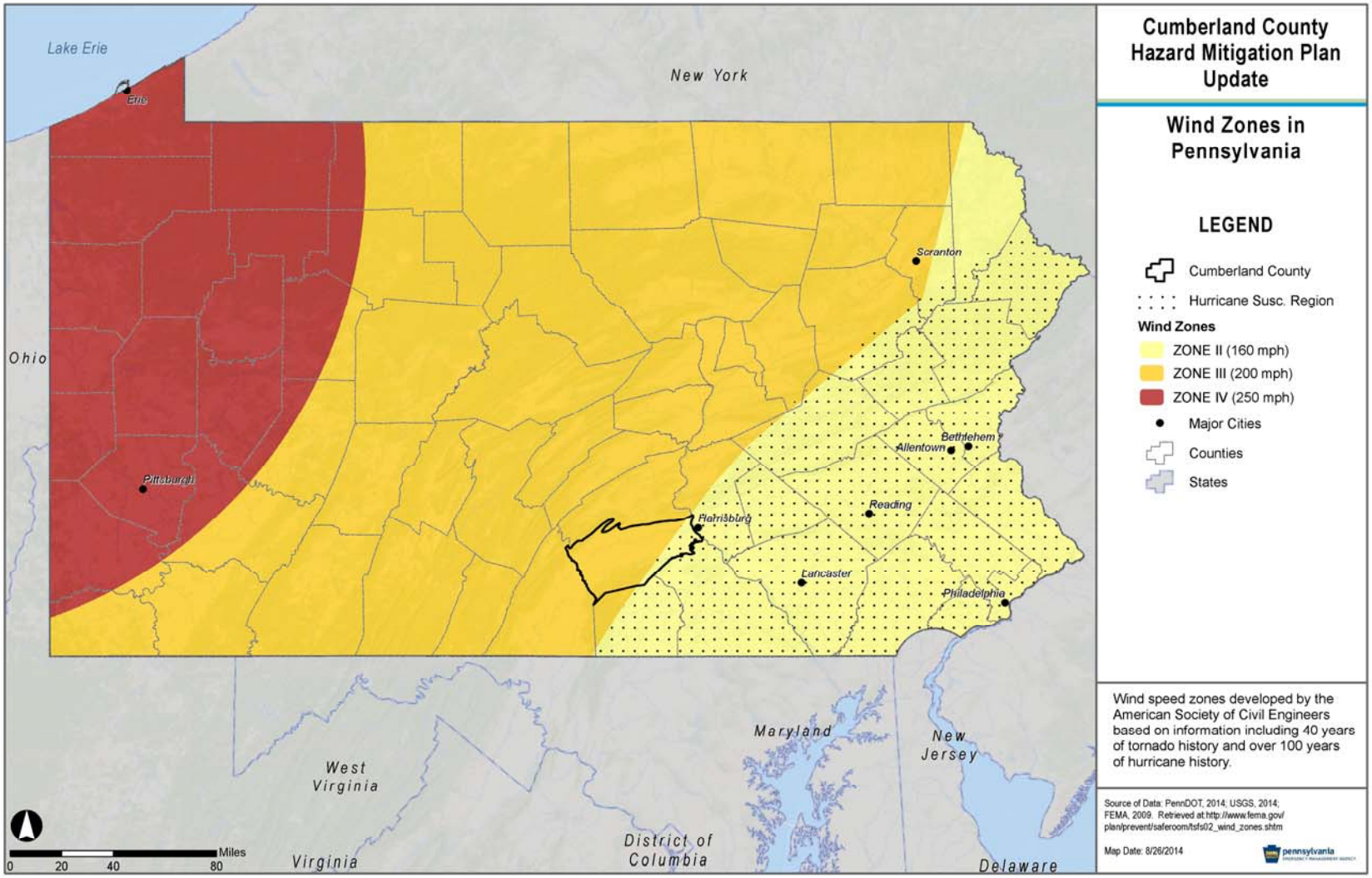
Table 4.3.8-1: Enhanced Fujita Scale (EF-Scale) categories with associated wind speeds and description of damages.

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.
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.

Figure 4.3.8-2 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. Cumberland County falls within Zone II and Zone III, meaning design wind speeds for shelters and critical facilities should be able to withstand a 3-second gust of up to 200 mph, regardless of

whether the gust is the result of a tornado, hurricane, tropical storm, or windstorm event. Therefore, these structures should be able to withstand speeds experienced in an EF4 tornado.

Figure 4.3.8-2: Design wind speeds for community shelters across the United States (FEMA, 2009).



Since tornado events are typically localized, environmental impacts 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 Figure 4.3.8-1 in order to prevent release of hazardous materials into the environment. A potential worst case scenario could be a tornado that results in loss of life and significant property damage and also releases hazardous materials into the environment of Cumberland County.

4.3.8.3 Past Occurrence

Tornadoes have occurred in all seasons and all regions of Pennsylvania, including Cumberland County. The northern, western and southeastern portions of the Commonwealth have been struck more frequently. One of the deadliest tornadoes in Pennsylvania occurred during a May, 1985 storm which killed six people, injured 60, and destroyed campers, manufactured homes, homes and businesses across Lycoming, Union and Northumberland Counties. While this event did not occur in Cumberland County, it took place only about 60 miles to the north. Between 1854 and 1979, there were six official tornadoes within Cumberland County (Cumberland EOP, 1984). A list of tornado events that have occurred in Cumberland County between 1961 and 2014 is shown in Table 4.3.8-2 with an associated F-Scale magnitude (see Table 4.3.8-1 for corresponding EF-Scale magnitude). Photographs of local wind damage are provided in Figure 4.3.8-3 and Figure 4.3.8-4, and a map showing the approximate location for many of these events is included in Figure 4.3.8-5.

Table 4.3.8-2: Previous tornado and funnel cloud events in Cumberland County (NCDC, 2014).

Location	Date	Estimated Length	Estimated Width	Magnitude (F-Scale)	Estimated Property Damage ($)
Countywide	4/16/1961	*not provided*	*not provided*	F3	250,000
Countywide	6/3/1964	*not provided*	*not provided*	F1	25,000
Countywide	3/21/1976	3 miles	70 yards	F0	0
Countywide	3/21/1976	5 miles	90 yards	F1	25,000
Countywide	7/31/1985	3 miles	20 yards	F1	250,000
Countywide	4/9/1991	3 miles	20 yards	F0	250,000
Countywide	4/9/1991	0 miles	20 yards	F1	250,000
Shippensburg	7/30/1996	3 miles	50 yards	F1	0
Carlisle Springs	6/21/2000	0 miles	30 yards	F0	0
Lemoyne	8/4/2004	1 mile	75 yards	F0	20,000
Newville	8/4/2004	3 miles	125 yards	F1	50,000
Oakville	9/17/2004	2 miles	50 yards	F1	0
Mechanicsburg	8/31/2005	2 miles	100 yards	F1	0
Wormleysburg	9/28/2006	3 miles	100 yards	F1	75,000
Mechanicsburg	6/13/2007	-	-	Funnel Cloud	0
Wertzville	5/26/2011	2.64 miles	100 yards	F1	15,000

Figure 4.3.8-3: Tornado in Silver Spring Township, Cumberland County, PA on May 26, 2011 (Photograph courtesy of *The Sentinel*, 2014).

There are hundreds of high wind events recorded in Cumberland County since 1950. In 1979, the County experienced straight line winds from a thunderstorm in excess of 90 mph. This storm caused severe tree and related property damage to the population center in the eastern portion of the County. A list of events that have occurred since 2005 is shown in Table 4.3.8-3. Windstorm events may be the result of thunderstorms, hurricanes, tropical storms, winter storms, or nor'easters.

Figure 4.3.8-4: Damage caused by severe thunderstorms with high winds in Middlesex Township, Cumberland County, PA on May 26, 2011 (Photograph courtesy of Michael Bupp/*The Sentinel*, 2014).

Figure 4.3.8-5: Tornado History in Cumberland County (1950-2013).

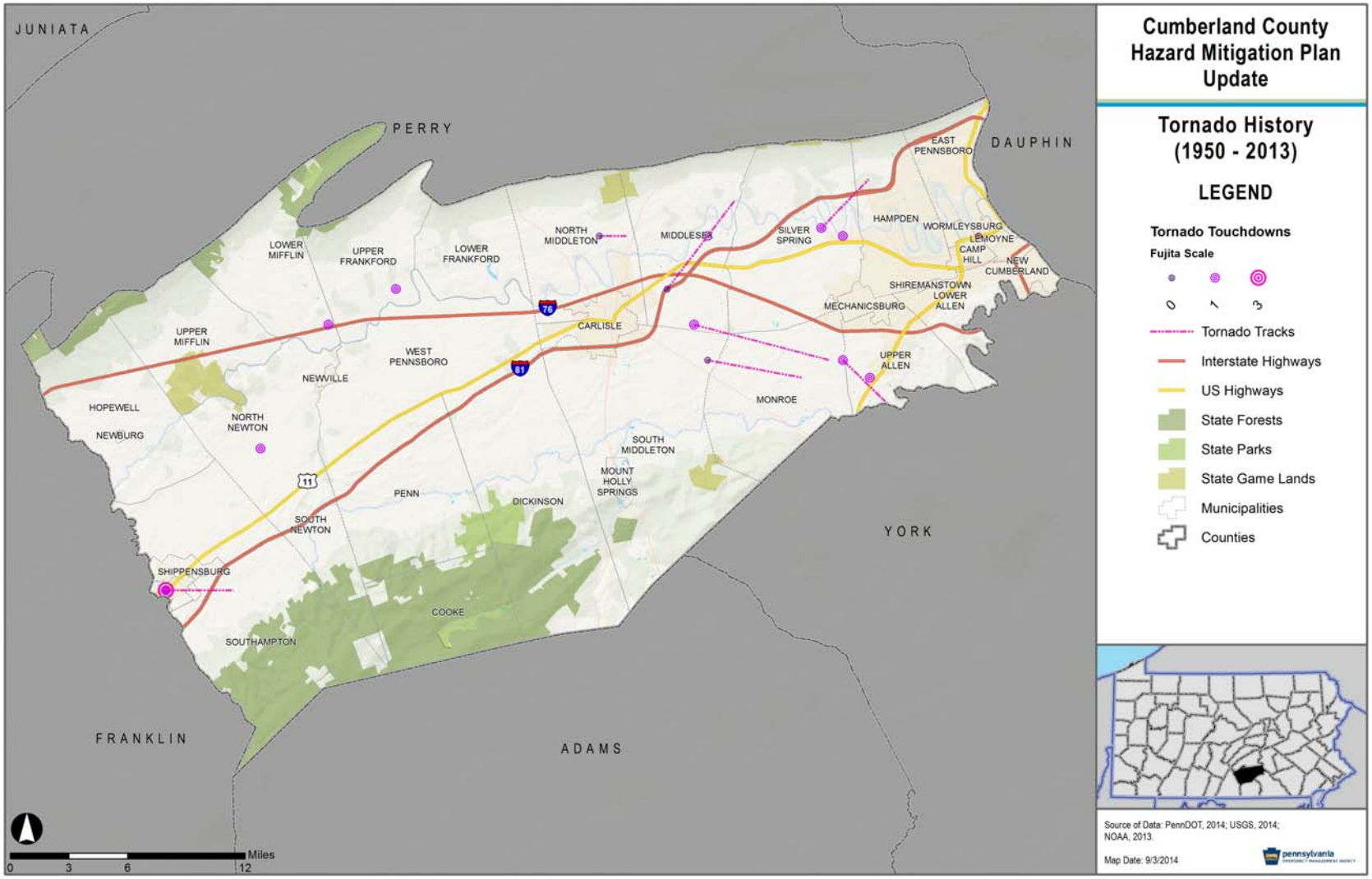


Table 4.3.8-3: Previous windstorm events in Cumberland County (NCDC, 2014 & community surveys).

Location	Date	Estimated Wind Speed (Knots)	Estimated Property Damage ($)
Enola	6/9/2005	50	*not provided*
Doubling Gap	6/9/2005	50	*not provided*
Shippensburg	6/13/2005	60	*not provided*
Camp Hill	7/19/2005	50	*not provided*
Carlisle	8/14/2005	50	*not provided*
Carlisle	6/22/2006	50	*not provided*
Countywide	7/4/2006	50	*not provided*
Countywide	12/1/2006	45	*not provided*
Countywide	2/5/2007	*not provided*	*not provided*
Countywide	2/5/2007	*not provided*	*not provided*
Shippensburg	6/8/2007	50	*not provided*
Bonny Brook	6/13/2007	50	*not provided*
Newburg	6/19/2007	50	*not provided*
Williams Grove	6/19/2007	50	*not provided*
Shiremanstown	6/19/2007	62	*not provided*
Newville	7/28/2007	50	*not provided*
Oakville	8/9/2007	50	*not provided*
Carlisle	8/25/2007	50	125,000
Enola	8/25/2007	50	*not provided*
Countywide	12/23/2007	50	*not provided*
Bloserville	6/29/2008	50	*not provided*
Mount Holly Springs	6/29/2008	50	*not provided*
Barnitz	7/23/2008	50	*not provided*
Newville	8/2/2008	50	*not provided*
Shiremanstown	8/7/2008	52	*not provided*
Countywide	12/31/2008	50	10,000
Countywide	2/12/2009	50	50,000
North Middleton	8/21/2009	68	*not provided*
Williams Grove	4/16/2010	50	*not provided*
Carlisle	5/14/2010	50	*5,000*
Middlesex	6/4/2010	50	*25,000*
Greason	6/4/2010	50	*5,000*
Newville	6/12/2010	50	*5,000*
New Cumberland	6/16/2010	52	*not provided*
Carlisle	6/24/2010	50	5,000
Allen	6/24/2010	50	5,000
New Cumberland	7/12/2010	50	5,000
Shippensburg	7/25/2010	50	5,000
Carlisle	8/16/2010	50	5,000

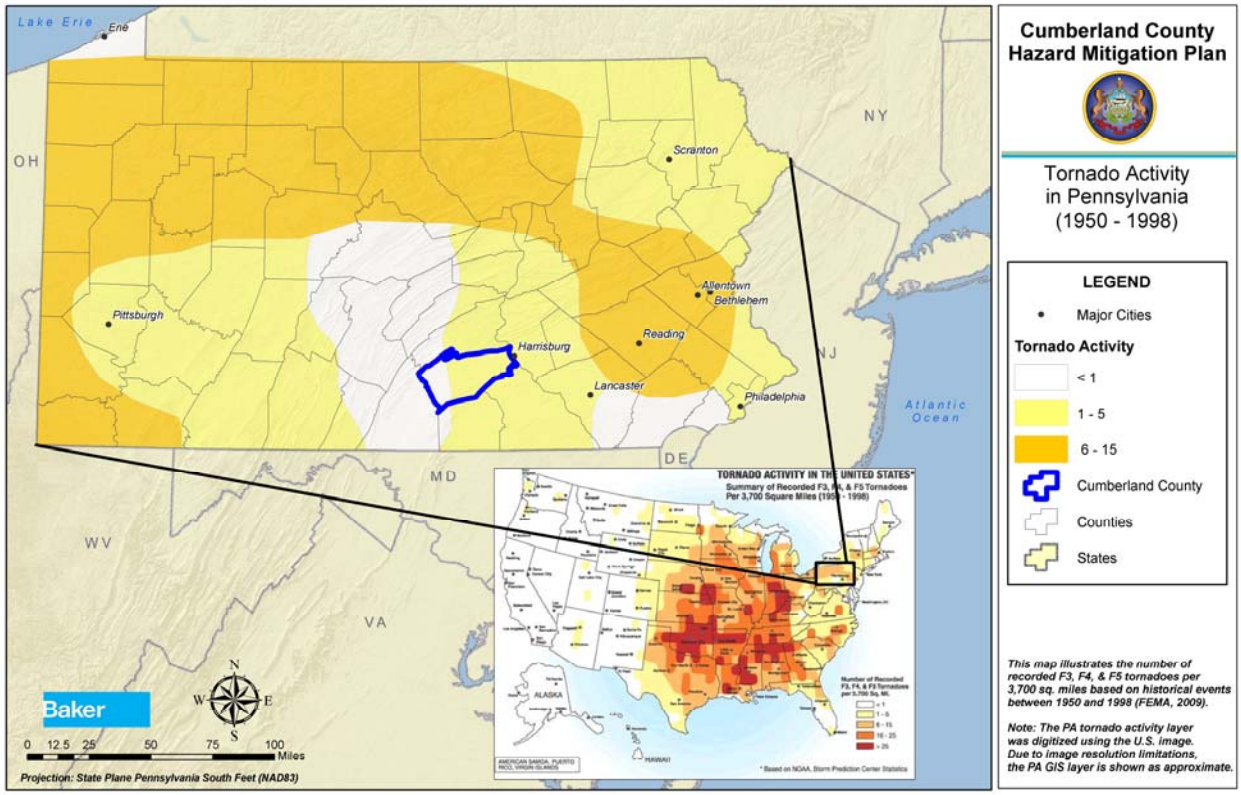
Table 4.3.8-3: Previous windstorm events in Cumberland County (NCDC, 2014 & community surveys).			
Location	**Date**	**Estimated Wind Speed (Knots)**	**Estimated Property Damage ($)**
Boiling Springs	9/22/2010	50	5,000
Shippensburg	9/22/2010	50	5,000
Lees Crossroads	5/26/2011	50	5,000
Carlisle	5/26/2011	56	5,000
Enblass	5/26/2011	50	5,000
Mechanicsburg	5/26/2011	50	5,000
Cedar Cliff Manor	5/26/2011	50	5,000
Mechanicsburg	5/26/2011	52	*not given*
Shippensburg	5/27/2011	50	5,000
New Kingstown	5/27/2011	50	5,000
Countywide	6/9/2011	50	5,000
Greason	7/7/2011	50	*not given*
Carlisle Springs	7/7/2011	50	*not given*
Springville	8/1/2011	60	5,000
West Hill	8/1/2011	50	5,000
Carlisle	5/27/2012	50	5,000
Mechanicsburg	5/27/2012	50	5,000
New Cumberland	5/27/2012	50	5,000
Newville	5/29/2012	50	5,000
Greason	5/29/2012	50	5,000
Cedar Cliff Manor	6/1/2012	50	5,000
Toland	6/29/2012	50	*not given*
Newburg	7/5/2012	50	5,000
Walnut Bottom	7/5/2012	50	5,000
Middlesex	7/18/2012	50	1,000
Gettysburg Junction	7/18/2012	50	5,000
Cedar Cliff Manor	7/31/2012	50	2,500
Wertzville	8/4/2012	50	5,000
Plainfield	8/26/2012	50	5,000
Doubling Gap	8/26/2012	50	5,000
Countywide	10/29/2012	50	*not given*
Walnut Bottom	6/13/2013	50	5,000
Carlisle	6/25/2013	50	5,000
Countywide	9/11/2013	50	2,000

4.3.8.4 Future Occurrence

According to the National Weather Service, the Commonwealth of Pennsylvania has an annual average of 10 tornadoes with two related deaths.

While the chance of being hit by a tornado is small, the damage that results when the tornado arrives is devastating. An F4 tornado can carry wind velocities of 200 mph, resulting in a force of more than 100 pounds per square foot of surface area. This is a "wind load" that exceeds the design limits of most buildings. Based on historical events between 1950 and 1998, Cumberland County lies within an area that has experienced fewer than five F3, F4, or F5 tornadoes per 3,700 square miles (see Figure 4.3.8-6).

Figure 4.3.8-6: Number of recorded F3, F4, & F5 Tornadoes per 3,700 sq. miles based on historical events between 1950 and 1998 (FEMA, 2009).



Because windstorm events are more common, the overall probability of future tornado and windstorm events can be considered *likely* according to the Risk Factor Methodology (see Table 4.4-1).

4.3.8.5 Vulnerability Assessment

While the frequency of windstorms and minor tornadoes is expected to remain relatively constant, vulnerability increases in more densely developed areas. Since high wind events may affect the entire County, it is important to identify specific critical facilities and assets that are most vulnerable to the hazard. Due to their light-weight and often unanchored design, mobile homes are extremely vulnerable to high winds. Table 4.3.8-4 lists the number of these structures in each municipality. Note that while this table discusses the number of mobile home structures, Table 4.4.3-1 in the Hazard Vulnerability Summary is related to mobile home and mobile home park parcels in order to provide assessed values.

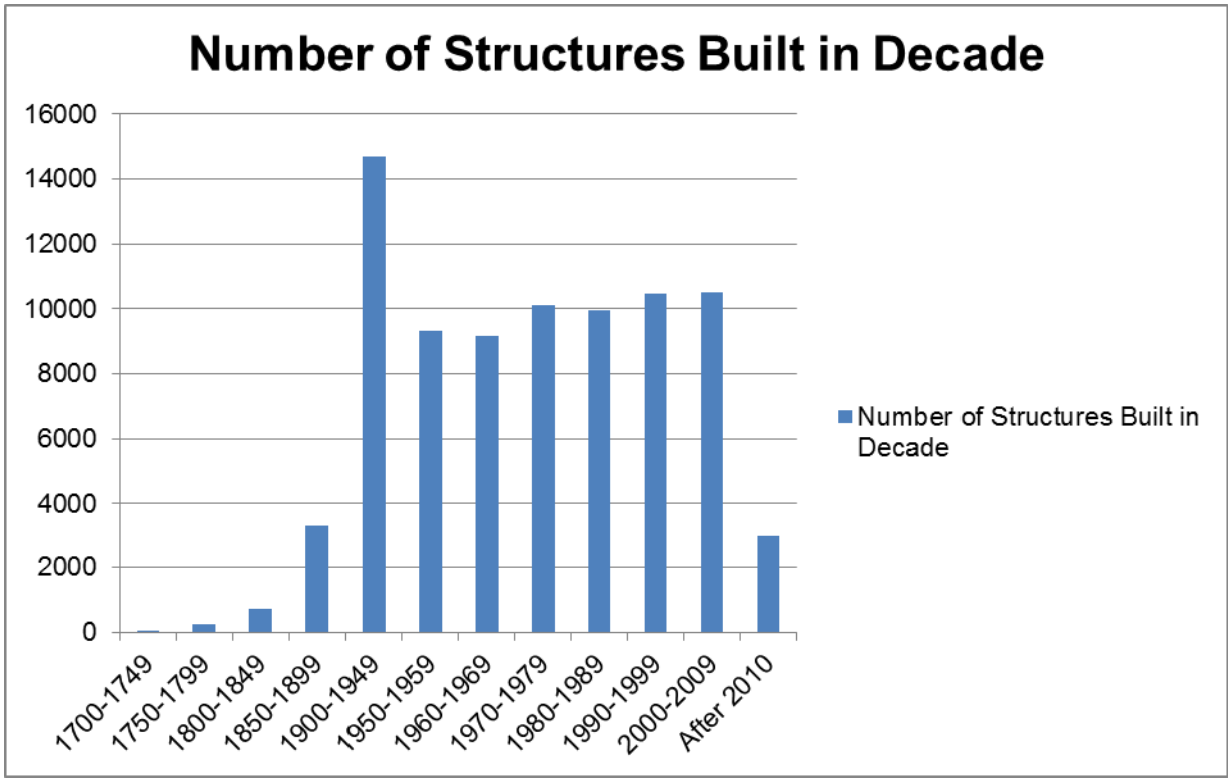
Table 4.3.8-4: Number of mobile homes per municipality in the County GIS database (2014).

Municipality	Number Of Mobile Homes	Percent Of Total Structures That Are Mobile Homes
Borough of Camp Hill	0	0%
Borough of Carlisle	18	0%
Township of Cooke	3	1%
Township of Dickinson	121	6%
Township of East Pennsboro	46	1%
Township of Hampden	514	4%
Township of Hopewell	46	5%
Borough of Lemoyne	0	0%
Township of Lower Allen	33	0%
Township of Lower Frankford	157	22%
Township of Lower Mifflin	218	30%
Borough of Mechanicsburg	0	0%
Township of Middlesex	767	28%
Township of Monroe	160	7%
Borough of Mount Holly Springs	107	12%
Borough of New Cumberland	0	0%
Borough of Newburg	0	0%
Borough of Newville	11	2%
Township of North Middleton	508	10%
Township of North Newton	36	4%
Township of Penn	83	7%
Borough of Shippensburg	1	0%
Township of Shippensburg	283	23%
Borough of Shiremanstown	0	0%
Township of Silver Spring	381	6%
Township of South Middleton	397	6%
Township of South Newton	13	3%
Township of Southampton	369	14%
Township of Upper Allen	125	2%
Township of Upper Frankford	288	33%
Township of Upper Mifflin	49	9%
Township of West Pennsboro	240	11%
Borough of Wormleysburg	0	0%
TOTAL	**4,974**	**5%**

Based on the number of mobile homes in each community, Middlesex Township, Hampden Township, and North Middleton Township are at greatest risk from high winds and tornadoes. In terms of the impact of these events on the percentage of total structures in a given municipality, Upper Frankford Township (33 percent), Lower Mifflin Township (30 percent), and Middlesex Township (28 percent) are most vulnerable.

Additional evaluation criteria include building age and building codes that may have been in effect at the time of construction, type of construction and condition of the structure (i.e., how well the structure has been maintained). With the exception of building age, this information is not available for structures countywide. However, parcel data includes *year built* information. As illustrated in Figure 4.3.8-7, a total of 19,062 parcels, approximately 23 percent of all parcels in the County (as of 2014), had primary structures built prior to 1950. The estimated corresponding total assessed building value for structures built prior to 1950 is $1,834,690,430. Note that this value should be treated as approximate and is likely an overestimate due to do how data is presented in the county database. 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 tornadoes and severe wind.

Figure 4.3.8-7: Distribution of the number of primary structures identified in the county parcel database as *main-building* built in each decade between 1700 and 2014. Note that structures built in the 1700s through 1949 are summed by half century, not decade. Also, the large number of structures built in the *1900 decade* may be a result of "1900" serving as a default value for structures built in the 19th century with an unknown construction date.



4.3.9. Wildfire

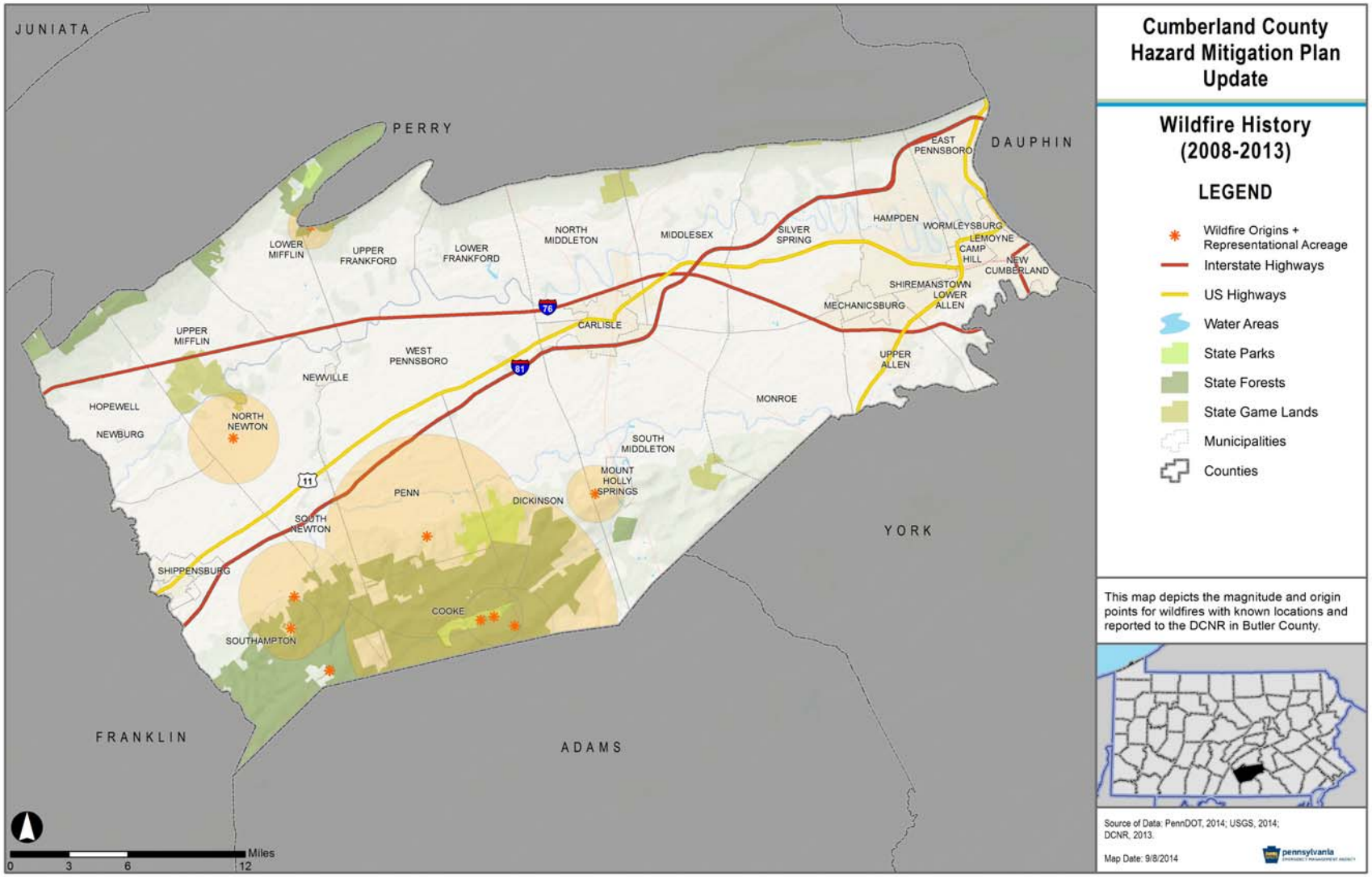
4.3.9.1 Location and Extent

Wildfires take place in less developed or completely undeveloped areas, spreading rapidly through vegetative fuels. 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. Most wildfires are caused by human carelessness or negligence. However, some are precipitated by lightning strikes and in rare instances, spontaneous combustion.

Wildfires in Pennsylvania can occur in open fields, grass, dense brush and forests. Much of the western half of Cumberland County consists of forested areas surrounded by cropland and pastures. Under dry conditions or droughts, wildfires have the potential to burn forests as well as croplands. The greatest potential for wildfires is in the spring months of March, April and May, and 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. Approximately 98 percent of wildfires in Pennsylvania are caused by people, often by debris burns (DCNR, 2014). Several fires have started in a person's backyard and traveled through dead grasses and weeds into bordering woodlands.

Portions of the Michaux (District 1) and Tuscarora (District 3) State Forests are located in Cumberland County. These forests, as well as several State Gameland areas, are of particular concern for wildfire events due to the large area of expanded woodland. Figure 4.3.9-1 shows the specific location and magnitude of the previous wildfire events from 2008-2013 identified in Section 4.3.9.3.

Figure 4.3.9-1: Map of wildfire origin and magnitude in Cumberland County from 2008-2013. Note that only events for which latitude/longitude information was reported are shown (DCNR – BOF, 2013).



4.3.9.2 Range of Magnitude

Wildfire events can range from small fires that can be managed by local firefighters to large fires impacting many acres of land. Large events may require evacuation from one or more communities and necessitate regional or national firefighting support. An example of a local wildfire is provided in Figure 4.3.9-2.

Figure 4.3.9-2: Fire fighter battles a wildfire in East Pennsboro Township, Cumberland County, PA in the spring of 2014 (Photograph courtesy of Cumberland County, 2014).

The impact of a severe wildfire can be devastating. While some fires are not human-caused and are part of natural succession processes, a wildfire can kill people, livestock, fish and wildlife. They often destroy property, valuable timber, forage and recreational and scenic values. Vegetation loss is often a concern, 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. As shown in Table 4.3.9-1, the most extensive wildfire reported to DCNR from 2002-2012 affected 55 acres in Dickinson Township in 2006.

4.3.9.3 Past Occurrence

There have been 42 wildfire events reported to DCNR in the County since 2002 (see Table 4.3.9-1). The Pennsylvania Department of Conservation of Natural Resources, Bureau of Forestry, estimates that these reported events may only be approximately 15 percent of the total number of events that have actually occurred over that time (DCNR – BOF, 2009). Information

on wildfire events occurring on private land is not available. An example of a local wildfire not reported to DCNR is shown in Figure 4.3.9-3.

Table 4.3.9-1: List of wildfire events reported in Cumberland County from 2002-2012 (DCNR – BOF, 2009 and 2014).

Year	Municipality	Area (Acres)
2012	Township of Upper Frankford	0.3
2012	Township of Southampton	0.5
2011	Township of Southampton	0.01
2009	Township of Cooke	0.7
2009	Township of Cooke	0.4
2009	Township of Southampton	1.5
2009	Township of North Newton	1
2008	Township of Cooke	9
2008	Township of Penn	5
2008	Township of South Middleton	0.4
2007	Township of Cooke	9.8
2007	Township of Cooke	5
2007	Township of Cooke	1.5
2007	Township of Dickinson	1.5
2007	Township of Lower Mifflin	0.3
2007	Township of Cooke	0.1
2006	Township of Dickinson	55
2006	Township of Dickinson	12
2006	Township of Southampton	7
2006	Township of Dickinson	1
2006	Township of Southampton	1
2006	Township of Southampton	0.8
2006	Township of South Middleton	0.3
2006	Township of South Middleton	0.25
2006	Township of Dickinson	0.1
2006	Township of Dickinson	0.1
2006	Township of Southampton	0.1
2005	Township of Dickinson	23
2005	Township of Southampton	22
2005	Township of Cooke	16
2005	Township of Southampton	7.5
2005	Township of Hopewell	4.3
2005	Township of South Middleton	2
2005	Township of South Middleton	1.5

Table 4.3.9-1: List of wildfire events reported in Cumberland County from 2002-2012 (DCNR – BOF, 2009 and 2014).

Year	Municipality	Area (Acres)
2005	Township of Lower Mifflin	0.6
2005	Township of South Middleton	0.1
2003	Township of South Middleton	3
2002	Township of Dickinson	30
2002	Township of South Middleton	4.5
2002	Township of Dickinson	4
2002	Township of Dickinson	0.4
2002	Township of Hopewell	0.01

Figure 4.3.9-3: Wildfire on the mountain north of Bella Vista Drive in East Pennsboro Township, Cumberland County, PA in 2010 (Photograph courtesy of Cumberland County, 2014).

Wildfire information obtained from the Pennsylvania Bureau of Forestry prior to 2002 is aggregated by state forest. Table 4.3.9-2 shows acreage burned in Michaux and Tuscarora State Forests between 1995 and 2002, some of which includes areas outside of Cumberland County. Of the 394.3 acres that burned in Michaux State Forest in 2001, 234 acres burned in Cooke Township on May 1, 2001 and 125 acres burned in Southampton Township on November 8, 2001.

Table 4.3.9-2: List of wildfire events in Michaux and Tuscarora State Forests prior to 2002.		
Year	**State Forest**	**Area Burned (Acres)**
2002	Michaux	39.0
	Tuscarora	34.8
2001	Michaux	394.3
	Tuscarora	6.3
2000	Michaux	15.9
	Tuscarora	21.8
1999	Michaux	74.5
	Tuscarora	12.6
1998	Michaux	24.0
	Tuscarora	41.5
1997	Michaux	5.6
	Tuscarora	68.1
1996	Michaux	1.5
	Tuscarora	7.0
1995	Michaux	12.0
	Tuscarora	22.2

4.3.9.4 Future Occurrence

Previous events indicate that annual wildfire occurrences in the County are expected. Weather conditions like drought can increase the likelihood of wildfires occurring. Any fire, without the quick response or attention of fire-fighters, forestry personnel, or visitors to the forest, has the potential to become a wildfire.

There is virtually a 100 percent chance of a forest fire of some size occurring in any given year within Cumberland County. However, the likelihood of one of those fires attaining significant size and intensity is unpredictable and highly dependent on environmental conditions and firefighting response. Overall, the probability of future wildfires can be considered *highly likely* according to the Risk Factor Methodology (see Table 4.4-1).

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.

4.3.9.5 Vulnerability Assessment

Using structure inventory data provided by the County, Table 4.3.9-3 shows there are 226 structures scattered throughout the Michaux and Tuscarora State Forests in Cumberland County. There are four municipalities where these structures are located. Of these municipalities, Cooke Township is most vulnerable, with nearly 63 percent of its structures

located within forested areas. It is worth noting that 92 percent of Cooke Township is state land (e.g., State Forest and Pine Grove Furnace Park). It is likely that many of these structures are used for recreation and not as year-round residences.

Table 4.3.9-3: Number of structures in the Michaux and Tuscarora State Forests per municipality (2014).

Municipality	Total Structures In Municipality	Structures In State Forest	Percent Of Structures In State Forest
Township of Cooke	326	205	62.9%
Township of Dickinson	2,160	4	0.2%
Township of Lower Mifflin	728	16	2.2%
Township of South Middleton	6,489	1	0.0%
TOTAL	**100,467**	**226**	**0.2%**

There are no critical facilities located in the State Forests.

The Pennsylvania Department of Conservation of Natural Resources, BOF conducts jurisdictional assessments of wildfire hazard throughout the Commonwealth. This analysis was completed in 2009 and represents the best available information on areas of wildfire hazards.

Hazard is defined by fuel, topography, and local weather that impact wildfire ignition and/or behavior. In other words, the wildfire *hazard* expresses which jurisdictions are most vulnerable to wildfires, shown in Figure 4.3.9-4. Based on this assessment, Cooke Township, Dickinson Township, Monroe Township, South Middleton Township, South Newton Township, and Southampton Township all have a *high wildfire hazard* potential.

Table 4.3.9-4 provides the number of structures and critical facilities located in the *high wildfire hazard* zone. South Middleton Township has the highest number of structures in the *high wildfire hazard* zone (6,489 out of 14,555 total). South Middleton Township also has the highest number of critical facilities identified in the *high wildfire hazard* zone (42 out of 71). Table 4.3.9-5 indicates the generalized land use type for each structure. Of the 14,555 structures, a majority are residential (14,032) or commercial (364).

Figure 4.3.9-4: Wildfire hazard potential per municipality in Cumberland County.

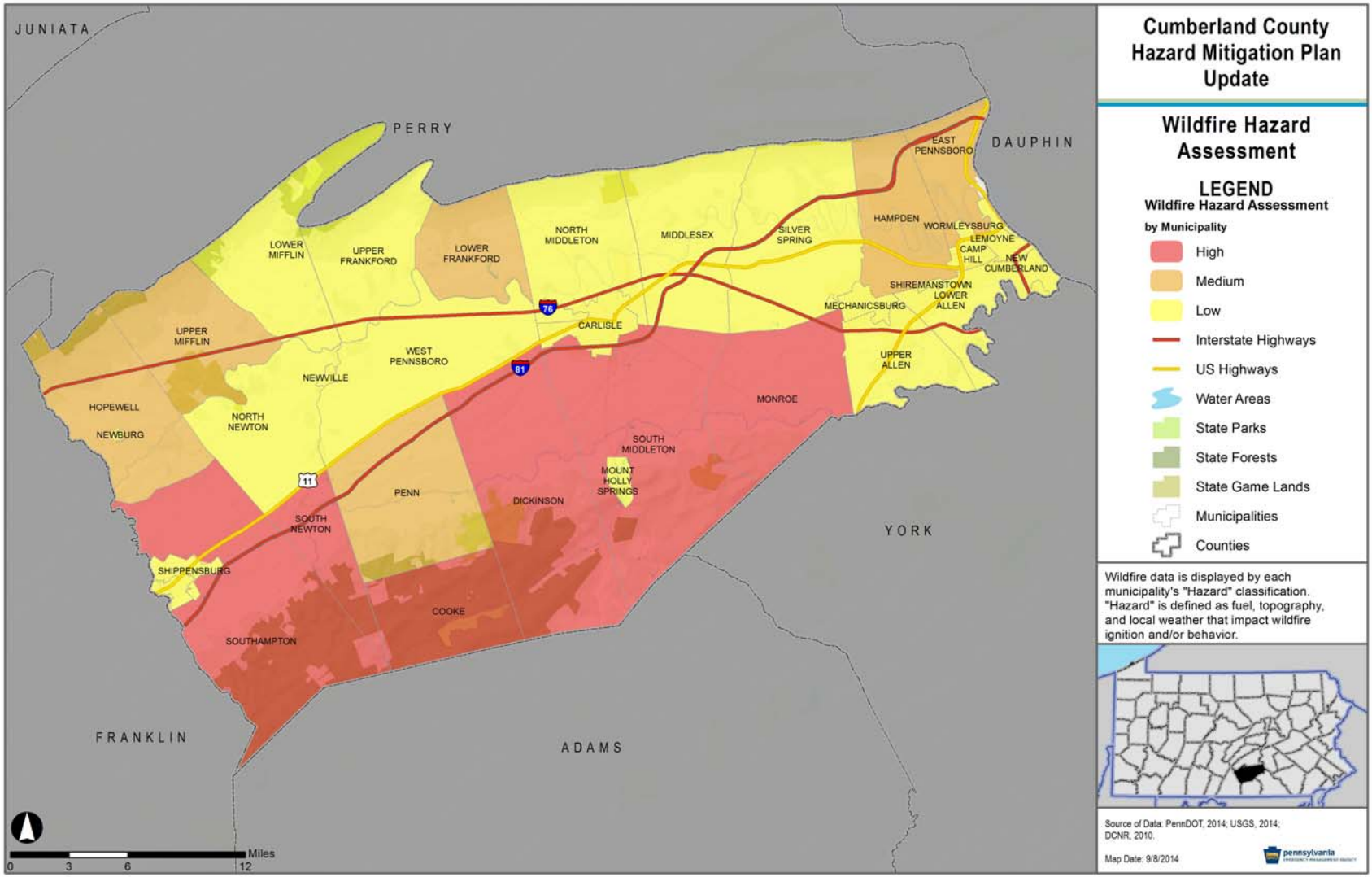


Table 4.3.9-4: Structures and critical facilities in the high wildfire hazard zone (Cumberland County GIS, 2014).

Municipality	Total Structures In Municipality	Structures In High Wildfire Hazard Zone	Percent Of Structures In High Wildfire Hazard Zone	Total Critical Facilities In Municipality	Total Critical Facilities In High Wildfire Hazard Zone	Percent Critical Facilities In High Wildfire Hazard Zone
Borough of Camp Hill	3,629	0	0%	16	0	0%
Borough of Carlisle	8,248	0	0%	67	0	0%
Township of Cooke	326	326	100%	2	2	100%
Township of Dickinson	2,160	2,160	100%	9	9	100%
Township of East Pennsboro	8,637	0	0%	29	0	0%
Township of Hampden	12,335	0	0%	58	0	0%
Township of Hopewell	854	0	0%	1	0	0%
Borough of Lemoyne	2,057	0	0%	13	0	0%
Township of Lower Allen	7,012	0	0%	30	0	0%
Township of Lower Frankford	715	0	0%	1	0	0%
Township of Lower Mifflin	728	0	0%	3	0	0%
Borough of Mechanicsburg	4,292	0	0%	25	0	0%
Township of Middlesex	2,749	0	0%	25	0	0%
Township of Monroe	2,413	2,413	100%	7	7	100%
Borough of Mount Holly Springs	893	0	0%	9	0	0%
Borough of New Cumberland	3,296	0	0%	10	0	0%
Borough of Newburg	134	0	0%	2	0	0%
Borough of Newville	696	0	0%	10	0	0%
Township of North Middleton	4,928	0	0%	23	0	0%
Township of North Newton	924	0	0%	6	0	0%
Township of Penn	1,149	0	0%	5	0	0%
Borough of Shippensburg	1,796	0	0%	9	0	0%
Township of Shippensburg	1,236	0	0%	13	0	0%
Borough of Shiremanstown	742	0	0%	4	0	0%
Township of Silver Spring	6,492	0	0%	35	0	0%
Township of South Middleton	6,489	6,489	100%	42	42	100%
Township of South Newton	507	507	100%	2	2	100%
Township of Southampton	2,660	2,660	100%	9	9	100%
Township of Upper Allen	7,286	0	0%	22	0	0%
Township of Upper Frankford	873	0	0%	5	0	0%
Township of Upper Mifflin	534	0	0%	1	0	0%
Township of West Pennsboro	2,270	0	0%	10	0	0%
Borough of Wormleysburg	1,407	0	0%	2	0	0%
TOTAL	**100,467**	**14,555**	**14%**	**505**	**71**	**14%**

Table 4.3.9-5: Structures in the high wildfire hazard zone by generalized land use type (Cumberland County GIS, 2014).

Municipality	Total Structures in Municipality	Agricultural	Civic/ Institutional	Commercial	Emergency Services	Government	Hospitals and Medical Centers	Industrial	Other/ Unspecified	Religious	Residential	School	Transportation	Grand Total
Borough of Camp Hill	3,629	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of Carlisle	8,248	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Cooke	326	0	0	0	1	1	0	0	3	0	321	0	0	326
Township of Dickinson	2,160	1	1	19	0	1	0	1	11	8	2,116	2	0	2,160
Township of East Pennsboro	8,637	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Hampden	12,335	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Hopewell	854	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of Lemoyne	2,057	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Lower Allen	7,012	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Lower Frankford	715	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Lower Mifflin	728	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of Mechanicsburg	4,292	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Middlesex	2,749	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Monroe	2,413	2	0	46	1	1	0	1	2	6	2,353	1	0	2,413
Borough of Mount Holly Springs	893	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of New Cumberland	3,296	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of Newburg	134	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of Newville	696	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of North Middleton	4,928	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of North Newton	924	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Penn	1,149	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of Shippensburg	1,796	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Shippensburg	1,236	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4.3.9-5: Structures in the high wildfire hazard zone by generalized land use type (Cumberland County GIS, 2014).

Municipality	Total Structures in Municipality	Agricultural	Civic/ Institutional	Commercial	Emergency Services	Government	Hospitals and Medical Centers	Industrial	Other/ Unspecified	Religious	Residential	School	Transportation	Grand Total
Borough of Shiremanstown	742	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Silver Spring	6,492	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of South Middleton	6,489	2	1	254	3	4	5	15	12	22	6,164	6	1	6,489
Township of South Newton	507	1	0	16	1	0	0	1	2	1	484	1	0	507
Township of Southampton	2,660	4	1	29	0	1	0	4	17	7	2,594	3	0	2,660
Township of Upper Allen	7,286	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Upper Frankford	873	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Upper Mifflin	534	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of West Pennsboro	2,270	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of Wormleysburg	1,407	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**100,467**	**10**	**3**	**364**	**6**	**8**	**5**	**22**	**47**	**44**	**14,032**	**13**	**1**	**14,555**

4.3.10. Winter Storm

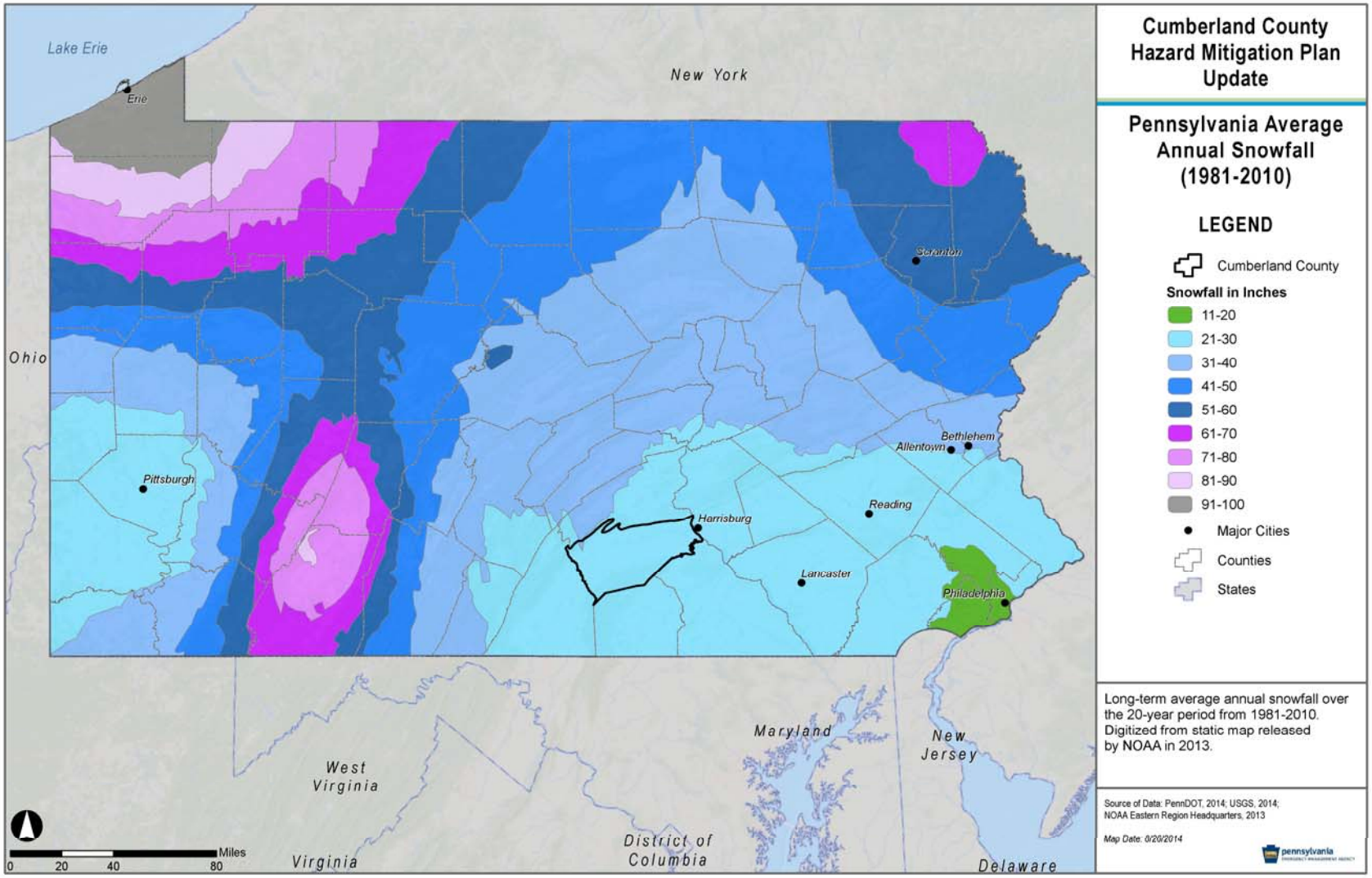
4.3.10.1 Location and Extent

Winter storms are regional events which affect Cumberland County, adjacent counties, other areas of the Commonwealth, or even the larger northeastern U.S. Region. Winter storms for Cumberland 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.

Cumberland County averages 21 to 30 inches of snow annually, as shown in Figure 4.3.10-1. This is a reduction in average annual snowfall from the previous twenty-year average annual snowfall observation of between 30 and 40 inches.

Figure 4.3.10-2: Pennsylvania Average Annual Snowfall (1981-2010).



4.3.10.2 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 either following the jet stream or developing as extra-tropical cyclonic weather systems over the Atlantic Ocean called nor'easters. 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. These storms may include one or more of the following weather events:

- Heavy Snowstorm: Accumulations of four inches or more in a six-hour period, or six inches or more in a twelve-hour period.
- Sleet Storm: 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.

Any of the above events can result in the closing of secondary roads, particularly in rural locations, loss of utility services and depletion of oil heating supplies. Environmental impacts often include damaged 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 caused by the weight of the snow from a single large storm or from a significant accumulation over time. 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. The worst winter storms, in early 1994, are described in Section 4.3.10.3.

4.3.10.3 Past Occurrence

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

The first of these devastating winter storms occurred in early January 1994 with record snowfall depths in excess of 33 inches across southwest and south-central portions of the Commonwealth, including Cumberland County, strong winds and sleet/freezing rains. 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; 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 15-30 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 Pennsylvania Department of Transportation storage sites.

During January and February 1994, Pennsylvania experienced at least 17 regional or statewide winter storms. 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 (see Table 4.3.3-1).

Five of the 18 Presidential Disaster and Emergency Declarations affecting Cumberland have been in response to hazard events related to winter storms (see Table 4.2-1). In addition to the events described above, other winter storm events, including those associated with Disaster Declarations, are listed in Table 4.3.10-1. A photograph of one of the events is provided as Figure 4.3.10-2.

Table 4.3.10-1: Previous winter storm events impacting Cumberland County (NCDC, 2014 & Cumberland EOP, 1984). Only significant events are shown prior to 2003, while all events since 2003 are listed.

Location	Date	Type	Property Damage ($)
Statewide	January 1966	Winter Storm	*not provided*
Statewide	February 1972	Major Winter Storm	*not provided*
Statewide	January 1978	Winter Storm	*not provided*
Statewide	1977	Major Winter Storm	*not provided*
Statewide	February 1978	Major Winter Storm	*not provided*
Statewide	1981	Major Winter Storm	*not provided*
Statewide	1981	Major Winter Storm	*not provided*
Several Counties	1/6/1994	Record Snowfall	988,000
Statewide	1/7/1996	Blizzard	635,000
Several Counties	3/4/2001	Heavy Snow	150,000
Several Counties	2/6/2003	Heavy Snow	*not provided*
Statewide	2/16/2003	Heavy Snow	263,000
Several Counties	12/5/2003	Heavy Snow	*not provided*
Several Counties	2/6/2004	Ice Storm	*not provided*
Several Counties	3/19/2004	Heavy Snow	*not provided*
Several Counties	2/24/2005	Heavy Snow	*not provided*
Statewide	3/1/2005	Heavy Snow	*not provided*
Statewide	12/9/2005	Heavy Snow	*not provided*
Statewide	12/16/2005	Winter Storm	*not provided*
Several Counties	2/12/2006	Heavy Snow	*not provided*
Several Counties	2/13/2007	Winter Storm	*not provided*
Several Counties	3/16/2007	Heavy Snow	*not provided*
Several Counties	12/13/2007	Winter Storm	*not provided*
Several Counties	12/15/2007	Winter Storm	*not provided*
Several Counties	2/1/2008	Winter Storm	*not provided*
Several Counties	2/12/2008	Ice Storm	*not provided*
Statewide	1/6/2009	Ice Storm	*not provided*
Statewide	1/27/2009	Winter Storm	*not provided*
Countywide	12/19/2009	Winter Storm	*not provided*
Countywide	02/05/2010	Winter Storm	*not provided*
Countywide	02/09/2010	Winter Storm	*not provided*
Countywide	02/01/2011	Winter Storm	*not provided*
Countywide	02/21/2011	Heavy Snow	*not provided*
Countywide	10/29/2011	Heavy Snow	*not provided*
Countywide	12/14/2013	Winter Storm	*not provided*
Countywide	02/04/2014	Winter Storm	*not provided*
Countywide	02/13/2014	Heavy Snow	*not provided*

Figure 4.3.10-2: Snow plow in South Middleton Township, Cumberland County, PA on December 14, 2013 (Photograph courtesy of Curt Werner/*The Sentinel*, 2014).

4.3.10.4 Future Occurrence

Winter storms are a regular, annual occurrence in Cumberland County. Approximately 35 winter storms occur across Pennsylvania and about five occur in Cumberland County annually. Table 4.3.10-2 shows the snow depths expected for 10 percent-, 4 percent-, 2 percent- and 1 percent-annual-chance snowfalls over a 1-day, 2-day and 3-day period in Cumberland County. These depths are based on data collected at the weather station in Carlisle, PA between 1894 and 1980. Data was available for 73 years of this 86 year time period; additional data collection would improve statistical calculation of annual probabilities. Overall, the probability of future winter storms can be considered *highly likely* according to the Risk Factor Methodology (see Table 4.4-1).

Table 4.3.10-2: Extreme snowfall amounts measured in inches for 10 percent, 4 percent, 2 percent and 1 percent-annual probability of occurrence storms in Cumberland County (NCDC, 2007).

Time Frame	Annual Probability Of Occurrence				Observed Max
	10 percent	4 percent	2 percent	1 percent	
1-Day	15.4	18.7	21.1	23.5	26.0
2-Day	18.6	22.9	26.0	29.1	29.0
3-Day	19.7	24.2	27.4	30.6	31.0

4.3.10.5 Vulnerability Assessment

Since winter storms have become a regular occurrence in Cumberland County, as well as other counties throughout the Commonwealth, strategies have been developed to respond these

events. Snow removal and utility repair equipment is present to respond to typical events. The use of auxiliary heat and electricity supplies such as wood burning stoves, kerosene heaters and gasoline power generators reduces the impact winter storm events have on individuals who have this equipment available. Locations lacking adequate equipment to protect against cold temperatures or significant snow and ice are more vulnerable to winter storm events. Even for communities that are prepared to respond to winter storms, severe events involving snow accumulations that exceed six or more inches in a12 hour period can cause a large number of traffic accidents, interrupt power supply and communications, and cause the failure of inadequately designed and/or maintained roof systems.

Similar to the vulnerability assessment discussion for tornadoes and severe wind, vulnerability to the effects of winter storms on buildings is dependent on the age of the building type, construction material used and condition of the structure. As mentioned previously, Figure 4.3.8-7 shows that most structures in Cumberland County were built since 1950, yet a total of 19,062 structures, approximately 23 percent of all structures in the County, were built prior to 1950. The corresponding total assessed building value for structures built prior to 1950 is $1,834,690,430. Note that this value should be treated as approximate and is likely an overestimate due to do how data is presented in the county database. 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. Based on the information available, all communities in Cumberland County are essentially equally vulnerable to the direct impacts of winter storms.

HUMAN-MADE OR TECHNOLOGICAL HAZARDS

4.3.11. Civil Disturbance

4.3.11.1 Location and Extent

The scale and scope of civil disturbance events varies widely. However, government facilities, local landmarks, prisons, and universities are common sites where crowds and mobs may gather. There are two prisons within Cumberland County; the Cumberland County Prison in the Borough of Carlisle and the White Hill State Prison in Lower Allen Township. The Tresslercare Wilderness School, a juvenile correction facility, is located in South Middleton Township. College and universities in the County include Central Pennsylvania College, Dickinson College, Messiah College, Penn State Dickinson School of Law, Shippensburg University and U.S. Army War College.

4.3.11.2 Range of Magnitude

Civil disturbances can take the form of small gatherings or large groups blocking or impeding access to a building, or disrupting normal activities by generating noise and intimidating people, as illustrated in Figure 4.3.11-1. They can range from a peaceful sit-in to a full scale riot, in which a mob burns or otherwise destroys property and terrorizes individuals. Even in its more passive forms, a group that blocks roadways, sidewalks, or buildings interferes with public order. There are two types of large gatherings typically associated with civil disturbances: a crowd and a mob. A crowd may be defined as a casual, temporary collection of people without a strong, cohesive relationship. Crowds can be classified into four categories (Juniata County, PA MJHMP, 2008):

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

Figure 4.3.11-1: A State Police trooper stood between Ku Klux Klan members and the crowd during a rally on the steps of the Cumberland County Courthouse on September 23, 2000 (Photograph courtesy of *The Sentinel*, 2014).

A mob can be defined as a large disorderly crowd or throng. Mobs are usually emotional, loud, tumultuous, violent and lawless. Similar to crowds, mobs have different levels of commitment and can be classified into four categories (Juniata County, PA MJHMP, 2008):

- Aggressive Mob: An aggressive mob is one that attacks, riots and terrorizes. The object of violence may be a person, property, or both. An aggressive mob is distinguished from

an aggressive crowd only by lawless activity. Examples of aggressive mobs are the inmate mobs in prisons and jails, mobs that act out their frustrations after political defeat, or violent mobs at political protests or rallies.

- Escape Mob: An escape mob is attempting to flee from something such as a fire, bomb, flood, or other catastrophe. Members of escape mobs are generally difficult to control can be characterized by unreasonable terror.
- Acquisitive Mob: An acquisitive mob is one motivated by a desire to acquire something. Riots caused by other factors often turn into looting sprees. This mob exploits a lack of control by authorities in safeguarding property.
- Expressive Mob: An expressive mob is one that expresses fervor or revelry following some sporting event, religious activity, or celebration. Members experience a release of pent up emotions in highly charged situations.

The worst civil disturbance event on record in Cumberland County, a prison riot, is described in Section 4.3.11.3.

4.3.11.3 Past Occurrence

There is one known significant civil disturbance event in Cumberland County. There was a riot at the White Hill State Correction Prison in 1989. The event actually consisted of two aggressive mob uprisings, the second taking place the day after the first.

4.3.11.4 Future Occurrence

Minor civil disturbances may occur in Cumberland County, but it is not possible to accurately predict the probability of future occurrence for civil disturbance events over the long-term. Overall, the probability of future civil disturbances can be considered *unlikely* according to the Risk Factor Methodology (see Table 4.4-1).

It may be possible to recognize the potential for an event to occur in the near-term. For example, an upcoming significant sporting event at one of the colleges or universities in the County may result in gathering of large crowds. Local law enforcement should anticipate these types of events and be prepared to handle a crowd so that peaceful gatherings are prevented from turning into unruly public disturbances.

4.3.11.5 Vulnerability Assessment

In general, Cumberland County is not particularly vulnerable to civil disturbance events. Most civil disturbance events, should they occur, would have minimal impact. Sites previously identified in Section 4.3.11.1 are locations where such events are more likely to occur and therefore should be considered more vulnerable. Adequate law enforcement at these locations minimizes the chances of a small assembly of people turning into a significant disturbance.

4.3.12. Dam Failure

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

4.3.13. Environmental Hazards

4.3.13.1 Location and Extent

Environmental hazards in Cumberland County focus mainly on hazardous material releases which can occur wherever hazardous materials are manufactured, used, stored, or transported. Such releases usually occur at fixed site facilities or along transportation routes. Interstates 81, 76, and 83, US Routes 11, 15, 11/15 and PA Route 581 are considered major transportation routes in Cumberland County. There are several points where these transportation routes cross streams within the watershed that serves as a part of the County's domestic water supply.

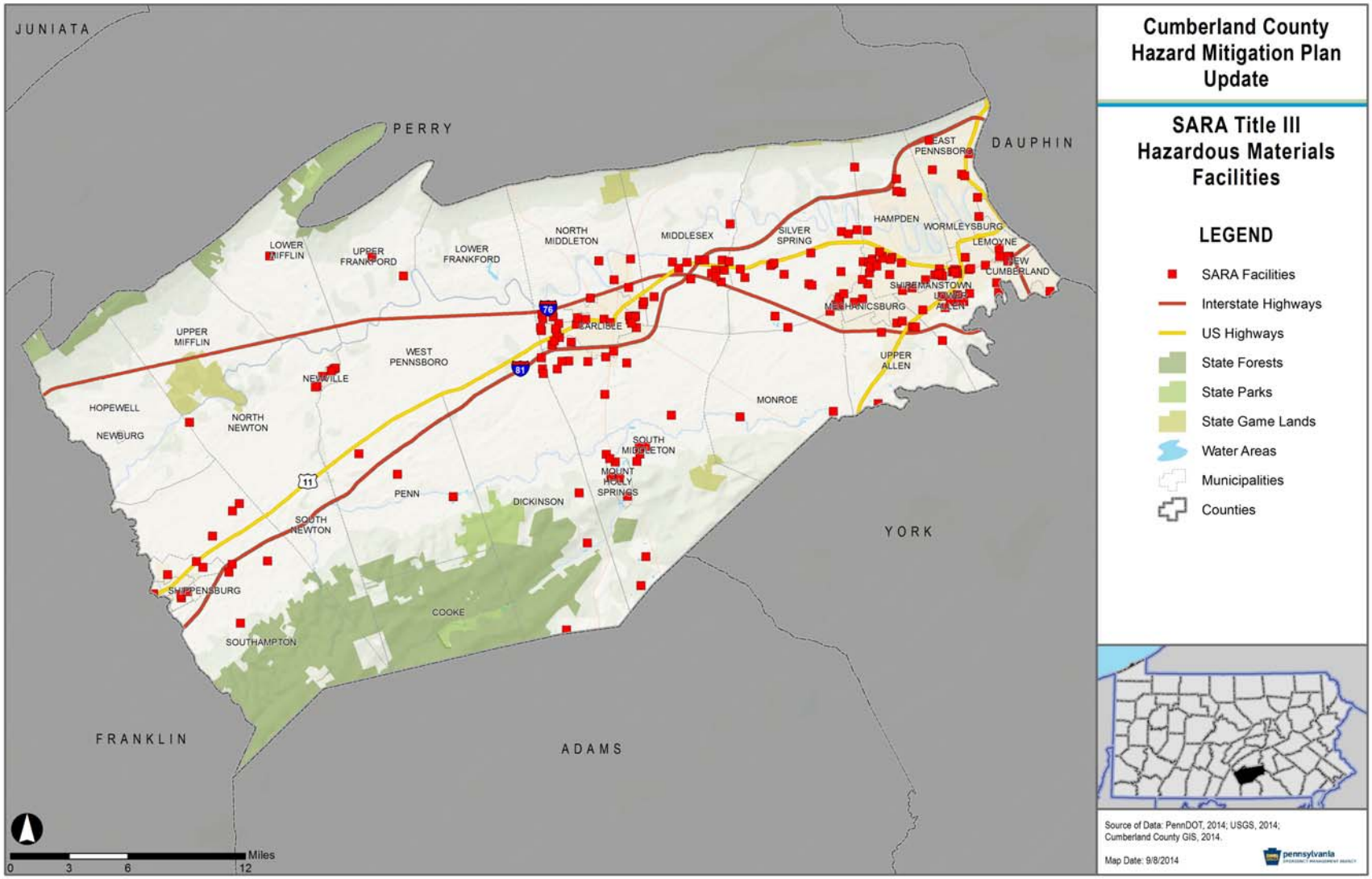
Transportation of hazardous materials on highways involves tanker trucks or trailers. Unsurprisingly, large trucks are responsible for the greatest number of hazard material release incidents, as illustrated in Figure 4.3.13-1. Hazardous material releases from rail transport are also of concern due to collisions and derailments that result in large spills. Severe rail events have reportedly occurred in the Enola and Lemoyne rail yards.

Figure 4.3.13-1: A truck driver spilled about 20 gallons of sulfuric acid along Interstate 81 in Penn Township, Cumberland County, PA on July 16, 2004 (Photograph courtesy of Jason Minick/*The Sentinel*, 2014).

Facilities that use, manufacture, or store hazardous materials in Pennsylvania must comply with both Title III of the federal Superfund Amendments and Reauthorization Act (SARA), also known as the Emergency Planning and Community Right-to-Know Act (EPCRA), and the Commonwealth's reporting requirements under the Hazardous Materials Emergency Planning and Response Act (1990-165), as amended. The community right-to-know reporting requirements keep communities abreast of the presence and release of chemicals at individual facilities. There are 197 SARA Title III facilities located in Cumberland County (see Figure 4.3.13-2 and Appendix E). Note that the list of SARA Title III facilities is not an exhaustive, fully-

comprehensive inventory of all hazardous material locations within the County and therefore, should not be used as such.

Figure 4.3.13-2: SARA Title III Hazardous Materials Facilities in Cumberland County.



Key information about the chemicals handled by manufacturing or processing facilities is contained in the U.S. Environmental Protection Agency's (EPA) Toxic Release Inventory (TRI) database. Facilities that employ 10 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. Additional hazardous materials are contained at the military installations within and surrounding Cumberland County (e.g., Carlisle Barracks U.S. Army Garrison).

4.3.13.2 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.
In addition to the possibility of human fatalities and/or injuries, the environmental impacts of hazardous material releases include:

- Hydrologic effects – surface and groundwater contamination
- Other effects on water quality such as changes in water temperature
- Damage to streams, lakes, ponds, estuaries, and wetland ecosystems
- Air quality effects – pollutants, smoke, and dust

- Loss of quality in landscape
- Reduced soil quality
- Damage to plant communities – loss of biodiversity; damage to vegetation
- Damage to animal species – animal fatalities; degradation of wildlife and aquatic habitat; pollution of drinking water for wildlife; loss of biodiversity; disease

A worst case hazardous material release could involve the contamination of public drinking water supplies and local waterways.

4.3.13.3 Past Occurrence

Since the passage of SARA, Title III facilities which produce, use, or store hazardous chemicals must notify the public through the county emergency dispatch center and PEMA if an accidental release of a hazardous substance meets or exceeds a designated reportable quantity, and affects or has the potential to affect persons and/or the environment outside the plant. SARA, Title III and Pennsylvania Act 165 also require a written follow-up report to PEMA and the County. These written follow-up reports include any known or anticipated health risks associated with the release and actions to be taken to mitigate potential future incidents. In addition, Section 204(a)(10) of Act 165 requires PEMA to staff and operate a 24-hour State Emergency Operations Center (SEOC) to provide effective emergency response coordination. There were 41 hazardous material/petroleum incidents in Cumberland County reported to the SEOC in 2011 (PEMA, 2011). Additional incident information for years prior to 2011 may be obtained from annual reports submitted to PEMA.

The US EPA TRI reports that 24,543 pounds of chemicals were released on-site at facilities located in Cumberland County in 2012, and there were total offsite transfers of 98,773 pounds as well. Table 4.3.13-1 lists the release of these chemicals by company. Many of these companies have or are federally listed SARA Title III facilities. Other prior year TRI information can be found on the EPA Toxic Release Inventory Database website.

Table 4.3.13-1: Summary of 2012 Toxic Release Inventory data in Cumberland County (US EPA, 2014).

Company	Chemicals Released	Municipality
ADM Alliance Nutrition, Inc.	Copper, Manganese, & Zinc Compounds	Borough of Camp Hill
ADM Milling Company	Chlorine	Borough of Camp Hill
Ames True Temper, Inc.	Copper, Manganese	Borough of Camp Hill
Atlas Roofing Corporation	Diisocyanates	Borough of Camp Hill
Carlisle Syntec, Inc.	Antimony Compounds, Decabromodiphenyl Oxide, Diisocyanates, Polycyclic Aromatic Compounds, Thiram, Toluene, Xylene, Zinc Compounds	Borough of Carlisle
Dairy Farmers of America, Inc.	Nitrate Compounds, Nitric Acid	Borough of Mechanicsburg
Domestic Casting Company, LLC	Copper, Manganese	Township of Shippensburg
Frog Switch & Manufacturing Company	Chromium, Lead, Manganese, Molybdenum Trioxide, Nickel	Borough of Carlisle

Table 4.3.13-1: Summary of 2012 Toxic Release Inventory data in Cumberland County (US EPA, 2014).		
Company	**Chemicals Released**	**Municipality**
	Compounds	
JLG Industries Inc.	Zinc Compounds	Township of Shippensburg
Land O' Lakes	Nitrate Compounds, Nitric Acid	Township of South Middleton
Land O' Lakes Purina Feed, LLC	Manganese, Copper, & Zinc Compounds	Borough of Camp Hill
Nestle Purina Petcare Company	Manganese Compounds, Propylene, Zinc Compounds	Township of Hampden
PPG Industries Carlisle Plant Works 6	Lead Compounds, Ammonia, Zinc Compounds, Manganese Compounds	Borough of Carlisle
Safety-Kleen Systems	Ethylene Glycol, Lead, Polycyclic Aromatic Compounds, Benzo(G,H,I) Perylene	Township of Silver Spring
Schrieber Foods, Inc.	Nitric Acid, Peracetic Acid, Nitrate Compounds	Township of Shippensburg
Skyline Steel, LLC	Manganese, Nickel, Lead	Borough of Camp Hill

In 2013, across the Commonwealth, there were 758 highway related hazardous material incidents totaling $1,382,005 in damages and 38 railway related incidents totaling $787,150 in damages (PHMSA, 2014). Other prior year incident information for Pennsylvania can be found on the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration website. The *Pennsylvania's Hazardous Material Emergency Planning and Response Act 1990-165: 2011 Annual Report* states that there were 41 hazardous material/petroleum incidents in 2011 in Cumberland County (PEMA, 2011).

4.3.13.4 Future Occurrence

While many hazardous material release incidents have occurred in Cumberland County in the past, they are generally considered difficult to predict. An occurrence is largely dependent upon the accidental or intentional actions of a person or group. Intentional acts are addressed under Section 4.3.16. Overall, the probability of future hazardous material release incidents can be considered *likely* according to the Risk Factor Methodology (see Table 4.4-1).

4.3.13.5 Vulnerability Assessment

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, as illustrated in Figure 4.3.13-3. Quick response minimizes the volume and concentration of hazardous materials that disperse through air, water and soil. In the event of an accidental or intentional release, the size and type of chemical released would be critical determinants of the effects on nearby residents and the environment.

Figure 4.3.13-3: A firefighter worked to contain diesel fuel spilling from the fuel tank of a truck after an accident in Lower Allen Township, Cumberland County, PA on December 30, 2005 (Photograph courtesy of Jason Minick/*The Sentinel*, 2014).

Expansion of the Mechanicsburg Fuel Terminal to provide increased storage for ethanol products has increased vulnerability to residents of Silver Spring Township. Potential risk is increased not only by the fixed facility itself, but also rail and truck transport to and from the facility. A municipal representative from Lower Allen Township noted ethanol transport on the Cumberland Valley Line on the *Evaluation of Identified Hazards and Risk* worksheet included in Appendix C.

Tables 4.3.13-2 through 4.3.13-5 provide data related to structures and critical facilities vulnerable to hazardous materials incidents at fixed facilities and in transit. The municipalities with the greatest number of the 88,623 structures within 1.5 miles of a SARA facility are Hampden Township (11,919), East Pennsboro Township (8,490), the Borough of Carlisle (8,248), and Upper Allen Township (7,024). The municipalities with the greatest number of the 475 critical facilities within 1.5 miles of a SARA facility are the Borough of Carlisle (67) and Hampden Township (58). The vast majority (83,225) of the 88,623 structures within 1.5 miles of a SARA facility are residential. The municipalities with the greatest number of structures vulnerable to hazardous materials incidents in transit are the Borough of Carlisle, Hampden Township, East Pennsboro Township, and Upper Allen Township due to being within 0.25 mile of major roads (Interstates, United States Highways, and Pennsylvania Highways) or rail lines. The municipalities with the greatest number of critical facilities vulnerable to hazardous materials incidents in transit are the Borough of Carlisle, Hampden Township, and the Borough of Mechanicsburg. The vast majority (50,267) of the 55,051 structures vulnerable to hazardous materials releases in transit are residential.

Table 4.3.13-2: Structures and Critical Facilities Vulnerable to Hazardous Materials Incidents-Fixed Facility Incidents for Cumberland County (Cumberland County GIS, 2014).

Municipality	Total Structures in Municipality	Structures within 1.5 mi of SARA Facilities	Percent of Structures within 1.5 mi of SARA Facilities	Total Critical Facilities in Municipality	Total Critical Facilities within 1.5 mi of SARA Facilities	Percent of Critical Facilities within 1.5 mi of SARA Facilities
Borough of Camp Hill	3,629	3,629	100.0%	16	16	100.0%
Borough of Carlisle	8,248	8,248	100.0%	67	67	100.0%
Township of Cooke	326	0	0.0%	2	0	0.0%
Township of Dickinson	2,160	1,015	47.0%	9	8	88.9%
Township of East Pennsboro	8,637	8,490	98.3%	29	29	100.0%
Township of Hampden	12,335	11,919	96.6%	58	58	100.0%
Township of Hopewell	854	80	9.4%	1	0	0.0%
Borough of Lemoyne	2,057	2,057	100.0%	13	13	100.0%
Township of Lower Allen	7,012	6,772	96.6%	30	29	96.7%
Township of Lower Frankford	715	60	8.4%	1	0	0.0%
Township of Lower Mifflin	728	398	54.7%	3	2	66.7%
Borough of Mechanicsburg	4,292	4,292	100.0%	25	25	100.0%
Township of Middlesex	2,749	1,951	71.0%	25	23	92.0%
Township of Monroe	2,413	1,525	63.2%	7	3	42.9%
Borough of Mount Holly Springs	893	893	100.0%	9	9	100.0%
Borough of New Cumberland	3,296	3,296	100.0%	10	9	90.0%
Borough of Newburg	134	0	0.0%	2	0	0.0%
Borough of Newville	696	696	100.0%	10	10	100.0%
Township of North Middleton	4,928	4,472	90.7%	23	23	100.0%
Township of North Newton	924	444	48.1%	6	4	66.7%
Township of Penn	1,149	664	57.8%	5	5	100.0%
Borough of Shippensburg	1,796	1,796	100.0%	9	7	77.8%
Township of Shippensburg	1,236	1,236	100.0%	13	13	100.0%
Borough of Shiremanstown	742	742	100.0%	4	4	100.0%
Township of Silver Spring	6,492	5,833	89.8%	35	34	97.1%
Township of South Middleton	6,489	5,899	90.9%	42	40	95.2%
Township of South Newton	507	49	9.7%	2	0	0.0%
Township of Southampton	2,660	2,218	83.4%	9	9	100.0%
Township of Upper Allen	7,286	7,024	96.4%	22	22	100.0%
Township of Upper Frankford	873	632	72.4%	5	5	100.0%
Township of Upper Mifflin	534	4	0.7%	1	0	0.0%
Township of West Pennsboro	2,270	882	38.9%	10	6	60.0%
Borough of Wormleysburg	1,407	1,407	100.0%	2	2	100.0%
TOTAL	**100,467**	**88,623**	**88.2%**	**505**	**475**	**94.1%**

Table 4.3.13-3: Structures Vulnerable to Hazardous Materials Releases at Fixed Facilities by Generalized Structure Type (Cumberland County GIS, 2014).

Municipality	Total Structures in Municipality	Agricultural	Civic/ Institutional	Commercial	Emergency Services	Government	Hospitals and Medical Centers	Industrial	Other/ Unspecified	Religious	Residential	School	Transportation	Grand Total
Borough of Camp Hill	3,629	0	2	217	1	1	0	4	2	9	3,387	6	0	3,629
Borough of Carlisle	8,248	0	11	664	7	15	6	22	48	27	7,398	50	0	8,248
Township of Cooke	326	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Dickinson	2,160	1	0	12	0	1	0	1	6	4	989	1	0	1,015
Township of East Pennsboro	8,637	0	2	246	6	1	1	0	31	15	8,170	18	0	8,490
Township of Hampden	12,335	0	3	556	3	1	1	9	19	15	11,305	7	0	11,919
Township of Hopewell	854	0	0	1	0	0	0	0	1	0	77	1	0	80
Borough of Lemoyne	2,057	0	0	223	1	1	1	10	5	4	1,810	2	0	2,057
Township of Lower Allen	7,012	0	1	468	2	1	1	11	24	9	6,248	7	0	6,772
Township of Lower Frankford	715	0	0	1	0	0	0	0	0	0	59	0	0	60
Township of Lower Mifflin	728	0	0	4	0	1	0	1	1	1	389	1	0	398
Borough of Mechanicsburg	4,292	0	2	298	4	1	1	3	10	16	3,951	6	0	4,292
Township of Middlesex	2,749	0	0	116	0	2	1	8	12	4	1,807	1	0	1,951
Township of Monroe	2,413	1	0	41	0	0	0	1	2	5	1,475	0	0	1,525
Borough of Mount Holly Springs	893	0	1	54	1	1	0	7	5	2	821	1	0	893
Borough of New Cumberland	3,296	0	2	173	1	2	0	5	4	8	3,098	3	0	3,296
Borough of Newburg	134	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of Newville	696	0	2	72	2	0	0	5	1	3	611	0	0	696
Township of North Middleton	4,928	0	1	84	1	4	1	3	36	8	4,332	2	0	4,472
Township of North Newton	924	2	0	8	0	0	0	3	9	3	418	1	0	444
Township of Penn	1,149	1	0	5	1	1	0	2	4	7	642	1	0	664
Borough of Shippensburg	1,796	0	3	210	2	1	0	17	17	16	1,528	2	0	1,796
Township of Shippensburg	1,236	0	1	49	0	1	5	2	4	5	1,115	54	0	1,236

Table 4.3.13-3: Structures Vulnerable to Hazardous Materials Releases at Fixed Facilities by Generalized Structure Type (Cumberland County GIS, 2014).

Municipality	Total Structures in Municipality	Agricultural	Civic/ Institutional	Commercial	Emergency Services	Government	Hospitals and Medical Centers	Industrial	Other/ Unspecified	Religious	Residential	School	Transportation	Grand Total
Borough of Shiremanstown	742	0	0	22	1	1	0	0	0	5	712	1	0	742
Township of Silver Spring	6,492	3	0	250	4	1	0	13	13	13	5,529	7	0	5,833
Township of South Middleton	6,489	2	1	250	3	4	5	13	12	21	5,581	6	1	5,899
Township of South Newton	507	0	0	2	0	0	0	0	0	0	47	0	0	49
Township of Southampton	2,660	4	1	24	0	1	0	3	14	6	2,162	3	0	2,218
Township of Upper Allen	7,286	0	1	200	3	1	2	0	14	14	6,773	16	0	7,024
Township of Upper Frankford	873	0	0	6	1	1	0	1	1	2	618	1	1	632
Township of Upper Mifflin	534	0	0	0	0	0	0	0	0	0	4	0	0	4
Township of West Pennsboro	2,270	2	0	18	0	0	1	1	4	6	846	4	0	882
Borough of Wormleysburg	1,407	0	0	76	1	1	0	0	3	3	1,323	0	0	1,407
TOTAL	**100,467**	**16**	**34**	**4,350**	**45**	**45**	**26**	**145**	**302**	**231**	**83,225**	**202**	**2**	**88,623**

Table 4.3.13-4: Structures and Critical Facilities Vulnerable to Hazardous Materials Incidents in Transit for Cumberland County (Cumberland County GIS, 2014).

Municipality	Total Structures in Municipality	Structures within 0.25 mi of Major Roads	Percent of Structures within 0.25 mi of Major Roads	Structures within 0.25 mi of rail lines	Percent of Structures within 0.25 mi of rail lines	Total Critical Facilities in Municipality	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
Borough of Camp Hill	3,629	2,171	59.8%	671	18.5%	16	6	37.5%	3	18.8%
Borough of Carlisle	8,248	7,051	85.5%	2,698	32.7%	67	61	91.0%	20	29.9%
Township of Cooke	326	101	31.0%	28	8.6%	2	2	100.0%	0	0.0%
Township of Dickinson	2,160	778	36.0%	577	26.7%	9	2	22.2%	1	11.1%
Township of East Pennsboro	8,637	3,724	43.1%	1,815	21.0%	29	18	62.1%	12	41.4%
Township of Hampden	12,335	4,821	39.1%	821	6.7%	58	28	48.3%	30	51.7%
Township of Hopewell	854	359	42.0%	0	0.0%	1	0	0.0%	0	0.0%
Borough of Lemoyne	2,057	930	45.2%	1,644	79.9%	13	9	69.2%	12	92.3%
Township of Lower Allen	7,012	2,668	38.0%	1,455	20.8%	30	11	36.7%	10	33.3%
Township of Lower Frankford	715	106	14.8%	0	0.0%	1	0	0.0%	0	0.0%
Township of Lower Mifflin	728	253	34.8%	0	0.0%	3	3	100.0%	0	0.0%
Borough of Mechanicsburg	4,292	2,906	67.7%	2,624	61.1%	25	20	80.0%	20	80.0%
Township of Middlesex	2,749	1,340	48.7%	96	3.5%	25	10	40.0%	7	28.0%
Township of Monroe	2,413	865	35.8%	272	11.3%	7	4	57.1%	2	28.6%
Borough of Mount Holly Springs	893	685	76.7%	565	63.3%	9	9	100.0%	5	55.6%
Borough of New Cumberland	3,296	461	14.0%	997	30.2%	10	0	0.0%	3	30.0%
Borough of Newburg	134	134	100.0%	0	0.0%	2	2	100.0%	0	0.0%
Borough of Newville	696	696	100.0%	0	0.0%	10	10	100.0%	0	0.0%
Township of North Middleton	4,928	2,524	51.2%	281	5.7%	23	16	69.6%	4	17.4%
Township of North Newton	924	482	52.2%	14	1.5%	6	5	83.3%	1	16.7%
Township of Penn	1,149	514	44.7%	174	15.1%	5	1	20.0%	2	40.0%

Table 4.3.13-4: Structures and Critical Facilities Vulnerable to Hazardous Materials Incidents in Transit for Cumberland County (Cumberland County GIS, 2014).

Municipality	Total Structures in Municipality	Structures within 0.25 mi of Major Roads	Percent of Structures within 0.25 mi of Major Roads	Structures within 0.25 mi of rail lines	Percent of Structures within 0.25 mi of rail lines	Total Critical Facilities in Municipality	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
Borough of Shippensburg	1,796	1,375	76.6%	838	46.7%	9	4	44.4%	4	44.4%
Township of Shippensburg	1,236	846	68.4%	149	12.1%	13	10	76.9%	3	23.1%
Borough of Shiremanstown	742	0	0.0%	627	84.5%	4	0	0.0%	4	100.0%
Township of Silver Spring	6,492	2,899	44.7%	937	14.4%	35	20	57.1%	9	25.7%
Township of South Middleton	6,489	2,432	37.5%	476	7.3%	42	17	40.5%	3	7.1%
Township of South Newton	507	319	62.9%	220	43.4%	2	2	100.0%	2	100.0%
Township of Southampton	2,660	1,169	43.9%	412	15.5%	9	6	66.7%	2	22.2%
Township of Upper Allen	7,286	3,207	44.0%	300	4.1%	22	15	68.2%	4	18.2%
Township of Upper Frankford	873	174	19.9%	0	0.0%	5	4	80.0%	0	0.0%
Township of Upper Mifflin	534	124	23.2%	0	0.0%	1	0	0.0%	0	0.0%
Township of West Pennsboro	2,270	958	42.2%	0	0.0%	10	4	40.0%	0	0.0%
Borough of Wormleysburg	1,407	751	53.4%	981	69.7%	2	0	0.0%	2	100.0%
TOTAL	**100,467**	**47,823**	**47.6%**	**19,672**	**19.6%**	**505**	**299**	**59.2%**	**165**	**32.7%**

Table 4.3.13-5: Structures Vulnerable to Hazardous Materials Releases in Transit by (Highway and Rail) by Generalized Structure Type (Cumberland County GIS, 2014).

Municipality	Total Structures in Municipality	Agricultural	Civic/ Institutional	Commercial	Emergency Services	Government	Hospitals and Medical Centers	Industrial	Other/ Unspecified	Religious	Residential	School	Transportation	Grand Total
Borough of Camp Hill	3,629	0	1	117	0	0	0	2	2	4	2,150	3	0	**2,279**
Borough of Carlisle	8,248	0	10	643	7	15	6	22	48	27	6,291	48	0	**7,117**
Township of Cooke	326	0	0	0	1	1	0	0	0	0	127	0	0	**129**
Township of Dickinson	2,160	1	0	11	0	0	0	0	6	6	1,084	1	0	**1,109**
Township of East Pennsboro	8,637	0	2	178	6	1	1	0	17	10	3,682	2	0	**3,899**
Township of Hampden	12,335	0	3	463	2	1	1	9	12	9	4,640	6	0	**5,146**
Township of Hopewell	854	0	0	5	0	0	0	0	2	5	347	0	0	**359**
Borough of Lemoyne	2,057	0	0	217	1	1	1	10	5	4	1,526	1	0	**1,766**
Township of Lower Allen	7,012	0	1	387	1	1	0	9	12	7	2,994	3	0	**3,415**
Township of Lower Frankford	715	0	0	0	0	0	0	0	0	0	106	0	0	**106**
Township of Lower Mifflin	728	1	1	3	0	1	0	1	2	1	241	2	0	**253**
Borough of Mechanicsburg	4,292	0	2	295	4	1	1	3	10	16	2,942	4	0	**3,278**
Township of Middlesex	2,749	0	0	117	0	2	1	8	9	7	1,228	0	0	**1,372**
Township of Monroe	2,413	1	0	34	1	1	0	1	2	5	981	1	0	**1,027**
Borough of Mount Holly Springs	893	0	1	54	1	1	0	7	5	2	794	1	0	**866**
Borough of New Cumberland	3,296	0	0	154	1	2	0	3	4	5	1,283	0	0	**1,452**
Borough of Newburg	134	0	0	5	1	0	0	0	0	1	127	0	0	**134**
Borough of Newville	696	0	2	72	2	0	0	5	1	3	611	0	0	**696**
Township of North Middleton	4,928	0	1	74	0	4	1	2	30	5	2,464	1	0	**2,582**
Township of North Newton	924	4	0	9	0	0	0	2	20	4	440	3	0	**482**
Township of Penn	1,149	1	0	6	1	1	0	2	3	7	639	0	0	**660**
Borough of Shippensburg	1,796	0	3	210	2	1	0	17	17	15	1,362	2	0	**1,629**
Township of Shippensburg	1,236	0	0	42	0	1	5	1	1	4	896	38	0	**988**

Table 4.3.13-5: Structures Vulnerable to Hazardous Materials Releases in Transit by (Highway and Rail) by Generalized Structure Type (Cumberland County GIS, 2014).

Municipality	Total Structures in Municipality	Agricultural	Civic/ Institutional	Commercial	Emergency Services	Government	Hospitals and Medical Centers	Industrial	Other/ Unspecified	Religious	Residential	School	Transportation	Grand Total
Borough of Shiremanstown	742	0	0	22	1	1	0	0	0	5	597	1	0	**627**
Township of Silver Spring	6,492	2	0	235	4	1	0	11	11	11	3,229	6	0	**3,510**
Township of South Middleton	6,489	0	1	217	2	3	3	9	2	14	2,547	3	1	**2,802**
Township of South Newton	507	1	0	16	1	0	0	1	1	1	306	1	0	**328**
Township of Southampton	2,660	1	0	21	0	1	0	3	4	3	1,317	1	0	**1,351**
Township of Upper Allen	7,286	0	1	178	3	1	2	0	10	11	3,202	16	0	**3,424**
Township of Upper Frankford	873	0	0	5	1	1	0	0	0	2	164	1	0	**174**
Township of Upper Mifflin	534	0	0	1	0	0	0	0	1	1	119	2	0	**124**
Township of West Pennsboro	2,270	1	0	37	1	1	0	1	7	12	897	1	0	**958**
Borough of Wormleysburg	1,407	0	0	68	1	1	0	0	3	2	934	0	0	**1,009**
TOTAL	**100,467**	**13**	**29**	**3,896**	**45**	**45**	**22**	**129**	**247**	**209**	**50,267**	**148**	**1**	**55,051**

4.3.14. Levee Failure

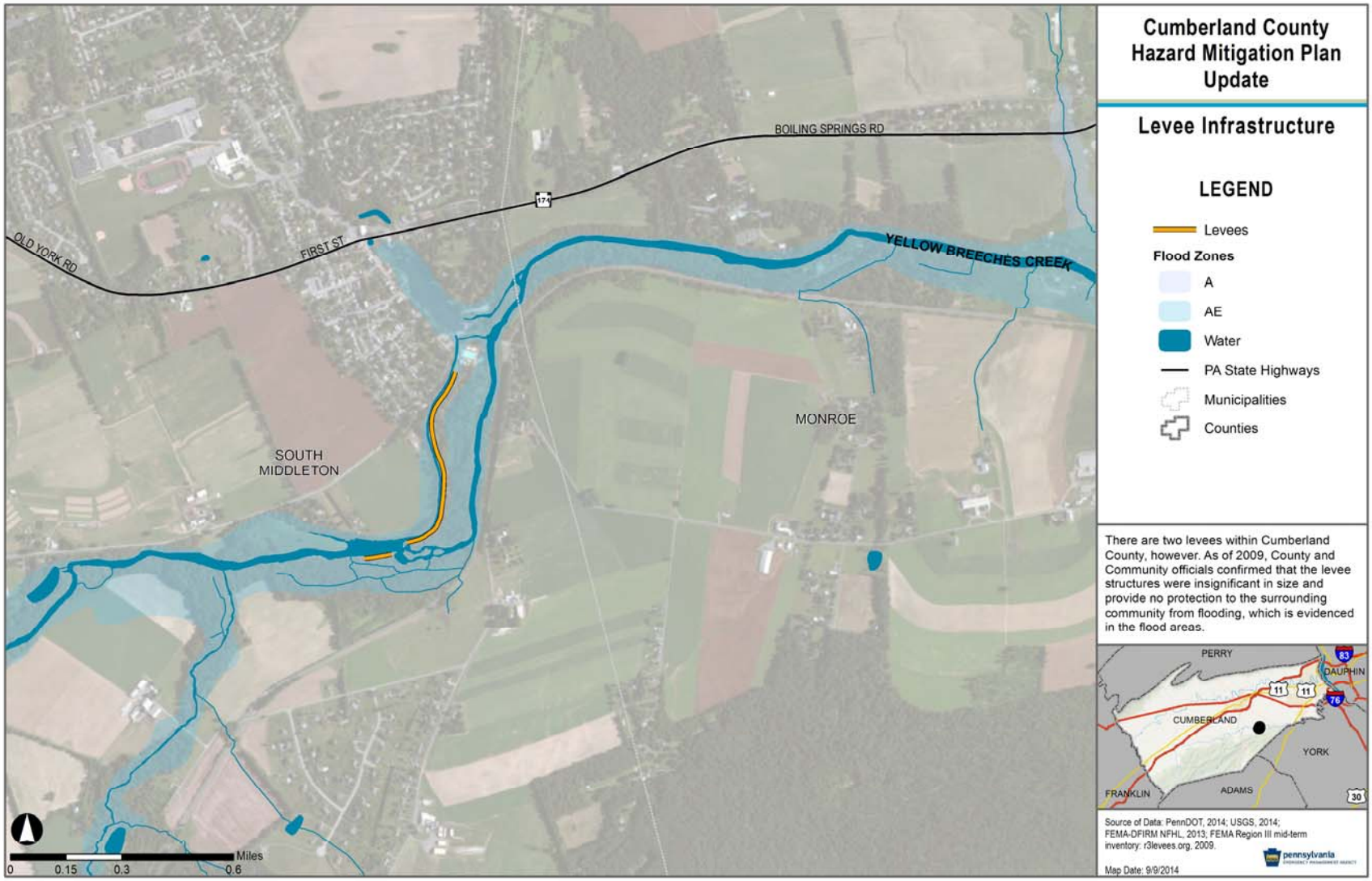
4.3.14.1 Location and Extent

FEMA completed an inventory of all known levees across Pennsylvania in 2009, known as the Mid-Term Levee Inventory (MLI). The MLI contains levee data gathered first and foremost for structures designed to protect from the 1 percent-annual-chance flood event. The area behind a maintained and certified levee that is designed to protect from a 1 percent-annual-chance flood is called a Levee Protected Area. The MLI also frequently includes levees that were not designed to protect against this base flood, but the MLI does not include every levee in every county – especially small levees and agricultural levees not engineered or able to be accredited to the 1 percent-annual-chance event. FEMA's inventory was compiled using all effective Flood Insurance Rate Maps and Flood Insurance Study reports in Pennsylvania, the USACE levee inventory, the DEP's Flood Control Project summaries, information from local governments, aerial photography, and additional information such as news articles and websites.

There are two levees within Cumberland County. These levees are located in close proximity to one another along Yellow Breeches Creek in Monroe Township (FEMA, *Mid-Term Levee Inventory*, 2009). They are not certified to protect against the 1 percent-annual-chance flood and are not accredited on the Flood Insurance Rate Maps (FIRM) published on March 16, 2009. Figure 4.3.14-1 shows the structures as well as the FEMA-designated base floodplain. County and community officials confirmed that these structures are insignificant in size and provide no protection to the surrounding community from flooding. After further investigation, officials clarified that these structures are actually parts of a historic canal which connects runoff from Boiling Springs Children's Lake to Yellow Breeches Creek. Recent drainage improvements at Boiling Springs Lake keep the canal essentially dry. Small amounts of water are diverted from the lake and discharged into Yellow Breeches Creek; however, water levels in the canal remain low even during times of high water. This area is included as part of the Wittlinger Nature Preserve and is surrounded by permanently protected open space.

The 2004 Cumberland County Hazard Mitigation Plan stated that flood control projects on the Susquehanna River since the major floods of the 1970s have reduced the risks from floods. However, none of these projects are known to be located within Cumberland County.

Figure 4.3.14-1: Containment structure along Yellow Breeches Creek as shown on FIRM Panel 42041C0244E.



4.3.14.2 Range of Magnitude

A levee failure or breach causes flooding in landward areas adjacent to the structure. The failure of a levee or other flood protection structure could be devastating depending on the level of flooding for which the structure is designed and the amount of landward development present. The environmental impacts of a levee failure result in significant water quality and debris disposal issues. Flood waters will back up sanitary sewer systems and inundate waste water treatment plants, causing raw sewage to contaminate residential and commercial buildings and the flooding waterway. The contents of unsecured containers of oil, fertilizers, pesticides and other chemicals get added to flood waters. Water supplies and waste water treatment could be off-line for weeks. After the flood waters subside, contaminated and flood damaged building materials and contents must be properly disposed. Contaminated sediment must be removed from buildings, yards and properties. However, the potential for these worst case impacts to occur in Cumberland County is minimal or nearly nonexistent since there are no significant levee systems located within the County. In Cumberland County the structures along Yellow Breeches Creek are not accredited; therefore, any flooding caused by failure or overtopping should not exceed areas already at risk from the 1 percent-annual-chance flood.

4.3.14.3 Past Occurrence

There are no known previous levee failures in Cumberland County, and the current levee system does not provide significant protection from the 1%-annual-chance flood.

4.3.14.4 Future Occurrence

Similarly to dam failures, given certain circumstances, levee failures can occur at any time. However, the probability of future occurrence can be reduced through proper design, construction and maintenance measures. Most levees are designed to meet a specified level of flooding. While FEMA focuses on mapping levees that will reduce the risk of a 1 percent-annual-chance flood, other levees may be designed to protect against smaller or larger floods. Design specifications provide information on the percent-annual-chance flood a structure is expected to withstand, provided that it has been adequately constructed and maintained. Overall, the probability of future levee failures can be considered *unlikely* according to the Risk Factor Methodology (see Table 4.4-1).

4.3.14.5 Vulnerability Assessment

With the exception of potential impacts from failed upstream flood protection structures outside of Cumberland County, there are no communities that are particularly vulnerable to levee failures. This is mainly due to the fact that there are only two known structures in the County and any levees that are yet unidentified are not large enough to create significant losses if they were to fail. The structures along Yellow Breeches Creek are not accredited; therefore, any flooding caused by failure or overtopping should not exceed areas already at risk from the 1 percent-annual-chance flood.

4.3.15. Nuclear Incidents

4.3.15.1 Location and Extent

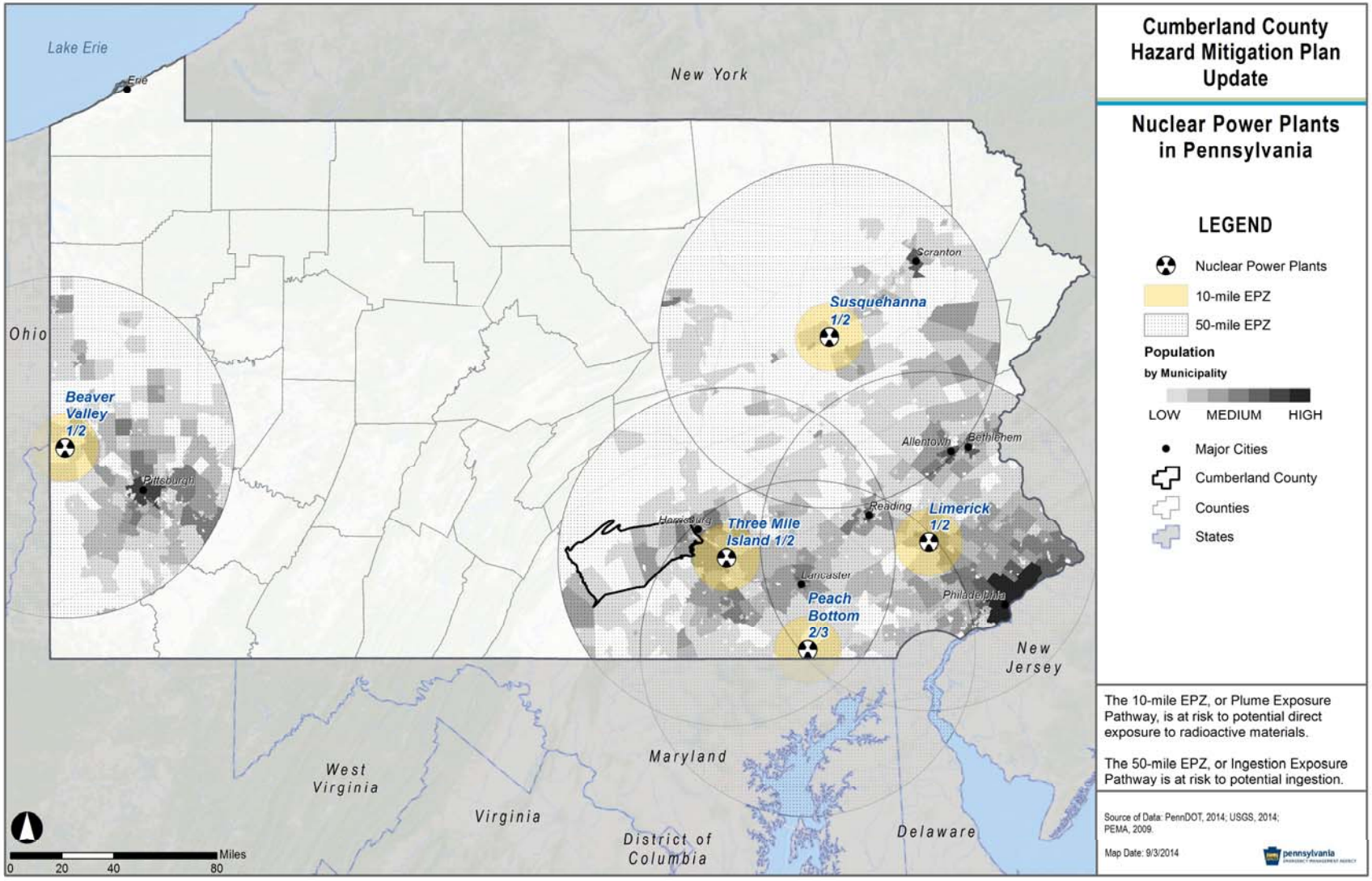
The Nuclear Regulatory Commission encourages the use of Probabilistic Risk Assessments (PRA) to estimate quantitatively the potential risk to public health and safety considering the design, operations and maintenance practices at nuclear power plants. Probabilistic Risk

Assessments typically focus on accidents that can severely damage the core and that may challenge containment. FEMA, PEMA and county governments have formulated Radiological Emergency Response Plans to prepare for radiological emergencies at the five nuclear power generating facilities in the Commonwealth of Pennsylvania. These plans include a *Plume Exposure Pathway Emergency Planning Zone (EPZ)* with a radius of ten miles from each nuclear power facility and an *Ingestion Exposure Pathway EPZ* with a radius of 50 miles from each facility.

As shown in Figure 4.3.15-1, Cumberland County is affected by both the 10-mile Plume Exposure Pathway EPZ and fifty mile Ingestion Exposure Pathway EPZ for the Three Mile Island (TMI) nuclear facility, located approximately nine miles southeast of the boundary of Cumberland County, along the Susquehanna River in Dauphin County, PA. New Cumberland Borough and Lower Allen Township are located within ten miles of TMI. The entire County is within the 50-mile Ingestion Exposure Pathway EPZ for TMI.

In addition, the southeastern edge of the County is within the Ingestion Exposure Pathway EPZ of the Peach Bottom nuclear facility located in Lancaster County. The remaining three nuclear plants in Pennsylvania are more than 50 miles away from Cumberland County. This distance exceeds the Plume Exposure and Ingestion Exposure Pathway EPZs for nuclear emergencies; therefore, these facilities are considered a minimal threat to the County. However, in the event of an emergency, evacuees from distant EPZs may seek shelter in Cumberland County.

Figure 4.3.15-1: Nuclear power plants and EPZs in Pennsylvania.



4.3.15.2 Range of Magnitude

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. The Cumberland County Radiological Emergency Response Plan, which is part of the County Emergency Operations Plan, includes the following:

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

Nuclear accidents 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 (NRC, 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 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 State Emergency Operations Center. State officials also have the capability to send emergency messages as text messages to mobile devices.

Potential environmental impacts include the long-term effects of radioactive contamination in the environment and, particularly in Pennsylvania, in agricultural products. Spills and releases of radiological active materials from accidents can result in the contamination of soil and water. Areas underlain by limestone and some types of glacial sediments are particularly susceptible to contamination.

After a nuclear incident, another significant impact is the effect of radiation on the health of the population near the incident. The duration of primary exposure could range in length from hours to months depending on the proximity to the point of radioactive release. External radiation and inhalation and ingestion of radioactive isotopes can cause acute health effects (e.g., death, severe health impairment), chronic health effects (e.g., cancers) and psychological effects. In order to better prepare for an emergency, drills are conducted locally (Figure 4.3.15-2).

Figure 4.3.15-2: Radiological emergency drill at the Carlisle Regional Medical Center in the Borough of Carlisle, Cumberland County, PA (Photograph courtesy of Cumberland County, 2014).

The worst past occurrence for Cumberland County is the *Site Area Emergency* at Three Mile Island in 1979, described in Section 4.3.15.3.

4.3.15.3 Past Occurrence

There has been one nuclear incident above the *Alert* classification in the United States. In March 1979, a *Site Area Emergency* event occurred at Three Mile Island, Unit 2. This event is the most serious commercial nuclear accident in United States history. The resulting contamination and state of the reactor core led to the development of a ten-year cleanup and scientific effort. Despite the severity of the damage, no injuries due to radiation exposure occurred. There were however, significant health effects reported due to the psychological stress on the individuals living in the area.

4.3.15.4 Future Occurrence

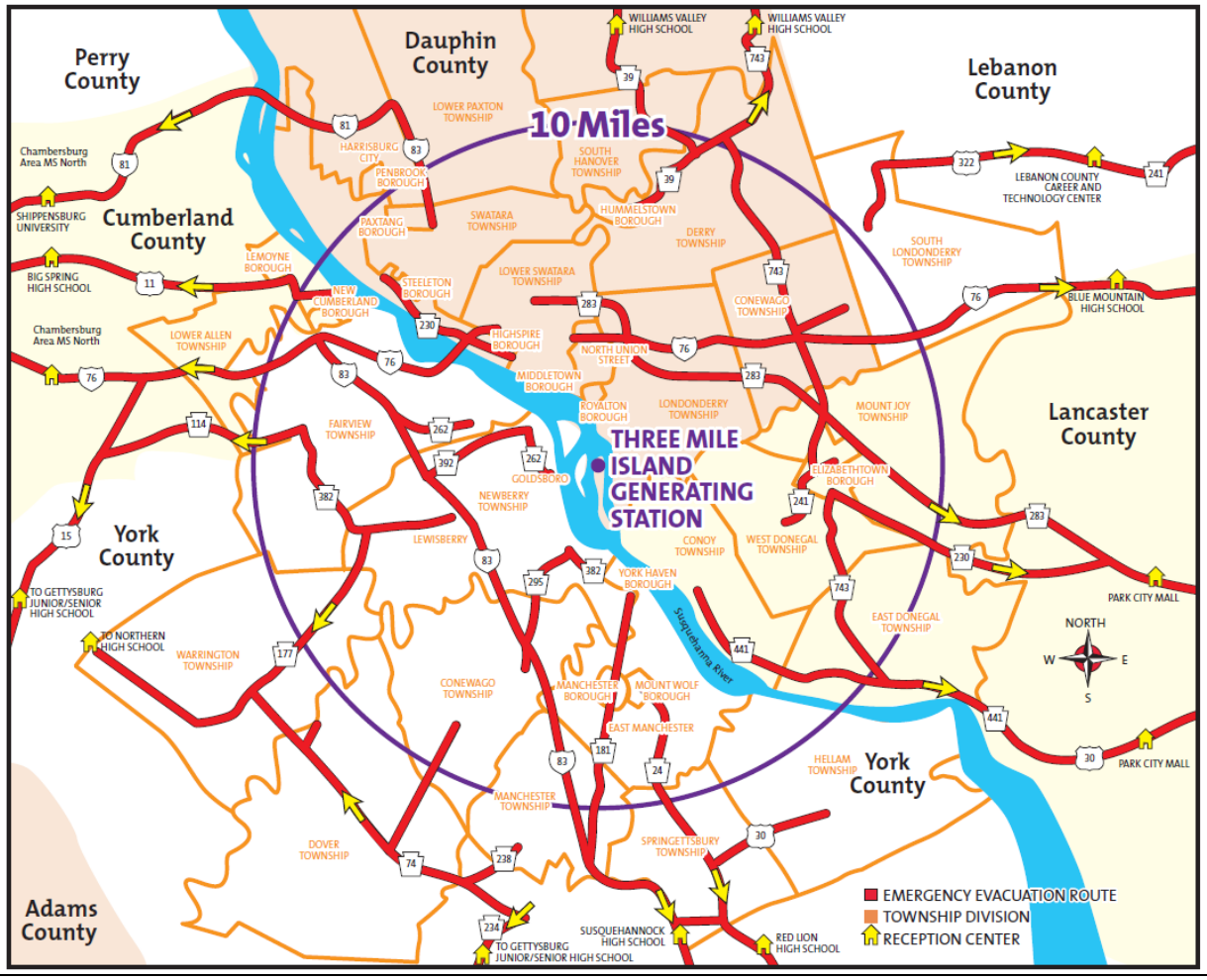
Across the United States, a number of *Unusual Event* and *Alert* classification level events occur each year at the 100+ nuclear facilities that warrant notification of local emergency managers. Of these, *Alert* emergencies occur less frequently. For example, in 1997, there were 40 notifications of *Unusual Events* and three *Alert* events nationwide. Based on historical events, *Site Area Emergency* and *General Emergency* incidents are very rare. Overall, the probability of future nuclear incidents can be considered *unlikely* according to the Risk Factor Methodology (see Table 4.4-1).

4.3.15.5 Vulnerability Assessment

New Cumberland Borough is located entirely within the Plume Exposure Pathway EPZ while Lower Allen Township (Allendale & Beacon Hill Subdivisions) is partially within this planning zone for Three Mile Island.

Health and environmental consequences from exposure to radiation levels can have serious long-term effects, and most of the literature related to nuclear incidents indicates that effects are experienced well within the fifty mile Ingestion Exposure Pathway Emergency Planning Zone. Figure 4.3.15-3 shows the evacuation plan map that would be used in the event an evacuation from the Three Mile Island Area would be necessary. Most of Cumberland County is outside of the emergency evacuation zone; however, the entire County would be affected on some level by such an event and is therefore considered at risk.

Figure 4.3.15-3: Evacuation plan map for the Three Mile Island area (Exelon, 2014).



In addition to the risk of a nuclear event at TMI, there is also potential for a nuclear accident to occur on the major roads and railroads that run through Cumberland County. The municipalities and populations vulnerable to events that may occur on these transportation routes are addressed in Section 4.3.13-5.

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.

An important consideration in evaluating terrorism hazards is the existence of facilities, landmarks, or other buildings of international, national, or regional importance. While Cumberland County has many notable landmarks from a local historic perspective, there are no sites which are considered significant landmarks in terms of national or international importance. However, the Pennsylvania state capital located to the east of the County across the Susquehanna River and Gettysburg National Military Park located to the south in Adams County are potential terrorist targets.

Nonetheless, terrorism can take many forms and terrorists have a wide range of personal, political, or cultural agendas. Therefore, there is no location that is not a potential terrorist target. Two types of terrorist activity are particularly relevant to Cumberland County: agriterrorism and intentional hazardous material releases. Agriterrorism is the direct, intentional, generally covert contamination of food supplies or introduction of pests and/or disease agents to crops and livestock. Cumberland County is semi-rural with about 46 percent of its land area dedicated to agriculture in 2014.

There are also a number of SARA Title III facilities and major transportation routes that traverse the County; making intentional hazard material releases a potential threat to citizens and the environment. This hazard is addressed in Section 4.3.13. Critical facilities including police stations, hospitals, fire stations, schools, wastewater treatment plants, water supply facilities, may be potential terrorist targets. A complete list of these facilities is included in Appendix E. The County has also identified the following potential terrorist targets within and outside of county boundaries, including areas which may be targets due to the gathering of large crowds:

- Army Barracks and War College (North Middleton Township)
- Navy Support Facility (Hampden Township)
- Defense Actives Region East (DDRE) (York County)
- Letterkenny Army Depot (Franklin County)
- Three Mile Island Nuclear Power Plant (see Section 4.3.14)
- Old Carlisle Fairgrounds – *Carlisle Events* (Carlisle Borough & North Middleton Township)
- Ken Mullen Stadium (Carlisle Borough)
- East Pennsboro School District (East Pennsboro Township)
- West Shore Stadium (Lower Allen Township)

- Cumberland Valley High School Stadium (Silver Spring Township)
- Boiling Springs High School (South Middleton Township)
- Big Spring School District (West Pennsboro Township)
- Messiah College (Upper Allen Township)
- Dickinson College Stadium (Borough of Carlisle)
- Norfolk-Southern Enola Yard

In addition, all bridges and railways (discussed in Section 4.3.17) across the County are considered potential targets. Middlesex Township experienced a suspected bomb incident in 2005 at the Pilot Truck stop located on Harrisburg Pike (Route 11). A suitcase was detonated by bomb team experts after it was believed to contain explosives. While it was later found not to be a bomb, the incident was a learning experience and served as a live exercise. Response to the incident was adequate, an important finding since the intersection of I-81 and I-76 is located within the Township.

4.3.16.2 Range of Magnitude

The severity of terrorist incidents depends upon the method of attack, the proximity of the attack to people, animals, or other assets and the duration of exposure to the incident or attack 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. In this case, 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. Some biological agents cannot be easily detected and may take time to develop. Therefore, it can be 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 which may result in the need for victims to be quarantined.

In Cumberland County past events have consisted of bomb threats, as described in Section 4.3.16.3.

4.3.16.3 Past Occurrence

Cumberland County experiences terrorist incidents annually. In 2002, 13 terrorist incidents (i.e., bomb threats) were reported while in 36 incidents were reported in 2001. More recently, 18 incidents were reported in 2008 while 21 were reported in 2007 (PEMA 2007 & 2008). Specific details regarding these incidents are not available. A photograph of a bomb threat response is provided in Figure 4.3.16-1.

Figure 4.3.16-1: There was a bomb threat at Shippensburg Area Senior High School on October 7, 2005 (Photograph courtesy of Pam Roy/*The Sentinel*, 2014).

4.3.16.4 Future Occurrence

Based on historical events, Cumberland County can expect to experience several terrorist incidents each year. Note that this estimate is based on the occurrence of past events over a short period of time and is not the result of detailed statistical sampling. Although previous events have not resulted in what are considered significant terrorist attacks, the severity of a future incident cannot be predicted with a sufficient level of certainty. Overall, the probability of future significant terrorist incidents can be considered *unlikely* according to the Risk Factor Methodology (see Table 4.4-1).

4.3.16.5 Vulnerability Assessment

Since the probability of terrorism occurring cannot be quantified in the same way as that of many natural hazards, it is not possible to assess vulnerability in terms of likelihood of occurrence. Instead, vulnerability is assessed in terms of specific assets. By identifying potentially at-risk terrorist targets in a community, planning efforts can be put in place to reduce the risk of attack. All communities in Cumberland County are vulnerable on some level, directly or indirectly, to a terrorist attack. However, communities where the previously mentioned potential targets are located should be considered more vulnerable. Site-specific assessments should be based on the relative importance of a particular site to the surrounding community or population, threats that are known to exist and 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 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 Accidents

4.3.17.1 Location and Extent

For the purposes of this plan, transportation accidents are defined as incidents involving highway, rail, and air travel. Within Cumberland County, there are over 2,400 miles of roads, 552 bridges and approximately 270 miles of railways. Key freight routes include I-81, I-76, I-83, PA 581 and PA 34/94. The Norfolk Southern Railroad runs along the entire eastern border of the Borough of New Cumberland. There is a potential for major accidents on any of these roads, bridges or railways.

The County has three private airports; Carlisle Business Airport, Shippensburg Regional Airport and Newville Regional Airfield. There are no public airports in Cumberland County, but there is a considerable amount of commercial air traffic from two airports located outside of the County; Harrisburg International Airport in Dauphin County and Capital City Airport in York County. Commercial air traffic flyovers not only bother residents with noise, but they also present the possibility of injury, damage to structures and fire, if an aircraft were to crash. A five-mile radius around each airport can be considered a high-risk area since most aviation incidents occur near landing or take-off sites. While Harrisburg International Airport is the largest airport in the area, it is greater than five miles away from the County.

Highway traffic volumes are illustrated on Figure 4.3.17-1, while rail and airport facilities are illustrated on Figure 4.3.17-2.

Figure 4.3.17-1: Cumberland County highway traffic volume.

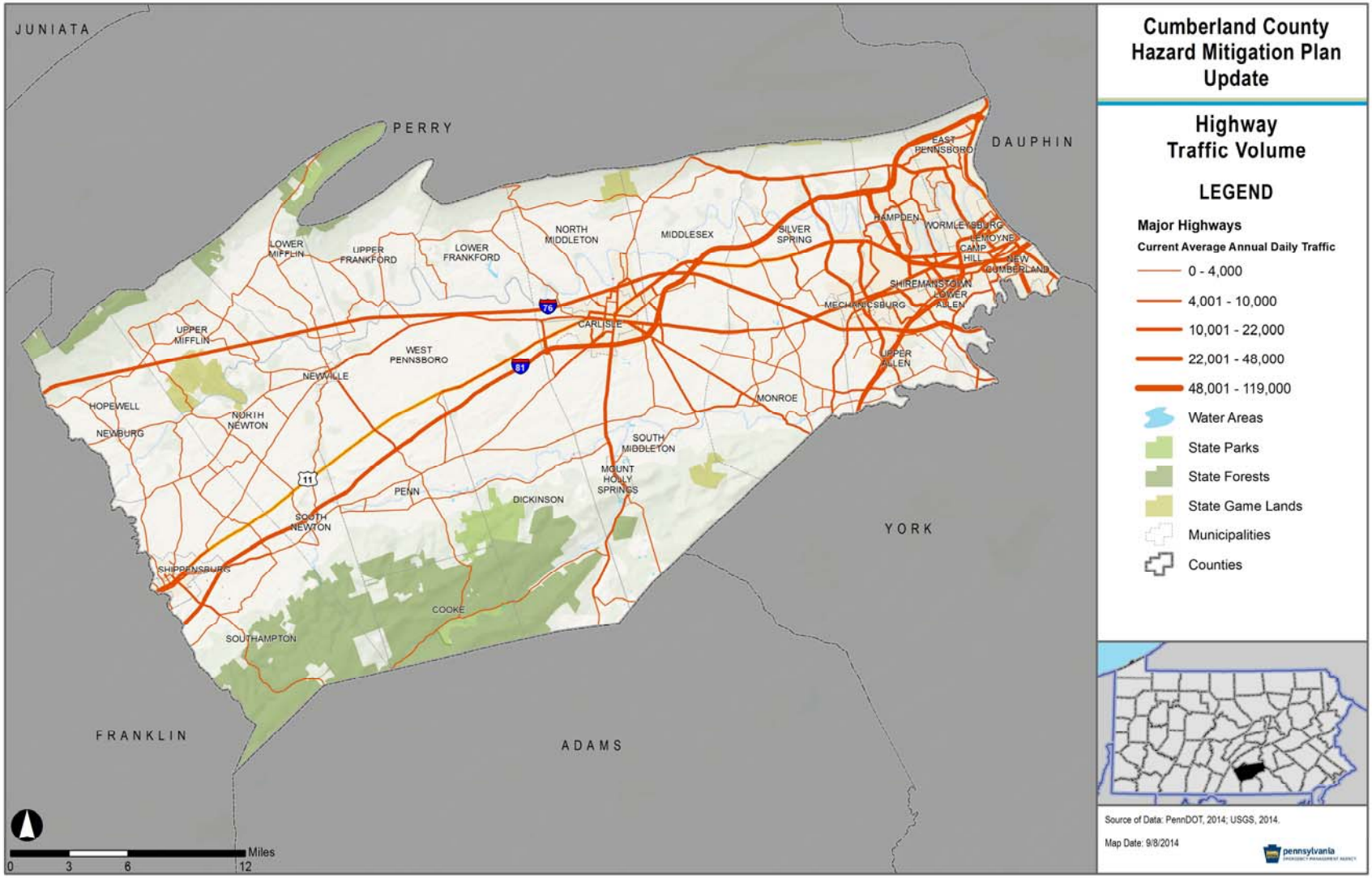
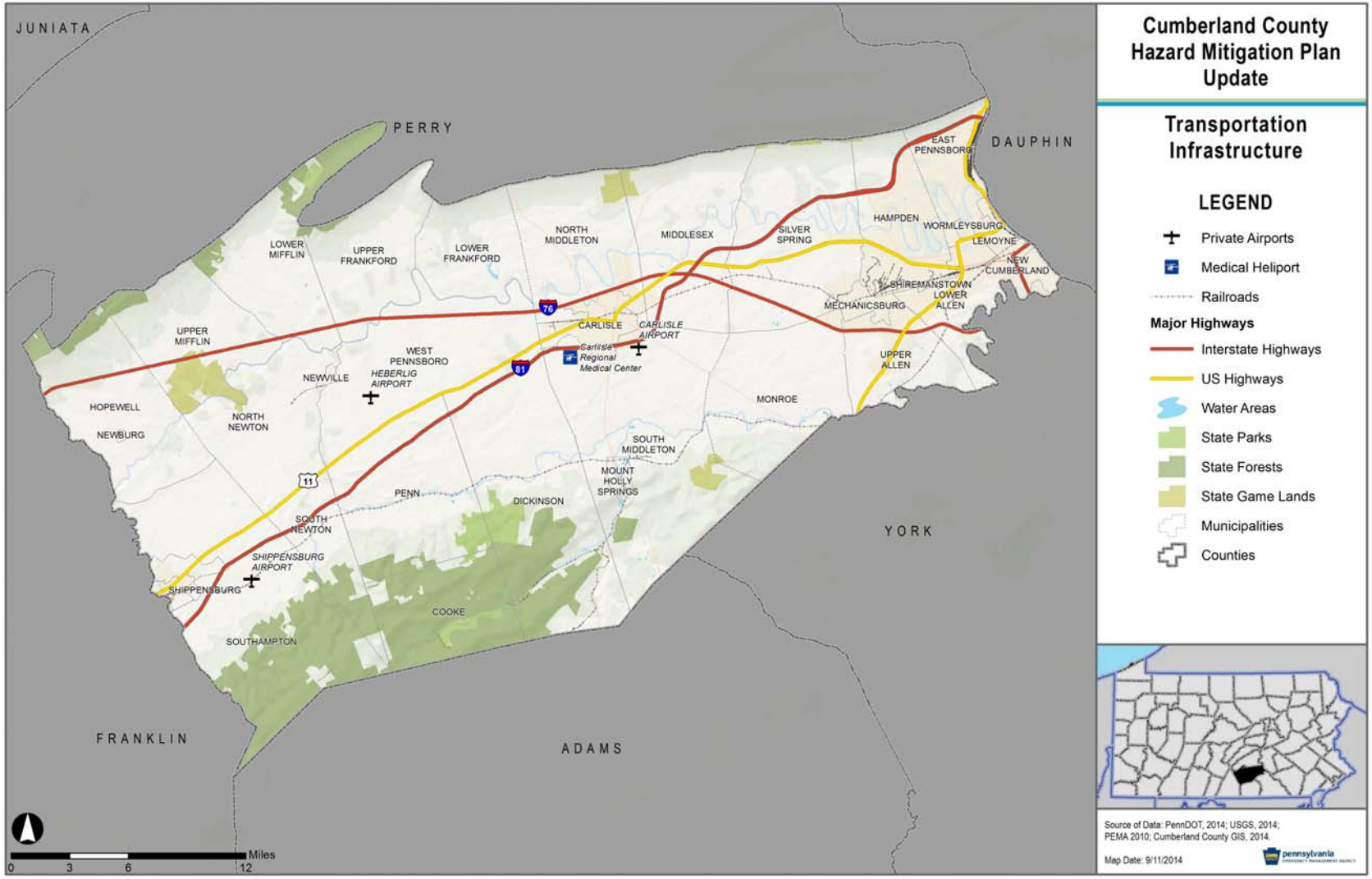


Figure 4.3.17-2: Cumberland County transportation infrastructure.



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.

The environmental impacts of transportation accidents can vary greatly. In the case of a simple motor vehicle crash, train derailment, or aviation accident, the environmental impact is minimal. However, if the accident involves any type of vehicle moving chemicals or other hazardous materials, the impact will be considerably larger and may include an explosion or the release of potentially hazardous material. An example of this type of worst case scenario is described in Section 4.2.1 and resulted in closure of Interstate 81 and US Route 22/322 westbound during the repair of two damaged bridges, causing a severe disruption to transportation in Cumberland County and the rest of the Capitol Region in 2013. For a complete discussion of the environmental impacts of hazardous materials releases, see Section 4.3.13.

4.3.17.3 Past Occurrence

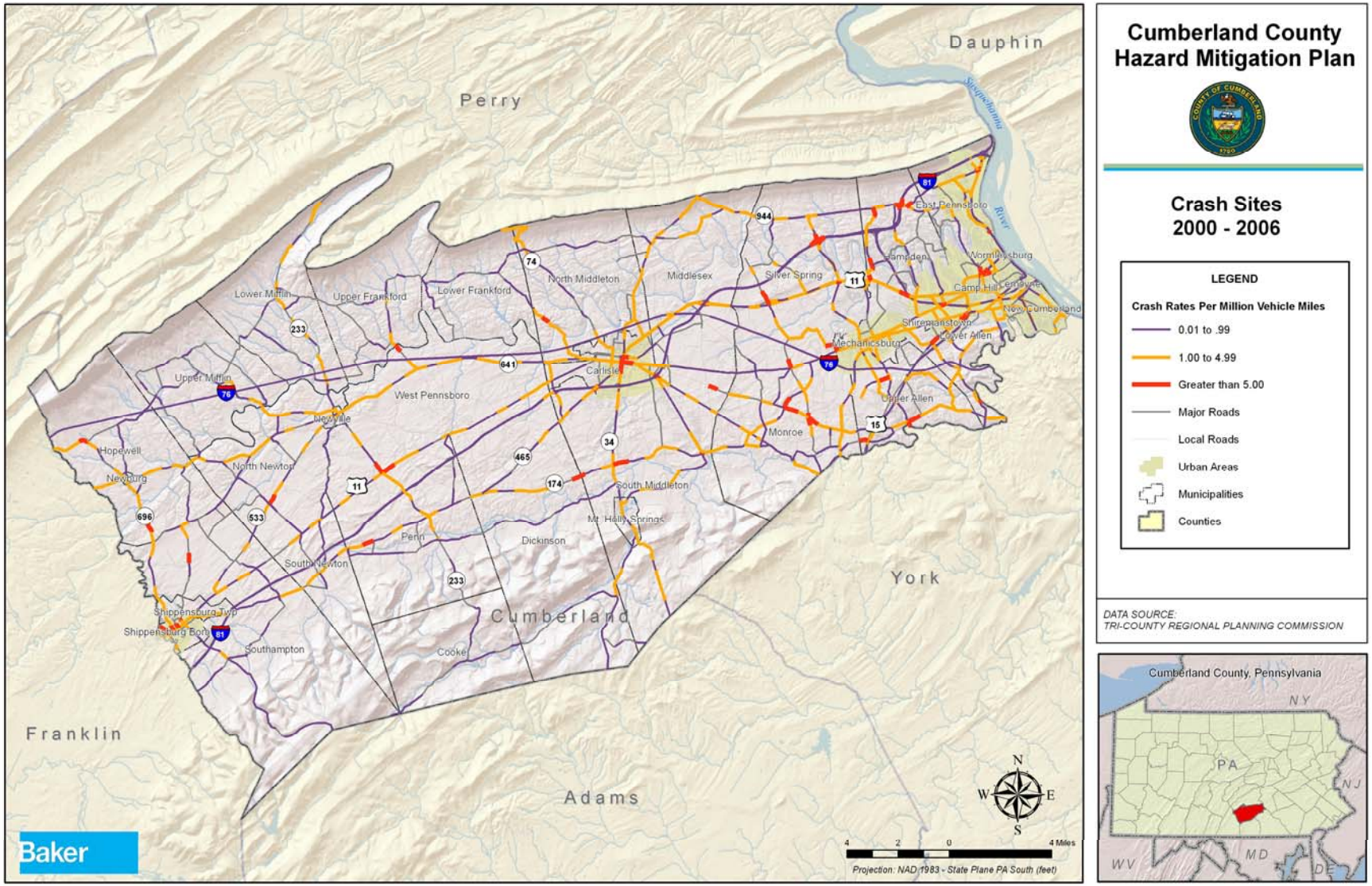
Based on previous events, the following intersections and corridors in Cumberland County have been identified by the Harrisburg Area Transportation Study (HATS) for safety initiatives in order to reduce fatalities, major injuries and economic loss to society (HATS, 2010):

- Valley Road – near I-81 interchange in Enola
- Interchange with PA 581/US 11 ramps and Central Boulevard in Camp Hill
- PA 581 ramps and Gateway Drive
- I-81 SB ramps and PA 944 Wertzville Road
- Wesley Drive and US 15 NB ramps
- Lisburn Road and PA 174 Boiling Spring Road
- Carlisle Pike and St John's Church Road
- East Penn Drive and Wertzville Road
- US 11 and PA 233 Centerville Road, west of Carlisle
- Pine Grove Road and PA 34 Holly Pike, south of Mt. Holly Springs
- Carlisle Pike and Orrs Bridge Rd
- Simpson Ferry Road and Allendale Road, Mechanicsburg
- Wertzville Road & I-81 NB ramps
- St. Johns Church Road and PA 641 Trindle Road
- I-81 ramps and PA 34 south of Carlisle
- PA 34 and PA 174 – Carlisle

- Carlisle Pike and Skyport Road
- Wesley Drive and Gettysburg Road
- Magaro Road and Wertzville Road, Enola
- Millers Gap Road and Wertzville Road
- Locust Point Road and Carlisle Pike, New Kingstown
- College Street and Louther Street, Carlisle (Dickinson Campus)
- US 15 ramps and W Lisburn Road

In addition, the Tri-County Regional Planning Commission has identified roads across the County which commonly experienced traffic crash incidents between 2000 and 2006 (see Figure 4.3.17-3). More recent data was not available for the 2014 HMP update.

Figure 4.3.17-3: Cumberland County crash analysis map (TCRPC, 2007).



Commercial bus accidents are also a concern. For example, a charter bus veered off the Pennsylvania Turnpike near Carlisle and struck a tree on March 9, 2013, killing the driver and one passenger (Malmont and Cress, 2013).

Two plane crashes occurred within the Borough of New Cumberland in 1983 and 1984; both in highly populated areas. One occurred beside an active playground. The other accident involved a crash into a residential property, killing both the pilot and an occupant of the house and threatening several others. A Cessna plane crashed in a residential area on Forge Road near the intersection with West Hunter Road in South Middleton Township on March 24, 2014, but only the pilot was injured (Carr, 2014). A photograph of this event is shown in Figure 4.3.17-4. All other plane crashes of past years have occurred in mountainous terrain and resulted in death or injury to occupants of the aircraft only.

Figure 4.3.17-4: A Cessna plane crashed in a residential area on Forge Road near the intersection with West Hunter Road in South Middleton Township, Cumberland County, PA on March 24, 2014 (Photograph courtesy of Curt Werner/*The Sentinel*, 2014).

Rail accidents were also noted by municipal respondents as a concern during the 2014 plan update process. For example, a freight train struck a tractor-trailer hauling a 135 foot long concrete bridge span at the Brandtsville Crossing in Monroe Township on September 12, 2013 (Croley, 2013). The crash and train derailment did not cause fatalities but resulted in significant property damage as well as closure of both lanes of York Road for more than 24 hours (Croley, 2013). A photograph of this event is provided in Figure 4.3.17-5.

Figure 4.3.17-5: A freight train struck a tractor-trailer hauling a 135 foot long concrete bridge span at the Brandtsville Crossing in Monroe Township, Cumberland County, PA on September 12, 2013 (Photograph courtesy of *The Sentinel*, 2014).

4.3.17.4 Future Occurrence

The number of transportation related accidents is expected to increase with growing populations and increased traffic volumes. East Pennsboro Township, which has experienced a 4.5 percent increase in population since 2010, notes increased traffic congestion on Routes 11, 15, I-81 and railways. New highway construction in Lower Allen Township will result in increased trucking and traffic congestion. There were approximately 65,000 long haul trucks operating daily in Cumberland County in 2003, 60,000 of which were traveling through (e.g. not considered inbound or outbound trucks) the County. It is anticipated that by 2030, over 121,000 long haul trucks will operate daily in the County, 109,000 of which will be traveling through the region without making a pickup or delivery (HATS, 2010). This is a result of the presence of interstates and other freight routes that traverse Cumberland County. During the 2014 HMP update, the Newville Borough Manager cited an increase in transportation accidents involving commercial vehicles due to increases in warehouses and truck routes through Newville.

Figure 4.3.17-3 provides traffic crash rates measured in crashes per million vehicle miles for major roads throughout Cumberland County. Rates measure between 0.01 and greater than 5.0 crashes per million miles based on historical 2000-2006 data from the Pennsylvania Department of Transportation. More recent data was not available for the 2014 HMP update. These rates provide a basis for estimating the number of future traffic crash incidents on given roads across the County. Crashes are likely to continue or increase without mitigation.

The average rate of aviation accidents nationwide is 8.47 accidents per 100,000 flight hours. Therefore, the likelihood of an aviation incident in the County is considered low. Information on

previous railway accidents is insufficient to assess the probability of future occurrence. This information may possibly be included in the countywide Railway Management Plan to be developed as Action 24.

Overall, the probability of future transportation accidents can be considered *highly likely* according to the Risk Factor Methodology (see Table 4.4-1).

4.3.17.5 Vulnerability Assessment

A transportation related accident can occur on any stretch of road or railway in Cumberland County. However, severe accidents are more likely along major highways such as I-81, I-76, I-83, US Routes 11, 15, 11/15 and PA Route 581 which experience heavier traffic volumes including heavy freight vehicles. The Borough of Shippensburg, Shippensburg Township, and Southampton Township have all indicated that truck and rail traffic is increasing in the area.

Middlesex Township has indicated that “Miracle Mile,” a one mile stretch of Harrisburg Pike (Route 11) which serves as the connector route between I-81 and I-76, experiences a very large volume of traffic. Tractor trailers make up a large portion of this volume. Due to congestion, it is an area which has been a challenge for emergency response. Middlesex Township incorporated a special road closure plan for the “Miracle Mile” in 2012 as part of their emergency operations plan.

Table 4.3.17-1 lists parcels and critical facilities within 0.25 mile of major highways (interstates, United States highways, and Pennsylvania highways) and rail lines and within 5 miles of an airport/heliport. The Borough of Carlisle stands out as the municipality most vulnerable to transportation accidents with the most structures within 0.25 mile of a major highway, the most structures within 0.25 mile of a rail line, and the most structures within 5 miles of an airport. The Borough of Carlisle also has the most critical facilities within 0.25 mile of a major highway and within 5 miles of an airport/heliport.

Table 4.3.17-1: Parcels 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 (Cumberland County GIS, 2014).

Municipality	Total Structures in Municipality	Structures within 0.25 mi of Major Roads	Percent of Structures within 0.25 mi of Major Roads	Structures within 0.25 mi of rail lines	Percent of Structures within 0.25 mi of rail lines	Structures within 5 mi of Airport/ Heliport	Percent of structures within 5 mi of airport	Total Critical Facilities in Municipality	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	Critical Facilities within 5 mi of Airport/ Heliport	Percent of Critical Facilities within 5 mi of airport
Borough of Camp Hill	3,629	2,171	59.8%	671	18.5%	0	0.0%	16	6	37.5%	3	18.8%	0	0.0%
Borough of Carlisle	8,248	7,051	85.5%	2,698	32.7%	8,248	100.0%	67	61	91.0%	20	29.9%	67	100.0%
Township of Cooke	326	101	31.0%	28	8.6%	7	2.1%	2	2	100.0%	0	0.0%	0	0.0%
Township of Dickinson	2,160	778	36.0%	577	26.7%	1,210	56.0%	9	2	22.2%	1	11.1%	6	66.7%
Township of East Pennsboro	8,637	3,724	43.1%	1,815	21.0%	0	0.0%	29	18	62.1%	12	41.4%	0	0.0%
Township of Hampden	12,335	4,821	39.1%	821	6.7%	0	0.0%	58	28	48.3%	30	51.7%	0	0.0%
Township of Hopewell	854	359	42.0%	0	0.0%	29	3.4%	1	0	0.0%	0	0.0%	0	0.0%
Borough of Lemoyne	2,057	930	45.2%	1,644	79.9%	0	0.0%	13	9	69.2%	12	92.3%	0	0.0%
Township of Lower Allen	7,012	2,668	38.0%	1,455	20.8%	0	0.0%	30	11	36.7%	10	33.3%	0	0.0%
Township of Lower Frankford	715	106	14.8%	0	0.0%	305	42.7%	1	0	0.0%	0	0.0%	1	100.0%
Township of Lower Mifflin	728	253	34.8%	0	0.0%	299	41.1%	3	3	100.0%	0	0.0%	0	0.0%
Borough of Mechanicsburg	4,292	2,906	67.7%	2,624	61.1%	0	0.0%	25	20	80.0%	20	80.0%	0	0.0%
Township of Middlesex	2,749	1,340	48.7%	96	3.5%	1,366	49.7%	25	10	40.0%	7	28.0%	21	84.0%
Township of Monroe	2,413	865	35.8%	272	11.3%	633	26.2%	7	4	57.1%	2	28.6%	3	42.9%
Borough of Mount Holly Springs	893	685	76.7%	565	63.3%	723	81.0%	9	9	100.0%	5	55.6%	7	77.8%
Borough of New Cumberland	3,296	461	14.0%	997	30.2%	0	0.0%	10	0	0.0%	3	30.0%	10	100.0%
Borough of Newburg	134	134	100.0%	0	0.0%	0	0.0%	2	2	100.0%	0	0.0%	0	0.0%
Borough of Newville	696	696	100.0%	0	0.0%	696	100.0%	10	10	100.0%	0	0.0%	0	0.0%
Township of North Middleton	4,928	2,524	51.2%	281	5.7%	4,598	93.3%	23	16	69.6%	4	17.4%	23	100.0%

Table 4.3.17-1: Parcels 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 (Cumberland County GIS, 2014).

Municipality	Total Structures in Municipality	Structures within 0.25 mi of Major Roads	Percent of Structures within 0.25 mi of Major Roads	Structures within 0.25 mi of rail lines	Percent of Structures within 0.25 mi of rail lines	Structures within 5 mi of Airport/ Heliport	Percent of structures within 5 mi of airport	Total Critical Facilities in Municipality	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	Critical Facilities within 5 mi of Airport/ Heliport	Percent of Critical Facilities within 5 mi of airport
Township of North Newton	924	482	52.2%	14	1.5%	738	79.9%	6	5	83.3%	1	16.7%	4	66.7%
Township of Penn	1,149	514	44.7%	174	15.1%	795	69.2%	5	1	20.0%	2	40.0%	3	60.0%
Borough of Shippensburg	1,796	1,375	76.6%	838	46.7%	1,796	100.0%	9	4	44.4%	4	44.4%	7	77.8%
Township of Shippensburg	1,236	846	68.4%	149	12.1%	1,236	100.0%	13	10	76.9%	3	23.1%	13	100.0%
Borough of Shiremanstown	742		0.0%	627	84.5%	0	0.0%	4	0	0.0%	4	100.0%	0	0.0%
Township of Silver Spring	6,492	2,899	44.7%	937	14.4%	385	5.9%	35	20	57.1%	9	25.7%	1	2.9%
Township of South Middleton	6,489	2,432	37.5%	476	7.3%	5,974	92.1%	42	17	40.5%	3	7.1%	39	92.9%
Township of South Newton	507	319	62.9%	220	43.4%	507	100.0%	2	2	100.0%	2	100.0%	2	100.0%
Township of Southampton	2,660	1,169	43.9%	412	15.5%	2,638	99.2%	9	6	66.7%	2	22.2%	9	100.0%
Township of Upper Allen	7,286	3,207	44.0%	300	4.1%	0	0.0%	22	15	68.2%	4	18.2%	1	4.5%
Township of Upper Frankford	873	174	19.9%	0	0.0%	315	36.1%	5	4	80.0%	0	0.0%	0	0.0%
Township of Upper Mifflin	534	124	23.2%	0	0.0%	20	3.7%	1	0	0.0%	0	0.0%	0	0.0%
Township of West Pennsboro	2,270	958	42.2%	0	0.0%	2,264	99.7%	10	4	40.0%	0	0.0%	10	100.0%
Borough of Wormleysburg	1,407	751	53.4%	981	69.7%	0	0.0%	2	0	0.0%	2	100.0%	0	0.0%
TOTAL	**100,467**	**47,823**	**47.6%**	**19,672**	**19.6%**	**34,782**	**34.6%**	**505**	**299**	**59.2%**	**165**	**32.7%**	**227**	**45.0%**

Approximately 83,599 people in Cumberland County live within five miles of at least one airport in or adjacent to Cumberland County. Population totals within these high-risk areas are listed in Table 4.3.17-2. In addition, New Cumberland Borough and East Pennsboro Township are located beneath routine flight paths for Harrisburg International and Capital City airports.

Table 4.3.17-2: Population within 5-miles of airports located in and adjacent to Cumberland County (Cumberland County GIS, 2014).

Municipality	Total Population	Population within 5 miles of airport
Borough of Camp Hill	7,888	0
Borough of Carlisle	18,682	18,682
Township of Cooke	179	15
Township of Dickinson	5,223	2,943
Township of East Pennsboro	20,228	0
Township of Hampden	28,044	0
Township of Hopewell	2,329	48
Borough of Lemoyne	4,553	0
Township of Lower Allen	17,980	0
Township of Lower Frankford	1,732	757
Township of Lower Mifflin	1,783	663
Borough of Mechanicsburg	8,981	0
Township of Middlesex	7,040	3,786
Township of Monroe	5,823	1,578
Borough of Mount Holly Springs	2,030	1,686
Borough of New Cumberland	336	0
Borough of Newburg	7,277	0
Borough of Newville	1,326	1,326
Township of North Middleton	11,143	10,286
Township of North Newton	2,430	1,885
Township of Penn	2,924	1,964
Borough of Shippensburg	4,416	4,373
Township of Shippensburg	5,429	5,429
Borough of Shiremanstown	1,569	0
Township of Silver Spring	13,657	739
Township of South Middleton	14,663	13,288
Township of South Newton	1,383	1,383
Township of Southampton	6,359	6,314
Township of Upper Allen	18,059	0
Township of Upper Frankford	2,005	892
Township of Upper Mifflin	1,304	48
Township of West Pennsboro	5,561	5,514
Borough of Wormleysburg	3,070	0
TOTAL	**235,406**	**83,599**

Table 4.3.17-3 indicates generalized land use type for structures vulnerable to aviation incidents. The vast majority of these structures are residential (32,483 of 34,782).

Table 4.3.17-3: Structures Vulnerable to Aviation Incidents by Generalized Structure Type (Cumberland County GIS, 2014).

Municipality	Total Structures in Municipality	Agricultural	Civic/ Institutional	Commercial	Emergency Services	Government	Hospitals and Medical Centers	Industrial	Other/ Unspecified	Religious	Residential	School	Transportation	Grand Total
Borough of Camp Hill	3,629	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of Carlisle	8,248	0	11	664	7	15	6	22	48	27	7,398	50	0	8,248
Township of Cooke	326	0	0	0	0	0	0	0	0	0	7	0	0	7
Township of Dickinson	2,160	0	0	10	0	1	0	0	3	6	1,189	1	0	1,210
Township of East Pennsboro	8,637	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Hampden	12,335	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Hopewell	854	0	0	0	0	0	0	0	0	0	29	0	0	29
Borough of Lemoyne	2,057	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Lower Allen	7,012	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Lower Frankford	715	0	0	2	0	1	0	0	1	0	301	0	0	305
Township of Lower Mifflin	728	2	1	3	0	0	0	0	2	0	290	1	0	299
Borough of Mechanicsburg	4,292	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Middlesex	2,749	0	0	116	0	2	1	8	10	5	1,224	0	0	1,366
Township of Monroe	2,413	1	0	5	0	0	0	0	0	4	623	0	0	633
Borough of Mount Holly Springs	893	0	1	52	1	1	0	4	5	2	656	1	0	723
Borough of New Cumberland	3,296	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of Newburg	134	0	0	0	0	0	0	0	0	0	0	0	0	0
Borough of Newville	696	0	2	72	2	0	0	5	1	3	611	0	0	696
Township of North Middleton	4,928	1	1	84	1	4	1	3	38	7	4,456	2	0	4,598
Township of North Newton	924	4	0	12	0	0	0	2	32	4	679	5	0	738
Township of Penn	1,149	1	0	6	1	0	0	3	3	6	774	1	0	795
Borough of Shippensburg	1,796	0	3	210	2	1	0	17	17	16	1,528	2	0	1,796
Township of Shippensburg	1,236	0	1	49	0	1	5	2	4	5	1,115	54	0	1,236

Table 4.3.17-3: Structures Vulnerable to Aviation Incidents by Generalized Structure Type (Cumberland County GIS, 2014).

Municipality	Total Structures in Municipality	Agricultural	Civic/ Institutional	Commercial	Emergency Services	Government	Hospitals and Medical Centers	Industrial	Other/ Unspecified	Religious	Residential	School	Transportation	Grand Total
Borough of Shiremanstown	742	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Silver Spring	6,492	0	0	8	0	0	0	0	0	0	377	0	0	385
Township of South Middleton	6,489	2	1	251	3	2	5	15	11	21	5,656	6	1	5,974
Township of South Newton	507	1	0	16	1	0	0	1	2	1	484	1	0	507
Township of Southampton	2,660	4	1	27	0	1	0	4	17	7	2,574	3	0	2,638
Township of Upper Allen	7,286	0	0	0	0	0	0	0	0	0	0	0	0	0
Township of Upper Frankford	873	0	0	2	0	0	0	0	1	1	310	0	1	315
Township of Upper Mifflin	534	0	0	0	0	0	0	0	0	0	20	0	0	20
Township of West Pennsboro	2,270	5	0	40	1	1	1	2	13	14	2,182	5	0	2,264
Borough of Wormleysburg	1,407	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	**100,467**	**21**	**22**	**1,629**	**19**	**30**	**19**	**88**	**208**	**129**	**32,483**	**132**	**2**	**34,782**

Additionally, the Borough of Newville has expressed concerns over the use of the Cumberland County mobile 911 communications truck that serves as the primary back-up to the County 911 center. The communications truck has been used as a mobile command post in recent years to respond to emergencies throughout Cumberland County. As a result, this critical piece of public safety equipment is at greater risk to an automobile accident that could easily take it out of service for an extended period of time. Such an incident would leave Cumberland County without an alternate 911 service. Plan update participants recognized that while this is a valid concern, a regional 911 back-up process is in place to address the issue. If a 911 call cannot or could not be received from the Cumberland 911 system, it is relayed to the 911 system of a surrounding county. Therefore, it was agreed that this is not a serious concern and Cumberland County did not need to address this issue in the Mitigation Strategy.

4.3.18. Urban Fire

4.3.18.1 Location and Extent

Significant urban fires are limited to more densely populated areas that contain large and/or multiple buildings. Such fires may start in a single structure, but spread to nearby buildings or throughout a large building if adequate fire control measures are not in place. An example of a local urban fire is provided in Figure 4.3.18-1.

Figure 4.3.18-1: Fire at Pitt and High streets in the Borough of Carlisle, Cumberland County, PA (Photograph courtesy of Cumberland County, 2014).

4.3.18.2 Range of Magnitude

The impact of urban fire and explosion events vary based on the size of the incident and the population and structure density where it occurs. Severe urban fires result in extensive damage to residential, commercial and/or public property. Lives may be lost and people are often displaced for several months to years depending on the magnitude of the event. There may be

environmental impacts related to hazardous materials when a fire event or explosion releases dangerous materials.

There are additional economic consequences related to this hazard. Urban fires and explosions may result in lost wages due to temporarily or permanently closed businesses, destruction and damage involving business and personal assets, loss of tax base, recovery costs, and lost investments in destroyed property.

The secondary effects of urban fire and explosion events relate to the ability of public, private, and non-profit entities to provide post-incident relief. Human services agencies (community support programs, health and medical services, public assistance programs and social services) can be affected by urban fire and explosion events as well. Effects may consist of physical damage to facilities and equipment, disruption of emergency communications, loss of health and medical facilities and supplies, and an overwhelming load of victims who are suffering from the effects of the urban fire, including loss of their home or place of business. A potential worst case scenario could involve an urban fire affecting critical facilities, numerous attached residences, or a large employer.

4.3.18.3 Past Occurrence

Cumberland County experiences a number of urban fires every year, most of which are small and affect one to a few structures. However, a list of previous significant urban fires is included in Table 4.3.18-1, and a photograph of one event is provided in Figure 4.3.18-2.

Table 4.3.18-1: List of previous significant urban fire events in Cumberland County.

Date	Location	Agency Action
May 2012	Borough of Carlisle (Leer Corporation)	None
May 2011	Carlisle Waste Water Treatment Plant	None
September 2009	Mechanicsburg Borough (4 row house fire at Market & Allen Streets)	None
July 2009	York (block of row houses on Chestnut Street)	Small Business Administration Loans made available
May 2007	Shippensburg Borough (King Street)	None
November 2001	Borough of Lemoyne (Market Street)	Small Business Administration Loan applied for, but not accepted
December 1999	Borough of Carlisle	Small Business Administration Loan received
February 1999	Borough of Lemoyne (West Shore Farmer's Market)	Small Business Administration Loan received
December 1993	Borough of Carlisle (Bartolli's Warehouse)	Small Business Administration Loan received

Figure 4.3.18-2: Fire fighters battled the blaze at the Leer Corporation building in the Borough of Carlisle, Cumberland County, PA on May 4, 2012 (Photograph courtesy of Jason Malmont/*The Sentinel*, 2014).

4.3.18.4 Future Occurrence

Based on historical events, Cumberland County is expected to experience three to four significant urban fire events per decade. Note that this estimate is based on the occurrence of past events over a short period of time and is not the result of detailed statistical sampling. The probability of future significant urban fires can be considered *possible* according to the Risk Factor Methodology (see Table 4.4-1).

4.3.18.5 Vulnerability Assessment

Areas where large buildings are located or development is densely spaced should be considered more vulnerable to urban fire events. In order to adequately assess vulnerability to urban fires, detailed information on the design specifications, specifically fires codes, used for construction of individual buildings is required. All 33 municipalities have adopted the Uniform Construction Code which assures buildings are designed to address structure fire hazards. However, these regulations will only affect new construction, as well as additions and renovations to existing structures. Older buildings that do not meet the criteria established in modern fire codes continue to remain vulnerable. The County will seek to identify these properties through Action 25 listed in the Mitigation Action Plan (see Section 6.4).

4.3.19. Utility Interruption

4.3.19.1 Location and Extent

Utility interruptions in Cumberland County focus primarily on power failures which are often a secondary impact of another hazard event. For example, severe thunderstorms or winter storms could bring down power lines and cause widespread disruptions in electricity service.

Strong heat waves may result in rolling blackouts where power may not be available for an extended period of time. Local outages may be caused by traffic accidents or wind damage.

During the 2014 HMP update, South Middleton Township's Local Emergency Management Coordinator, Ron Hamilton, stated that power companies in the area will not do preventative maintenance (tree trimming) but will only respond after a tree has damaged a power line. In many municipalities, street trees are a requirement for developers even when overhead power lines are present. It was suggested by members of the HMSC that municipalities should consider eliminating this requirement or revising it to account for proper placement and species of trees, which could reduce the potential for power line damage. For example, Lower Allen Township already regulates street tree species in their subdivision and land development ordinances and cite the requirement that only trees which will not interfere with overhead lines may be planted (ecode360, 2014).

Utility interruptions and power failures can take place anywhere in the County.

4.3.19.2 Range of Magnitude

Most severe power failures or outages are regional events. A loss of electricity can have numerous impacts including, but not limited to food spoilage, loss of heat or air conditioning, basement flooding (i.e., sump pump failure), lack of indoor lighting, loss of water supply (i.e., well pump failure) and lack of phone or internet service. These issues are often more of a nuisance than a hazard, but can cause damage or harm depending on the population affected and the severity of the outage. The worst utility interruption in Cumberland County occurred in 2007 and is described in Section 4.3.19.3.

4.3.19.3 Past Occurrence

Minor power outages occur annually. A significant outage occurred on December 16, 2007. Approximately 75,000 Pennsylvania Power and Lighting customers were without power across south-central Pennsylvania due to heavy icing. Some customers were without power for up to three days. A photograph from a power outage in 2011 is provided in Figure 4.3.19-1.

Figure 4.3.19-1: A telephone pole was leaning at the intersection of Bernheisel Bridge Road and Sherwood Drive in Middlesex Township, Cumberland County, PA on May 28, 2011 following a storm that caused power outages for thousands of county residents (Photograph courtesy of Jason Malmont/*The Sentinel*, 2014).

4.3.19.4 Future Occurrence

Minor power failure events (i.e., short outage) may occur several times a year for any given area in the County, while major (i.e., widespread, long outage) events take place once every few years. Power failures are likely occurrences during severe weather and therefore should be expected during those events. Overall, the probability of future utility interruption events can be considered *likely* according to the Risk Factor Methodology (see Table 4.4-1).

4.3.19.5 Vulnerability Assessment

Emergency medical facilities, including retirement homes and senior centers are particularly vulnerable to power outages. While back-up power generators are often used at these facilities, loss of electricity may result in hot or cold temperatures for which elderly populations are particularly vulnerable. Appendix E provides a list of where those facilities are located in Cumberland County. Some municipalities, like Silver Spring Township, have identified evacuation shelters in case of loss of heat or air conditioning.

Pennsylvania Power and Lighting recently implemented a new dispatch communications system called Mobile Operations Management (MOM). This system links every Pennsylvania Power and Lighting crew to a central emergency response coordination center. This technology has reduced average outage times in Pennsylvania from an average of 108 minutes between 2004 and 2008 to 71 minutes in 2009.

4.4 Hazard Vulnerability Summary

4.4.1. Methodology

Ranking hazards helps communities set goals and priorities for mitigation based on their vulnerabilities. A Risk Factor (RF) is a tool used to measure the degree of risk for identified hazards in a particular planning area. The RF can also 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.

Risk Factor values were obtained by assigning varying degrees of risk to five categories for each of the nineteen hazards profiled in the 2014 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 agreed upon by the planning team 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 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: 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 *(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)*	**1**	**10%**
	12 TO 24 HRS	SELF-DEFINED	**2**	
	6 TO 12 HRS	SELF-DEFINED	**3**	
	LESS THAN 6 HRS	SELF-DEFINED	**4**	
DURATION *How long does the hazard event usually last?*	**LESS THAN 6 HRS**	SELF-DEFINED *(NOTE: Levels of warning time and criteria that define them may be adjusted based on hazard addressed.)*	**1**	**10%**
	LESS THAN 24 HRS	SELF-DEFINED	**2**	
	LESS THAN 1 WEEK	SELF-DEFINED	**3**	
	MORE THAN 1 WEEK	SELF-DEFINED	**4**	

4.4.2. Ranking Results

Using the methodology described in Section 4.4-1, Table 4.4-2 lists the Risk Factor calculated for each of the nineteen potential hazards identified in the 2014 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 less than 2.0 are considered *low* risk.

Table 4.4-2: Ranking results by hazard for Cumberland County using the Risk Factor methodology.

Hazard Natural(N) Or Human-Made(M)	Risk Assessment Category					Risk Factor (RF)
	Probability	Impact	Spatial Extent	Warning Time	Duration	
Flood, Flash Flood, Ice Jam (N)	3	2	3	3	3	**2.7**
Winter Storm (N)	4	1	4	1	3	**2.7**
Tornado, Wind Storm (N)	3	3	2	4	1	**2.7**
Subsidence, Sinkhole (N)	4	1	4	2	1	**2.6**
Environmental Hazard (M)	3	2	2	4	3	**2.6**
Drought (N)	2	2	4	2	4	**2.6**
Wildfire (N)	4	1	2	2	3	**2.4**
Dam Failure (M)	1	3	2	4	3	**2.3**
Pandemic (N)	2	2	3	1	4	**2.3**
Hurricane, Tropical Storm, Nor'easter (N)	2	2	3	1	3	**2.2**
Terrorism (M)	1	3	2	4	2	**2.2**
Transportation Accident (M)	4	1	1	4	1	**2.2**
Nuclear Incident (M)	1	2	2	4	4	**2.1**
Utility Interruption (M)	3	1	2	3	1	**2**
Urban Fire and Explosion (M)	2	2	1	4	1	**1.9**
Landslide (N)	1	1	1	4	1	**1.3**
Earthquake (N)	1	1	1	4	1	**1.3**
Civil Disturbance (M)	1	1	1	3	1	**1.2**
Levee Failure (M)	1	1	1	2	2	**1.2**

Based on these results, there are six *high* risk hazards, eight *moderate* risk hazards and five *low* risk hazards in Cumberland County. Mitigation actions were developed for all high, moderate, and low risk hazards (see Section 6.4). The threat posed to life and property for moderate and high risk hazards is considered significant enough to warrant the need for establishing hazard-specific mitigation actions. Mitigation actions related to future public outreach and emergency service activities are identified to address low risk hazard events (i.e., urban fire and explosion, landslide, earthquake, civil disturbance, and levee failure).

Per the 2013 Standard Operating Guide, a jurisdictional risk comparison matrix has been completed as Table 4.4-3 to indicate whether each municipality's level of risk for each hazard is

greater than (>), less than (<), or equal to (=) the County's risk factor. This exercise was completed via the *Hazards in Your Community* worksheet (see Appendix C-4) together with the findings in the hazard profiles.

Table 4.4-3: Jurisdictional Risk Comparison Matrix

Jurisdiction	Identified Hazard and Corresponding Countywide Risk Factor																		
	Flood, Flash Flood & Ice Jam	Winter Storm	Tornado & Windstorm	Subsidence & Sinkholes	Environmental Hazards	Drought	Wildfire	Dam Failure	Pandemic	Hurricane, Tropical Storm, Nor'easter	Terrorism	Transportation Accidents	Nuclear Incidents	Utility Interruption	Urban Fire	Landslide	Earthquake	Civil Disturbance	Levee Failure
Cumberland County	**2.7**	**2.7**	**2.7**	**2.6**	**2.6**	**2.6**	**2.4**	**2.3**	**2.3**	**2.2**	**2.2**	**2.2**	**2.1**	**2.0**	**1.9**	**1.3**	**1.3**	**1.2**	**1.2**
Borough of Camp Hill	=	=	=	=	=	=	<	=	=	=	=	>	=	=	=	=	=	=	=
Borough of Carlisle	<	=	=	=	<	=	<	<	=	=	=	=	<	=	=	=	=	>	=
Township of Cooke	<	=	=	<	<	=	>	>	=	=	=	<	=	=	=	>	=	=	=
Township of Dickinson	=	=	=	=	=	=	>	>	=	=	=	<	=	=	=	>	=	=	=
Township of East Pennsboro	>	=	=	=	>	=	=	=	=	=	=	>	=	=	=	>	=	=	=
Township of Hampden	=	=	=	=	=	=	=	<	=	=	=	>	<	>	=	>	=	=	=
Township of Hopewell	=	=	=	<	=	=	=	=	=	=	=	=	=	=	=	>	=	=	=
Borough of Lemoyne	<	=	=	=	=	=	<	=	=	=	=	>	=	=	>	=	=	=	=
Township of Lower Allen	=	=	=	=	=	<	=	=	=	=	=	=	=	=	=	=	=	>	=
Township of Lower Frankford	=	=	=	=	=	=	=	>	=	=	=	<	=	=	=	>	=	=	=
Township of Lower Mifflin	=	=	=	<	=	=	<	=	=	=	=	<	=	=	=	=	=	=	=
Borough of Mechanicsburg	<	=	=	=	=	=	<	=	=	=	=	>	=	=	=	=	=	=	=
Township of Middlesex	=	=	=	=	=	=	<	<	=	=	=	>	=	=	=	=	=	=	=
Township of Monroe	=	=	=	=	=	=	>	=	=	=	=	=	=	=	=	=	=	=	>
Borough of Mount Holly Springs	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=

Table 4.4-3: Jurisdictional Risk Comparison Matrix

Jurisdiction	Identified Hazard and Corresponding Countywide Risk Factor																		
	Flood, Flash Flood & Ice Jam	Winter Storm	Tornado & Windstorm	Subsidence & Sinkholes	Environmental Hazards	Drought	Wildfire	Dam Failure	Pandemic	Hurricane, Tropical Storm, Nor'easter	Terrorism	Transportation Accidents	Nuclear Incidents	Utility Interruption	Urban Fire	Landslide	Earthquake	Civil Disturbance	Levee Failure
Cumberland County	**2.7**	**2.7**	**2.7**	**2.6**	**2.6**	**2.6**	**2.4**	**2.3**	**2.3**	**2.2**	**2.2**	**2.2**	**2.1**	**2.0**	**1.9**	**1.3**	**1.3**	**1.2**	**1.2**
Borough of New Cumberland	=	=	=	=	=	=	<	=	=	=	=	>	>	=	=	=	=	=	=
Borough of Newburg	=	=	=	<	<	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Borough of Newville	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=	=	=	=	=
Township of North Middleton	=	=	=	=	=	=	<	>	=	=	=	=	=	=	=	>	=	=	=
Township of North Newton	=	=	=	=	=	=	<	=	=	=	=	=	=	=	=	=	=	=	=
Township of Penn	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Borough of Shippensburg	=	=	=	=	=	=	<	=	=	>	=	=	<	=	=	=	=	=	=
Township of Shippensburg	>	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Borough of Shiremanstown	<	=	=	=	=	=	=	=	=	=	=	>	=	=	=	=	=	=	=
Township of Silver Spring	=	=	=	>	>	=	<	=	=	=	=	>	=	=	=	>	=	=	=
Township of South Middleton	=	=	<	<	=	<	=	<	=	<	=	=	=	=	=	=	=	=	=
Township of South Newton	=	=	=	=	=	=	>	=	=	=	=	=	=	=	=	=	=	=	=
Township of Southampton	=	=	=	>	=	=	>	=	=	=	=	<	=	=	=	>	=	=	=
Township of Upper Allen	>	=	=	=	>	=	<	=	=	=	=	>	=	=	=	=	=	=	=

Table 4.4-3: Jurisdictional Risk Comparison Matrix

Jurisdiction	Identified Hazard and Corresponding Countywide Risk Factor																		
	Flood, Flash Flood & Ice Jam	Winter Storm	Tornado & Windstorm	Subsidence & Sinkholes	Environmental Hazards	Drought	Wildfire	Dam Failure	Pandemic	Hurricane, Tropical Storm, Nor'easter	Terrorism	Transportation Accidents	Nuclear Incidents	Utility Interruption	Urban Fire	Landslide	Earthquake	Civil Disturbance	Levee Failure
Cumberland County	**2.7**	**2.7**	**2.7**	**2.6**	**2.6**	**2.6**	**2.4**	**2.3**	**2.3**	**2.2**	**2.2**	**2.2**	**2.1**	**2.0**	**1.9**	**1.3**	**1.3**	**1.2**	**1.2**
Township of Upper Frankford	=	=	=	=	=	=	<	=	=	=	=	<	=	=	=	>	=	=	=
Township of Upper Mifflin	<	=	=	<	<	=	=	=	=	=	=	=	=	=	=	>	=	=	=
Township of West Pennsboro	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Borough of Wormleysburg	=	=	=	=	=	=	=	=	=	=	=	>	=	=	=	=	=	=	=

4.4.3. Potential Loss Estimates

Based on available data, general loss estimates were established for flood, tornado and wind storm, and wildfire, and winter storm events. The potential losses incurred by hurricanes and tropical storms are associated with the impacts of flooding and high wind. Estimates provided in this section are based on previous events, cumulative assessed values for property located in high risk areas, and geospatial analysis. As discussed in Section 2.5, the structures dataset used to assess vulnerability throughout section 4.3 do not have a building or property value associated with them.

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.

When potential loss estimates provided in the 2014 HMP update are based on parcel values provided in the county tax assessment database, the values are representative of replacement value alone; content loss, functional loss, and displacement cost are not included.

Flood

Several deaths and millions of dollars' worth of property damage have been caused by floods in Cumberland County. Previous flood events listed in Table 4.3.3-1 have caused an estimated $51,000,000 worth of property damage throughout the County. Approximately 78 percent ($40,000,000) of these losses were caused by Tropical Storm Agnes in 1972. It is important to note that loss estimates are not available for many of the previous flood events which have occurred in the County. Historical loss estimates are available for only 20 of the 82 events listed in Table 4.3.3-1. Therefore, it is likely that $51,000,000 is a minimum estimate of historical flood losses. Beyond losses reported to the NCDC in the Storm Events Database, the NFIP tracks the total amount of paid claims for insured properties. Overall, the NFIP has paid out over $15.1 million in claims since 1978.

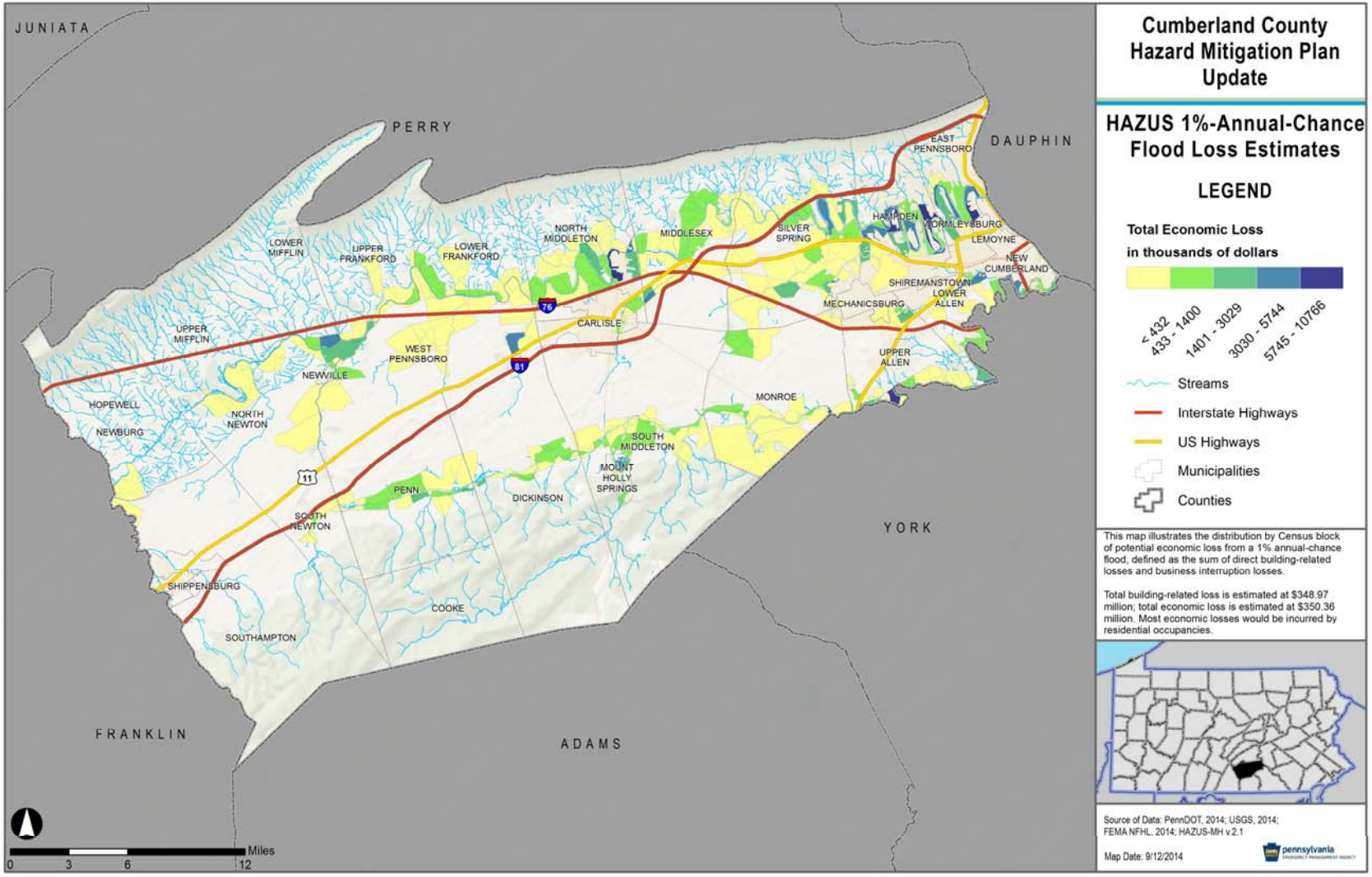
In addition to looking at the assessed value of parcels, this plan employed an enhanced HAZUS analysis for floods. As opposed to basic analysis using only default data, enhanced analysis incorporates some kind of more recent, up-to-date, or specific data for inclusion in the hazard models. The enhanced 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 G.

Using these datasets in HAZUS-MH Version 2.1, total building-related losses from a 1 percent-annual-chance flood in Cumberland County are estimated to equal $348,970,000. Residential occupancies make up 58.25 percent of the total estimated building-related losses. Figure 4.4.3-1 shows a distribution of building-related losses by census block across Cumberland County. Total economic loss, including replacement value, content loss, functional loss and displacement cost, from a countywide 1 percent-annual-chance flood are estimated to equal $350,360,000.

Figure 4.4.3-1: HAZUS 1 percent-annual-chance flood loss estimates in Cumberland County (2014).



Winter Storms

Historical loss information for winter storms is limited. However, property damage information available for events listed in Table 4.3.10-1 ranges from $150,000 to $988,000. A high percentage of losses from winter storms are usually in the form of repairs to damaged utility poles, wires and other infrastructure.

Tornado, Windstorm

Since 1960, tornado events in Cumberland County are estimated to have caused $1,210,000 in damages. Accurate loss estimates for previous general windstorms are currently not available. A significant portion of dollar losses from windstorms and tornadoes are often a result of damage to mobile homes. These structures are typically made of lightweight materials. Without adequate anchoring, they are particularly vulnerable to high winds. Table 4.4.3-1 shows the distribution by municipality of cumulative assessed value for mobile home and mobile home park parcels. Note that Table 4.3.8-4 in the Tornado and Windstorm profile is related to mobile home structures rather than parcels.

Table 4.4.3-1: Mobile homes parcel value per jurisdiction (Cumberland County GIS, 2014)

Municipality	Mobile Home And Mobile Home Park Parcels	Mobile Home And Mobile Home Park Parcel Total Assessed Value
Borough of Camp Hill	0	$0.00
Borough of Carlisle	3	$456,300.00
Township of Cooke	4	$585,100.00
Township of Dickinson	138	$15,364,500.00
Township of East Pennsboro	53	$5,573,400.00
Township of Hampden	31	$21,807,300.00
Township of Hopewell	73	$8,507,300.00
Borough of Lemoyne	0	$0.00
Township of Lower Allen	6	$3,935,400.00
Township of Lower Frankford	80	$13,693,900.00
Township of Lower Mifflin	71	$11,805,900.00
Borough of Mechanicsburg	1	$100,700.00
Township of Middlesex	80	$25,816,100.00
Township of Monroe	34	$6,184,800.00
Borough of Mount Holly Springs	33	$6,100,900.00
Borough of New Cumberland	0	$0.00
Borough of Newburg	0	$0.00
Borough of Newville	12	$782,100.00
Township of North Middleton	136	$27,991,400.00
Township of North Newton	58	$7,162,100.00
Township of Penn	94	$9,526,800.00
Borough of Shippensburg	4	$290,600.00

Table 4.4.3-1: Mobile homes parcel value per jurisdiction (Cumberland County GIS, 2014)

Municipality	Mobile Home And Mobile Home Park Parcels	Mobile Home And Mobile Home Park Parcel Total Assessed Value
Township of Shippensburg	12	$5,689,800.00
Borough of Shiremanstown	0	$0.00
Township of Silver Spring	60	$21,156,500.00
Township of South Middleton	115	$34,776,500.00
Township of South Newton	23	$2,658,000.00
Township of Southampton	195	$56,126,100.00
Township of Upper Allen	11	$20,696,700.00
Township of Upper Frankford	79	$16,825,600.00
Township of Upper Mifflin	96	$11,230,100.00
Township of West Pennsboro	79	$16,139,300.00
Borough of Wormleysburg	0	$0.00
TOTAL	**1,581**	**$350,983,200.00**

Wildfire

Figure 4.3.9-4 in the Wildfire profile illustrates which jurisdictions are most vulnerable to wildfires. Based on this assessment, Cooke Township, Dickinson Township, Monroe Township, South Middleton Township, South Newton Township, and Southampton Township all have a *high wildfire hazard* potential. Table 4.3.9-4 in the Wildfire profile provides the number of structures and critical facilities located in the *high wildfire hazard* zone, while Table 4.3.9-5 indicates the generalized land use type for each structure. Because assessed value was not available for individual structures, Table 4.4.3-2 indicates the total assessed value of the parcels within the *high wildfire hazard* areas. Based on the analysis by parcels, South Middleton Township has the highest potential losses due to wildfire.

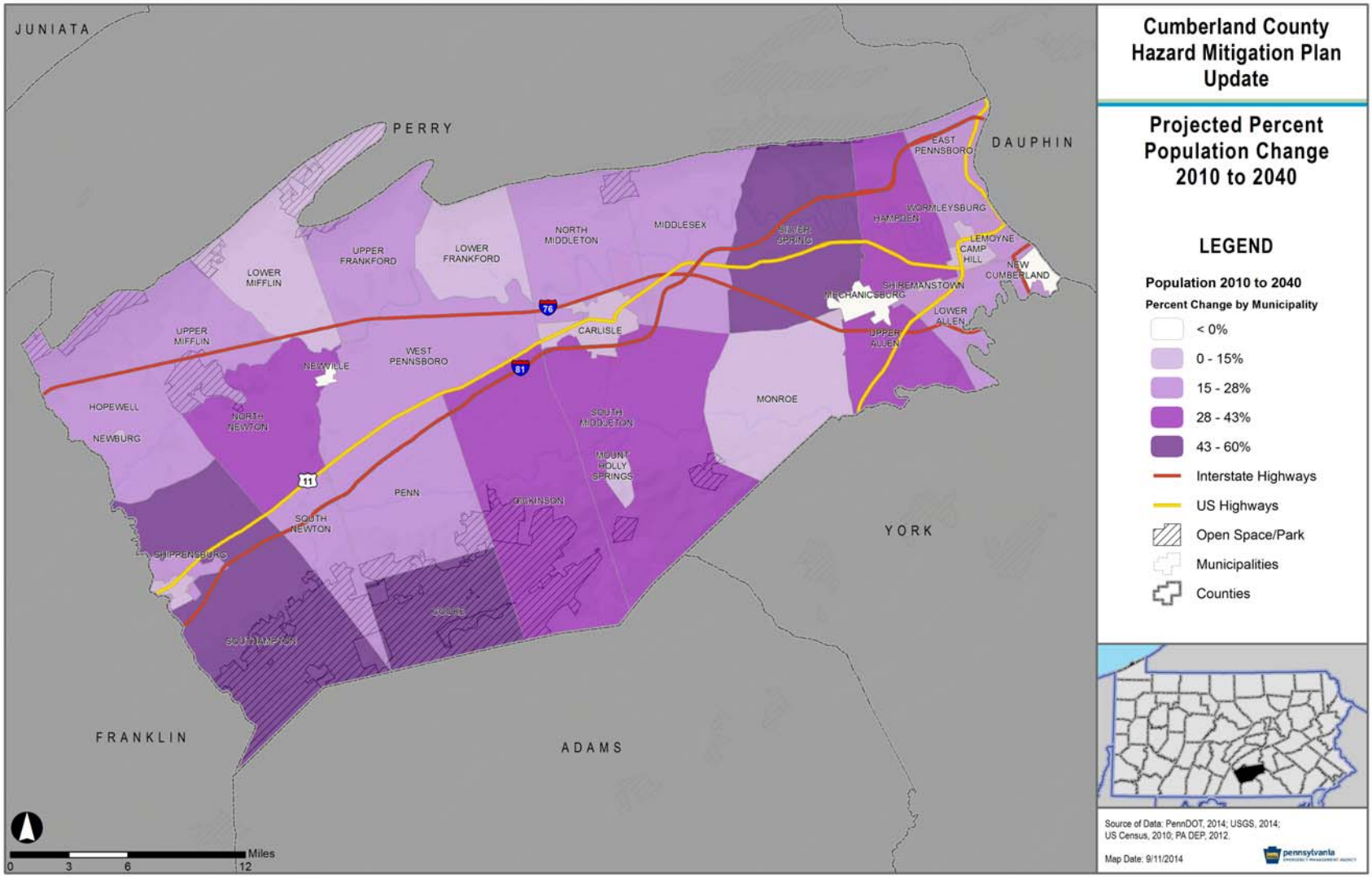
Table 4.4.3-2: Total assessed value of parcels within the *high wildfire hazard* area (Cumberland County GIS, 2014).

Municipality	Total Parcels	Total Assessed Value
Township of Cooke	389	$44,026,400.00
Township of Dickinson	2,832	$718,467,300.00
Township of Monroe	2,814	$704,432,400.00
Township of South Middleton	7,405	$2,600,354,800.00
Township of South Newton	631	$116,541,100.00
Township of Southampton	2,915	$864,691,600.00
TOTAL	**16,986**	**$5,048,513,600.00**

4.4.4. Future Development and Vulnerability

Total population in Cumberland County is estimated to have increased 2.5 percent between 2010 and 2013 from 235,406 to 241,212. However, this increase is not equally distributed across the County. Populations increased in some municipalities, but declined in others (see Table 2.3-1). Countywide populations are expected to continue increasing in the future. The projected percent population change for municipalities in Cumberland County from 2010 to 2040 is provided in Figure 2.3-1. These population projections were prepared by the PA Department of Environmental Protection (DEP) as a part of the State Water Plan. All municipalities except New Cumberland, Mechanicsburg, and Newville are expected to grow from 2010-2040; Cooke, Southampton, and Silver Spring Township are expected to grow the most with rates upwards of 43%. Increases in population may result in increased development pressure on both urbanized areas such as the Borough of Carlisle as well as undeveloped rural areas such as agricultural land. There are exceptions to this future trend. For example, no significant development is anticipated in the near future in Cooke Township since most of the land is owned by the state.

Figure 4.4.4-1: Projected percent population change for municipalities in Cumberland County from 2010 to 2040.



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. Table 4.4.4-1 shows the acreage in each municipality that is vacant land, which indicates how much land might be available for future development. Vacant parcels are those with a land use code of 100, 123, 200, 300, 400, 600, and 700.

Table 4.4.4-1: Vacant Parcel Acreage by Municipality (Cumberland County GIS and Planning Departments, 2014).

Municipality	Total Parcel Acreage	Vacant Parcel Acreage	Percent Of Acreage That Is Vacant
Borough of Camp Hill	1,150.9	31.7	2.8%
Borough of Carlisle	3,085.0	315.7	10.2%
Township of Cooke	2,629.4	77.9	3.0%
Township of Dickinson	22,877.4	3,517.9	15.4%
Township of East Pennsboro	6,148.6	705.6	11.5%
Township of Hampden	9,865.6	1,064.1	10.8%
Township of Hopewell	16,472.0	886.5	5.4%
Borough of Lemoyne	806.1	89.7	11.1%
Township of Lower Allen	5,995.1	389.1	6.5%
Township of Lower Frankford	9,349.9	191.6	2.0%
Township of Lower Mifflin	12,012.4	783.2	6.5%
Borough of Mechanicsburg	1,368.3	252.4	18.4%
Township of Middlesex	16,010.3	1,498.8	9.4%
Township of Monroe	16,671.7	2,307.4	13.8%
Borough of Mount Holly Springs	883.8	76.4	8.6%
Borough of New Cumberland	877.0	26.7	3.0%
Borough of Newburg	91.1	3.8	4.2%
Borough of Newville	233.4	19.9	8.5%
Township of North Middleton	14,863.9	878.6	5.9%
Township of North Newton	14,267.3	434.9	3.0%
Township of Penn	17,461.0	1,445.5	8.3%
Borough of Shippensburg	760.1	96.7	12.7%
Township of Shippensburg	1,457.2	359.7	24.7%
Borough of Shiremanstown	162.7	5.8	3.5%
Township of Silver Spring	19,435.3	2,301.4	11.8%
Township of South Middleton	29,063.2	4,176.2	14.4%
Township of South Newton	5,248.7	125.9	2.4%
Township of Southampton	20,996.3	1,469.1	7.0%
Township of Upper Allen	7,757.7	1,254.0	16.2%

Table 4.4.4-1: Vacant Parcel Acreage by Municipality (Cumberland County GIS and Planning Departments, 2014).

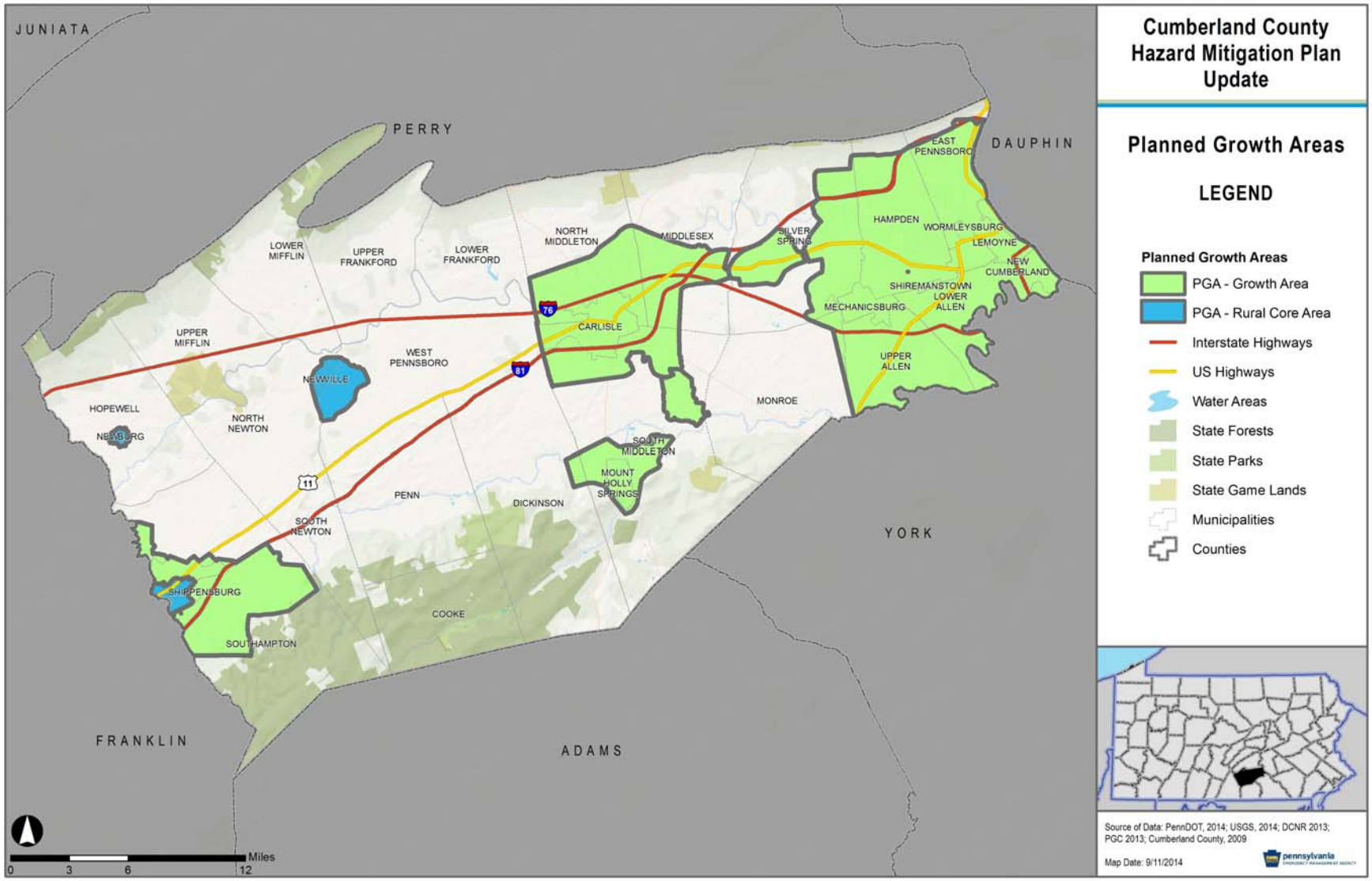
Municipality	Total Parcel Acreage	Vacant Parcel Acreage	Percent Of Acreage That Is Vacant
Township of Upper Frankford	11,868.3	170.9	1.4%
Township of Upper Mifflin	13,016.7	249.6	1.9%
Township of West Pennsboro	19,264.6	679.5	3.5%
Borough of Wormleysburg	374.8	39.7	10.6%
TOTAL	**302,525.8**	**25,925.7**	**8.6%**

Results of the vacant parcel analysis show that more than 15 percent of the parcels in Shippensburg Township, Borough of Mechanicsburg, Upper Allen Township, and Dickinson Township are considered "vacant." These vacant parcels and the municipalities they are located in should be considered particularly vulnerable to development pressure unless adequate planning measures are in place.

Planned growth areas identified by the County are shown in Figure 4.4.4-1. Primary growth areas include all of eastern Cumberland County to the base of North Mountain, the area surrounding the boroughs of Carlisle and Mount Holly Springs, and the Shippensburg Township area. The Borough of Shippensburg and Borough of Newville were identified as core areas where rural growth is expected.

Losses from hazard events are expected to rise with increasing populations. These areas of expected growth are vulnerable to all of the moderate and significant hazards described in this plan, including some of the more localized hazards such as flooding, hazardous material release and dam failures. In addition, eastern Cumberland County growth area is within the 10-mile Plume Exposure Pathway EPZ of Three Mile Island Nuclear Power Plant.

Figure 4.4.4-1: Cumberland County planned growth areas.



5. Capability Assessment

5.1 Update Process Summary

Cumberland County has a number of resources it can access to implement hazard mitigation initiatives including emergency response measures, local planning and regulatory tools, administrative assistance and technical expertise, fiscal capabilities, and participation in local, regional, state and federal programs. The presence of these resources enables community resiliency through actions taken before, during and after a hazard event.

The 2004 HMP identified the presence of local plans, ordinances and codes in each municipality. It also specified local, state and federal resources available for mitigation efforts. Through responses to the *Capability Assessment Survey* distributed to all municipalities and input from the HMSC, the 2010 HMP provided an updated inventory of the most critical local planning tools available within each municipality and a summary of the fiscal and technical capabilities available through programs and organizations outside of the County. It also identified emergency management capabilities and the processes used for implementation of the National Flood Insurance Program.

The capability assessment information was updated for the 2014 HMP through the *Capability Assessment Survey* and the new *NFIP Worksheet* (included in Appendix C). Note that the 2014 capability assessment has been reorganized to match the outline provided in PEMA's 2013 Standard Operating Guide and FEMA's 2013 Local Mitigation Planning Guidance. In particular, this capability assessment includes a new section focused on plan integration.

Because Cumberland County acts as a central repository for much information related to local capabilities, county officials were able to knowledgably provide all information not already populated using FEMA's Community Information System. Municipal officials were then invited via live meeting announcement, email, webinar announcement, and phone call to review and comment on the *Capability Assessment Survey* and the *NFIP Worksheet* as completed by county officials. Corrections and additions provided were incorporated into the attached versions of the worksheets.

While the capability assessment serves as a good instrument for identifying local capabilities, it also provides a means for recognizing gaps and weaknesses that can be resolved through future mitigation actions. The results of this assessment lend critical information for developing an effective mitigation strategy.

5.2 Capability Assessment Findings

5.2.1. Planning and Regulatory Capability

5.2.1.1 Local Plans and Ordinances

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, zoning ordinances, and emergency operations plans. These tools provide mechanisms for the implementation of adopted mitigation strategies. Table 5.2-1 summarizes their presence within each municipality.

Table 5.2-1: Summary of planning tools adopted by each municipality in Cumberland County (Cumberland County Planning Department and Cumberland County Department of Public Safety, 2014).

Community	Comprehensive Plan	Building Code (UCC)	Floodplain Ordinance – NFIP Participant	Subdivision & Land Development Ordinance	Zoning Ordinance	EOP
Borough of Camp Hill	Yes	Yes	Yes	Yes	Yes	Yes
Borough of Carlisle	Yes	Yes	Yes	Yes	Yes	Yes
Township of Cooke	Yes	Yes	Yes	Yes	No	Yes
Township of Dickinson	Yes	Yes	Yes	Yes	Yes	Yes
Township of East Pennsboro	Yes	Yes	Yes	Yes	Yes	Yes
Township of Hampden	Yes	Yes	Yes	Yes	Yes	Yes
Township of Hopewell	Yes	Yes	Yes	Yes	Yes	Yes
Borough of Lemoyne	Yes	Yes	Yes	Yes	Yes	Yes
Township of Lower Allen	Yes	Yes	Yes	Yes	Yes	Yes
Township of Lower Frankford	Yes	Yes	Yes	Yes	Yes	Yes
Township of Lower Mifflin	Yes	Yes	Yes	Yes	Yes	Yes
Borough of Mechanicsburg	Yes	Yes	Yes	Yes	Yes	Yes
Township of Middlesex	Yes	Yes	Yes	Yes	Yes	Yes
Township of Monroe	Yes	Yes	Yes	Yes	Yes	Yes
Borough of Mount Holly Springs	Yes	Yes	Yes	Yes	Yes	Yes
Borough of New Cumberland	Yes	Yes	Yes	Yes	Yes	Yes
Borough of Newburg	No	Yes	Yes	Yes	Yes	Yes
Borough of Newville	Yes	Yes	Yes	Yes	Yes	Yes
Township of North Middleton	Yes	Yes	Yes	Yes	Yes	Yes
Township of North Newton	Yes	Yes	Yes	Yes	No	Yes
Township of Penn	Yes	Yes	Yes	Yes	Yes	Yes
Township of Shippensburg	Yes	Yes	Yes	Yes	Yes	Yes
Borough of Shippensburg	Yes	Yes	Yes	Yes	Yes	Yes
Borough of Shiremanstown	Yes	Yes	Yes	Yes	Yes	Yes
Township of Silver Spring	Yes	Yes	Yes	Yes	Yes	Yes
Township of South Middleton	Yes	Yes	Yes	Yes	Yes	Yes
Township of South Newton	Yes	Yes	Yes	Yes	Yes	Yes
Township of Southampton	Yes	Yes	Yes	Yes	Yes	Yes
Township of Upper Allen	Yes	Yes	Yes	Yes	Yes	Yes
Township of Upper Frankford	Yes	Yes	Yes	Yes	No	Yes
Township of Upper Mifflin	Yes	Yes	Yes	Yes	No	Yes
Township of West Pennsboro	Yes	Yes	Yes	Yes	Yes	Yes
Borough of Wormleysburg	Yes	Yes	Yes	Yes	Yes	Yes

Local comprehensive plans provide a vision for the physical design and development of a community, and the principles in comprehensive plans are typically implemented through zoning

ordinances, subdivision regulations, and capital improvement programs. Integrating hazard mitigation into the comprehensive plan helps to guide the community's development in a way that does not lead to increased hazard vulnerability and can encourage whole community, 'smart and safe' growth. The existing countywide Comprehensive Plan for Cumberland County was developed in 2003 and updated in November 2011. In addition, all but one municipality (the Borough of Newburg) have adopted local Comprehensive Plans.

Building codes regulate construction 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. In 2003, the Commonwealth of Pennsylvania implemented Act 45 of 1999, the Uniform Construction Code (UCC), a comprehensive building code that establishes minimum regulations for most new construction, including additions and renovations to existing structures. All 33 municipalities in Cumberland County have since adopted the UCC. The 2009 International Codes issued by the International Code Council is currently in use under the UCC. Since all municipalities in Cumberland County have adopted the UCC, they are required to administer and enforce the 2009 building code regulations, using their own employees or via certified third party agencies, for all building permits submitted on or after January 1, 2013.

Through administration of floodplain ordinances, municipalities can ensure that all new construction or substantial improvements to existing structures located in the floodplain are flood-proofed, dry-proofed, or built above anticipated flood elevations. Floodplain ordinances may also prohibit development in certain areas altogether. The NFIP establishes minimum ordinance requirements which must be met in order for that community to participate in the program. However, a community is permitted and in fact, encouraged, to adopt standards which exceed NFIP requirements. Through participation in the NFIP, all municipalities within the County have a floodplain ordinance in place. For more information on floodplain management and participation in the NFIP in Cumberland County, see Section 5.2.1.2.

Subdivision and land development ordinances are intended to regulate the development of housing, commercial, industrial or other uses, including associated public infrastructure, as land is subdivided into buildable lots for sale or future development. Within these ordinances, guidelines on how land will be divided, the placement and size of roads and the location of infrastructure can reduce exposure of development to hazard events. All jurisdictions within Cumberland County have adopted and enforce a subdivision and land development ordinance.

Zoning ordinances allow for local communities to regulate the use of land in order to protect the interest and safety of the general public. Zoning ordinances can be designed to address unique conditions or concerns within a given community. They may be used to create buffers between structures and high-risk areas, limit the type or density of development and/or require land development to consider specific hazard vulnerabilities. All but four jurisdictions within Cumberland County have adopted and enforce a zoning ordinance.

Numerous other plans and organizations are also in place at the municipal and county level for topics such as open space management, Act 167 stormwater management, natural resources protection, capital improvements, economic development, historic preservation, and farmland

preservation. Details are provided on the *Capability Assessment Survey* included in Appendix C.

5.2.1.2 Participation in the National Flood Insurance Program (NFIP)

All municipalities in Cumberland County are participants in the NFIP. Community participation in the NFIP allows for property owners to obtain flood insurance. Flood insurance provides a means for homeowners, renters and business owners to financially protect themselves. This capability greatly improves resilience after a flood hazard event by allowing residents to repair and rebuild. Table 5.2-2 provides a list of Cumberland County municipalities with the number of flood insurance policies and coverage that exist in that municipality.

Table 5.2-2: NFIP policies and coverage (FEMA Community Information System, July 2014).

Community	Number Of NFIP Policies	Total Coverage ($)
Borough of Camp Hill	34	$7,812,400.00
Borough of Carlisle	111	$18,635,000.00
Township of Cooke	N/A	N/A
Township of Dickinson	26	$4,100,200.00
Township of East Pennsboro	102	$18,351,900.00
Township of Hampden	186	$35,707,100.00
Township of Hopewell	5	$668,400.00
Borough of Lemoyne	8	$1,256,000.00
Township of Lower Allen	73	$13,852,100.00
Township of Lower Frankford	7	$1,266,200.00
Township of Lower Mifflin	6	$1,222,000.00
Borough of Mechanicsburg	21	$3,746,600.00
Township of Middlesex	19	$2,913,600.00
Township of Monroe	63	$10,474,500.00
Borough of Mount Holly Springs	67	$8,308,800.00
Borough of New Cumberland	115	$17,138,400.00
Borough of Newburg	1	$82,000.00
Borough of Newville	1	$80,000.00
Township of North Middleton	58	$11,178,100.00
Township of North Newton	3	$703,000.00
Township of Penn	4	$854,800.00
Township of Shippensburg	29	$4,902,100.00
Borough of Shippensburg	13	$4,387,100.00
Borough of Shiremanstown	7	$1,551,800.00
Township of Silver Spring	54	$10,053,300.00
Township of South Middleton	75	$14,627,900.00
Township of South Newton	7	$1,110,400.00
Township of Southampton	34	$5,189,200.00
Township of Upper Allen	57	$11,409,100.00

Table 5.2-2: NFIP policies and coverage (FEMA Community Information System, July 2014).

Community	Number Of NFIP Policies	Total Coverage ($)
Township of Upper Frankford	11	$779,500.00
Township of Upper Mifflin	1	$200,000.00
Township of West Pennsboro	9	$1,454,500.00
Borough of Wormleysburg	107	$17,718,600.00

The NFIP program is managed by local municipalities participating in the program through ordinance adoption and floodplain regulation while the County provides an oversight and coordination role. Similarly, permitting processes needed for building construction and development in the floodplain are implemented at the municipal level through various ordinances (e.g. zoning, subdivision/land development and floodplain ordinances). All compliance and enforcement mechanisms are instituted through municipal codes and enforced by local zoning officers. The only Certified Floodplain Managers among municipal Floodplain Administrators/NFIP Coordinators in the county are staff of East Pennsboro and Lower Allen townships. Municipal floodplain regulations for all 33 municipalities in the county exceed the FEMA minimal standards as developed by the Pennsylvania Department of Community and Economic Development (DCED). Freeboard requirements exceed FEMA requirements in Dickinson Township, Lower Mifflin Township, Shippensburg Township, and South Middleton Township.

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. As mentioned above, the Pennsylvania 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 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).

Publication of the countywide Digital Flood Insurance Rate Map on March 16, 2009 greatly enhanced mitigation capabilities as they relate to identifying flood hazards. The digital flood hazard information provided by FEMA is a significant improvement to the previously effective paper Flood Insurance Rate Maps. Residents and municipal officials are provided with mapping assistance from the Cumberland County GIS Department, Cumberland County Planning Department and the Cumberland County Department of Public Safety upon request.

It is important to recognize that there are five municipalities in the County where flood elevations have not been identified. Flood zones on the effective Flood Insurance Rate Maps in Cooke Township, Borough of Newville, Penn Township, Borough of Shiremanstown and Upper Mifflin Township are identified as approximate 1 percent-annual-chance flood hazard areas without Base Flood Elevations determined or 0.2 percent-annual-chance flood hazard areas. There are no communities in Cumberland County participating in the NFIP Community Rating System (FEMA CIS, 2014).

There are a few existing limitations to flood mitigation in Cumberland County. As mentioned, there are no communities in Cumberland County participating in the NFIP Community Rating System. According to the municipal NFIP Worksheets, interest in participation in CRS is thwarted by the administrative requirements of the program. At the same time, though, all municipalities in the County are flood prone. Community participation in this program can provide premium reductions for properties located outside of Special Flood Hazard Areas of up to 10 percent and reductions for properties located in Special Flood Hazard Areas of up to 45 percent. These discounts can be obtained by undertaking public information, mapping and regulations, flood damage reduction and flood preparedness activities (FEMA, 2014).

Also, numerous roads and intersections where flooding issues repeatedly occur were identified in Section 4.3.3.3. Some of these roads and intersections are state routes. The County and local municipalities face challenges in mitigating flood events on state routes since these roads are owned and maintained by the Commonwealth of Pennsylvania. Local municipalities do not have the authority to independently carry out a mitigation project. In these situations, the Pennsylvania Department of Transportation must decide to undertake the project. Since the Department of Transportation is often most concerned with larger, critical transportation routes, smaller state roads and intersections which significantly affect a local community may not get the attention they need for the Commonwealth to take on a mitigation project.

5.2.1.3 Emergency Management

The Cumberland County Department of Public Safety coordinates countywide emergency management efforts. Each municipality has a designated local emergency management coordinator who possesses a unique knowledge of the impact hazard events have on their community. A significant amount of information used to develop this plan was obtained from the emergency management coordinators as well as County staff. The Emergency Management Services Code (PA Title 35) requires that all municipalities in the Commonwealth have a Local Emergency Operations Plan (EOP) which is updated every two years. As of August 2014, all municipalities in Cumberland County have or are in the process of updating their local EOP. A countywide EOP also exists and is dated January 1, 2013. Municipalities are not required to sign on to the County EOP, because county staff prefers to keep municipal emergency management coordinators actively engaged at a more local level.

Additionally, Cumberland County has a Continuity of Operations Plan in place, although no municipalities have adopted a Continuity of Operations Plan. Carlisle Borough, South Middleton Township, and North Middleton Township are the only municipalities in Cumberland County with Disaster Recovery Plans.

In addition to local emergency management efforts, the South Central Task Force (SCTF) is a regional all-hazards emergency preparedness task force for eight counties in South Central Pennsylvania. The task force encompasses Adams, Cumberland, Dauphin, Franklin, Lancaster, Lebanon, Perry and York Counties. SCTF's preparedness activities address planning, prevention and response. It enhances regional coordination capabilities in case of incidents that exceed the capabilities of a single county or jurisdiction. Emphasis is also placed on collaborating with the private sector to endure the security and resilience of privately owned businesses and infrastructure, especially those critical to countywide public health and operational continuity such as the energy, telecommunications, food processing and transportation sectors. Though SCTF is an all-hazards group, it began as a counter-terrorism organization and maintains an extensive training program to mitigate the threat of terrorism for local emergency response entities as well as for the private sector.

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, and fiscal staff to handle complex grant application processes.

Based on 2014 *Capability Assessment Survey* results, municipalities in Cumberland County have adequate administrative and technical staff needed to conduct hazard mitigation-activities. However, there seems to be a common lack of personnel for land surveying and scientific work related to community hazards. This result is not necessarily surprising since these tasks would typically be contracted to outside providers. Many communities have personnel skilled in geographic information systems. The County GIS Department is also able to provide these services. Additionally, County staff members are experienced with grant writing and are able to assist municipalities upon request. All municipalities in the County have an identified emergency management coordinator, some of whom are responsible for more than one jurisdiction. The only Certified Floodplain Managers among municipal Floodplain Administrators/NFIP Coordinators in the county are staff of East Pennsboro and Lower Allen townships.

Local organizations that could act as partners for future mitigation activities include the Capital Region COG (formerly West Shore COG) and the Western Cumberland COG, non-profit environmental organizations such as the Susquehanna River Basin Commission, the Merrill Linn Conservancy, local watershed associations, LeTort Regional Authority, business

development organizations such as the Chamber of Commerce and Rotary Club, and historical or cultural agencies such as the Cumberland County Historical Society.

State and multi-agency programs in Pennsylvania which can provide technical assistance for mitigation activities include, but are not limited to:

- Pennsylvania Bureau of Labor & Industry
- Pennsylvania Construction Codes Academy
- Pennsylvania Department of Community and Economic Development
- Pennsylvania Department of Conservation and Natural Resources
- Pennsylvania Department of Environmental Protection
- Pennsylvania Department of General Services
- Pennsylvania Department of Transportation
- Pennsylvania Emergency Management Agency
- Pennsylvania Housing Finance Agency
- Pennsylvania Insurance Department
- Pennsylvania Silver Jackets (volunteer-based)
- Pennsylvania State System of Higher Education
- Pennsylvania Treasury
- ReadyPA multi-agency outreach program

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

- Army Corp of Engineers
- Department of Agriculture
- Department of Housing and Urban Development
- Department of the Interior
- Economic Development Administration
- Emergency Management Institute
- Environmental Protection Agency
- Federal Emergency Management Agency
- General Services Administration
- Geological Survey
- Office of Infrastructure Protection
- National Oceanic and Atmospheric Administration
- National Weather Service
- Small Business Administration

Additional details on these state and federal technical assistance programs can be found in the *Pennsylvania 2013 Standard State All-Hazard Mitigation Plan*.

5.2.3. Financial Capability

The decision and capacity to implement mitigation-related activities is often strongly dependent on the presence of local financial resources. While some mitigation actions are less costly than

others, it is important that money is available locally to implement policies and projects. Financial resources are particularly important if communities are trying to take advantage of state or federal mitigation grant funding opportunities that require local-match contributions. Most municipalities within the County perceive financial capability to be limited.

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

- Water and sewer fees (municipal authorities);
- Stormwater utility fees (being initiated in Hampden Township as of August 2014);
- Development impact fees; and
- General obligation, revenue, and/or special tax bonds (for example through the County Industrial Development Authority).

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

- Commonwealth Financing Authority (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
- Community Conservation Partnerships Program (C2P2) Community Recreation and Conservation Program
- DCED Business Financing
- DCED Flood Mitigation Program
- DCED H2O Flood Control Projects
- DCED Keystone Communities
- DCED Local Government Capital Project Loan Program
- DCED Municipal Assistance Program
- DEP Growing Greener Program
- Pennsylvania Infrastructure Investment Authority (PENNVEST)
- 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

Additional details on these state and federal financial resources can be found in the *Pennsylvania 2013 Standard State All-Hazard Mitigation Plan*.

Limited funding is a critical barrier to the implementation of hazard mitigation activities. The county will need to rely on regional, state and federal partnerships for financial assistance.

5.2.4. Education and Outreach

Cumberland County is very active with education and outreach related to hazard mitigation and emergency management. Department of Public Safety staff participates in natural disaster or safety related school programs. Staff from the Public Safety and Planning departments as well as the County Cooperative Extension, provide ongoing public education programs such as responsible water use, fire safety, household preparedness, and environmental education. The Public Safety Department and the South Central Task Force have a public-private partnership to address terrorism. Finally, local citizen groups or non-profit organizations in Cumberland County focused on environmental protection (LeTort Regional Authority, Clean Air Board of Central PA, various watershed protection groups, etc.) assist with education.

There are a few existing limitations to education and outreach capabilities in Cumberland County. As of August 2014, White Rock Acres Development in Monroe Township is the only community in Cumberland County which established a Community Wildfire Protection Plan and participates in the *Firewise* program. However, there are numerous communities identified as vulnerable to wildfire hazards. The Pennsylvania Firewise Community Program assists planned and existing communities in implementing management practices which reduce the risk of wildfire events. Firewise communities are those that avoid potential fire emergencies by addressing and correcting fire hazards and preparing for the threat of a wildfire event (DCNR – BOF, 2014). Improved participation in this program would reduce the loss of lives, property and resources to wildfires by building and maintaining communities using practices that are compatible with their natural surroundings.

Similarly, only Cumberland County and Carlisle Barracks currently participate in the *StormReady* program, although all of the municipalities would benefit from participation. Furthermore, none of the municipalities in Cumberland County have adopted a Continuity of Operations Plan, and only three currently have a Disaster Recovery Plan in place.

5.2.5. Plan Integration

Upon review of the 2004 HMP, municipalities agreed that minimal action was taken in incorporating the HMP findings into other planning mechanisms. However, with both the 2010 and the 2014 HMP, all municipalities were required through plan adoption to review existing zoning ordinances, floodplain ordinances, land-use ordinances and building codes to incorporate findings of the HMP and evaluate whether local planning tools adequately addressed risk assessment results (2010 Action 33 and 2014 Action 30). Based on the results

of these evaluations, communities were expected to revise existing local planning and regulatory tools to address local vulnerability to the high and moderate risk hazards identified in this plan.

Integrating hazard mitigation into the comprehensive plan helps to guide the community's development in a way that does not lead to increased hazard vulnerability. For instance, future development can be guided away from areas with known hazards, and design standards to withstand potential hazards can be created for new or improved construction. Furthermore, Comprehensive Plans promote sound land use and regional cooperation among local governments to address planning issues. These plans serve as the official policy guide for influencing the location, type and extent of future development by establishing the basis for decision-making and review processes on zoning matters, subdivision and land development, land uses, public facilities and housing needs over time.

The existing countywide Comprehensive Plan for Cumberland County was developed in 2003 and updated in November 2011. In addition, all but one municipality (the Borough of Newburg) have adopted local Comprehensive Plans. County governments are required by law to adopt a comprehensive plan, while local municipalities may do so at their option. Future comprehensive plan updates and improvements will consider 2014 HMP findings. For example, *Chapter 8: Future Land Use Plan, Chapter 10: Housing Plan,* and *Chapter 14: Community Facilities Plan* of the Cumberland County Comprehensive Plan can guide future growth and development away from the hazard-prone areas identified in *Chapter 4: Risk Assessment* of the HMP. Similarly, the statement in *Chapter 10: Housing Plan* of the County Comprehensive Plan can be expanded to not only recommend that the public sector make investments in infrastructure primarily within Planned Growth Areas but also to recommend that the investments be made primarily in areas which have not been identified as being hazard prone in *Chapter 4: Risk Assessment* of the HMP. The data provided in *Chapter 4: Risk Assessment* of the HMP can also be used to update *Chapter 12: Transportation Plan* of the County Comprehensive Plan to design transportation systems and other critical infrastructure to withstand the effects of known hazards so that they will still function in the event of an emergency or disaster. Components of the County Comprehensive Plan can also be incorporated into the HMP. For instance, *Chapter 14: Community Facilities Plan* of the County Comprehensive Plan includes the recommendation that the County encourage adoption of wellhead protection provisions by municipalities, which was just added to the 2014 HMP as the new Action 6. The two plans could also share recommendations related to floodplain management, groundwater protection, and slope preservation (*Chapter 16: Natural Areas and Historic Resources Preservation Plan* of the County Comprehensive Plan).

As discussed in Section 4.3.19.1 of the HMP, Lower Allen Township provides an example of how subdivision and land development ordinances can be developed to mitigate hazards - in this case utility interruption. Section 192-58 of the Lower Allen Township ordinance regulates landscape design and cites that only trees that will not interfere with overhead lines may be planted (ecode360, 2014).

6. Mitigation Strategy

6.1 Update Process Summary

The mitigation techniques for Cumberland County have been revised in the 2014 HMP per FEMA's Local Mitigation Handbook (March 2013) and PEMA's Standard Operating Guide (October 2013) (see Section 6.3). The 2014 mitigation strategy has also been revised to reflect vulnerabilities and needs identified through the risk assessment as well as results of the review of mitigation goals, objectives, and actions identified in the 2010 HMP. Goals, objectives, and actions have been added or removed as indicated in Sections 6.1, 6.2, and 6.4.

The following definitions based on FEMA's *State and Local Mitigation Planning How-To Guide* were used:

- *Goals* are general guidelines that explain the Commonwealth would like to achieve. They are usually broad policy-type statements, long term, and represent global visions.
- *Objectives* define specific and measureable strategies or implementation steps that must be implemented in order to attain identified goals.
- *Mitigation Actions* are more specific than objectives, and have identified responsible parties, timeframes, and potential funding sources. They are the specific actions to achieve goals and objectives.

There were eighteen goals and forty-one objectives identified in the 2010 Cumberland County Hazard Mitigation Plan. Goals one through 14 were hazard-specific while goals 15 through 18 addressed broader hazard mitigation concerns. A list of these goals and objectives as well as a review summary based on comments received from stakeholders who participated in the 2014 HMP update process is included in Table 6.1-1. These reviews were based on responses received from communities to the *Action and Goal Progress Worksheet* and comments received from county officials. Municipal officials were invited to provide feedback on the proposed 2014 goals and objectives via live meeting announcement, email, webinar announcement, and phone call. Appendix C includes a summary of responses to the *Action and Goal Progress Worksheet*. The main change is that the list of goals and objectives for the County was consolidated in 2014 in order to avoid redundancies.

Table 6.1-1: List and review summary of 2010 mitigation strategy goals and objectives.	
Goal 1: Reduce potential injury/death and damage to existing community assets due to dam failures.	
Objective 1A: Complete Emergency Action Plans for all high hazard dams in the County.	**Review:** Goals 1-14 from the 2010 strategy have been consolidated into a single goal (Goal 1) in the 2014 strategy in order to avoid redundancies. Objective 1A has been carried into the 2014 strategy as Objective 1A.
Goal 2: Reduce potential damage to existing community assets due to droughts.	
Objective 2A: Improve the use of water conservation and burn ban restrictions during drought emergencies.	**Review:** Goals 1-14 from the 2010 strategy have been consolidated into a single goal (Goal 1) in the 2014 strategy in order to avoid redundancies. Objective 2A has been carried into the 2014

Table 6.1-1: List and review summary of 2010 mitigation strategy goals and objectives.	
	strategy as Objective 1B.
Goal 3: Reduce potential injury/death and damage to existing community assets due to flooding.	
Objective 3A: Identify by municipality and evaluate protection of existing critical facilities with the highest relative vulnerability in the 100-year floodplain.	**Review:** Goals 1-14 from the 2010 strategy have been consolidated into a single goal (Goal 1) in the 2014 strategy in order to avoid redundancies. Objective 3A has been carried into the 2014 strategy as Objective 1D. Objective 3B has been carried into the 2014 strategy as Objective 1E. Objective 3C has been carried into the 2014 strategy as Objective 1F. Objective 3D has been carried into the 2014 strategy as Objective 1C.
Objective 3B: Identify and evaluate strategies for repetitive-loss properties.	
Objective 3C: Provide public outreach/education regarding strategies (e.g. flood-proofing) for property owners in the 100-year floodplain.	
Objective 3D: Address identified data limitations regarding lack of detailed information about individual structures located in the 100-year floodplain.	
Goal 4: Reduce potential injury/death and damage to existing community assets due to environmental hazards or hazardous material releases.	
Objective 4A: Identify by municipality the most-vulnerable residents and critical existing facilities.	**Review:** Goals 1-14 from the 2010 strategy have been consolidated into a single goal (Goal 1) in the 2014 strategy in order to avoid redundancies. Objectives 4A and 4B have been carried into the 2014 strategy as Objective 1D. Objective 4C has been carried into the 2014 strategy as Objective 1G.
Objective 4B: Develop comprehensive approach to reducing potential injury/damages for nearby critical facilities and vulnerable populace.	
Objective 4C: Evaluate potential contamination of drinking water sources along transportation corridors.	
Goal 5: Reduce potential injury/death and damage to existing community assets due to nuclear incidents.	
Objective 5A: Identify by municipality the most-vulnerable and critical structures and infrastructure relative to terrorism.	**Review:** Goals 1-14 from the 2010 strategy have been consolidated into a single goal (Goal 1) in the 2014 strategy in order to avoid redundancies. Objectives 5A and 5B have been carried into the 2014 strategy as Objective 1D. Objective 5C has been carried into the 2014 strategy as Objective 4C. Objective 5D has been carried into the 2014 strategy as Objective 4B.
Objective 5B: Assess the inherent and tactical vulnerability to terrorism of critical structures/infrastructure.	
Objective 5C: Enhance response capability of County and municipal services.	
Objective 5D: Increase public awareness of actions to take during an emergency.	
Goal 6: Reduce potential injury/death and damage to existing community assets due to pandemic incidents.	
Objective 6A: Improve planning efforts for response measures needed in the event of a pandemic event.	**Review:** Goals 1-14 from the 2010 strategy have been consolidated into a single goal (Goal 1) in the 2014 strategy in order to avoid redundancies. Objective 6A has been carried into the 2014 strategy as Objective 4A.
Goal 7: Reduce negative impacts and potential injury/death and damage to existing community assets	

Table 6.1-1: List and review summary of 2010 mitigation strategy goals and objectives.	
due to power failures.	
Objective 7A: Reduce outage time during significant power failures.	**Review:** Goals 1-14 from the 2010 strategy have been consolidated into a single goal (Goal 1) in the 2014 strategy in order to avoid redundancies. Objective 7A has been carried into the 2014 strategy as Objective 1H.
Goal 8 Reduce potential injury/death and damage to existing community assets due to subsidence and sinkholes.	
Objective 8A: Enhance public awareness of the potential impacts of subsidence hazards.	**Review:** Goals 1-14 from the 2010 strategy have been consolidated into a single goal (Goal 1) in the 2014 strategy in order to avoid redundancies. Objective 8A has been carried into the 2014 strategy as Objective 1J. Objective 8B has been carried into the 2014 strategy as Objective 1I.
Objective 8B: Improve identification of areas prone to significant subsidence events.	
Goal 9: Reduce potential injury/death and damage to existing community assets due to transportation accidents.	
Objective 9A: Improve adequacy and efficiency of emergency response in the event of traffic accidents.	**Review:** Goals 1-14 from the 2010 strategy have been consolidated into a single goal (Goal 1) in the 2014 strategy in order to avoid redundancies. Objective 9A has been carried into the 2014 strategy as Objective 4A. Objective 9B has been carried into the 2014 strategy as Objective 1K.
Objective 9B: Enhance planning efforts to account for increased railway traffic throughout the County.	
Goal 10: Reduce potential injury/death and damage to existing community assets due to terrorism.	
Objective 10A: Identify by municipality the most-vulnerable and critical structures and infrastructure relative to terrorism.	**Review:** Goals 1-14 from the 2010 strategy have been consolidated into a single goal (Goal 1) in the 2014 strategy in order to avoid redundancies. Objectives 10A and 10B have been carried into the 2014 strategy as Objective 1D. Objective 10C has been carried into the 2014 strategy as Objective 4C. Objective 10D has been carried into the 2014 strategy as Objective 4B.
Objective 10B: Assess the inherent and tactical vulnerability to terrorism of critical structures/infrastructure.	
Objective 10C: Enhance response capability of County and municipal services.	
Objective 10D: Increase public awareness of actions to take during an emergency.	
Goal 11: Reduce potential injury/death and damage to existing community assets due to urban fires.	
Objective 11A: Improve understanding and identification of structures vulnerable to significant urban fires.	**Review:** Goals 1-14 from the 2010 strategy have been consolidated into a single goal (Goal 1) in the 2014 strategy in order to avoid redundancies. Objective 11A has been carried into the 2014 strategy as Objective 1L.

Table 6.1-1: List and review summary of 2010 mitigation strategy goals and objectives.	
Goal 12: Reduce potential injury/death and damage to existing community assets due to wildfires.	
Objective 12A: Identify by municipality (especially in Dickinson, Cooke, South Middleton and Southampton townships) the most-vulnerable and critical existing structures to wildfires.	**Review:** Goals 1-14 from the 2010 strategy have been consolidated into a single goal (Goal 1) in the 2014 strategy in order to avoid redundancies. Objective 12A has been carried into the 2014 strategy as Objective 1D. Objective 12B has been carried into the 2014 strategy as Objective 1C.
Objective 12B: Address identified data limitations regarding lack of detailed information about individual structures (e.g., roof and siding construction materials) located within areas more prone to wildfire.	
Goal 13: Reduce potential injury/death and damage to existing community assets due to windstorms & tornadoes.	
Objective 13A: Identify by municipality the most-vulnerable and critical existing structures and infrastructure due to the effects of severe weather.	**Review:** Goals 1-14 from the 2010 strategy have been consolidated into a single goal (Goal 1) in the 2014 strategy in order to avoid redundancies. Objective 13A has been carried into the 2014 strategy as Objective 1D. Objective 13B has been carried into the 2014 strategy as Objective 1M. Objective 13C has been carried into the 2014 strategy as Objective 1C.
Objective 13B: Evaluate communities that require warning systems and storm shelters.	
Objective 13C: Address identified data limitations regarding lack of detailed information about characteristics of individual structures.	
Goal 14: Reduce potential injury/death and damage to existing community assets due to winter storms.	
Objective 14A: Identify by municipality the most-vulnerable and critical existing structures and infrastructure due to the effects of severe weather.	**Review:** Goals 1-14 from the 2010 strategy have been consolidated into a single goal (Goal 1) in the 2014 strategy in order to avoid redundancies. Objective 14A has been carried into the 2014 strategy as Objective 1D. Objective 14B has been carried into the 2014 strategy as Objective 1M. Objective 14C has been carried into the 2014 strategy as Objective 1C.
Objective 14B: Evaluate communities that require warning systems and storm shelters.	
Objective 14C: Address identified data limitations regarding lack of detailed information about characteristics of individual structures.	
Goal 15: Promote disaster-resistant future development.	
Objective 15A: Assess the adequacy of municipal zoning/land-use/floodplain ordinances and building-code implementation.	**Review:** Goal 15 has been carried into the 2014 strategy as Goal 2. Objectives 15A through 15C have been carried into the 2014 strategy as Objectives 2A-2C.
Objective 15B: Encourage and facilitate the development or revision of comprehensive plans and zoning/land-use/floodplain ordinances to limit development in high-hazard areas.	
Objective 15C: Provide adequate and consistent enforcement of ordinances and codes within and between jurisdictions.	
Goal 16: Reduce vulnerability of critical facilities to all hazard events.	
Objective 16A: Update and improve critical facility information across the County.	**Review:** Goal 16 and Objective 16A have not been included as a stand-alone

Table 6.1-1: List and review summary of 2010 mitigation strategy goals and objectives.	
	goal and a stand-alone objective in the 2014 strategy, as they have been covered in the 2014 strategy under Goal 1 and Objectives 1C-1D.
Goal 17: Promote hazard mitigation as a public value in recognition of its importance to the health, safety and welfare of the population.	
Objective 17A: Provide public education to increase awareness of hazards and opportunities for mitigation.	**Review:** Goal 17 has been carried into the 2014 strategy as Goal 3. Objectives 17A through 17C have been carried into the 2014 strategy as Objectives 3A-3C.
Objective 17B: Promote partnerships between the municipalities and the County to continue to develop a County-wide approach to identifying and implementing mitigation actions.	
Objective 17C: Continue the promotion of disaster resistance in the business community via the hazard mitigation planning initiative.	
Goal 18: Improve response and recovery capabilities.	
Objective 18A: Increase awareness by residents (i.e., through public outreach/education) of actions to take during an emergency.	**Review:** Goal 18 has been carried into the 2014 strategy as Goal 4. Objectives 18A and 18B have been carried into the 2014 strategy as Objectives 4B-4C.
Objective 18B: Enhance response capability of County and municipal fire, police and emergency medical services personnel to special populations.	

Actions provide more detailed descriptions of specific work tasks to help the County and its municipalities achieve prescribed goals and objectives. There were 34 actions identified in the 2010 Cumberland County Hazard Mitigation Plan. Four of the 2010 actions have been completed, three have been canceled, and four have been deferred. The remaining 23 actions from 2010 were identified by the County during the 2014 update as ongoing. A list of these actions as well as a review and summary of their progress based on comments received from stakeholders involved in the Hazard Mitigation Plan update process is included in Table 6.1-2.

Table 6.1-2: List and review summary of 2010 mitigations actions.	
Action 1: Participate in the development and continued update of *Emergency Action Plans*.	**Review:** This action is ongoing. All EAPs that were due for revision or update were completed during this reporting period. Additionally, the County Department of Public Safety has developed rapid checklists for emergency actions to be taken for each dam in Cumberland County.
Action 2: Form a drought emergency working group to resolve water conservation enforcement issues.	**Review:** This action has been deferred due to the time period since the last drought emergency in 2002. All water purveyors (e.g., PA American Water) have drought emergency plans on file with the Department of Public Safety.
Action 3: Issue countywide "advisory" burn bans.	**Review:** This action is ongoing. Burn bans will be issued on an as-needed basis, but the County is now encouraging each municipality to issue burn ban advisories at their discretion in consultation with their District Forester.

Table 6.1-2: List and review summary of 2010 mitigations actions.	
Action 4: Update and provide more detail to the countywide *downstream users* inventory.	**Review:** This action has been deferred. Prior to 9/11, PA DEP disseminated a downstream water users list. Thereafter, due to homeland security concerns (i.e., critical infrastructure protection) DEP has stopped disseminating this information to the County.
Action 5: Increase participation in FEMA's Community Rating System (CRS) Program.	**Review:** This action has been canceled. After conducting a CRS workshop in 2012, a local consensus was reached that the program's administrative requirements are too burdensome for the perceived modest reduction in flood insurance rates.
Action 6: Obtain *participating* status in the National Flood Insurance Program.	**Review:** This action has been completed. An administrative error was identified that caused Newburg Borough's participation status to be suspended. The error was corrected, and Newburg Borough has returned to a participating status.
Action 7: Acquire more detailed structure information.	**Review:** This action is ongoing. Responsible parties are now inventorying additional information from municipal subdivision and land development plan applications. The County is recommending that municipalities include first floor elevation data in their ordinances and land development applications.
Action 8: Develop *Flood Intensity Indicators* document.	**Review:** This action is ongoing. The County GIS Department performed GPS mapping of the high water marks for Tropical Storms Irene and Lee. Data will continue to be compiled in order to develop flood elevation predictions.
Action 9: Review the County Act 167 Plan for critical flood hazard information.	**Review:** This action has been completed. The Cumberland County Planning Department integrated critical flood information into the 2011 update to the county-wide Act 167 Plan.
Action 10: Apply for funding to perform detailed flood studies.	**Review:** This action has been canceled. In 2013 the County decided to abandon the Risk Map project it was pursuing due to a lack of interest and funding from FEMA. However, on October 12, 2013, the GIS Department recorded the high water mark for a local flooding event with GPS. This was the fourth high water mark recorded by GIS since 2011. This data enabled the county to assess that the flood modeling HAZUS software is largely inaccurate for the county. In the future, this high water data will help the county predict future flooding events or prove/disprove the validity of other flood model software.
Action 11: Develop flood mitigation project proposals which are eligible for state and federal mitigation grant funding programs.	**Review:** This action is ongoing. Lemoyne Borough submitted a hazard mitigation project for funding regarding storm drains and culverts. The Borough initially submitted the project to PEMA but in 2013, the Borough decided to fund this project locally rather than using state or federal funds. Also, the Little Run culvert maintenance project for Hampden and East Pennsboro townships was completed so is no longer included in Appendix H. Other projects have been maintained in or added to Appendix H.
Action 12: Perform public outreach activities that promote reduction in the number of RPL structures.	**Review:** This action is ongoing. The County Planning Department notifies municipalities of funding opportunities for RPL properties following disaster declarations.

Table 6.1-2: List and review summary of 2010 mitigations actions.	
Action 13: Identify properties in the community at high risk of flooding for purposes of property protection.	**Review:** This action is ongoing. The Cumberland County Planning Department disseminates a list of RPL properties to the respective municipalities.
Action 14: Participate in the NOAA National Weather Service Ice Observer Program.	**Review:** This action is ongoing. Cumberland County DPS and local emergency management coordinators and fire chiefs of affected municipalities participate in the NOAA program as necessary.
Action 15: Update *Annex E* regularly and coordinate with state and federal counterparts on radiological emergency response.	**Review:** This action is ongoing. Annex E is updated annually by the Cumberland County DPS (see action item 16).
Action 16: Provide assistance as requested in the development of *Annex A*.	**Review:** This action is ongoing. Cumberland County DPS is waiting on PEMA to publish Annex A to address all radiological hazards. Once published, DPS will incorporate the County's existing Annex E into the new Annex A.
Action 17: Identify *point of dispensing* sites.	**Review:** This action is ongoing. Point of dispensing sites (PODS) have been completed and work continues with the PA Dept of Health to add or delete sites as deemed necessary.
Action 18: Identify *mass clinic* sites.	**Review:** This action is deemed completed, as it is being addressed through Action #17.
Action 19: Pursue advanced emergency response planning efforts.	**Review:** This action is deemed completed, as it is being addressed through Action #17.
Action 20: Implement full disclosure of sinkhole hazards.	**Review:** This action is ongoing. Many municipalities require the identification of karst geology during the subdivision and land development process. Such requirements are included provisions in municipal subdivision and land development ordinances.
Action 21: Begin inventorying future "significant" sinkhole events.	**Review:** This action has been deferred. No formal process exists at the municipal, county or state level to inventory, report and track sinkhole occurrences. Until such a process is developed, this action will be deferred.
Action 22: Participate in the South-Central Task Force.	**Review:** This action is ongoing. Several DPS office staff actively serve on the Task Force board and participate in the Task Force's exercises and training events.
Action 23: Coordinate with state and federal agencies on potential mitigation actions for terrorist activities.	**Review:** This action is ongoing. The South Central Task Force coordinates with state and federal agencies on potential mitigation actions for terrorist activities. The Task Force also includes various municipal representatives including police chief, fire chiefs, EMS, County Sherriff, hospitals, Cumberland-Perry Mental Health Intellectual Developmental Disabilities and Early Intervention, etc.
Action 24: Expand participation in the *StormReady* Program.	**Review:** This action is ongoing. Six municipalities are preparing to begin participation in the StormReady program: Newville Borough, North Newton Township, Upper Mifflin Township, Lower Mifflin Township, Newburg Borough, and Lower Frankford Township.
Action 25: Perform public outreach activities which inform manufactured home or commercial trailer owners of the increased vulnerability of these structures to natural hazards.	**Review:** This action has been canceled. The County has one mobile home park in Monroe Township and the residents are well-educated on flood hazard risks. In addition, the manager of the mobile home park provides an educational packet to homeowners.

Table 6.1-2: List and review summary of 2010 mitigations actions.	
Action 26: Develop a countywide Traffic Management Plan.	**Review:** This action is ongoing. Cumberland County DPS is working with the I-81 Corridor Coalition to develop a TMP. In addition, information from the Three Mile Island evacuation plan and the county's 911 System includes uniquely numbered intersections across the county for access control points.
Action 27: Develop a countywide Railway Management Plan.	**Review:** This action has been deferred based on other priority actions. The County Department of Public Safety and local fire and police coordinate with Norfolk Southern on grade crossings.
Action 28: Identify tax-exempt properties and update missing structural information.	**Review:** This action is ongoing. The County's Tax Assessment Office has been updating the exempt property inventory via the county's on-going reassessment to include structural information.
Action 29: Assist with coordination between County residents and utility companies on critical outage events.	**Review:** This action is ongoing. Social media is increasingly being utilized by the County DPS and Communications Dept. to communicate power outages to residents based on known intelligence and instructions on contacting their respective power utility company.
Action 30: Expand participation in the *Firewise* Program.	**Review:** This action is ongoing. White Rock Acres subdivision in Monroe Township is still included in the FireWise program. No other communities are targeted for inclusion within the next reporting period, but the County DPS will continue to evaluate the need based on development trends, patterns and the identified urban/wildland interface.
Action 31: Participate in winter storm exercises.	**Review:** This action is ongoing. Cumberland Department of Public Safety staff routinely participates in FEMA's virtual tabletop exercise program at the Emergency Management Institute in Emmittsburg, MD. This includes winter storm exercises. In addition, public safety and municipal staff participate in PEMA-sponsored training and exercises that include winter storms.
Action 32: Coordinate with the Pennsylvania Department of Transportation on winter storm response.	**Review:** This action is ongoing. Cumberland DPS's EOC staff includes a PennDOT liaison to achieve this coordination.
Action 33: Review and update existing ordinances and other regulatory or planning mechanisms with respect to findings included in the 2010 HMP.	**Review:** This action is ongoing. Cumberland County Planning Department provides ongoing technical assistance to its municipalities that include HMP concepts and their integration into local ordinances. For example, the County recently assisted Mount Holly Springs Borough, Upper Mifflin Township, North Newton Township, and Hopewell Township with developing new or amended zoning ordinances.
Action 34: Update Geographic Information Systems data for all critical or vulnerable facilities and distribute maps of facility locations.	**Review:** This action is ongoing. Cumberland Planning Department, in collaboration with the Public Safety and GIS departments, utilize the HMP update and annual maintenance process to spatially update its inventory of critical facilities and their vulnerabilities.

6.2 Mitigation Goals and Objectives

The 2010 goals and objectives were revised for reasons explained in Table 6.1-1, primarily in order to consolidate redundancies. Table 6.2-1 shows the mitigation goals and objectives established for the 2014 HMP. Appendix C includes a summary of responses to the *Action and Goal Progress Worksheet*.

Table 6.2-1: List of 2014 mitigation strategy goals and objectives.

Goal	Objective(s)
Goal 1: Reduce potential injury/death and damage to existing community assets due to the following hazards: dam failures, droughts, flooding, environmental hazards or hazardous material releases, nuclear incidents, pandemic incidents, power failures, subsidence and sinkholes, transportation accidents, terrorism, urban fires, wildfires, windstorms and tornadoes, and winter storms.	**Objective 1A:** Complete Emergency Action Plans for all high hazard dams in the County.
	Objective 1B: Improve the use of water conservation and burn ban restrictions during drought emergencies.
	Objective 1C: Address identified data limitations regarding lack of detailed information about individual structures located within areas susceptible to any of the listed hazards.
	Objective 1D: Identify critical facilities and at-risk populations, assess their vulnerability, and develop a comprehensive approach to reducing potential damages/injuries to critical facilities/populations.
	Objective 1E: Identify and evaluate strategies for repetitive-loss properties.
	Objective 1F: Provide public outreach/education regarding strategies (e.g. flood-proofing) for property owners in the 100-year floodplain.
	Objective 1G: Evaluate potential contamination of drinking water sources along transportation corridors.
	Objective 1H: Reduce outage time during significant power failures.
	Objective 1I: Improve identification of areas prone to significant subsidence events.
	Objective 1J: Enhance public awareness of the potential impacts of subsidence hazards.
	Objective 1K: Enhance planning efforts to account for increased railway traffic throughout the County.
	Objective 1L: Improve understanding and identification of structures vulnerable to significant urban fires.
	Objective 1M: Evaluate communities that require warning systems and storm shelters.
Goal 2: Promote disaster-resistant future development.	**Objective 2A:** Assess the adequacy of municipal zoning/land-use/floodplain ordinances and building-code implementation.
	Objective 2B: Encourage and facilitate the development or revision of comprehensive plans and zoning/land-use/floodplain ordinances to limit development in high-hazard areas.
	Objective 2C: Provide adequate and consistent enforcement of ordinances and codes within and between jurisdictions.
Goal 3: Promote hazard mitigation as a public value in recognition of its importance to the health, safety and welfare of the	**Objective 3A:** Provide public education to increase awareness of hazards and opportunities for mitigation.
	Objective 3B: Promote partnerships between the municipalities and the County to continue to develop a County-wide approach to identifying and implementing mitigation actions.
	Objective 3C: Continue the promotion of disaster resistance in the business community via the hazard mitigation planning initiative.

Table 6.2-1: List of 2014 mitigation strategy goals and objectives.	
population.	
Goal 4: Improve response and recovery capabilities.	**Objective 4A:** Improve adequacy, efficiency, and planning efforts for response measures needed in the event of a significant hazard.
	Objective 4B: Increase awareness by residents (i.e., through public outreach/education) of actions to take during an emergency.
	Objective 4C: Enhance response capability of County and municipal fire, police and emergency medical services personnel to special populations.

6.3 Identification and Analysis of Mitigation Techniques

The mitigation strategy in the updated Hazard Vulnerability Assessment and Mitigation Plan Update should include analysis of a comprehensive range of specific techniques or actions. FEMA, through the March 2013 Local Mitigation Handbook, and PEMA, through the October 2013 Standard Operating Guide (SOG), identify four categories of hazard mitigation techniques.

- **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.

Table 6.3-1 provides a matrix identifying the mitigation techniques used for each hazard in the County. The specific actions associated with these techniques are included in Table 6.4-1. Mitigation projects associated with some of these techniques (e.g., *structure and infrastructure* projects for flood hazards) are included in Appendix H.

Table 6.3-1: Mitigation techniques used for the moderate and high risk hazards in Cumberland County.

Hazard	Mitigation Technique			
	Local Plans and Regulations	Structure and Infrastructure	Natural Systems Protection	Education and Awareness
Civil Disturbance	✓			✓
Dam Failure	✓		✓	✓
Drought	✓			✓
Flood, Flash Flood, & Ice Jam	✓	✓	✓	✓
Earthquake	✓			✓
Environmental Hazards	✓		✓	✓
Hurricane, Tropical Storm, & Nor'easter	✓	✓	✓	✓
Landslide	✓			✓
Levee Failure	✓			✓
Nuclear Incidents	✓			✓
Pandemic	✓			✓
Subsidence & Sinkholes	✓			✓
Transportation Accidents	✓			✓
Terrorism	✓			✓
Tornado & Windstorm	✓			✓
Urban Fire	✓			✓
Utility Interruption	✓			✓
Wildfire	✓			✓
Winter Storm	✓			✓

6.4 Mitigation Action Plan

The 2014 mitigation actions are based on comments received from county officials and responses received from communities to the *Action and Goal Progress Worksheet*. Because Cumberland County acts as a central repository for such information, county officials updated the list of actions by indicating progress made and whether any actions were being added, canceled, or deferred. Municipal officials were then invited to provide feedback on the proposed 2014 actions via live meeting announcement, email, webinar announcement, and phone call. Appendix C includes a summary of responses to the *Action and Goal Progress Worksheet*. Four new actions were added by the County, while seven were removed due to being completed or canceled. Additionally, four municipalities provided new flood mitigation projects, which are included in Appendix H. At least one mitigation action was established for each hazard in Cumberland County. More than one action is identified for several hazards. Each mitigation action is intended to address one or more of the goals and objectives identified in

Section 6.2. Each community has at least one mitigation action in the 2014 Mitigation Strategy. Table 6.4-1 lists the 2014 mitigation actions.

Table 6.4-1: List of 2014 mitigation actions with information including community or communities affected, action category, hazard addressed, action description, lead agency/department and general implementation schedule.	
COMMUNITY: Cumberland County and local municipalities downstream of high-hazard dams, including South Middleton Township, North Middleton Township, Cook township, Lower Frankford Township, Dickinson Township, Mount Holly Springs Borough, West Pennsboro Township, and Monroe Township	**ACTION:** Participate in the development and continued update of *Emergency Action Plans*.
ACTION NO: 1	
Category:	Education and Awareness
Hazard(s) Addressed:	Dam Failure
Description:	Exercise appropriate oversight and coordination in the development of dam *Emergency Action Plans* to ensure that stakeholders understand and are competent to carry out specified responsibilities.
Lead Agency/Department:	Cumberland County Department of Public Safety
Implementation Schedule:	Participate as *Emergency Action Plans* are being developed or updated.
COMMUNITY: Cumberland County, Camp Hill Borough, Carlisle Borough, Cooke Township, Dickinson Township, East Pennsboro Township, Hampden Township, Hopewell Township, Lemoyne Borough, Lower Allen Township, Lower Frankford Township, Lower Mifflin Township, Mechanicsburg Borough, Middlesex Township, Monroe Township, Mount Holly Springs Borough, New Cumberland Borough, Newburg Borough, Newville Borough, North Middleton Township, North Newton Township, Penn Township, Shippensburg Township, Shippensburg Borough, Shiremanstown Borough, Silver Spring Township, South Middleton Township, South Newton Township, Southampton Township, Upper Allen Township, Upper Frankford Township, Upper Mifflin Township, West Pennsboro Township, and Wormleysburg Borough	**ACTION:** Form a drought emergency working group to resolve water conservation enforcement issues.
ACTION NO: 2	
Category:	Local Plans and Regulations
Hazard(s) Addressed:	Drought
Description:	Form a working group composed of concerned local law enforcement officers and code officials, representatives from the state governor's office, the County Drought Emergency Board and Troop H of

Table 6.4-1: List of 2014 mitigation actions with information including community or communities affected, action category, hazard addressed, action description, lead agency/department and general implementation schedule.	
	the Pennsylvania State Police to explore ways of better enforcing water conservation rules during drought emergencies. Past experiences have shown it is very difficult for local municipalities to enforce state directives.
Lead Agency/Department:	Cumberland County Department of Public Safety
Implementation Schedule:	This action has been deferred but may be needed in the future. Convene the working group when significant drought events occur.
COMMUNITY: Cumberland County **ACTION NO:** 3	**ACTION:** Issue countywide "advisory" burn bans.
Category:	Education and Awareness
Hazard(s) Addressed:	Drought
Description:	The Emergency Operations Coordinator shall issue advisory countywide burning bans in consultation with municipal officials when necessary during severe droughts. These bans would then be adopted locally where they can be implemented more efficiently.
Lead Agency/Department:	Cumberland County Department of Public Safety
Implementation Schedule:	Issue advisory bans as deemed necessary when significant drought events occur.
COMMUNITY: Cumberland County, Camp Hill Borough, Carlisle Borough, Cooke Township, Dickinson Township, East Pennsboro Township, Hampden Township, Hopewell Township, Lemoyne Borough, Lower Allen Township, Lower Frankford Township, Lower Mifflin Township, Mechanicsburg Borough, Middlesex Township, Monroe Township, Mount Holly Springs Borough, New Cumberland Borough, Newburg Borough, Newville Borough, North Middleton Township, North Newton Township, Penn Township, Shippensburg Township, Shippensburg Borough, Shiremanstown Borough, Silver Spring Township, South Middleton Township, South Newton Township, Southampton Township, Upper Allen Township, Upper Frankford Township, Upper Mifflin Township, West Pennsboro Township, and Wormleysburg Borough **ACTION NO:** 4	**ACTION:** Update and provide more detail to the countywide *downstream users* inventory.
Category:	Education and Awareness
Hazard(s) Addressed:	Environmental Hazards
Description:	Identify points in streams and rivers that feed

Table 6.4-1: List of 2014 mitigation actions with information including community or communities affected, action category, hazard addressed, action description, lead agency/department and general implementation schedule.	
	drinking water reservoir(s) and/or downstream users that are vulnerable to contamination from hazardous materials leakages from both fixed facilities and transportation corridors. Incorporate information on these locations and vulnerable downstream users into a new map and database that can be used to prioritize future mitigation actions. Local municipalities will be given an opportunity to provide user information and locations where hazardous materials are more likely to occur (e.g. railroad tracks along a stream bank). Post spill response signs along major roads and interstates.
Lead Agency/Department:	Cumberland County Planning Department; Cumberland County GIS Department
Implementation Schedule:	This action was identified as deferred during the 2014 HMP update due to homeland security concerns but may be resumed at a later time.
COMMUNITY: Carlisle Borough, Silver Spring Township, Hampden Township, East Pennsboro Township, Mechanicburg Borough, Shiremanstown Borough, Camp Hill Borough, Wormleysburg Borough, Lemoyne Borough, Monroe Township, Upper Allen Township, Lower Allen Township, and New Cumberland Borough	**ACTION (NEW):** Explore ways for the MS4 communities in Cumberland County to consolidate efforts to meet MS4 requirements.
ACTION NO: 5	
Category:	Local Plans and Regulations, Education and Awareness, Natural Systems Protection
Hazard(s) Addressed:	Flood, Flash Flood & Ice Jam; Environmental Hazards
Description:	In 2013 the http://stormwaterpa.org/cumberland-county.html website was launched in collaboration between Cumberland County, StormwaterPA, and Alliance for the Chesapeake Bay; the purpose of the website is to provide educational resources about watershed protection in order to meet the MS4 education/outreach requirement for all MS4 communities in the county. In 2014 CapCOG published an RFQ to prepare a single Pollution Reduction Plan for the region. Continuing to consolidate efforts moving forward will make the most efficient use of available resources.
Lead Agency/Department:	Cumberland County Planning Department
Implementation Schedule:	In progress.
COMMUNITY: County-wide	**ACTION (NEW):** Encourage municipalities to incorporate well-head protection provisions into municipal subdivision and land development ordinances.
ACTION NO: 6	

Table 6.4-1: List of 2014 mitigation actions with information including community or communities affected, action category, hazard addressed, action description, lead agency/department and general implementation schedule.	
Category:	Local Plans and Regulations
Hazard(s) Addressed:	Environmental Hazards
Description:	Amendments and/or additions to existing municipal Subdivision and Land Development Ordinances.
Lead Agency/Department:	Cumberland County Planning Department
Implementation Schedule:	2-4 years
COMMUNITY: Cumberland County, Camp Hill Borough, Carlisle Borough, Cooke Township, Dickinson Township, East Pennsboro Township, Hampden Township, Hopewell Township, Lemoyne Borough, Lower Allen Township, Lower Frankford Township, Lower Mifflin Township, Mechanicsburg Borough, Middlesex Township, Monroe Township, Mount Holly Springs Borough, New Cumberland Borough, Newburg Borough, Newville Borough, North Middleton Township, North Newton Township, Penn Township, Shippensburg Township, Shippensburg Borough, Shiremanstown Borough, Silver Spring Township, South Middleton Township, South Newton Township, Southampton Township, Upper Allen Township, Upper Frankford Township, Upper Mifflin Township, West Pennsboro Township, and Wormleysburg Borough	**ACTION:** Acquire more detailed structure information.
ACTION NO: 7	
Category:	Education and Awareness
Hazard(s) Addressed:	Flood, Flash Flood, & Ice Jam; Hurricane, Tropical Storm, & Nor'easter
Description:	Collect information on first floor elevations (obtained from elevation certificates), foundation type, construction type, basement presence, building height (# of stories). Some of this information is already held by the County Tax Assessment Office, but needs to be transferred into a more usable format in a GIS database. Acquiring this data will greatly improve future flood loss estimates.
Lead Agency/Department:	Cumberland County Planning Department; Cumberland County GIS Department
Implementation Schedule:	In progress.
COMMUNITY: Cumberland County, Camp Hill Borough, Carlisle Borough, Cooke Township, Dickinson Township, East Pennsboro Township, Hampden Township, Hopewell Township, Lemoyne Borough, Lower Allen Township, Lower Frankford Township, Lower Mifflin Township, Mechanicsburg Borough, Middlesex Township,	**ACTION:** Develop *Flood Intensity Indicators* document.

Table 6.4-1: List of 2014 mitigation actions with information including community or communities affected, action category, hazard addressed, action description, lead agency/department and general implementation schedule.	
Monroe Township, Mount Holly Springs Borough, New Cumberland Borough, Newburg Borough, Newville Borough, North Middleton Township, North Newton Township, Penn Township, Shippensburg Township, Shippensburg Borough, Shiremanstown Borough, Silver Spring Township, South Middleton Township, South Newton Township, Southampton Township, Upper Allen Township, Upper Frankford Township, Upper Mifflin Township, West Pennsboro Township, and Wormleysburg Borough	
ACTION NO: 8	
Category:	Education and Awareness
Hazard(s) Addressed:	Flood, Flash Flood, & Ice Jam; Hurricane, Tropical Storm, & Nor'easter
Description:	Develop a *Flood Intensity Indicators* document that includes quantitative and qualitative information from local emergency management staff on the relationship between flood "signs" (e.g. water surfacing at a specific man hole cover) for given intensity levels and the impact such an event will have on local public and private properties. Coordinate with Civil Air Control to collect aerial photography of real time flooding. This information will be documented and shared so that it is accessible to other local and County planning personnel. Mount Holly Springs, East Pennsboro, New Cumberland and Wormleysburg are municipalities where this information is believed to be common knowledge. Publicize this information to increase awareness of flood hazards and promote public involvement in hazard mitigation.
Lead Agency/Department:	Cumberland County Department of Public Safety; Cumberland County Municipalities; Cumberland County Planning Department; Cumberland County GIS Department
Implementation Schedule:	In progress.
COMMUNITY: Cumberland County	**ACTION (NEW):** Expand the role of the County's Local Emergency Planning Committee from hazardous materials planning role to an all-hazards planning role.
ACTION NO: 9	
Category:	Local Plans and Regulations
Hazard(s) Addressed:	All hazards
Description:	During a reorganization period of the county LEPC, additional all-hazards topics and information will be placed on LEPC meeting agendas as subject matter for information and approval.

Table 6.4-1: List of 2014 mitigation actions with information including community or communities affected, action category, hazard addressed, action description, lead agency/department and general implementation schedule.	
Lead Agency/Department:	Cumberland County Local Emergency Planning Committee
Implementation Schedule:	A new series of LEPC meetings for the 2014-2015 season begins in September of 2014. This activity will take place during reorganization.
COMMUNITY: Cumberland County **ACTION NO:** 10	**ACTION (NEW):** Continue participation in the Interagency Working Group.
Category:	Education and Awareness
Hazard(s) Addressed:	All hazards
Description:	The Interagency Working Group (IWG) meets bi-annually at the War College and consists of county, municipal, fire, police, EMS, and representatives from other county-based federal installations (NAVICP and New Cumberland). The IWG's primary goal is to afford members of the County's emergency management/disaster preparedness community to become acquainted with each other and to understand their respective roles, functions, and capabilities prior to an incident.
Lead Agency/Department:	Cumberland County Department of Public Safety
Implementation Schedule:	Bi-annual meetings
COMMUNITY: Cumberland County, Camp Hill Borough, Carlisle Borough, Cooke Township, Dickinson Township, East Pennsboro Township, Hampden Township, Hopewell Township, Lemoyne Borough, Lower Allen Township, Lower Frankford Township, Lower Mifflin Township, Mechanicsburg Borough, Middlesex Township, Monroe Township, Mount Holly Springs Borough, New Cumberland Borough, Newburg Borough, Newville Borough, North Middleton Township, North Newton Township, Penn Township, Shippensburg Township, Shippensburg Borough, Shiremanstown Borough, Silver Spring Township, South Middleton Township, South Newton Township, Southampton Township, Upper Allen Township, Upper Frankford Township, Upper Mifflin Township, West Pennsboro Township, and Wormleysburg Borough **ACTION NO:** 11	**ACTION:** Develop flood mitigation project proposals which are eligible for state and federal mitigation grant funding programs.
Category:	Natural Systems Protection; Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, & Ice Jam; Hurricane, Tropical Storm, & Nor'easter; Dam Failure
Description:	Develop flood mitigation project proposals which are

Table 6.4-1: List of 2014 mitigation actions with information including community or communities affected, action category, hazard addressed, action description, lead agency/department and general implementation schedule.	
	eligible for funding through various state and federal mitigation grant programs. These projects should specifically address structural mitigation efforts for existing buildings or infrastructure, but may be designed to provide natural resource benefits (e.g. stream or wetland restoration projects which reduce flooding in the surrounding area). Currently proposed projects are included in Appendix H.
Lead Agency/Department:	Cumberland County Planning Department; Cumberland County Department of Public Safety; Cumberland County Municipalities
Implementation Schedule:	In progress. Implement projects as funding opportunities become available.
COMMUNITY: Cumberland County and local municipalities including New Cumberland Borough, East Pennsboro Township, Camp Hill Borough **ACTION NO:** 12	**ACTION:** Perform public outreach activities that promote reduction in the number of Repetitive Loss and Severe Repetitive Loss structures.
Category:	Education and Awareness – National Flood Insurance Program
Hazard(s) Addressed:	Flood, Flash Flood, & Ice Jam; Hurricane, Tropical Storm, & Nor'easter
Description:	Perform public outreach activities to address Repetitive Loss structures, focusing specifically on communities in the County which have a high number of Repetitive Loss structures; the Borough of New Cumberland (61), East Pennsboro Township (25), and Borough of Camp Hill (15). At a minimum, activities will include notification to property owners of the flood hazards present and encourage flood insurance purchases for un-insured structures in the area.
Lead Agency/Department:	Cumberland County Planning Department; Cumberland County Municipalities
Implementation Schedule:	In progress.
COMMUNITY: Cumberland County, Camp Hill Borough, Carlisle Borough, Cooke Township, Dickinson Township, East Pennsboro Township, Hampden Township, Hopewell Township, Lemoyne Borough, Lower Allen Township, Lower Frankford Township, Lower Mifflin Township, Mechanicsburg Borough, Middlesex Township, Monroe Township, Mount Holly Springs Borough, New Cumberland Borough, Newburg Borough, Newville Borough, North Middleton Township, North Newton Township, Penn Township, Shippensburg Township, Shippensburg Borough, Shiremanstown Borough, Silver Spring Township, South Middleton Township, South Newton	**ACTION:** Identify properties in the community at high risk of flooding for purposes of structure protection (i.e., acquisition, elevation, flood-proofing, etc.).

Table 6.4-1: List of 2014 mitigation actions with information including community or communities affected, action category, hazard addressed, action description, lead agency/department and general implementation schedule.	
Township, Southampton Township, Upper Allen Township, Upper Frankford Township, Upper Mifflin Township, West Pennsboro Township, and Wormleysburg Borough	
ACTION NO: 13	
Category:	Structure and Infrastructure
Hazard(s) Addressed:	Flood, Flash Flood, & Ice Jam; Hurricane, Tropical Storm, & Nor'easter
Description:	Evaluate properties in the community considered at high risk of flooding to identify structures (including Repetitive Loss and Severe Repetitive Loss structures) which federal mitigation funds can be applied most effectively for purposes of buyout, relocation, elevation, or flood-proofing. Use information on vacant lots located in the 1 percent-annual-chance floodplain (see Table 4.4.4-2) to address vulnerability of future development and collect information such as lowest adjacent grade, lowest floor, etc… for properties currently located and structures proposed for construction in the 1 percent-annual-chance floodplain. In addition, identify sources of funding for local-match contributions.
Lead Agency/Department:	Cumberland County Planning Department; Cumberland County Municipalities
Implementation Schedule:	In progress.
COMMUNITY: East Pennsboro Township, Lemoyne Borough, New Cumberland Borough, Wormleysburg Borough	**ACTION:** Participate in the NOAA National Weather Service Ice Observer Program.
ACTION NO: 14	
Category:	Education and Awareness
Hazard(s) Addressed:	Flood, Flash Flood, & Ice Jam
Description:	Train and certify ice observers who will monitor potential ice jam conditions along the Susquehanna River and provide warning for imminent ice jam events.
Lead Agency/Department:	Cumberland County Department of Public Safety
Implementation Schedule:	In progress.
COMMUNITY: Cumberland County	**ACTION:** Update *Annex E* regularly and coordinate with state and federal counterparts on radiological emergency response.
ACTION NO: 15	
Category:	Local Plans and Regulations
Hazard(s) Addressed:	Nuclear Incidents

Table 6.4-1: List of 2014 mitigation actions with information including community or communities affected, action category, hazard addressed, action description, lead agency/department and general implementation schedule.	
Description:	Update *Cumberland County Radiological Emergency Response Procedures to Nuclear Power Plant Incidents (Annex E)* regularly. Hold annual review meetings between the utility, Cumberland County and other counties affected by the 10-mile Emergency Planning Zone. Perform bi-annual federally evaluated exercises. Include an action plan for reducing potential injury/death and damage at identified critical facilities. After PEMA publishes Annex A to address all radiological hazards, the Department of Public Safety will incorporate the County's existing Annex E into the new Annex A.
Lead Agency/Department:	Cumberland County Department of Public Safety; Pennsylvania Emergency Management Agency; Exelon
Implementation Schedule:	Update annually.
COMMUNITY: Cumberland County **ACTION NO:** 16	**ACTION:** Provide assistance as requested in the development of *Annex A*.
Category:	Local Plans and Regulations
Hazard(s) Addressed:	Nuclear Incidents
Description:	Coordinate with the state as requested in the development of *Annex A* which is intended to cover multiple types of radiological hazards including those related to transportation, fixed facility, medical and construction uses. There is some uncertainty regarding when this document will be completed, but it will eventually be merged with *Annex E*.
Lead Agency/Department:	Cumberland County Department of Public Safety; Pennsylvania Emergency Management Agency
Implementation Schedule:	Schedule is dependent on incoming requests for comments and coordination with the state.
COMMUNITY: Cumberland County **ACTION NO:** 17	**ACTION:** Identify *point of dispensing* sites.
Category:	Local Plans and Regulations
Hazard(s) Addressed:	Pandemic
Description:	Identify large capacity *point of dispensing* sites which would be used during serious emergencies when the county population would need to be quickly vaccinated or provided medical support.
Lead Agency/Department:	Cumberland County Department of Public Safety; Cumberland County GIS Department
Implementation Schedule:	Point of dispensing sites (PODS) have been completed and work continues with the PA Department of Health to add or delete sites as

Table 6.4-1: List of 2014 mitigation actions with information including community or communities affected, action category, hazard addressed, action description, lead agency/department and general implementation schedule.	
	deemed necessary.
COMMUNITY: Cumberland County, Camp Hill Borough, Carlisle Borough, Cooke Township, Dickinson Township, East Pennsboro Township, Hampden Township, Hopewell Township, Lemoyne Borough, Lower Allen Township, Lower Frankford Township, Lower Mifflin Township, Mechanicsburg Borough, Middlesex Township, Monroe Township, Mount Holly Springs Borough, New Cumberland Borough, Newburg Borough, Newville Borough, North Middleton Township, North Newton Township, Penn Township, Shippensburg Township, Shippensburg Borough, Shiremanstown Borough, Silver Spring Township, South Middleton Township, South Newton Township, Southampton Township, Upper Allen Township, Upper Frankford Township, Upper Mifflin Township, West Pennsboro Township, and Wormleysburg Borough	**ACTION:** Implement full disclosure of sinkhole hazards.
ACTION NO: 18	
Category:	Education and Awareness
Hazard(s) Addressed:	Subsidence & Sinkholes
Description:	Implement full disclosure of sinkhole information based on Pennsylvania Department of Conservation and Natural Resources maps and local knowledge to those building on land where documented sinkholes are located. This disclosure can take place through the permit process. When such disclosures are necessary, clarify to recipients that they are building at their own risk.
Lead Agency/Department:	Cumberland County Planning Department; Pennsylvania Department of Conservation and Natural Resources
Implementation Schedule:	In progress.
COMMUNITY: Cumberland County, Camp Hill Borough, Carlisle Borough, Cooke Township, Dickinson Township, East Pennsboro Township, Hampden Township, Hopewell Township, Lemoyne Borough, Lower Allen Township, Lower Frankford Township, Lower Mifflin Township, Mechanicsburg Borough, Middlesex Township, Monroe Township, Mount Holly Springs Borough, New Cumberland Borough, Newburg Borough, Newville Borough, North Middleton Township, North Newton Township, Penn Township, Shippensburg Township, Shippensburg Borough, Shiremanstown Borough, Silver Spring Township, South Middleton Township, South Newton	**ACTION:** Begin inventorying future “significant” sinkhole events.

Table 6.4-1: List of 2014 mitigation actions with information including community or communities affected, action category, hazard addressed, action description, lead agency/department and general implementation schedule.	
Township, Southampton Township, Upper Allen Township, Upper Frankford Township, Upper Mifflin Township, West Pennsboro Township, and Wormleysburg Borough	
ACTION NO: 19	
Category:	Education and Awareness
Hazard(s) Addressed:	Subsidence & Sinkholes
Description:	Begin compiling a central inventory list of "significant" sinkhole events which includes basic information such as location, damage and the party responsible for repair. All information should be reported to and maintained by the County Hazard Mitigation Officer at the Cumberland County Planning Department. Minor events will not be reported.
Lead Agency/Department:	Cumberland County Planning Department; Cumberland County Department of Public Safety
Implementation Schedule:	No formal process exists at the municipal, county or state level to inventory, report and track sinkhole occurrences. This action will be resumed when such a process is developed.
COMMUNITY: Cumberland County, Camp Hill Borough, Carlisle Borough, Cooke Township, Dickinson Township, East Pennsboro Township, Hampden Township, Hopewell Township, Lemoyne Borough, Lower Allen Township, Lower Frankford Township, Lower Mifflin Township, Mechanicsburg Borough, Middlesex Township, Monroe Township, Mount Holly Springs Borough, New Cumberland Borough, Newburg Borough, Newville Borough, North Middleton Township, North Newton Township, Penn Township, Shippensburg Township, Shippensburg Borough, Shiremanstown Borough, Silver Spring Township, South Middleton Township, South Newton Township, Southampton Township, Upper Allen Township, Upper Frankford Township, Upper Mifflin Township, West Pennsboro Township, and Wormleysburg Borough	**ACTION:** Participate in the South-Central Task Force.
ACTION NO: 20	
Category:	Education and Awareness
Hazard(s) Addressed:	Terrorism; Regional all-hazard response
Description:	Enhance County and municipality preparedness to respond to a terrorism event through participation in

Table 6.4-1: List of 2014 mitigation actions with information including community or communities affected, action category, hazard addressed, action description, lead agency/department and general implementation schedule.	
	training, exercise and planning activities of the South-Central Task Force.
Lead Agency/Department:	Cumberland County Department of Public Safety
Implementation Schedule:	Participate regularly in training exercises, planning activities and emergency response.
COMMUNITY: Cumberland County **ACTION NO:** 21	**ACTION:** Coordinate with state and federal agencies on potential mitigation actions for terrorist activities.
Category:	Education and Awareness
Hazard(s) Addressed:	Terrorism; Regional all-hazard response
Description:	Work with PEMA, FEMA and the U.S. Department of Homeland Security to stay abreast of procedures for identifying and determining benefits/costs for potential mitigation actions for terrorist activities.
Lead Agency/Department:	Cumberland County Department of Public Safety
Implementation Schedule:	Coordinate as information becomes available.
COMMUNITY: Cumberland County, Camp Hill Borough, Carlisle Borough, Cooke Township, Dickinson Township, East Pennsboro Township, Hampden Township, Hopewell Township, Lemoyne Borough, Lower Allen Township, Lower Frankford Township, Lower Mifflin Township, Mechanicsburg Borough, Middlesex Township, Monroe Township, Mount Holly Springs Borough, New Cumberland Borough, Newburg Borough, Newville Borough, North Middleton Township, North Newton Township, Penn Township, Shippensburg Township, Shippensburg Borough, Shiremanstown Borough, Silver Spring Township, South Middleton Township, South Newton Township, Southampton Township, Upper Allen Township, Upper Frankford Township, Upper Mifflin Township, West Pennsboro Township, and Wormleysburg Borough **ACTION NO:** 22	**ACTION:** Expand participation in the *StormReady* Program.
Category:	Education and Awareness
Hazard(s) Addressed:	Tornado & Windstorm; Hurricane, Tropical Storm, & Nor'easter
Description:	Expand participation in the National Oceanic and Atmospheric Administration's *StormReady* program. Cumberland County and Carlisle Barracks already participate in the *StormReady* program. Six municipalities are preparing to begin participation as of the 2014 update: Newville Borough, North Newton Township, Upper Mifflin Township, Lower Mifflin

Table 6.4-1: List of 2014 mitigation actions with information including community or communities affected, action category, hazard addressed, action description, lead agency/department and general implementation schedule.	
	Township, Newburg Borough, and Lower Frankford Township.
Lead Agency/Department:	Cumberland County Department of Public Safety
Implementation Schedule:	In progress.
COMMUNITY: Cumberland County **ACTION NO:** 23	**ACTION:** Develop a countywide Traffic Management Plan.
Category:	Local Plans and Regulations
Hazard(s) Addressed:	Transportation Accidents
Description:	Prepare a countywide Traffic Management Plan. This plan will improve countywide and regional emergency response through the implementation of several measures including common identification of intersections for all emergency responders and all types of emergency response plans.
Lead Agency/Department:	Cumberland County Department of Public Safety; Cumberland County GIS Department; Cumberland County Special Fire Police
Implementation Schedule:	In progress.
COMMUNITY: Cumberland County, Camp Hill Borough, Carlisle Borough, Cooke Township, Dickinson Township, East Pennsboro Township, Hampden Township, Hopewell Township, Lemoyne Borough, Lower Allen Township, Lower Frankford Township, Lower Mifflin Township, Mechanicsburg Borough, Middlesex Township, Monroe Township, Mount Holly Springs Borough, New Cumberland Borough, Newburg Borough, Newville Borough, North Middleton Township, North Newton Township, Penn Township, Shippensburg Township, Shippensburg Borough, Shiremanstown Borough, Silver Spring Township, South Middleton Township, South Newton Township, Southampton Township, Upper Allen Township, Upper Frankford Township, Upper Mifflin Township, West Pennsboro Township, and Wormleysburg Borough **ACTION NO:** 24	**ACTION:** Develop a countywide Railway Management Plan.
Category:	Local Plans and Regulations
Hazard(s) Addressed:	Transportation Accidents
Description:	Develop a Railway Management Plan similar to the Traffic Management Plan that identifies railways (including mile markers), railway crossings, high traffic areas and other information. Use lessons

Table 6.4-1: List of 2014 mitigation actions with information including community or communities affected, action category, hazard addressed, action description, lead agency/department and general implementation schedule.	
	learned from the Traffic Management Plan.
Lead Agency/Department:	Pennsylvania Department of Transportation; Cumberland County Department of Public Safety
Implementation Schedule:	This action has been deferred based on other priority actions but may be resumed at a later time. The County DPS and local fire and police coordinate with Norfolk Southern on grade crossings.
COMMUNITY: Cumberland County, Camp Hill Borough, Carlisle Borough, Cooke Township, Dickinson Township, East Pennsboro Township, Hampden Township, Hopewell Township, Lemoyne Borough, Lower Allen Township, Lower Frankford Township, Lower Mifflin Township, Mechanicsburg Borough, Middlesex Township, Monroe Township, Mount Holly Springs Borough, New Cumberland Borough, Newburg Borough, Newville Borough, North Middleton Township, North Newton Township, Penn Township, Shippensburg Township, Shippensburg Borough, Shiremanstown Borough, Silver Spring Township, South Middleton Township, South Newton Township, Southampton Township, Upper Allen Township, Upper Frankford Township, Upper Mifflin Township, West Pennsboro Township, and Wormleysburg Borough	**ACTION:** Identify tax-exempt properties and update missing structural information.
ACTION NO: 25	
Category:	Education and Awareness
Hazard(s) Addressed:	Urban Fire
Description:	Structural information is not up-to-date or accurate for tax-exempt properties. Identify structures that are tax-exempt and therefore lack detailed structural information. Obtain structure information for tax-exempt properties to more accurately represent County structure inventory data which can be used to conduct future urban fire hazard vulnerability analyses.
Lead Agency/Department:	Cumberland County GIS Department
Implementation Schedule:	In progress.
COMMUNITY: Cumberland County	**ACTION:** Assist with coordination between County residents and utility companies on critical outage events.
ACTION NO: 26	
Category:	Education and Awareness
Hazard(s) Addressed:	Utility Interruption
Description:	Coordinate with the Pennsylvania Public Utility

Table 6.4-1: List of 2014 mitigation actions with information including community or communities affected, action category, hazard addressed, action description, lead agency/department and general implementation schedule.	
	Commission, PEMA and local utilities (PPL, Penelec, Adams Electric, & Met-Ed) to resolve power failures expeditiously, especially for incidents that pose imminent danger to people and property.
Lead Agency/Department:	Cumberland County Department of Public Safety
Implementation Schedule:	In progress.
COMMUNITY: Cumberland County and local municipalities considered at high risk from wildfire hazards including Southampton Township, South Newton Township, Cooke Township, Dickinson Township, South Middleton Township, Monroe Township, Penn Township, Upper Mifflin Township, and Dickinson Township.	**ACTION:** Expand participation in the *Firewise* Program.
ACTION NO: 27	
Category:	Education and Awareness
Hazard(s) Addressed:	Wildfire
Description:	The County will facilitate or coordinate expanded participation in the *Firewise* program and invite a PA DCNR – Bureau of Forestry representative (Rick Deppen, Wildfire Prevention Specialist) to introduce the program to vulnerable municipalities. By learning more about the program and assisting local municipalities in developing Community Wildfire Protection Plans (CWPP), the County hopes to promote participation in *Firewise*. The CWPPs should address fuel treatments conducted in critical areas. The White Rock Acres CWPP may serve as a framework for other communities.
Lead Agency/Department:	Cumberland County Department of Public Safety; Pennsylvania Department of Conservation and Natural Resources – Bureau of Forestry
Implementation Schedule:	In progress.
COMMUNITY: Cumberland County	**ACTION:** Participate in winter storm exercises.
ACTION NO: 28	
Category:	Education and Awareness
Hazard(s) Addressed:	Winter Storm; Nor'easter
Description:	PEMA holds annual winter storm exercises. The County will participate in these exercises as opportunities arise.
Lead Agency/Department:	Cumberland County Department of Public Safety
Implementation Schedule:	Participate annually

Table 6.4-1: List of 2014 mitigation actions with information including community or communities affected, action category, hazard addressed, action description, lead agency/department and general implementation schedule.	
COMMUNITY: Cumberland County, Camp Hill Borough, Carlisle Borough, Cooke Township, Dickinson Township, East Pennsboro Township, Hampden Township, Hopewell Township, Lemoyne Borough, Lower Allen Township, Lower Frankford Township, Lower Mifflin Township, Mechanicsburg Borough, Middlesex Township, Monroe Township, Mount Holly Springs Borough, New Cumberland Borough, Newburg Borough, Newville Borough, North Middleton Township, North Newton Township, Penn Township, Shippensburg Township, Shippensburg Borough, Shiremanstown Borough, Silver Spring Township, South Middleton Township, South Newton Township, Southampton Township, Upper Allen Township, Upper Frankford Township, Upper Mifflin Township, West Pennsboro Township, and Wormleysburg Borough	**ACTION:** Coordinate with the Pennsylvania Department of Transportation on winter storm response.
ACTION NO: 29	
Category:	Education and Awareness
Hazard(s) Addressed:	Winter Storm; Nor'easter
Description:	Hold meetings between county maintenance managers and PennDOT to coordinate response activities prior to winter storm season.
Lead Agency/Department:	Cumberland County Department of Public Safety
Implementation Schedule:	Coordinate annually
COMMUNITY: Cumberland County, Camp Hill Borough, Carlisle Borough, Cooke Township, Dickinson Township, East Pennsboro Township, Hampden Township, Hopewell Township, Lemoyne Borough, Lower Allen Township, Lower Frankford Township, Lower Mifflin Township, Mechanicsburg Borough, Middlesex Township, Monroe Township, Mount Holly Springs Borough, New Cumberland Borough, Newburg Borough, Newville Borough, North Middleton Township, North Newton Township, Penn Township, Shippensburg Township, Shippensburg Borough, Shiremanstown Borough, Silver Spring Township, South Middleton Township, South Newton Township, Southampton Township, Upper Allen Township, Upper Frankford Township, Upper Mifflin Township, West Pennsboro Township, and Wormleysburg Borough	**ACTION:** Review and update existing ordinances and other regulatory or planning mechanisms with respect to findings included in the 2014 HMP.
ACTION NO: 30	
Category:	Local Plans and Regulations

Table 6.4-1: List of 2014 mitigation actions with information including community or communities affected, action category, hazard addressed, action description, lead agency/department and general implementation schedule.	
Hazard(s) Addressed:	All hazards – future development
Description:	Individual municipalities will review and update existing zoning ordinances, floodplain ordinances, land-use ordinances, building codes, Comprehensive Plans, and Emergency Operations Plans to incorporate findings of the 2014 Hazard Mitigation Plan Update and evaluate whether local planning tools adequately address risk assessment results. This includes an evaluation of snow-removal and emergency access logistics with new development planning and an evaluation of ordinances to standardize hydrant connections.
Lead Agency/Department:	Cumberland County Planning Department; Cumberland County Municipalities
Implementation Schedule:	In progress.
COMMUNITY: Cumberland County, Camp Hill Borough, Carlisle Borough, Cooke Township, Dickinson Township, East Pennsboro Township, Hampden Township, Hopewell Township, Lemoyne Borough, Lower Allen Township, Lower Frankford Township, Lower Mifflin Township, Mechanicsburg Borough, Middlesex Township, Monroe Township, Mount Holly Springs Borough, New Cumberland Borough, Newburg Borough, Newville Borough, North Middleton Township, North Newton Township, Penn Township, Shippensburg Township, Shippensburg Borough, Shiremanstown Borough, Silver Spring Township, South Middleton Township, South Newton Township, Southampton Township, Upper Allen Township, Upper Frankford Township, Upper Mifflin Township, West Pennsboro Township, and Wormleysburg Borough	**ACTION:** Update Geographic Information Systems data for all critical or vulnerable facilities and distribute maps of facility locations.
ACTION NO: 31	
Category:	Education and Awareness
Hazard(s) Addressed:	All hazards – critical facilities / vulnerable facilities
Description:	A significant amount of information on critical facilities information is available at the Cumberland County Department of Public Safety. However, this data does not match files obtained from the Cumberland County GIS Department. Update the County's inventory of critical facilities with input from local municipalities and centralize the collection of critical facility GIS data into a single dataset. This dataset will be particularly useful for future vulnerability analyses related to hazardous material releases and other hazard assessments. Included in this action should be an evaluation of critical facilities

Table 6.4-1: List of 2014 mitigation actions with information including community or communities affected, action category, hazard addressed, action description, lead agency/department and general implementation schedule.	
	with the highest relative vulnerability to the effects of power outage (i.e., hospitals, nursing homes, etc…).
Lead Agency/Department:	Cumberland County Department of Public Safety; Cumberland County GIS Department
Implementation Schedule:	In progress.

Table 6.4-1 lists 31 mitigation actions, many of which will require substantial time commitments from staff at the County and local municipalities. Those that participated in the development of the 2014 HMP believe that each of these actions is attainable and could potentially be implemented over the next five-year cycle.

While most of these activities will be pursued over the next five years, the reality of limited time and resources requires the identification of high priority mitigation actions. Prioritization allows the individuals and organizations involved to focus their energies and ensure progress on mitigation activities. Evaluating mitigation actions involves judging each action against certain criteria to determine whether or not it can be executed. The feasibility of each mitigation action was evaluated using the ten evaluation criteria set forth in the Mitigation Action Evaluation methodology in PEMA's October 2013 Standard Operating Guide. The methodology solicits input on whether each action is highly effective or feasible and ineffective or not feasible for the criteria. These criteria are listed below and aid in determining the feasibility of implementing one action over another.

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

To evaluate the mitigation actions, each action was identified as highly effective or feasible and ineffective or not feasible using the Mitigation Action Evaluation form. In order to evaluate and prioritize the mitigation actions, participants identified *favorable* and *less favorable* factors for each action. For each criterion, the prioritization methodology assigned a "+" if the action was

highly effective or feasible, a “-“ if the action was ineffective or not feasible, and a “N” if no cost or benefit could be associated with the suggested action or the action was not applicable to the criteria. Results are included in Table 6.4-2. All actions received scores where their positive factors outweighed their negative factors.

Table 6.4-2: Mitigation Action Feasibility Evaluation.

Mitigation Actions		PA Steel Criteria Considerations										
		(+) Highly Effective or Feasible (-) Ineffective or Not Feasible (N) Neutral or Not Applicable										
No.	**Name**	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	**Total Score**
1	Participate in the development and continued update of Emergency Action Plans.	+	+	N	+	N	+	N	N	N	N	4 (+) 0 (-) 6 (N)
2	Form a drought emergency working group to resolve water conservation enforcement issues.	+	+	+	+	N	N	N	N	N	N	4 (+) 0 (-) 6 (N)
3	Issue countywide “advisory” burn bans.	+	+	N	-	+	+	-	-	N	N	4 (+) 3 (-) 3 (N)
4	Update and provide more detail to the countywide downstream users inventory.	+	+	+	+	-	+	N	N	+	N	6 (+) 1 (-) 3 (N)
5	Explore ways for the MS4 communities in Cumberland County to consolidate efforts to meet MS4 requirements.	N	+	+	+	+	+	N	+	+	+	8 (+) 0 (-) 2 (N)
6	Encourage municipalities to incorporate well-head protection provisions into municipal subdivision and land development ordinances.	+	+	+	+	+	+	N	+	N	N	7 (+) 0 (-) 3 (N)
7	Acquire more detailed structure information.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
8	Develop Flood Intensity Indicators document.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
9	Expand the role of the County’s Local Emergency Planning Committee from hazardous materials planning role to an all-hazards planning role.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)

Table 6.4-2: Mitigation Action Feasibility Evaluation.

Mitigation Actions		PA Steel Criteria Considerations										
		(+) *Highly Effective or Feasible* (-) *Ineffective or Not Feasible* (N) *Neutral or Not Applicable*										
No.	**Name**	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	**Total Score**
10	Continue participation in the Interagency Working Group.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
11	Develop flood mitigation project proposals which are eligible for state and federal mitigation grant funding programs.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
12	Perform public outreach activities that promote reduction in the number of Repetitive Loss structures.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
13	Identify properties in the community at high risk of flooding for purposes of property protection.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
14	Participate in the NOAA National Weather Service Ice Observer Program.	+	+	+	N	N	+	N	+	+	N	6 (+) 0 (-) 4 (N)
15	Update Annex E regularly and coordinate with state and federal counterparts on radiological emergency response.	+	+	+	+	N	+	N	+	+	N	7 (+) 0 (-) 3 (N)
16	Provide assistance as requested in the development of Annex A.	+	+	+	N	N	+	N	+	+	N	6 (+) 0 (-) 4 (N)
17	Identify point of dispensing sites.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
18	Implement full disclosure of sinkhole hazards.	+	+	+	+	+	+	+	+	+	N	9 (+) 0 (-) 1 (N)
19	Begin inventorying future “significant” sinkhole events.	+	+	+	-	+	+	+	-	+	N	7 (+) 2 (-) 1 (N)

Table 6.4-2: Mitigation Action Feasibility Evaluation.

Mitigation Actions		PA Steel Criteria Considerations										
		(+) *Highly Effective or Feasible* (-) *Ineffective or Not Feasible* (N) *Neutral or Not Applicable*										
No.	**Name**	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	**Total Score**
20	Participate in the South-Central Task Force.	+	N	+	+	+	N	+	+	+	+	8 (+) 0 (-) 2 (N)
21	Coordinate with state and federal agencies on potential mitigation actions for terrorist activities.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
22	Expand participation in the StormReady Program.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)
23	Develop a countywide Traffic Management Plan.	+	N	+	N	+	N	N	+	+	N	5 (+) 0 (-) 5 (N)
24	Develop a countywide Railway Management Plan.	+	N	+	+	+	+	+	+	+	N	8 (+) 0 (-) 2 (N)
25	Identify tax-exempt properties and update missing structural information.	+	+	+	+	+	+	N	N	+	N	7 (+) 0 (-) 3 (N)
26	Assist with coordination between County residents and utility companies on critical outage events.	+	+	+	+	+	N	+	-	+	N	7 (+) 1 (-) 2 (N)
27	Expand participation in the Firewise Program.	+	+	+	-	+	+	-	-	-	N	5 (+) 4 (-) 1 (N)
28	Participate in winter storm exercises.	+	+	+	+	+	+	N	+	N	N	7 (+) 0 (-) 3 (N)
29	Coordinate with the Pennsylvania Department of Transportation on winter storm response.	+	+	+	+	+	+	+	+	+	+	10 (+) 0 (-) 0 (N)

Table 6.4-2: Mitigation Action Feasibility Evaluation.

Mitigation Actions		PA Steel Criteria Considerations										
		(+) Highly Effective or Feasible (-) Ineffective or Not Feasible (N) Neutral or Not Applicable										
No.	**Name**	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	**Total Score**
30	Review and update existing ordinances and other regulatory or planning mechanisms with respect to findings included in the 2014 HMP.	N	+	+	+	+	+	-	-	-	+	6 (+) 3 (-) 1 (N)
31	Update Geographic Information Systems data for all critical or vulnerable facilities and distribute maps of facility locations.	+	+	+	+	+	+	N	+	N	N	7 (+) 0 (-) 3 (N)

Actions were then compared with one another to determine a ranking or priority by applying the Multi-Objective Mitigation Action Prioritization criteria, which use 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) and color-coded based on the following:

- Low Priority (yellow): 1.0 – 1.8
- Medium Priority (orange): 1.9 – 2.4
- High Priority (red): 2.5 – 3.0

In order to prioritize the mitigation actions, criteria were applied as shown in Table 6.4-3.

Table 6.4-3: Mitigation Action Prioritization.

Mitigation Actions		Multi-Objective Mitigation Action Prioritization Criteria Low = 0-1.8 Medium = 1.9-2.4 High = 2.5-3					
No.	**Name**	**Effectiveness**	**Efficiency**	**Multi-Hazard Mitigation**	**Addresses High Risk Hazard**	**Addresses Communications/ Critical Infrastructure**	**Total Score**
1	Participate in the development and continued update of Emergency Action Plans.	3	3	3	3	3	3
2	Form a drought emergency working group to resolve water conservation enforcement issues.	1.8	1	1	1	1	1.16
3	Issue countywide “advisory” burn bans.	1	1	1	1	1	1
4	Update and provide more detail to the countywide downstream users inventory.	2.3	1.8	1	1	1	1.5
5	Explore ways for the MS4 communities in Cumberland County to consolidate efforts to meet MS4 requirements.	2.4	2.5	1	1	2	1.88
6	Encourage municipalities to incorporate well-head protection provisions into municipal subdivision and land development ordinances.	2.4	1.9	1	1.9	1	1.685
7	Acquire more detailed structure information.	2.5	2.5	3	3	2	2.6
8	Develop Flood Intensity Indicators document.	2.5	2	1	3	3	2.2
9	Expand the role of the County’s Local Emergency Planning Committee from hazardous materials planning role to an all-hazards planning role.	2.3	2	3	3	3	2.56

Table 6.4-3: Mitigation Action Prioritization.

Mitigation Actions		Multi-Objective Mitigation Action Prioritization Criteria Low = 0-1.8 Medium = 1.9-2.4 High = 2.5-3					
No.	**Name**	**Effectiveness**	**Efficiency**	**Multi-Hazard Mitigation**	**Addresses High Risk Hazard**	**Addresses Communications/ Critical Infrastructure**	**Total Score**
10	Continue participation in the Interagency Working Group.	2.5	2	3	3	3	2.6
11	Develop flood mitigation project proposals which are eligible for state and federal mitigation grant funding programs.	3	2.4	0.5	3	3	2.32
12	Perform public outreach activities that promote reduction in the number of Repetitive Loss structures.	2	1.4	0.5	3	2.1	1.685
13	Identify properties in the community at high risk of flooding for purposes of property protection.	3	3	0.5	3	2.3	2.395
14	Participate in the NOAA National Weather Service Ice Observer Program.	2	1.8	3	3	1.5	2.215
15	Update Annex E regularly and coordinate with state and federal counterparts on radiological emergency response.	2.5	1.5	0.5	1	3	1.65
16	Provide assistance as requested in the development of Annex A.	2.5	1.5	2.3	0.5	1	1.635
17	Identify point of dispensing sites.	2.7	2.6	1	2	1	1.97
18	Implement full disclosure of sinkhole hazards.	1	1	1	1	1	1
19	Begin inventorying future “significant” sinkhole events.	1	1	1	1	1	1
20	Participate in the South-Central Task Force.	2	2	2.4	2.5	3	2.305

Table 6.4-3: Mitigation Action Prioritization.							
Mitigation Actions		Multi-Objective Mitigation Action Prioritization Criteria Low = 0-1.8 Medium = 1.9-2.4 High = 2.5-3					
No.	Name	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High Risk Hazard	Addresses Communications/ Critical Infrastructure	Total Score
21	Coordinate with state and federal agencies on potential mitigation actions for terrorist activities.	3	3	2.4	2.2	3	2.76
22	Expand participation in the StormReady Program.	1	1	3	2	1	1.55
23	Develop a countywide Traffic Management Plan.	2	2	1.8	2	1	1.81
24	Develop a countywide Railway Management Plan.	2	2	1.8	2	1	1.81
25	Identify tax-exempt properties and update missing structural information.	2	2	1	3	1	1.8
26	Assist with coordination between County residents and utility companies on critical outage events.	1.5	1	1	1	3	1.4
27	Expand participation in the Firewise Program.	1	1	1	1	1	1
28	Participate in winter storm exercises.	2.8	1.9	1	3	2	2.08
29	Coordinate with the Pennsylvania Department of Transportation on winter storm response.	2.8	1.9	1	3	2	2.08
30	Review and update existing ordinances and other regulatory or planning mechanisms with respect to findings included in the 20140 HMP.	1.8	1.8	2.1	3	1.7	2.025

Table 6.4-3: Mitigation Action Prioritization.							
Mitigation Actions		Multi-Objective Mitigation Action Prioritization Criteria					
		Low = 0-1.8 Medium = 1.9-2.4 High = 2.5-3					
No.	Name	Effectiveness	Efficiency	Multi-Hazard Mitigation	Addresses High Risk Hazard	Addresses Communications/ Critical Infrastructure	Total Score
31	Update Geographic Information Systems data for all critical or vulnerable facilities and distribute maps of facility locations.	1.8	1.8	3	3	3	2.4

7. Plan Maintenance

7.1 Update Process Summary

Monitoring, evaluating and updating this plan are critical to maintaining its value and success in Cumberland 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. In order to review and update the 2010 HMP, annual review meetings were held on September 10, 2012 and on October 25, 2013, and meeting documentation is included as Appendix I. The 2014 HMP will be reviewed as deemed necessary by the HMSC during its annual meeting, but no fewer than once every two years.

7.2 Monitoring, Evaluating and Updating the Plan

Municipal officials within Cumberland County recognize that the Hazard Mitigation Plan is not a static document and requires regular review and evaluation. The plan will be monitored for changes in the conditions under which the plan was developed, such as new or revised state laws, major disaster declarations, or availability of funding. Chaired by Kirk Stoner, Director of Planning for the Cumberland County Planning Department, the HMSC established for the 2014 HMP is designated to lead monitoring, evaluation and future update efforts with support and representation from all participating municipalities. The HMSC 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 HMSC will oversee the progress made on the implementation of action items identified in the 2014 HMP and modify actions, as needed, to reflect changing conditions. The HMSC will meet annually during the fall months to discuss specific coordination efforts that may be needed with other stakeholders. In addition, it will also serve in an advisory capacity to the Cumberland County Board of Commissioners and the Cumberland County Planning Commission.

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 HMSC to provide updates on applicable mitigation actions and feedback on changing hazard vulnerabilities within their community.

Periodic evaluations of the 2014 HMP will take place as deemed necessary by the HMSC during its annual meeting, but no fewer than once every two years. Evaluations of the 2014 HMP will not only include an investigation of whether mitigation actions were completed, but also an assessment of how effective those actions were in mitigating losses. A review of the qualitative and quantitative benefits (or avoided losses) of mitigation activities will support this assessment. Results of the evaluation will then be compared to the goals and objectives established in the plan and decisions will be made regarding whether actions should be discontinued, or modified in any way in light of new developments in the community. Progress

will be documented by the HMSC for use in the next HMP update and submitted to the Board of Commissioners.

Upon each HMP evaluation, the HMSC 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 HMSC 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.

The Cumberland County HMP 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 Cumberland Hazard Mitigation Plan:

- Has the nature or magnitude of hazards affecting the County changed?
- Are there new hazards that have the potential to impact the County?
- Do the identified goals and actions address current and expected conditions?
- Have mitigation actions been implemented or completed?
- Has the implementation of identified mitigation actions resulted in expected outcomes?
- Are current resources adequate to implement the Plan?
- Should additional local resources be committed to address identified hazards?

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

As was done during development of the 2014 HMP, the HMSC will involve the public during annual meetings or periodic evaluations of the HMP by providing an opportunity to submit comments. The public will have access to the current HMP through their local municipal office or the Cumberland County Planning Department. Additionally, a copy of the adopted plan will be posted to the County website (http://www.ccpa.net/) for five years so that the public has electronic access to the plan. The website includes an easy-to-access feedback option so that residents, business owners, and others who read the plan will be able to provide a comment about the plan or about the mitigation strategies.

Information on upcoming events related to the HMP, such as annual mitigation plan evaluation meetings or solicitation for comments, will be announced via newsletters, newspapers, mailings and the County website. The public is encouraged to submit comments on the HMP at any time. All comments received will be maintained and considered by the HMSC when updating the HMP.

The County Mitigation Officer will document the number of people who participate in the annual meetings and the results of the meeting for inclusion in the plan when it is next updated. In this way, the public will have an opportunity to become involved in the planning process and to influence mitigation planning decisions.

In order to better involve the public in the 2014 plan update, the County Mitigation Officer extended an invitation to many stakeholder groups (see Table 3.2-2). This practice will be carried out in future plan updates as well.

8. Plan Adoption

The Plan was submitted to the Pennsylvania State Hazard Mitigation Officer on October 21, 2014. It was forwarded to FEMA for final review and approval-pending-adoption on November 5, 2014. FEMA granted approval-pending-adoption on February 5, 2015. Full approval from FEMA was received on *<Month Day, Year>*.

This section of the plan includes copies of the local adoption resolutions passed by Cumberland 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.

Cumberland County 2014 Hazard Mitigation Plan

County Adoption Resolution

Resolution No. _____

Cumberland County, Pennsylvania

WHEREAS, the municipalities of Cumberland 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, Cumberland 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 Cumberland County 2014 Hazard Mitigation Plan has been developed by the Cumberland County Department of Planning and the Cumberland County Department of Public Safety in cooperation with other county departments, local municipal officials, and the citizens of Cumberland County, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Cumberland County 2014 Hazard Mitigation Plan, and

WHEREAS, the Cumberland County 2014 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 Cumberland that:

- The Cumberland County 2014 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 Cumberland County 2014 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2014

ATTEST:

_____

CUMBERLAND COUNTY COMMISSIONERS

By _____

By _____

By _____

Cumberland County 2014 Hazard Mitigation Plan

Municipal Adoption Resolution

Resolution No. _____

<*Borough/Township of Municipality Name*>, Cumberland County, Pennsylvania

WHEREAS, the <*Borough/Township of Municipality Name*>, Cumberland 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 Cumberland County 2014 Hazard Mitigation Plan has been developed by the Cumberland County Department of Planning and the Cumberland County Department of Public Safety 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 Cumberland County 2014 Hazard Mitigation Plan, and

WHEREAS, the Cumberland County 2014 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 Cumberland County 2014 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 Cumberland County 2014 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this _____ day of _____, 2014

ATTEST: ***<BOROUGH/TOWNSHIP OF MUNICIPALITY NAME>***

_____ By _____

By _____

By _____

The date each jurisdiction adopted both the 2010 and 2014 plan is listed in Table 8-1.

Table 8-1: Adoption date of the Hazard Mitigation Plan by Cumberland County and local municipalities.

Jurisdiction	2010 HMP Adoption Date	2014 HMP Adoption Date
Cumberland County	11/15/10	
Borough of Camp Hill	09/14/11	
Borough of Carlisle	03/10/11	
Township of Cooke	02/09/11	
Township of Dickinson	04/18/11	
Township of East Pennsboro	04/06/11	
Township of Hampden	01/04/10	
Township of Hopewell	03/07/11	
Borough of Lemoyne	01/06/11	
Township of Lower Allen	04/11/11	
Township of Lower Frankford	03/08/11	
Township of Lower Mifflin	02/24/11	
Borough of Mechanicsburg	08/16/11	
Township of Middlesex	01/03/11	
Township of Monroe	01/03/11	
Borough of Mount Holly Springs	01/10/11	
Borough of New Cumberland	04/06/11	
Borough of Newburg	01/21/11	
Borough of Newville	10/19/10	
Township of North Middleton	04/07/11	
Township of North Newton	02/01/11	
Township of Penn	01/31/11	
Township of Shippensburg	04/02/11	
Borough of Shippensburg	02/01/11	
Borough of Shiremanstown	09/12/11	
Township of Silver Spring	01/03/11	
Township of South Middleton	02/24/11	
Township of South Newton	12/10	
Township of Southampton	04/25/11	
Township of Upper Allen	05/18/11	
Township of Upper Frankford	03/28/11	
Township of Upper Mifflin	05/18/11	
Township of West Pennsboro	02/28/10	
Borough of Wormleysburg	01/11/11	